MEDDELELSER OM GRØNLAND
UDGIVNE AF
KOMMISSIONEN FOR VIDENSKABELIGE UNDERSØGELSER I GRØNLAND
BD. 146 · NR. 2

THE ESKIMO SKELETON

CONTRIBUTIONS TO THE PHYSICAL ANTHROPOLOGY OF THE ABORIGINAL GREENLANDERS

BY

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WITH 22 FIGURES IN THE TEXT
AND 16 PLATES

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1953

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I. INTRODUCTION

Of all the many peoples that make up the population of this earth few have such special characteristics as the Eskimos. Living their lives as they do in a country that to us appears utterly uninhabitable and forbidding, unfriendly as no other, they have to struggle hard to find their food, scarce as it is, and difficult to get at; but to this comes the cold, the darkness, and the endless distances, adversaries, each of which would seem more than enough to cope with. However, the Eskimos have overcome them all, though often at great cost. And not only have they managed to keep alive in these severe surroundings, but have also achieved to display a rich spiritual activity, with a rather highly developed religion, and with a wealth of sagas and songs.

Owing to the position of their country, so far away from all others, and to the exceptional conditions of life, they have had to fend for themselves in most ways, and have been able to learn but very little from their neighbours. Maybe this is the reason why their culture, the material as well as the immaterial, is so singularly fascinating to one's imagination.

From an anthropological point of view the Eskimos also form an exciting subject with many problems. First there is the question as to whether it might be an essential difference in build that determines the better adaptation to the arctic conditions, and next whether, racially, they form one single people, and if so, from where this originates. Finally, if major wanderings have taken place among the separate groups, and whether we can establish any relationship with the neighbours.

A great part of the knowledge gathered about Eskimo life comes from Danish explorers and scientists, and quite naturally so, as Denmark, together with the rest of Scandinavia, is the country in Europe that has had most contact with the Eskimos. We may just mention the fact that about half of all now-living Eskimos live in Greenland, and that the Scandinavians were the first Europeans to meet the Eskimos on

Greenland, in the early Middle Ages, and through 5 centuries have remained their only contact.

As far back as in the year 982 the Icelander Eric the Red, who, by the way, was descended from Norway, founded the first Scandinavian settlement on the coast of Greenland. As far as we know it was, to begin with, only occasionally that the "Norsemen" came across the Eskimos, whom they nicknamed "Skraellinger", meaning weaklings. But from about the year 1200 the latter began to push forward in considerable numbers towards the Norse settlements in south-western Greenland. Fighting took place, and gradually the "Skraellinger" got the upper hand. At the same time the Norsemen were more and more losing contact with their mother countries, and finally they succumbed entirely and became extinct. We cannot tell exactly how and when, only that it must have happened during the 15th century.

Towards the end of the 15th, and in the beginning of the 16th centuries, the great voyages of discovery began, and it was not long before the Eskimos were being "rediscovered", by accident so to speak, during the many attempts at finding the North-West Passage. It was, however, not until a century later that the interest in these new-discovered countries themselves, and in their population, became alive. In 1721 Hans Egede landed in Greenland to begin his missionary work among the Eskimos, and as early as in 1670 the well-known Hudson Bay Company was started, which through centuries was the only regular connection of the Central Eskimos—for good or evil—with white people. On the other side of America the Russians began, in the early 18th century, an exploitation of the Eskimos' country, and of the Eskimos themselves.

The scientific exploration began in the 19th century with the fundamental works of the Dane, H. Rink. Since then development has made steady progress with contributions from all branches of science, especially from ethnography and archaeology.

The physical anthropology did not come in till later, especially if we disregard the first doubtful reports and only consider works that come up to demands now-a-days made on materials and methods. The purpose of the physical anthropology is, we know, that of determining the body of the Eskimos, such as it appears in our time, and such as it was in earlier times (by examination of skeletons), and thus to try and find a solution to the above mentioned questions regarding their origin, adaptation, relationship, and wanderings.

The collection attached to the laboratory of physical anthropology of the Copenhagen University comprises a very great number of, partly well dated, Eskimo skeletons, mostly from Greenland. The object of

the present work is first and foremost, by an examination of these skeletons, to explain the anthropological conditions in Greenland previous to the present European colonization, and possibly hereby to throw light on conditions in the whole of the arctic region. But in addition to this, a number of skeletons found in the central and western Eskimo districts will be inspected and compared with materials previously examined.

II. OUTLINE OF THE ARCHAEOLOGICAL CONDITIONS IN THE ENTIRE ESKIMO REGION

The questions regarding the descent and wanderings of the Eskimos, and the origin and development of their culture, may be tackled by many channels, and many branches of science have contributed to their solution: archaeology, ethnology, linguistics, mythology, serology, etc., as well as the physical anthropology. Of these no doubt archaeology and ethnology have got us furthest ahead. The results obtained have, however, not always been compatible with the theories advanced, so we may safely say that no final decision has so far been reached.

In 1891 RINK (81) summed up the results of his investigations, mainly linguistic, but to some degree also ethnographic, and came to the conclusion that all Eskimo cultures must have one common origin, because he found so many points of resemblance between the various branches that he could not possibly imagine that they should have started in different places. The cradle of this culture, Rink thought, must have been a place somewhere on the coast of Alaska, presumably by the great river mouths. From there the Eskimos must have spread east. In Rink's opinion they had most probably come to the coast of Alaska from the interior of America, but he would not rule out the possibility that they might have come from Asia, across the Bering Strait.

In his doctorate thesis, 1905, "On the Origin of the Eskimo Culture—An Ethnographic and Anthropogeographic Study", STEENSBY (88) arrives, at about the same result; viz.,—"The Eskimo Culture is an original North Indian form of culture, the wintery side of which has been exceptionally strongly developed through adaptation to the wintery ice of the Arctic Ocean." Contrary to Rink, however, he thinks that its primary development has taken place round the Coronation Gulf, where the original inland population have first reached the sea when in spring they followed the reindeer on their wandering north. To begin with their methods of hunting the sea animals have been much influenced by the old inland methods, the *Palaeo Eskimo Culture*, but gradually

they have become more and more specialized, right up to the highly developed *Neo Eskimo Coastal Culture*, which we find now-a-days in Alaska and on Greenland.

Steensby's theory forms the foundation for the following great works by Birket-Smith, although in a modified and extended form. These are based on the 2 types of culture mentioned above, the Palaeo Eskimo Culture, high-arctic, and partly with inland characteristics, a culture which is still found in the central regions, and the Neo Eskimo Culture, the subarctic, maritime type, which, as also stated above, is found in Alaska and on Greenland. BIRKET-SMITH first set forth his theory as follows (3):

"To begin with the Eskimos have been living in the interior by reindeer hunting and, in the winter, by fishing from the ice on rivers and lakes. This is the Primeval or Proto Eskimo layer, which is still extant in a single group, namely the Reindeer Eskimos on Barren Grounds, with comparatively few alterations, but which has otherwise perished. The turning of the ice fishing into seal hunting, in the regions between Hudson Bay and Coronation Gulf, marks the beginning of the Palaeo Eskimo Culture. Hereby new possibilities opened up for spreading to hitherto uninhabitable regions, and the Palaeo Eskimos then followed the coast westwards right to the Bering Strait; whether they have also spread eastwards, and in such case how far, we know nothing about— to Greenland they would hardly have reached. By the Bering Strait a time rich in fruitful development came for the Eskimos, part of the new no doubt owing to their own independent adaptation to the milder conditions, but still more seems to be a loan from the north-west coast of America and from Asia. Here the Eskimos have probably also found an earlier coastal population, which is still represented by the Eskimoified Aleutians and the Pacific Eskimos. But as to what part these people have played in the development of the Neo Eskimo Culture, and what relationship they have with the other North-American and North-East Asiatic peoples, we are not at all certain.

Being superior to the older form, the Neo Eskimo Culture was able to spread eastwards. Moreover it has been encouraged by a lowering of the land, which apparently has given the big sea animals better conditions than the present, and possibly by a softening of the climate, too. To this period apparently belongs the forward push in the now uninhabited northern parts of the arctic archipelago, as well as the immigration to Greenland.

In the central areas, finally, a new advance by the Eskimos from the interior has taken place, leading to the formation of the last layer, which, of course, according to its origin, is bound to agree in many points with that of the Palaeo Eskimos. It is most strongly pronounced

in the areas round the North-West Passage, and less so on Baffin Island, but may still be traced in Labrador and in the Thule district."

This theory, however, BIRKET-SMITH has had to modify to some extent (5), as, among other things, later finds, from Labrador (Cap Dorset) and Alaska, of old culture types have made it necessary for the "Proto Eskimo" area to be extended so as to comprise the whole northern inland region, right across North America.

THERKEL MATHIASSEN, who has carried out archaeological investigations by Hudson Bay (on the V. Thule Expedition) and in Greenland, goes against Birket-Smith's theory (62), as he points out that at that time there was no archaeological evidence whatever of any "Palaeo Eskimo" culture previous to the Thule Culture, in the central regions. Mathiassen thinks, on the contrary, that as the earliest stages of the Thule Culture is found in Alaska, the origin of the Eskimos will have to be looked for there:

"I have advanced the following arguments against that theory: There is no archaeological evidence whatever to show that any Palaeo Eskimo Culture earlier than the Thule Culture has existed in the Central regions west of Hudson Bay.

Thus I am inclined to think that the Thule Culture represents the first settlement of the Eskimos in arctic Canada and Greenland; and as presumably the Thule Culture originally came from the west, it is to the west we should turn, to Alaska and Siberia, to find the native home of the Eskimos."

The very latest archaeological investigations, from Ipiutak in Alaska, have solved at any rate part of the problems, and in a way combined the 2 theories. Here LARSEN and RAINEY (51) have found a culture earlier than the Thule Culture, but with very pronounced inland characteristics, corresponding with Steensby's and Birket-Smith's "Palaeo Eskimo" culture. This ancient culture shows, however, so many connections with prehistoric, North Asiatic cultures that undoubtedly it must originate from there.

According to Larsen and Rainey we must imagine that the origin of the Eskimo culture is to be found somewhere round the great Siberian rivers, as a hunting culture, based mainly on reindeer hunting, but not unacquainted with the hunting of sea animals. In the course of the millennium before Christ these hunters were pressed east by their somewhat superior neighbours, and have in groups gradually crossed the Bering Strait. In America they have spread right across Alaska and North Canada. Their culture at that time is well known through finds in North and South Alaska and by the Hudson Bay, and is still extant, fairly unaltered, by a single now-living group, the Reindeer Eskimos west of Hudson Bay.

In North Alaska we find the *Ipiutak Culture* (Fig. 1) by Ipiutak, which has given a name to the whole culture complex; in South Alaska it is found in the oldest layers of the excavations by Prince William's Sound, and round Hudson Bay it is represented, besides by the now-living Reindeer Eskimos, also by the Dorset Culture, which is probably a little later and somewhat modified. This culture has spread as far as North-West Greenland, where remains of it have been found in the Kap York district.

On the Bering Sea Islands meanwhile the original inland culture was gradually being transformed into a coastal culture with the hunting of

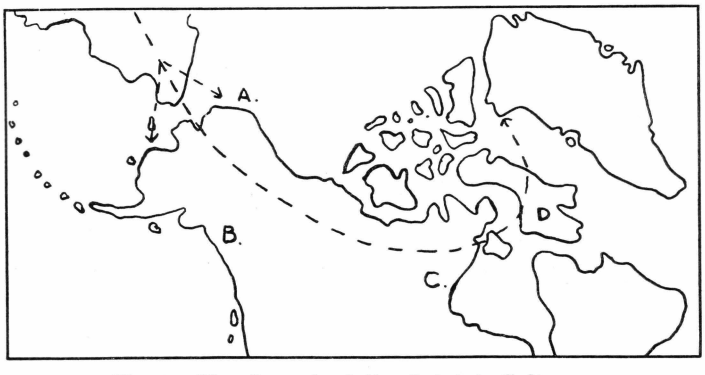

Fig. 1. The Spread of the Ipiutak Culture.
A: Ipiutak, B: Prince William's Sound,
C: Reindeer Eskimos, D: Cap Dorset.

sea animals as the main livelihood. This earliest coastal culture, which is the first link in a series of cultures named by Larsen and Rainey the "*Arctic Whalehunting Culture*", we have, according to its place of development, called the "Old Bering Sea Culture". The following phases of this "Arctic Whalehunting Culture", which all share the coastal characteristics and only differ through a gradual development of various details, are the: Punuk, Okvik, Birnirk, Thule, and finally Inugsuk Cultures. Like its predecessor, the Ipiutak Culture, it has spread east and almost everywhere proved superior to the Ipiutak Culture, so that this latter has only been able to hold out in a single place, by the Reindeer Eskimos.

Simultaneously with its spreading this "Arctic Whalehunting Culture" (Fig. 2) has, as already mentioned, undergone a certain development, so that the various types, Old Bering Sea, Okvik, Punuk, and Birnirk in Alaska, Thule by Hudson Bay, and Inugsuk on Greenland are to be considered as stages of development only. This wandering and development must have taken place during the first 15 centuries A. D.

In more recent times a new wandering has finally taken place, as part of the Ipiutak people, who, as mentioned, survived in the central regions as Reindeer Eskimos, have gone north and occupied the central

Fig. 2. The Spread of the "Arctic Whalehunting Culture".
I. Old Bering Sea, II. Birnirk, III. Thule,
IV. Inugsuk, V. North-East Greenland, C. Surviving Ipiutak.

coastal districts, probably encouraged by a change of the climate (Birket-Smith's Eschato Eskimos). The "Arctic Whalehunters" who lived here have been pressed aside, partly westwards to the coasts of North Alaska, and partly eastwards to Greenland (the Thule district) and Labrador.

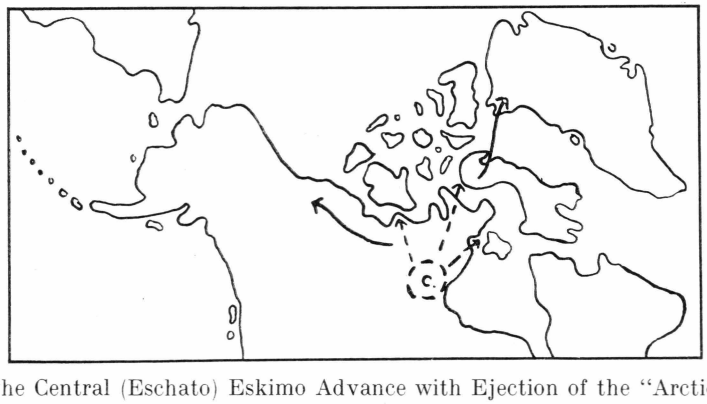

Fig. 3. The Central (Eschato) Eskimo Advance with Ejection of the "Arctic Whalehunters" towards East and West.

If we take a separate view of conditions in Greenland (MATHIASSEN (62) and LARSEN (49)), we find, as intimated, the first immigration some time before the year 1000, across the Smith Sund. They were Eskimos with Dorset Culture, hardly very numerous, as we have found practically no trace of them outside the Thule district in North-West Greenland.

Later, about the year 1000, the first immigration of Eskimos with Thule Culture took place. They spread, in the beginning slowly, later more quickly, southwards along the west coast, where fairly soon they met the mediaeval Norsemen, or at least found traces of them. The culture of the Eskimos gradually altered, among other things by the taking in of a few Norse elements, and thus developed into the Inugsuk Culture. In keeping with the decline of the Norse culture, the Eskimos spread more and more, and having taken possession of the west coast of Greenland, they went round Kap Farvel, up along the east coast, and finally reached right up to the north-easternmost corner (Fig. 2).

Somewhat later again one, or a few, waves of Eskimos with Thule Culture have come across Smith Sund. But these have gone round the north of Greenland (Fig. 2, group V), and have settled along the north-east coast, where they have mingled with the Inugsuk people. The ensuing North-East Greenland mixed culture thus contains Inugsuk elements and late Thule elements which are not known in the Inugsuk Culture. It is found in North-East Greenland as far south as Scoresbysund.

During recent centuries, last about 1850, Eskimos have kept coming across Smith Sund in small groups. They have remained in the Thule district and got the name of Polar Eskimos.

Thus it is seen that there are 3 kinds of civilization in Greenland, Inugsuk in West and South-East Greenland, North-East Greenland Culture in North-East Greenland, and a mixed area in the Thule district, through which all the cultures have passed successively: Cape Dorset — Inugsuk — Later Thule — Polar Eskimo.

This classification according to the archaeological conditions form the basis of the following investigations; but before we go through these, it will be of importance to consider what is already available of physical anthropological works.

III. PREVIOUS EXAMINATIONS

Greenland Skeletons.

The celebrated Danish anatomist JACOB WINSLØW was the first to describe the Eskimo cranium (98). In 1732 he wrote a short article about a cranium he had got from V. H. Riecke, the surgeon, who had himself found it on Hundeø near Disko by the west coast of Greenland. Winsløw gives, in comparatively few words, a characterization of the cranium, containing just those features which to this day are considered the most important racial characteristics:

"The cranium is long and narrow, the forehead flattened and receding, the top of the cranium sharp or angular, the neck very protruding and somewhat tapering.

The lines after the 2 musc. temporales are very plain and extended, and reach up so high that they are only a good inch from sutura sagittalis, and so far back that they almost reach sutura lambdoidea.

The nasal bones are exceptionally narrow, so that together they are hardly broader than a single one of ours, which makes the nose sunken at the top, and flat.

Orbits and cheek-bones are very large, making the face very broad.

The upper jaw protrudes strongly under the nasal opening, almost as by apes.

The branches of the lower jaw are very broad, but low in comparison. The circumference of the dental projection narrows in front and does not correspond with the more arcade-shaped upper jaw."

JOH. FR. BLUMENBACH (quotation from Crania Groenlandica (20)) has described 2 Eskimo crania from Greenland and 2 from Labrador, and found them agreeing well. Fürst & Hansen, however, in their reference to his work "Decas collectionis suae craniorum diversarum gentium illustrata" (Göttingen 1800) conclude as follows: "Blumenbach's reproductions, which are on a natural scale, hardly impress one as Eskimo crania in the same unmistakable manner as the crania described by Winsløw".

In 1842 ANDERS RETZIUS, the Swedish anthropologist (80), has measured and described 2 Eskimo crania, one from Upernavik, the

other presumably from East Greenland. He has taken 14 measures, and mentions a great number of essential features by the build of the crania: large capacity, keel-shaped crown, powerful facial skeleton, narrow nasal bones, large orbits with broad fissurae orbitales, and broad cheek-bones, broader than the largest breadth of the neuro-cranium, and further that the angle breadth of the lower jaw is big, and the jaw itself low and broad, and that the broad cheek-bones, together with the keel-shaped crown, give the face a triangular shape. Retzius finds that the crania answer well to those, by Blumenbach and others, described Eskimo crania, and that they differ essentially from the European crania.

In another work Retzius goes into the origin of the Eskimos and finds that they have great likeness to certain Indian tribes, for instance the Chipewyan and Cherokee. He thinks, nevertheless, that we must look for the origin of the Eskimos in Asia, because he has noticed a great likeness between a collection of Tunguse crania and the Eskimo crania, and found that Blumenbach's description of the Tunguse crania applies completely to the Eskimo crania. He concludes his treatise like this:

"Nach dieser Ansicht würde also der Volkstamm, zu dem die Eskimos gehören, nur in Nordamerika ein Polarstamm sein, aber von einer dünner Ausbreitung auf den Inseln des Polarmeeres und in den nördlichsten Teilen von Amerika sich von Westen nach Osten über Asien nach China hin erstrechen, un dort die eigentliche chinesische Bevölkerung ausmachen, welche genau von der tartarish-chinesischen unterschieden werden muss. In dem Übergang von Amerika bis Asien besteht er nach meiner Ansicht in der sogenannten Aleuten, deren Schädel ich zwar nicht kenne, die aber von Mehren als in der Form mit denen des Eskimos am meisten übereinsstimmend beschrieben werden."

Rudolf Virchow (99) has, in 1870, measured 5 Greenland crania from "Omenak" on the west coast of Greenland. The crania were picked, as the best, out of a rather large collection, and Virchow has taken 23 different measures on each. He compares them with 49 Danish ancient crania, 6 Lapp, and 5 Finn crania, and finds as characteristic for the Greenlanders: »Leptoscafocefalie mit Prognathie und kolossale Ausbildung des Gesichtsschädels." Moreover the Greenlanders diverge by a very large projection of musculus temporalis and by "die wahrhaft bestiale Ausbildung der Supraorbitalgegend." Finally we find that the neck bone forms an unusual great part of the cranium, compared with the whole of the median sagittal arch, and is the cause of the great values of the maximum length of the cranium in proportion to the basis length.

The dating of the 5 crania is quite uncertain; they have been re-examined by Fürst & Hansen in Crania Groenlandica (20) (AB α 15—345—51).

5 crania collected by Th. Fries from heathen graves on the island of Disko have been described by FREDERIK SUNDEWALL in 1872 (93). After quoting Fries's discussion regarding a possible mixture of races between the Eskimos and the mediaeval Norsemen, in which he, Fries, comes to the conclusion that the possible Nordic contribution cannot play any practical part, Sundewall goes through the 31 measures he has taken on each cranium. In many cases he has not followed the usual practice, so here his measures naturally cannot be compared with those of previous and later investigators. This applies for example to such important measures as the maximum length and maximum breadth of the cranium. This is a great pity, as the circumstances by the finds, with great certainty, date the crania back to the time before the beginning of the Danish colonization in the 18th century. He describes the Greenland cranium as coarse and angular, with an almost bestial appearance. It is typically dolichocephalic and, because of the keel-shaped crown, high. He mentions that the sutures of the cranium are inclined to ossify, and points out, like previous investigators, the very big projection of m. temporalis. By the facial skeleton he draws special attention to the broad cheek-arches and the very narrow nasal bones, as well as to the huge, protruding upper jaw. The teeth are much worn, a fact he puts down to the Greenlanders' animal food and mineral lacking drinking water.

In 1874 ADOLF PANSCH (72) has given a very fine description of a small series of crania from the north-easternmost part of Greenland. Out of 11, however, only 6 were adults, and Pansch has not attempted at any sex determination. His measuring technique answers in most cases to the one used now. He arrives at the result that the crania, apart from all of them being somewhat larger, fit completely with descriptions by previous investigators of Eskimo crania from other places. Thus they are bound to be Eskimos, and he does not find the slightest trace of European admixture. He finds it of special interest that the sutures are ossified to a very great extent, in one case even despite the fact of synchondrosis spheno-occipitalis being open.

TOPINARD has, in Revue d'Anthropologie 1875 (94), calculated a series of measurements from "Thesaurus craniorum" by Bernhard Davis, into the decimal system. The measures originate from 25 crania, of which 13 from Greenland. Topinard finds, like Davis, that the Greenlanders are the purest and most typical of the Eskimo race, while in the rest of North America this race has already been modified by mixing with the Indians. He points out that of all peoples the Eskimos from Greenland are the most dolichocephalic and leptorrhinic, and concludes that as they, like the Tasmanians, have a cranium of such individual shape "peut etre representent-ils l'une des premieres formations humaines".

Bessels has, in 1875 (2), published some measures of an extraordinarily interesting collection of crania from the north-westernmost part of Greenland. It consists of 101 crania, all of which, with the exception of 3 or 4, have been brought home by Hayes' expedition, from the area surrounding Etah by Smith Sund. Bessels considers all these crania to be of pure breed, as they originate from graves, at any rate only a few years later than the first expeditionary visits. He does not believe that the intercourse with whale hunters, which goes much further back in time, has been of such long duration as to give sufficient time for a mixture of races.

Unfortunately Bessels has had to give up his attempt at a sex determination of the crania; during this attempt he noticed, however, that the wear on the teeth of female crania seems considerably heavier than that on the male, and thinks that this circumstance should be helpful by a determination of sex. He does not go into any discussion regarding the results of his measurements.

According to information by Stewart (92), Otis is said to have sex-determined Bessels's collection, but Otis's book (from 1880), unfortunately, is not accessible in Denmark.

Stewart states further that the Greenland crania published by Hrdlicka in 1924 are, for the greater part, those already measured by Bessels. It has not, however, been possible to identify them in Hrdlicka's series. As moreover Bessels also has been in possession of 31 crania of entirely uncertain dating, from the southern part of West Greenland, and as these may also be imagined to have gone into Hrdlicka's material, we cannot accept Hrdlicka's measures as being valid for the Kap York district.

In Crania Ethnica 1882, de Quatrefage & Hamy (79) have collected the measures of a great many crania, though they themselves have only measured 11 male and 2 female from Greenland. They establish the fact that there is a difference between western and eastern Eskimos, as the former are considerably more dolichocephalic than the latter. The eastern Eskimos they characterize as hypsistenocephalic with protruding neck and a powerful facial skeleton. They give the length-breadth index for all hitherto published Greenland crania (156 men and women) as 71,50. That the Eskimos are of Mongolian origin, they consider a certainty.

Søren Hansen (1886 (23) and 1895 (25)) has published 2 small series of East Greenland crania, collected by the expeditions of G. Holm and C. Ryder. His technique answers reasonably to that used now-a-days, though a few measures diverge, for instance the facial height. His general description of the crania fits with that of previous investigators. He draws attention to the difficulty by determining the age of the Eskimo crania because of the heavy wear on the teeth and the early closing of the sutures,

as he is of the opinion that by the Eskimos the sutures close already at the age of about 30. The crania originate, as mentioned, from the east coast, the first investigation of which was by the said expeditions, for which reason these crania must be of pure race. They have later been described in Crania Groenlandica, and are included in the present work.

DUCKWORTH & PAIN (14) have measured a series of crania from Labrador, supplemented with some from Greenland, in various European museums. To the characteristics previously mentioned they add: distinct sutura infraorbitalis, thick lower jaw, and frequent occurrence of torus palatinus and mandibularis. They find the Greenland crania far less varying than the crania from Labrador. The material is, at any rate as far as the Greenland part is concerned, entirely undated.

BRIERLY & PARSON (8) have measures and descriptions of 17 crania, collected on a journey along the west coast of Greenland. Although the collector says that he has taken great pains in order to get skeletons from heathen graves, he mentions nevertheless that one of them originates from a place where the inhabitants died out during a smallpox epidemic in 1857, and that another no doubt is one of a mediaeval Norseman. 3 of the 17 crania had a well developed torus palatinus, and on most of them the edge of os tympani was greatly thickened.

In 1896 Peary brought home from the Kap York district 4 adult Eskimos and 2 children, out of which 4 died from tuberculosis in the course of a very short time. HRDLICKA (31) has measured their skeletons and supplemented them with further 1 female and 5 male skeletons from the same district, thus making a small series of 7 male and 2 female skeletons. These he compares with Bessels's crania and a small material from Hudson Bay, and finds good agreement with the latter but a considerable deviation from Bessels's measures, especially concerning the length-breadth index. Besides the crania, Hrdlicka has also measured some extremity bones belonging to them.

HOESSLY's (28) examination of a collection of crania appeared in 1916, a collection gathered in 1912—13 on a small island near Angmagssalik. Hoessly discusses thoroughly a possible admixture of European features, and is of the opinion that this possibility would be extraordinarily small. The graves were at that time more than 50 years old, that is, dating back to at least 25 years before the discovery of Angmagssalik in 1884 by G. Holm, and before then communications with West Greenland were very rare. Hoessly's technique of investigation is that given by Martin, which is likewise used in the present work. The safe dating, the identical measuring technique, and the size of the series (29 crania measured) makes it valuable for comparison with the present.

Hoessly points out that the Mongolian features stand out clearly in the facial skeleton, and thinks that the Eskimos, because of their

dolichocephaly, must be considered a primitive branch of the Mongolian race. Otherwise his crania are remarkable for great capacity, the lowest length-breadth index of all hitherto (in 1916) examined, and an unusually high cranio-facial index. Among the Mongolian features he mentions the large flat fossae caninae.

In 1915 appeared Carl M. Fürst and Fr. C. C. Hansen's *Crania Groenlandica* (20). Here we find a very thorough perusal of 380 crania from all parts of Greenland. The great number is the great merit of this work, as it means great certainty by the statistic calculations. Of other things that ought to be pointed out there are, partly the very thorough introduction into the problems with articles on the exploration and history of Greenland and a very copious survey of literature, partly the very fine get up, in text as well as pictures. Especially the pictures are of a quality difficult to equal at the present. Being the first great collected work on the Greenlanders' anthropology, Crania Groenlandica is frequently quoted by other investigators engaged on Eskimo anthropology.

There is, however, some objection to various things. In the first place the value of the investigations is very much reduced by the fact that among the material there is a number of crania with traces of mingling with Europeans, a fact mentioned by Fürst and Hansen themselves. This is the result of another error, namely that the dating as a rule is altogether uncertain, and in the case of a great part of the crania we do not even know the locality where they were found. For this reason we cannot, as a matter of course, accept the material in Crania Groenlandica as being a typical Eskimo material. As to the numerical treatment itself, the general omission of distinguishing between males and females is a draw-back which to a high degree limits the applicability of the given mean figures, mean errors, and spreadings.

As a result of their investigations Fürst and Hansen conclude that there are no differences between the population in the various districts on Greenland, that the Eskimos presumably originate from Asia, and that the Greenland cranium is not so primitive as hitherto presumed, but on the contrary is fairly highly developed in its own specific direction, conditional on the very powerful mastication apparatus.

Despite the fact that the uncertain dating, as mentioned, is a drawback, it makes it nevertheless possible for us to use the material in a way somewhat different from the one originally intended. That is to say, we may use it as to some degree representative of the mixed Greenland population, and in this capacity compare it with pure Eskimo crania from the time before the beginning of the Danish colonization. This will be done in the present work.

Heinrich Krantz (47) has a small collection of skeletons from 1934 which of only 3 crania have been of measurable. They originate from

Scoresbysund and are therefore of great interest, even though the number of course is very small. Besides measures and general description Krantz also goes into various pathological conditions.

From 1938, finally, we have FISCHER-MØLLER's publication (18) on some extremity bones from old Greenland graves, originating from before the year 1750. The skeletons must be of pure race, apart from a possible, no doubt insignificant, admixture from the mediaeval Norsemen. Fischer-Møller classifies his material, according to the archaeological conditions, into one group from West and South-East Greenland, and one from North-East Greenland, and finds that the bones from North-East Greenland are somewhat larger than the others, and accordingly calculates the stature of the North-East Greenlanders a little higher. The bones measured constitute part of the skeletal material that forms the basis of the present work. As a few questions of dating have proved to be rather obscure, and some skeletons therefore have had to be omitted, and also for the sake of the entirety, they have all been re-measured, and only the safely dated bones have been included here.

The skeletal material which we, according to the above, will be able to compare with the present, must be the following:

A) Hoessly's skeletons from Angmagssalik, which must belong to the period of the Inugsuk Culture.

B) Pansch's skeletons from Scoresbysund, which belong to the North-East Greenland domain.

C) Bessels's series from Etah by Smith Sund.

In the case of B and C, however, with the limitation due to the fact that there is no sex determination.

Finally it must be of interest to compare the pure Eskimos with the mixed as they are found in

D) the West Greenland series in Crania Groenlandica.

Examinations of Living Greenlanders.

Besides the skeletons we have also examined the living Eskimos. The first Europeans to meet Eskimos were *the mediaeval Norsemen* who were colonizing Greenland and Wineland in the time round the year 1000. They have, of course, not left any anthropological description of the Eskimos, whom they gave the name of "Skraellinger", and they did not come into closer contact with them until the end of the 13th and in the 14th century, when the Norse colonies on Greenland were already declining. An Icelander, who stayed in Greenland in 1385—87, refers, according to Finnur Jonsson (44), to two Eskimos he kept prisoners, as

monsters, but apart from this Finnur Jonsson mentions no account of the looks of the Eskimos in the old manuscripts.

With the second colonization of West Greenland in the 18th century contact was made a-new with these "Skraellinger", who then after all had taken possession of the country the Norsemen had had to give up. It was, however, not until the much later exploration of the east coast of Greenland that anthropological investigations were encouraged.

As the only white man before and after, CLAVERING (11) met in 1823, 12 Eskimos on the now uninhabited north-east coast. He discribes them as follows:

"Die Haare waren schwartz, die Geschichter rund, die Hände und Füsse sehr fleischig und geschwollen". "Ihr Gesichtsausdrück war äusserst stupid und nichtssagend, doch wurde dies wahrscheinlich durch die Erstaunen über alles was sie sahen erhöht." "Sie gehören offenbar zu derselben Rasse wie die Eskimos in andern Gegend Grönlands und in den nördlichen Teilen Amerikas." "Unser Verkehr war zu kurz um von der Sprache etwas zu lernen, aber die von Kapitänen Parry und Lyons gegebenen Beschreibungen der Eingeborenen zu Iglulik passten in allen Stücken auf unsere Freunde."

GRAAH (22) has (1832) described the South-East Greenlanders, but has also stuck to general phrases:

"The Greenlanders who inhabit the southern part of the west coast have in their appearance little in common with the proper Eskimo tribes and with the natives round the Disko Bay. The Eastlanders seem to me to have still less. They have not the plump fleshy body of the Eskimos nor their protrusive stomach; on the contrary they are erect, often even thin. They also differ from the Eskimos by the shape of the head and by beautiful physiognomies, full of character. The women and children often have brown hair, and the colour of body and face is almost exactly like that by our peasantry, that is to say when now and again, with the aid of blubber and urine, they have properly scrubbed the dirt off themselves. And no more than I dare conclude that the Eskimos round the Hudson Bay originate from the Romans, because Capitain Parry among them found "many a good Roman nose", no more do I presume that the Eastlanders originate from Icelanders who formerly built on Greenland, because in one or two things they resemble the Europeans. Their bristly hair, their black, somewhat Chinese eyes, their disproportionately small hands and feet, their disposition, inclinations, manners, customs, and language disclose, however, that they are of the same extraction as those Eskimos."

SØREN HANSEN, who, as already mentioned, has prepared 2 series of Eskimo crania, has also contributed to the anthropology of the living Eskimos. In 1886 he published a work on the East Greenlanders (23, 26)

based on measures taken by Holm and Garde in 1884—85. It is a matter of the measures of 46 Eskimos from Angmagssalik, 45 from the rest of the south-east coast, and for comparison 45 from the south-west coast. He finds that the East- and West-Greenlanders are typical Eskimos and much like each other, apart from the stature of the East Greenlanders being a little taller than that of the West Greenlanders. The build is characterized as powerful with arms of medium length but short and rather thin legs. He points out himself the somewhat reduced value of the small series, and therefore has later personally measured a great number of West Greenlanders, so that he, after supplementing them with measures taken by Ryder and Steenstrup, in 1893, is able to produce measures of altogether 2500 living West Greenlanders (24). Analyzing this material he finds that the mean of the stature varies somewhat between the various districts (from 158 by Egedesminde to 169 by Umanak), with no regularity however, and the mean for the whole of West Greenland is found to be only, for males 9, for females 13 mm, lower than for East Greenland, a difference so small that we may hardly attach any importance to it. The maximum length and maximum breadth have been measured on 546 men and 474 women. The length-breadth indices calculated from here prove to diverge, in the case of the men as well as of the women, only 0,1 from the corresponding values for the east coast.

Søren Hansen next points out a very peculiar circumstance. Comparing the length-breadth index in the various districts he finds that this index in the case of the northern part of the Upernavik district is, for men 3,1 and for women 6,7, lower than for the rest of Greenland. He has found this difference again between the northern part of the Upernavik district and the rest of Greenland in the case of the nasal index, although less pronounced, but the rest of the measures and also the colour of hair and eyes show no differences. He explains this fact by presuming that the population in the northern regions have immigrated comparatively late and have belonged to a more dolichocephalic Eskimo tribe than the other Greenlanders. He finds the great likeness between east and west remarkable, as the West Greenlanders are all more or less mixed as a consequence of the close intercourse with Europeans.

KNUD POULSEN (78) has during the years 1898—99 measured 29 men and 11 women from Angmagssalik, of which he says that they are not identical with those measured by Holm in 1884—85. He therefore pools the two groups and thus obtains a series of 86, which he compares with Søren Hansen's great material from the west coast of Greenland. He finds that the stature as well as the measures of the head are very little different from that of the West Greenlanders, especially the maximum length, maximum breadth, and length-breadth index of the head

are almost identical: "There is on the whole a rather exact coincidence between mine and the former measurings and observations".

The Polar Eskimos in the Thule district and round Smith Sund on the whole, have been described by Steensby (in 1910) and Hrdlicka (also in 1910).

STEENSBY (89) has measured and described 10 women and 8 men. He mentions that these Eskimos almost give the impression of belonging to quite another race than the West Greenlanders. Steensby, however, does not go further into these circumstances and does not at all compare the measures for the various groups.

HRDLICKA (31) has measured 3 men and 1 woman whom Peary in 1896 brought to the U.S.A. Also he holds the opinion that the resemblance to the Central Eskimos is greater than that to the Greenlanders. Neither does Hrdlicka discuss this resemblance particularly thoroughly. This with some right, however, in the case of both investigators, as anyhow it would not be possible to draw any safe conclusions from so small a material.

The now living population in Scoresbysund have been examined by PETERS (76), who gives the measures of about 30 men and women, all immigrated from Angmagssalik. The measures are in good agreement with those by Søren Hansen and Knud Poulsen from Angmagssalik. Peters produces all means and variation breadths, but does not discuss the relationship to other Eskimos.

Finally, as late as 1949, VIBEKE FABRICIUS-HANSEN (15) has produced the result of the measuring of 130 men and 142 women from the Julianehaab district. She considers the population in this district to be of comparatively pure race, as a great part of them have immigrated in recent times from the south-east coast. The measures diverge somewhat from those formerly known from the east as well as the west coast, both in the case of the stature and the length-breadth index. She does not, however, consider this sufficient to attach any importance to it.

It will thus be seen that we have a great material of anthropological investigations from West and South-East Greenland, of pure Eskimos (South-East Greenland), and of mixed (West Greenland). The material from the Thule district is, on the contrary, very scarce, and about the extinct population in North-East Greenland we only have Clavering's brief observations.

Eskimos from Other Areas.

During the course of time numerous reports have appeared on the Eskimos outside Greenland. It would carry things too far to enter into them all, though it is of interest to go through the most important of the

more recent ones, which may be significant for the investigations in the present work.

From the islands west of Smith Sund we have only 2 minor works, an extremely unfortunate fact, as the immigration to Greenland must have taken place across these islands.

With no commentaries of any kind and with no information about the crania, except that they originate from various places on Baffin Island, HRDLICKA (33) has published the measures of 4 male and 5 female crania in 1924. From the tables it appears that the figures come nearer to Hrdlicka's measures of Central Eskimos than to his measures from Greenland.

OETTEKING (70) has measured the stature and the length and breadth of the head on living Eskimos on Baffin Island round Cape Dorset. 10 men and 13 women have been measured, and it appears that they are closely related to the other now living East Eskimos.

STEWART has in 1939 (92) gathered together all what is found hitherto of scientific importance regarding the physical anthropology of the Labrador Eskimos. The work comprises partly skeletal examinations, and partly the measuring of living persons. The skeletons are divided up into two groups, one originating from Christian burials, and therefore not much more than a 100 years old, and one from old heathen graves, which is somewhat older, though not further determined archaeologically. On the part of the skeletons in the older graves there should be no possibility of any "white" admixture, but well of an admixture from Indians. The skeletons from the Christian graves cannot be regarded as pure.

From the old graves Stewart has first and foremost a new series of skeletons collected by Duncan Strong in 1927—28, next he has re-examined a series collected by Sornberger in 1891—92 and previously in short reported by Russell and Huxley in 1899 (83). Stewart has included Oetteking's skeletal material from 1908 (68) in his calculations after having sex determined the skeletons. In his calculations Stewart has furthermore included measures taken by Spengel (87) in 1874 (of which 2 have already been described by Blumenbach in 1800), Vichow 1878 (100), Sergi 1901, Schenk 1899, and Duckworth 1895. All these skeletons are pooled in the group "old stone graves", whereby this group has got a statically fairly satisfactory size. From Christian graves we only find some skeletal parts collected by Strong in 1927, and it is a matter of so few (12 + 8) that Stewart has made no statistics of them.

The examinations of the living Eskimos are based on measurements made by Strong in 1927—28. This is a large material, consisting of 58 men and 79 women, types obviously mixed being left out. For comparison Stewart has prepared a series of measurements made by Lee and Sorn-

berger 1891—92, of which a few measures have been published in 1895 and 1901 by Oetteking. Stewart has also included 3 small series by Pittard, Virchow, and Duckworth, as he mentions the possibility of these 3 investigators having measured partly the same individuals, a group of Eskimos which, in the years round the turn of the century, were being exhibited in various places in Europe.

In the discussion of the results Stewart points out the difficulties by anthropological works on Eskimos, in the case of the living due to the difficult working conditions in the arctic climate, and in the case of the skeletons because so much material is poorly dated. Next he strongly critizises SELTZER's (85) far-reaching reflections on the East Eskimos' being descended from Indian Algonqin-Cree tribes, and does not think that he can show anything like that with his material. He points out that Seltzer's material and methods would hardly be tenable statistically. Analogously he does not think he can approve of SHAPIRO's (86) original theory regarding the Athapaska Indians and the West Eskimos, as a matter of course.

In the case of Labrador Stewart has shown that the population in earlier times were more dolichocephalic than now, and are very near to the population in Greenland at that time. They diverge from the prehistoric Eskimos from Point Barrow, "Old Igloos", as well as from the carriers of the Thule Culture on Southampton Island. The present Eskimos in Labrador are somewhat smaller than their ancestors and have a broader cranium. Stewart connects this fact with the changed nutrition.

The Eskimos west and north of Hudson Bay, the Central Eskimos, have been measured and described by BIRKET-SMITH (4) who has examined 113 male members (living) of the Iglulik, Netsilik, and Reindeer Eskimo tribes. Having gone over the measures, Birket-Smith thoroughly goes through other materials available, and discusses likenesses and variations in the whole of the Eskimo region. The conclusion of this comparison, which comprises both living and skeletons, is as follows:

"If finally we try to gather together the diffused details, we shall scarcely make more progress than what is contained in the following: Apart from the Pacific Eskimo, about whom nothing can be said at all with certainty, and disregarding the change of type discernable to the west, especially in the Colville District, South Alaska, and among the Asiatic Eskimos, the Eskimos as a whole form one somatic unit, though of course there are local and chronological deviations from the common basic form. These sub-types include the ancient population at Point Barrow and the present-day Eskimos in the Mackenzie Delta and in the north of the Upernavik District, all of whom stand out by reason of a marked degree of dolichocephaly, but it remains for the future to show

whether otherwise there is any close relationship between them. Regarding the other Eskimos, one conspicuous fact is that the western tribes are rather more mesocephalic than the easterly groups, due especially to an increase in the width of the head; it is particularly worth noting that the Copper Eskimos, who culturally are very near to the tribes west of Hudson Bay, in this respect approach the Eskimos in northern Alaska."

Some important skeletal finds originate from the same regions. First and foremost those by the V. Thule Expedition from Naujan, which FISCHER-MØLLER has prepared in 1937 (17). The skeletons, unfortunately rather few, are particularly interesting, as they are safely dated to the period of the Thule Culture. As mentioned in the archaeological outline, the Thule Culture was found in these central regions before the advance of the inland Eskimos in later times. The result of Fischer-Møller's investigations is very surprising, as it appears that the skeletons from Naujan show decisive differences from a group from Point Barrow which may be dated to almost the same culture period, "Old Igloo", while they are almost identical with a series of crania from newer graves by Point Barrow. Fischer-Møller's skeletal material is among those in the anthropological collection in Copenhagen; it is therefore included in the present work after being re-measured, and the classification according to sex somewhat altered.

The Thule Culture has survived in a single place right up to our time, namely on Southampton Island, where the last carriers of this culture became extinct in the beginning of this century.

HRDLICKA's skeletons from Southampton Island therefore should also be referable to this culture. In 1910 he has (31) examined 9 male and 5 female crania, the conclusion of his work being that the crania show all the well-known Eskimo features, which Hrdlicka thinks are to some degree produced by climate and nutrition. With regard to the relationship of the crania to those of other Eskimo tribes, he finds that "the rarety of pronounced dolichocephaly" excludes any near relationship with the Eskimos from Labrador and Greenland, though, in a following article, he nevertheless finds some parallels with his small series of crania from Smiths Sund.

The Copper Eskimos, a little further west, have been examined by The Canadian Arctic Expedition 1913—18 and by Vilhjalmur Stefansson, whose notes have been prepared by Seltzer 1933.

The material from The Canadian Arctic Expedition consists partly of measures of living Eskimos, partly of skeletal remains. JENNESS (43) has measured some living Copper Eskimos, 82 men and 42 women. He finds that they show great likeness to the Greenlanders, especially the East Greenlanders, but that their dimensions are, all things considered, somewhat larger. This applies to the stature as well as to the length

and breadth of the head. The likeness to the western Eskimos in Alaska is not quite so great. He does not think that his material contains any signs of mixture with whites, though possibly so with Indians.

The skeletal remains originate, besides from areas round Coronation Gulf, also from various places along the north-east coast of Alaska. Their dating is very variable; part of them was found unprotected, just placed on the ground (as is the custom by the Cobber Eskimos), and can hardly be many years old. CAMERON (10) has measured and described them thoroughly, but has made no comparison with other materials, neither would such comparison, considering the small number, scattered, in time as well as in place, have given any significant information.

SELTZER (85) has in 1933, as mentioned, prepared Stefansson's measures of living Copper Eskimos and of Eskimos from the Mackenzie Delta and from various localities in northern Alaska. He finds that whilst the Copper Eskimos, as already shown by Jenness, are very near to the East Eskimos, both the Mackenzie and Colville Eskimos form individual groups, which diverge considerably from all other known living Eskimos. In the case of both groups the stature is considerably taller than usual for the Eskimos, but while the Mackenzie Eskimos are extremely dolichocephalic, the population in the Colville district are, according to Eskimo standard, highly mesocephalic. In the Colville district, however, there is so much Indian admixture that this may explain the special conditions, but in the case of the Mackenzie Eskimos there is very little indication of intercourse with the Indians. Seltzer finds, on the other hand, the likeness between the now-living Mackenzie Eskimos and the old skeletons from Point Barrow remarkable, as they, too, are extremely dolichocephalic. Finally he compares them with other Eskimo skeletons and now-living Eskimos, and with Canadian Indians, and arrives at the conclusion stated below. As we see this is, in the case of the Eskimos, in good accordance with the results arrived at by Birket-Smith in 1940 (4):

"Two distinct cultures, the Thule, originating from the Alaskan region, and the Eschato from the central region, one superimposed upon the other, and identified with distinct physical types, may be clearly discerned from the mass of data.

It appears that the earlier Thule Culture was carried by a very tall, extremely dolichocephalic hypsicephalic Eskimo group, whose home was somewhere in the west. These people, with whaling as their main cultural background, spread over the whole Arctic from Alaska to Greenland. The Mackenzie Eskimos east of the Mackenzie River Delta represent their only approximately pure living descendants.

At a much later period, allied with the Escato Culture advance, there was a sudden Indianoid expansion from central Canada from about the region of Lake Athabaska. From this focus these migrations into

the Eskimo regions, replacing and superimposing upon earlier Thulers emanated from two distinct sources. One group was derived from people of Athapaskan stock as represented by the modern Chipewyans, characterized by moderate height, mesocephaly, wide heads and fairly, long and broad faces; the other was of Algonkian origin as represented by modern Cree, showing very short stature, dolichocephaly bordering mesocephaly, quite short and narrow faces with low cephalo-facial indices.

The "Athapaskan-Chipewyan" group travelled to the north and west, the western division occupying the region of Kotzebue Sound, Seward Peninsula, and Sct. Lawrence Island, while the northern division, represented by the Copper Eskimos, migrated to the region of Coronation Gulf and Victoria Island.

The "Algonkian-Cree" stock sent there numbers to the north and east in successive waves of migration. The first group occupied the whole territory of Hudson Bay, Labrador, Baffin Island, and Greenland, supplanting still existing bands of Old Thulers. The second group, represented by the present Caribou Eskimos, at a later period invaded the Barren Grounds, where they are to be found to-day."

This theory has however, as mentioned, been very strongly critizised by Stewart (92).

The now repeatedly mentioned old skeletons from Point Barrow were excavated from some old collapsed house ruins "old igloo mounds" by van Valin, and HRDLICKA has measured and described them. To begin with this culture type was believed to be Thule Culture (so presumed by Fischer-Møller and Seltzer), but a later inspection has proved it to be somewhat earlier, from the Birnirk period (Collins 1934 (12)), predecessor of the Thule Culture and passing gently into this. (See the archaeological outline). In 1930 Hrdlicka published the measures of 52 crania and some limb bones, in 1943 the number of crania has increased (35, 39).

The crania have been compared with a series from Greenland and one from the Seward Peninsula, and Hrdlicka finds that the measures of the Point Barrow crania are almost identical with the measures of the Greenland crania, and that both groups diverge somewhat from the western Eskimos, showing in particular a much lower length-breadth index than the latter. Hrdlicka has compared the limb bones belonging to the "Old Igloo" crania with bones from the Seward Peninsula and from the area round the Yukon River. He finds that the "Old Igloo" bones diverge considerably from the bones from Yukon, but show only small differences from the bones from the Seward Peninsula. Hrdlicka did not think that he could advance any theory, at that time, regarding the origin of these "Old Igloos".

HAWKES (27) has published a series of skeletons from Point Barrow from later time, and HRDLICKA has likewise, 1943, a series from later

time. These skeletons are in no way without interest, as they possibly may represent central Thule Culture Eskimos who have been superseded by the now living Central Eskimos during the advance of these latter in later time. If this is the case, there should be great likeness between the late skeletons from Point Barrow and the old ones from Hudson Bay, which is exactly what Fischer-Møller found when comparing them. Here we must, however, comment that both Fischer-Møller's and Hawkes's series are very small, both consisting of a total of about 20 individuals.

The Eskimos along the coast of the Bering Sea and by the great rivers have been examined by HRDLICKA and SHAPIRO. HRDLICKA has in 1930 (35) measured several hundred living Eskimos and mentions, as the most important result of the investigation, that there is found to be a fundamental likeness between the Eskimos and the neighbouring Indian tribes, so that these two populations must be considered 2 branches on a common Asiatic-Mongolian stem.

SHAPIRO (86) has measured 41 living male Eskimos from the Seward Peninsula and compared them with as many measures as possible by other investigators. He finds that they are very near to the Copper and Smith Sund Eskimos, and holds the opinion that these tribes form a special group. In support of this hypothesis he mentions that if we leave this out of account, the Eskimos will show a steadily increasing breadth and decreasing length of the head, from east to west. Next he points out that there is great accordance between them (the Seward Eskimos) and a group of pure Chipewyan Indians from the area round Lake Athabaska, and from this draws the conclusion that these Eskimos are descended from Indians who, in comparatively late time, have wandered north towards Coronation Gulf, and have partly settled there, and partly spread east and west, to Smith Sund and the Seward Peninsula respectively. Everywhere this wandering has taken place in areas already inhabited by Eskimos. This theory has, as it appears from the above, been further developed and somewhat modified by Seltzer (85). Stewart goes strongly against it, as he critizises the statistical methods as well as the heterogeneity of the Eskimo material concerned, and points out the apparent uncertainty round the measures taken on Indians.

HRDLICKA has in 1933 (36) measured living Eskimos further south, round Upper and Lower Kuskokwim. He finds that the Eskimos there, together with the rest of the Eskimos in West and South-West Alaska, form one big family, inside which, however, there are a few minor differences. This South-West Eskimo family differs from the Eskimos on the Seward Peninsula and from the North and North-East Eskimos, and is more like the Aleutians.

In American museums there are several thousand crania, of which measures have been published, with intervals, by Hrdlicka, the latest in 1943 (33, 39). Unfortunately he gives next to no information as to dating or find conditions, but groups them solely according to geographical conditions. In the case of desert regions where habitation has only been of short duration, this may be quite satisfactory, but in the case of places like Alaska, where great migrations have taken place, and where one wave of population has followed the other, such grouping is of very poor value, and, worse, may lead to faulty results, as pointed out by Fischer-Møller and Birket-Smith (17,4). In a few cases we may, however, succeed in finding some dated crania. This is the case of 5, found by Collins at Gambell on the St. Lawrence Island, which may be carried right back to the old Bering Sea Culture, the earliest of the Eskimo coastal cultures. In his tables Hrdlicka furthermore distinguishes between crania from older and newer graves by Point Hope, with no specification, however, of the culture types belonging to them. If, however, we may consider the now living inhabitants of the Point Hope district as being people with old Thule Culture, who have immigrated in later times, after being driven away from the areas round the northern part of Hudson Bay by the Central Eskimos, during the last great advance of these latter, then these late skeletons from Point Hope must be of a certain interest.

OETTEKING (69) has prepared a collection of crania, comprising, among other things, some Eskimo crania from St. Lawrence Island and the Siberian coast, collected by "The Jesup North Pacific Expedition". The Eskimo crania, at anyrate, are unfortunately entirely undated; they are found again in Hrdlicka's great material from 1943. Oetteking finds that the Eskimos are of Mongolian origin, and that his series is very near to the rest of the western Eskimos, but differs somewhat from the eastern Eskimos.

The, by OETTEKING in 1945 (71) published, skeletons from Prince William's Sound are neither safely dated. He finds that they agree mainly with the Eskimos from Alaska and Siberia, but that they also show some likeness to Californian Indians.

On the Aleutians and Kodiak HRDLICKA (40, 41) has for several years been excavating for skeletal parts. On Kodiak he has succeeded, according to the archaeological conditions, in distinguishing between an old and a new population. On the Aleutians he distinguishes in a similar way between Pre-Aleutians and Aleutians, but the archaeological conditions are far more uncertain here, and the classification is no doubt based on the character of the collected skeletal material itself. The Pre-Aleutian and Pre-Koniag are both more dolichocephalic and hypsicephalic than the now living inhabitants of these islands. Hrdlicka

finds by comparison with Alaska Eskimos and Sioux Indians that Pre-Aleutians and Pre-Koniag are mostly like the Indians, a fact interpreted as supporting Shapiro's theory as to the Indian origin of part of the Alaska Eskimos. COLLINS has had a thorough perusal of Hrdlicka's work and goes against this theory, which he moreover considers to be without archaeological support, pointing out that if we, instead of comparing, like Hrdlicka, with a large series of crania, comprising best part of Alaska, limit our comparisons to the nearest living Eskimos, we will find that the likeness with these latter is at least just as great as that with the Indians. LAUGHLIN (53), finally, has pointed out that there are unmistakable traces of Pre-Aleutians in the now living population on the western Aleutians, and that the blood type pattern of this population is typically Eskimoid.

If thus we single out those of the published skeletal series that are dated and, by combination with the archaeological investigations, arrange them chronologically and in accordance with the history of civilization, we get the following result:

A. Ipiutak Culture.

From this we have no safely dated skeletal parts, but the now living Reindeer Eskimos, and maybe also the rest of the Central Eskimo tribes, must no doubt originate from the carriers of this culture.

B. "Arctic Whale Hunting" Culture.

1. "*Old Bering Sea*", 5 crania from St. Lawrence Island, excavated by Collins, published by Hrdlicka in 1943.

2. *Birnirk.* A large collection of skeletons from "old igloo mounds" by Point Barrow, excavated by van Valin, published by Hrdlicka in 1930 (and 1943).

3. *Thule.* Fischer-Møller's and Hrdlicka's small skeletal series from Hudson Bay are safely dated. The late skeletons from Point Hope may possibly originate from descendents of old Thule Culture people. The same applies in part to the Polar Eskimos.

To this comes finally Stewart's "old stone grave" series, which no doubt must be referred to a late modified Thule Culture.

The two principal groups in the present material, which will be gone through in the following sections, may be referred to 1) *The Inugsuk Culture* and 2) *The North-East Greenland Culture.* Both are offshoots of the Thule Culture, but the former has, rather early, taken its own course and reached a considerable independent development, whilst the latter is a mixed culture, partly showing Inugsuk features, and partly containing a number of old Thule elements which are not found in the Inugsuk Culture.

IV. METHODICS

The method employed by the investigations has in all cases been that described by R. MARTIN in *Lehrbuch der Anthropologie* (55).

Basis of the sex determination has been the shape of the pelvis, the size and robusticity of the skeleton, and the size and modelling of the cranium, especially the development of the superciliary arches and the profile line of the forehead.

The age has been determined by aid of the degree of ossification in the sutures and the wear on the teeth, and sometimes the development of the set of teeth.

All measures have been taken in close agreement with the definitions in Martin's book, and the numbers of the measures herein have been entered on the tables (M 1, 2 etc.). All measures have been taken twice, the capacities even three times.

Almost all distances and arch measures on the cranium have been determined directly by aid of sliding compass, spreading caliper, and tape measure. Exceptions are auricular bregma height (M 20) and calvarial height (M 22a), which have been measured on the median-sagittal curves. These have been drawn with the cranium fixed in the cube at the Frankfurter horizontal plane. All angles excepting the facial profile angles have likewise been measured on these curves. The profile angles of the face have been determined by aid of the goniometer, the mandibular angle with the special goniometer constructed for this purpose. The capacities have been determined by aid of the mellet method, and has, as said, been carried out 3 times on each cranium.

And finally Sarasin curves have been drawn on all the well-preserved crania.

On the limb bones the length measures have been taken on the measuring table (humerus M 1 and M 2, radius and ulna M 1, femur M 1, 3 and 4, tibia M 1 and 1a, and fibula M 1), with the large sliding compass (femur M 5 and tibia M 1b), with the large spreading caliper (tibia M 2 and outer pelvis measures), and with the small spreading caliper (radius and ulna M 2). The rest of the measures have been taken with an ordinary sliding compass and a tape measure. For epiphysis-

diaphysis angles goniometer combined with measuring table has been used, and for the torsion angles, the torsion goniometer constructed by Kurt Bröste (demonstrated by 3. Congres International d'Anthropologie in Bruxelles 1948).

The statures have been determined by aid of Pearson's formulars, in as much as only the lengths of humerus, femur, and tibia have been employed for the determinations.

Outside those of Martin described there are a few new measures. It is a matter of the following:

The breadth of fissura orbitalis inferior: The greatest transversal diameter of the fissure,

The thickness of the edge of os tympani: measured at right angles to the facet against porus acusticus, *partly vertical, partly horizontal,*

The breadth of sulcus paraglenoidalis ossis ilii: The greatest transversal breadth of the sulcus.

In the comparison tables are given:

n: number of observations

M: mean $= \frac{\Sigma x}{n}$

s: standard deviation $= \sqrt{\frac{\Sigma (x \div M)^2}{n \div 1}}$

m: mean error $= \frac{s}{\sqrt{n}}$

var: variation breadth.

By comparison between 2 groups it has been examined whether there is any difference either between the means or between the standard deviations. It appears that in no case in the present material do we find significant differences between the standard deviations, for which reason they are presumed to be identical. By comparison between the means we may therefore employ the t-test.

By this test we begin by presuming that the 2 true means that correspond to the calculated means, are identical. In such case the numerical quantity

$$t = \frac{\text{the difference between the calculated means}}{\text{the mean error on this difference}}$$

must follow a t-distribution. If now the t-values found by the calculation are outside the 1 % limit, we reject the hypothesis of the identity of the true means and say that there is a significant difference between the means.

The percentic limits corresponding to each single t (P) have been found by aid of Fisher & Yates' statistic tables (16).

The 1 % niveau has been chosen as significance limit as this is the practice in anthropological dissertations.

The mean error on the difference between the means has been calculated according to formulas given by Tage Kemp (45 page 103—4).

V. THE SKELETAL MATERIAL

The Greenland skeletons originate in localities spread over the whole west and east coast of Greenland. They have all been collected by scientific expeditions, which, as a rule, have confined themselves each to its own area of the country. The bones from West Greenland have all been brought home by Therkel Mathiassen from the big excavations by Inugsuk (in 1929), by Kangâmiut (1930), round the Disko Bugt (1933), and in the Julianehaab District (1934), a single one however by Eigil Knuth from the Godthaab District. Many of the South-East Greenland skeletons have likewise been collected by Therkel Mathiassen during excavations along the Frederik VI's Kyst and in the Angmagssalik area (1932). In addition Helge Larsen has found skeletons by Kangerdlugssuaq in Knud Rasmussens Land (1937), and a number of crania finally come from earlier expeditions. Gustav Holm 1885, and C. G. Amdrup and K. Poulsen in 1898—99 and 1900.

All these bones from West and South-East Greenland have been collected into one group, as they have been found under circumstances which permit of a safe placing in the same culture period, the Inugsuk Culture. In the case of the south-east coast this is quite easy, as in the time before 1885 we know of no other culture here but Inugsuk. On the other hand, when it is a matter of finds from the west coast, we must demand a closer explanation of the archaeological conditions.

The impassable coast between Kangerdlugssuaq and Scoresbysund has been set down as border between West and South-East Greenland on the one side, and North-East Greenland on the other. The reason for making any border at all is, as already mentioned, the fact that we, with certainty, can show a culture wandering north round Greenland down to Scoresbysund, and that this northern culture shows features decisively different from Inugsuk, even though there are things too, which with great certainty show the spreading of the Inugsuk Culture from West Greenland round Kap Farvel, and via Angmagssalik and Kangerdlugssuaq, right up to the very northernmost part of the east coast. As the non-Inugsuk elements in this North-East Greenland culture

are near to the original central Thule Culture, it will be natural to place its carriers in a group apart.

The North-East Greenland skeletons have been collected by Ryder 1891—92, by Danmarksexpeditionen 1906—08, by Alvin Petersen 1933, and by Helge Larsen and P. V. Glob during the 3 years' expedition 1932—34. In addition to this 3 isolated skeletal finds have been made by members of the Pearyland Expedition 1949, and some crania have been brought home by the East Greenland Comp. 1921.

From the Kap York district, through which all Eskimo immigration must have taken place, we have unfortunately very few skeletons, brought home by Mylius Erichsen and Erik Holtved.

Some of the crania from the east coast, those that were brought to Copenhagen before 1915, have already been described in Crania Groenlandica. They have, however, been re-measured and are included here, partly to make the material larger, and partly because the measures taken by Fürst & Hansen in certain cases diverge from those now used.

Of the rest of the skeletons none have been published before, a number of the limb-bones are, however, included in the material prepared by Fischer-Møller in 1938. All these limb bones, too, have been measured a-new.

Sex-determination of skeletons can be a very difficult matter, and is said to be particularly difficult in the case of the Eskimos. However, in most cases it has not been difficult to separate the present material into males and females. The entirely unsafe cases have not been included by calculation of the numerical quantities. Basis for the sex determination has first and foremost been the shape of the pelvis, where this is preserved, next the size and robusticity of the skeleton, and finally the size and build of the cranium, especially the shape of the forehead and the region round the superciliary arches. It appears moreover, as already pointed out by Bessels, that the wear on the teeth is generally much heavier by women than by men. Bessels explains this circumstance by the fact that the curing of the skins, which is largely done by chewing, is mostly woman's work.

The age classification is made, according to Martin's principle, the groups infans I, infans II, juvenis, adultus, maturus, senilis, according to the development of the cranium and the ossification degree of the sutures. It must, however, be observed that these biological age-groups say nothing with certainty about the chronological age of the individual, as we have no experience as to when the sutures close by the Eskimos. The wear on the teeth may be a great help, but must no doubt be estimated with great caution when the mastication apparatus, as here, besides for dealing with the food, is used for curing skins etc. The procedure in the present work has been this: the age has first been deter-

mined according to the ossification degree of the sutures and of synchondrosis sphenobasilaris, and then possibly modified according to the degree of the wear on the teeth. As the anthropometric preparation of the material comprises only adult skeletal parts, and as we will hardly find any differences of importance between the 3, as it is seen very unsafely determined, adult age-groups mutually, this classification has as a rule been omitted. The age changes by adults that might be mentioned are atrophy of the jaws after loss of teeth. The very few measures, however, that might reflect these changes, are so unsafe, when the atrophy is of importance, that they have been left out entirely of the numerical material.

By the treatment of the torus question only, the dividing up in 3 different adult age-groups has been retained.

Below is a broad outline of the areas from where the material originates, the further details are as follows:

Inugsuk Culture	West Greenland	Inugsuk District	(TM 1929)
		Disko Bugt	(TM 1933)
		Kangâmiut Area	(TM 1930)
		Julianehaab Distr.	(TM 1934)
	South-East Greenland	Fr. VI's Kyst	(TM 1932)
		Angmagssalik Distr.	(TM 1932)
		Fr. VI's Kyst + Angmagssalik Distr.	(Holm 1885 + Amdrup & Poulsen 1898—1900)
		Knud Rasmussens Land	(HL 1935)
North-East-Greenland Culture		Dødemandsbugten, Sues Land m. m.	(HL + Glob 1932—34)
		Scoresbysund	(Alwin Petersen 1923)
		Scoresbysund	(Ryder 1891—92)
		Christian X's Land	(Denmarksexp.)
		Single finds	
Kap York Distr.		Saunders Ø	(Mylius Erichsen 1904)
		Ũmänaq	(Holtved 1937)

Besides these, some crania belonging to the Thule Culture, from Naujan, brought home by V. Thule Expedition, and some crania from the north and west coast of Alaska, brought home by Helge Larsen.

Inugsuk area: The greater part of the skeletons from here were found in graves in or near great middens on the small islands of Tunúngassoq and Sangmissoq, situated in a bay on the south coast of the Inugsuk island. It is these middens that have provided the archaeological material that is the basis for the demarcation of the Inugsuk Culture. They have been excavated by Therkel Mathiassen in 1929, and the archaeological results published in Meddelelser om Grønland (57). The rest of the skeletons originate from localities in the neighbourhood, partly on Inugsuk itself, partly on the surrounding islands.

One of the opened graves, which by the way contained a great number of skeletons, (Tunúngassoq grave I), has apparently been used in several periods, the last time maybe about a hundred years ago. Thus the skeletons cannot safely be said to be unmixed. The rest of the graves may be referred to the Inugsuk Culture before the year 1750.

Disko Bugt: The archaeological results of the excavations have been gone through by Therkel Mathiassen in Meddelelser om Grønland, vol. 93 (61). The skeletons were found in graves near the big settlements Igdlutalik and Igdlorssuit. A single one was found in the entrance to one of the house ruins. The Eskimo graves are typical, by Igdlutalik was found in all no less than 44, of which 36 were opened and examined. The remaining 8 were left behind untouched as memorials. None of the graves are younger than the very earliest Danish colonization, a few maybe contemporary with it, but none of the skeletal remains can possibly originate from mixed Eskimos. The culture type is Inugsuk, in a few single places even earlier with Cape Dorset-like features.

The Kangâmiut area: The excavations have also here been undertaken under the leadership of Therkel Mathiassen in 1930 (58). In the various places finds have been made of very different age. Thus none of the graves from Qeqertarmiut may with certainty be referred to the "Pre-Danish" Inugsuk Culture. In one of them, on the contrary, bits of faience of late date have been found. For safety's sake they are therefore considered late, and none of the skeletons included here. The rest of the graves must be safe Inugsuk graves.

The Julianehaab District: All the skeletons from here have been collected by an expedition who, under the leadership of Therkel Mathiassen, in 1934 were making excavations in this district (62). Skeletons have only been taken from graves where archaeological investigations have taken place, and typically pure Inugsuk Culture proved.

From the west coast of Greenland we have further only one well dated cranium. This was excavated in 1945 by Eigil Knuth in the *Godthaab District* together with a few other defective skeletal remains.

From *Frederik VI's Kyst* we have a great number of skeletons, collected in 1931 by Therkel Mathiassen and collaborators. In Meddelelser om Grønland, vol. 109, are detailed reports of the find conditions (60).

The Angmagssalik District (59): Of special interest here is the settlement by Sûkersît, which has not been inhabited for several hundred years, and where several skeletons have been found in the house ruins, so the inhabitants of the place have presumably become extinct after one of the catastrophes that may befall the Eskimos, mostly hunger or epidemics. Finds of skeletons in house ruins are on the the whole more frequent on the east coast than on the west coast, where life conditions naturally are somewhat better.

Knud Rasmussens Land: The skeletons from here were found by Helge Larsen in 1935 on "The Anglo-Danish East Greenland Expedition". The archaeological conditions have been gone through in Meddelelser om Grønland, vol. 119 (50). It is a matter of pure Inugsuk finds.

A large group of *South-East Greenland crania originate from the first expeditions* to these regions: Holm 1885, Amdrup 1898—99 and 1900. A number of them have already been examined by Søren Hansen in Meddelelser om Grønland, vol. X, (23), and they have all been published by Fürst & Hansen in Crania Groenlandica (20). They have now been re-examined radically by the same method as the rest of the material in this work.

A fairly large skeletal material has been collected by Helge Larsen and P. V. Glob during the expedition to *Christian X's Land* 1931–34, conducted by Lauge Koch. The archaeological conditions are described in M. o. Gr., vol. 102, "Dødemandsbugten, an Eskimo Settlement on Clavering Island by Helge Larsen" (49) and "Eskimo Settlements in Kempefjord and King Oscars Fjord by P. V. Glob" (21). It is in this work about the Dødemandsbugten that Helge Larsen has demarcated and described the special North-East Greenland culture (see page 12).

From *Scoresbysund* Alwin Petersen has, in 1924, brought home a small collection of crania. The only information about them is a few remarks in M. o. Gr., vol. 68, (77). So much, however, is certain that the crania originate from graves in the immediate vicinity of the old Eskimo settlements by Kap Hope and Kap Tobin.

From *Sydkap* 2 skeletons originate, excavated by Helge Larsen (50).

A further 7 crania originate from *Scoresbysund.* They were brought home by *Ryders Expedition* in 1891—92. They have formerly been examined by Søren Hansen (25) as well as by Fürst & Hansen (20).

The *Danmarksexpeditionen* 1906—08 brought home 4 crania from the *northernmost part of the east coast.* Also these have formerly been published in Crania Groenlandica (20).

3 skeletons were collected by the Pearyland Expedition, 1 from *Cape East near Dødemandsbugten and 2 from "Greisdalen".*

5 crania, finally, belong to the North-East Greenland series; of those we have but very little information. The 4 are known to originate from the north-east coast and were presented by the East-Greenland Comp. in 1921. The 5th was taken up by Captain Thostrup by Germania Havn.

The Kap York District holds, archaeologically as well as physic-anthropologically, a key-position in Greenland, as the immigration of the Eskimos to Greenland no doubt has taken place across Smith Sund. Of course it is of particular importance that finds from such areas are well dated. The existing skeletal material is, unfortunately, very scarce; only a few skeletons were brought home by Mylius Erichsen in 1904—05 and Erik Holtved in 1937. Mylius Erichsen's crania are only roughly dated, as they are only known with certainty to originate from heathen times. The rest of the skeletons may, on the other hand, with fair safety by referred to 16—18 century, to the Inugsuk Culture. So as to get a material large enough to permit of only very rough conclusions, the whole skeletal material from the Kap York district has been pooled into 1 group. Mylius Erichsen's collection has formerly been treated in Crania Groenlandica. The crania all originate from Saunders Ø. Holtved's skeletal parts were found in house ruins by Ũmánaq. Of the archaeological conditions Holtved has written in M. o. Gr. vol. 141, "Archaeological Investigations in the Thule District" (29).

Central Eskimos with Thule Culture.

For comparison with the Greenland skeletons the safely dated part of the skeletal material brought home by V. Thule Expedition has been prepared again. It is mainly a matter of skeletons from Naujan by Repulse Bay in the Hudson Bay. The skeletons have formerly been published by Fischer-Møller ("Skeletal Remains of the Central Eskimos" (17)), but partly has a new cranium been added, and partly has the sex division been somewhat re-arranged, so that in order to get the whole material prepared by the same technique, it has been gone over again and again. The archaeological conditions, which of course form the basis of the formulation of the whole Thule Culture, has been treated by Therkel Mathiassen in Rep. and the V. Thule Expedit. vol. IV, "Archaeology of the Central Eskimos", (56).

Skeletons from Alaska.

Finally has a small collection of bones from Alaska been examined in connection with the rest of the material; the bones were all found by Helge Larsen. They gain distinction by being extremely well dated. Unfortunately they are not particularly old, as they all originate from 17.—18. century, but they are at least from pre-European time. The skeletons originate partly from the areas round Point Hope on the north coast of Alaska, partly from Kuskokwim Bay on the west coast. They were brought home in 1945 and 1949 respectively.

VI. MEASURES AND INDICES FOR THE GREENLAND CRANIA

In the following sections the material will be gone through, first measure by measure, next with regard to the qualities generally not expressed in figures. First Greenland will be treated separately, as by far the greater part of the skeletons examined originate from there; consequently the main object will be to elucidate the raceological conditions there.

The material from Greenland has, according to the connection of the skeletons with different cultures, been divided into 3 groups:

group I: skeletons from the Inugsuk Culture area,
group II: skeletons from the North-East Greenland Culture area,
group III: skeletons from the Kap York District.

In groups I and II the dating is safe, but this is not so in the case of group III. Some of the skeletons in this group are doubtless from the Inugsuk period, whilst others so far may be from any time whatever, between the arrival of the first Eskimos round the year 800 A. D. and that of the last about 1850.

In all 3 groups male and female skeletons have been treated separately for the sake of the preparation of the figures. Table I gives the number of skeletons in the various groups:

Table 1. The Material.

	Crania		Whole skeletons	
	Male	Female	Male	Female
I. Inugsuk area	100	82	59	43
II. North-East Greenland	23	29	11	8
III. Kap York Distr.	7	4	–	–
IV. Naujan	13	8	10	4
V. Alaska	6	5	–	–
Total...	149	128	80	55
	277		135	

For comparison the following series of crania from Greenland are available (see chap. III page 16):

group A: Hoessly's crania from Angmagssalik
group B: Pansch's crania from North-East Greenland
group C: Bessels's crania from the Kap York District
group D: Fürst & Hansen's crania from West Greenland.

The crania in group A are doubtless pure Inugsuk crania, and thus correspond completely with the now examined in group I. The North-East Greenland crania in group B in the same way answer exactly the now examined in group II. Bessels's material, in the case of far the greater part, no doubt originates from the Kap York District, and as to their dating the same applies as for the skeletons in group III. Neither Pansch nor Bessels has distinguished between male and female crania, which impedes the comparison with this material. Neither has Bessels given any means for his measures; they are calculated here after the individual measures given.

Of Fürst & Hansen's material have been included only the crania, which beyond doubt originate from West Greenland. The thing is that most of them are not dated, and several of them are no doubt rather late, with signs of mingling with Europeans. It will therefore be of importance to make sure whether these crania are different from the pure Inugsuk crania, that is whether the material in Crania Groenlandica may still be considered a pure Eskimo material, or if the mixture with whites has marked the crania in such a way that this is not the case. Means, mean errors, etc. are in Crania Groenlandica only calculated for males and females jointly. So as better to be able to draw comparisons with the Inugsuk crania, these quantities have now, from the given individual measures, been calculated for males and females separately.

The Neuro Cranium.

The Length of the Cranium.

3 length measures have been taken on the calvarium, the maximum length (M 1), glabella-inion length (M 2), and glabella-lambda length (M 3).

Most important is doubtless the *maximum length*, which most scientists consider as being of fundamental importance raceally. It is nearly always mentioned in anthropological publications, thus also in all those that are of importance for comparison with the material in the present.

The distribution of the material in groups I and II may be seen in fig. 4. In the case of the female crania the curves appear fine, of a

shape to be expected by a normal distribution. In the case of the male crania they are not quite so even, though with no striking irregularities.

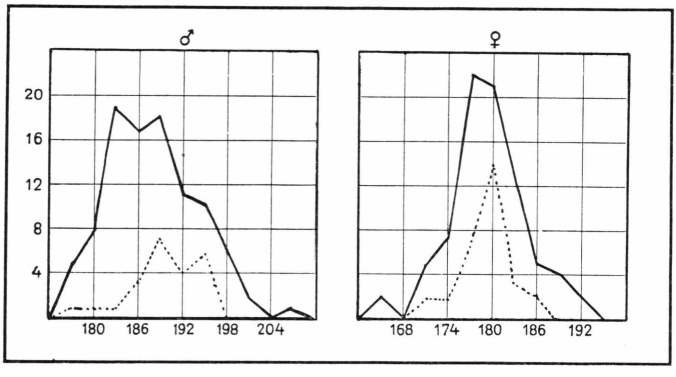

Fig. 4. Maximum Length. ——— Inugsuk ····· North-East Grld.

Means, standard deviations, mean errors, etc. appear from table 2, into which have also been entered for comparison the figures for Bessels's North-West Greenlanders, Hoessly's South-East Greenlanders, Pansch's North-East Greenlanders, and Fürst & Hansen's mixed West Greenlanders.

Table 2. Maximum Length of the Cranium. (M 1).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	97	187,8 ± 0,63	6,21	176–206	81	179,5 ± 0,56	5,09	165–192
II. North-East Greenland	23	189,8 ± 1,01	4,82	178–196	29	179,1 ± 0,68	3,65	170–186
III. Kap York Distr.	7	186,7 –	–	181–192	4	176,5 –	–	172–186
A. Inugsuk (Hoessly) ...	18	192,4 –	–	189–200	9	176,8 –	–	163–186
D. West Grld. (Cr. Groenl.)	111	188,9 ± 0,56	5,84	174–205	97	182,7 ± 0,59	5,44	173–201

	Males & Females		
	n	M	var.
B. North-East Grdl. (Pansch).....	6	189,7	182–196
C. Kap York Distr. (Bessels)	101	184,6	–

It will be seen that the mean for the male crania in group II is 2 mm higher than in group I, a difference also indicated by the distribution curves. Compared with the mean errors it does not, however, appear significant, which is in good agreement with the means for women being almost identical.

The small series from the Kap York District have a somewhat lower mean for both sexes, Hoessly's for the South-East Greenlanders is higher in the case of the men, and lower in the case of the women, and Pansch's figure for North-East Greenland men and women jointly, tallies completely with the figures for men alone in group II. Bessels's value for men and women is near enough half way between the figures for men and women in groups I and II.

The difference of 3,2 mm between the women in group I and those in the mixed group from West Greenland is striking, and with a t-value of 3,95 ($P < 0{,}001$) is statistically significant. For the men the difference is considerably smaller; there *is* however a difference of 1,1 mm.

The means for maximum length are, compared with those of other races, very high, higher for instance than all the figures given by Martin (55) for 23 populations from different parts of the earth.

Table 3. Glabella-Inion Length. (M 2).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area	97	181,6 ± 0,67	6,57	169–202	79	172,9 ± 0,62	5,50	155–186
II. North-East Greenland	23	182,3 ± 1,01	4.84	171–189	29	171,0 ± 0,69	3,73	161–197
III. Kap York Distr.....	7	181,0 –	–	176–185	4	170,3 –	–	166–180
A. Inugsuk (Hoessly) ...	18	186,3 –	–	–	9	169,4 –	–	–
D. West Grld. (Cr. Groenl.)	103	183,7 ± 0,67	6,71	167–200	95	177,5 ± 0,59	5,78	166–191

Table 3 shows means etc. for *glabella-inion length*, here we have, however, only figures from Hoessly's series and from Crania Groenlandica for comparison. The figures show practically the same conditions as found for maximum length; there is no safe difference between groups I and II, the mean for group III is somewhat lower than that for groups I and II, and in Hoessly's series the male figures are higher, and the female lower, than in the rest. Also the difference between group I and the West Greenland crania from Crania Groenlandica apppears again, is even higher here, for the men 2,1 and for the women 4,6 mm. To this answer t-values of 2,23 and 5,41 respectively ($0{,}05 > P > 0{,}02$ and $P < 0{,}001$).

Glabella-lambda length entirely follows the 2 other length measures in the cases of groups I, II, and III, and there are no other figures available for comparison.

Thus we *have not proved any length difference between crania of pure Eskimos* from different culture periods. There is, on the other hand, at anyrate in the case of the women, a *significant difference between the pure*

Eskimos and the mixed West Greenlanders, as the latter show higher figures for maximum length as well as for glabella-inion length.

The Breadth of the Cranium.

Of the breadth measures the maximum breadth is the most important and the best defined. Minimum frontal breadth is also well defined, but belongs perhaps just as much to the facial cranium as to the calvarium. Maximum frontal breadth, which is the breadth of os frontale, is far less exact, whilst bi-auricular breadth and asterion breadth again are very well defined measures. The mastoidal breadth, on the other hand, is rather inaccurately determined, and is depending on the development of a bone protuberance so variable as processus mastoideus.

Instead of the maximum breadth a few investigators use the biparietal breadth, which as a rule is somewhat smaller. Stewart (92) thus mentions that Bessels has used this measure. Bessels himself does not explain his measures in detail, but does, however, describe the said measure as "Grösste Breite". In Crania Groenlandica, where Bessels is frequently quoted, nothing is said to the effect that Bessels's maximum breadth should be the biparietal breadth, at anyrate it is compared with the maximum breadth as a matter of course.

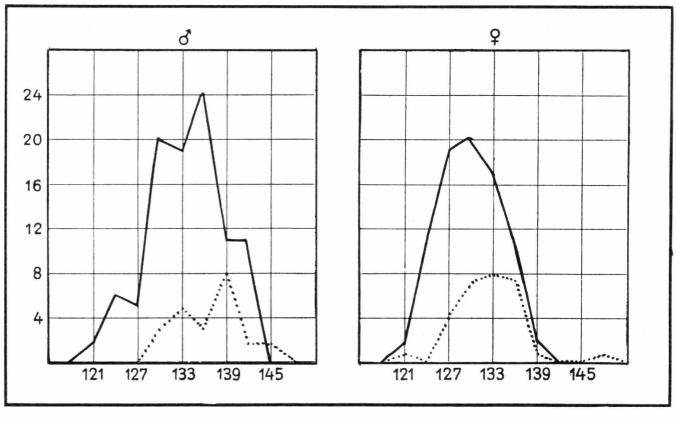

Fig. 5. Max. Breadth ——— Inugsuk ····· North-East Grld.

The distribution of *maximum breadth* appears from fig. 5. Although the curves are not quite even, they nevertheless indicate normal distributions inside the 2 groups. The figures appear from table 4.

It will be seen, first of all, that for men as well as for women the figures in group II are higher than in group I, namely 3,3 mm and 2,6 mm respectively. Calculating the corresponding t-values we get the figures 2,86 and 2,76, to which answers $0{,}01 > P > 0{,}001$, which is below the

Table 4. Maximum Breadth (M 8).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	98	133,6 ± 0,51	5,09	120–143	82	129,8 ± 0,45	4,08	120–139
II. North-East Greenland	23	136,9 ± 0,94	4,51	129–146	29	132,4 ± 0,93	4,98	121–148
III. Kap York Distr.	7	138,3 –	–	133–144	4	131,3 –	–	126–138
A. Inugsuk (Hoessly) ...	18	134,3 –	–	128–145	11	126,2 –	–	121–132
D. West Grld. (Cr. Groenl.)	109	134,5 ± 0,40	4,22	129–144	94	131,4 ± 0,45	4,31	122–142

	Males & Females		
	n	M	var.
B. North-East Grld. (Pansch)	6	138,2	131–145
D. Kap York Distr. (Bessels)	100	130,3	–

chosen significance limit. The Kap York figures are nearest to the North-East Greenland figures (group II), and the same applies to Pansch's measures, which are even a little higher than the measures for men from North-East Greenland. Hoessly's male crania are very near the rest of the Inugsuk crania, while the female are considerable narrower. Bessels's figure from the Kap York District for men and women is quite close to the Inugsuk figure for women alone, which might indicate that the Kap York crania are particularly narrow. As mentioned it cannot, however, be excluded that Bessels has employed the somewhat smaller biparietal breadth, in which case the difference of course is easy to explain. The late West Greenlanders in group D are somewhat bigger than the pure in group I, but even in the case of the female crania, which show the greater difference, only just exactly on the border of significance ($t = 2{,}53$, $0{,}02 > P > 0{,}01$).

The values for *minimum frontal breadth* etc. appear from table 5,

Table 5. Minimum Frontal Breadth (M 9).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	97	96,0 ± 0,44	4,27	88–108	80	93,2 ± 0,42	3,82	83–104
II. North-East Greenland	23	96,9 ± 0,72	3,44	91–103	29	93,1 ± 0,67	3,60	84–99
III. Kap York Distr.	6	96,7 –	–	94–100	4	95,0 –	–	91–98
A. Inugsuk (Hoessly) ...	18	94,9 –	–	90–100	11	89,5 –	–	85–92
D. West Grld. (Cr. Groenl.)	113	96,7 ± 0,40	4,30	85–111	102	93,5 ± 0,46	4,69	82–105

which shows that all means are quite near to one another. Conditions regarding the *maximum frontal breadth* appear from table 6.

Table 6. Maximum Frontal Breadth (M 10).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	90	113,1 ± 0,48	4,53	100–123	72	110,2 ± 0,40	3,41	103–119
II. North-East Greenland	21	115,7 ± 0,92	4,22	110–123	28	111,0 ± 0,73	3,90	103–120
III. Kap York Distr.	6	116,0 –	–	113–122	4	111,5 –	–	109–113
A. Inugsuk (Hoessly) ...	18	114 –	–	110–120	11	109,5 –	–	98–116
D. West Grld. (Cr. Groenl.)	105	109,4 ± 0,45	4,53	100–123	99	106,0 ± 0,44	4,32	97–116

It will be seen that the mean for men in group II is 2,6 mm higher than in group I, while there is only a difference of 0,8 mm between the corresponding figures for women. As the distribution of the male crania in group II is not quite regular, and as a calculated t-value gives only 2,30, this difference is not significant. There is, however, a significant difference between the figures for men as well as for women in groups I and D ($t = 5{,}61$ and 7,00 corresponding with $P < 0{,}001$). Another thing is, if this numerical difference indicates a difference between the crania, as maximum frontal breadth is a measure difficult to take, and may easily be differently interpreted by different investigators.

To characterize the proportions between the breadth measures now gone over, we have employed *transversal frontal index* and *transversal fronto-parietal index*. Corresponding to the disagreement pointed out between maximum breadth for groups I and II, there is a difference between the means for fronto-parietal index in the 2 groups. In the case of the women it is significant, $t = 2{,}63$, $P = 0{,}01$. Fronto-parietal index shows, as might be expected, no disagreement between the Inugsuk crania and the mixed crania from Crania Groenlandica.

Table 7. Transvers. Fronto-Parietal Index (M 9/M 8).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	96	71,9 ± 0,33	3,31	63,8–79,8	80	71,9 ± 0,33	2,17	64,3–77,5
II. North-East Greenland	23	70,8 ± 0,56	2,69	66,7–76,7	29	70,4 ± 0,47	2,50	65,7–75,8
III. Kap York Distr.	6	70,1 –	–	66,7–72,7	4	72,4 –	–	69.6–74,8
A. Inugsuk (Hoessly) ...	18	70,9 –	–	–	11	70.8 –	–	–
D. West Grld. (Cr. Groenl.)	107	71,5 ± 0,33	3,45	64,2–84,1	94	71,2 ± 0,37	3,18	62,1–81,4

The minor differences found between maximum frontal breadth for men and women in groups I and II are reflected in transversal frontal

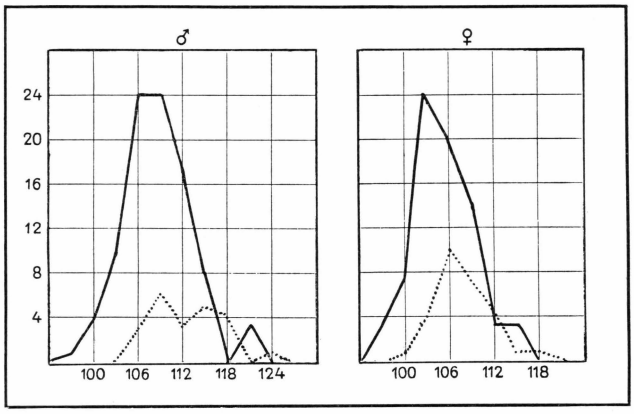

Fig. 6. Biauricular Breadth ——— Inugsuk ····· North-East Gr.

index, though not to such a degree as to the disagreements being statistically significant.

Fig. 6 shows the distributions of *biauricular breadth.* The curve for the North-East Greenland men is not quite even, but the rest are fine and regular.

Table 8. Biauricular Breadth (M 11).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	92	125,5 ± 0,53	5,04	117–137	76	120,7 ± 0,45	3,93	110–129
II. North-East Greenland	21	130,0 ± 1,10	5,05	122–140	27	123,1 ± 0,64	3,32	115–130
III. Kap York Distr.	6	131,0 ± –	–	129–134	2	125,5 –	–	124–127
A. Inugsuk (Hoessly) ...	17	125,9 –	–	–	10	116,6 –	–	–

In table 8 we find the figures. The means in group II are seen to be higher than in group I, for the male groups 4,5 mm, for the female groups 2,4 mm. Compared with the mean errors the differences show significance with t-values of 3,69 and 2,83 respectively ($P < 0{,}001$ and $0{,}01 > P > 0{,}001$). Moreover it appears from the table that the Kap York crania are near to the North-East Greenland crania, and that the male in Hoessly's group are very near to the men in the Inugsuk group, whilst Hoessly's female crania show a somewhat lower figure than the corresponding in the Inugsuk group.

Fig. 7 and table 9 show the conditions regarding *asterion breadth.* There appears to be a very distinct difference between groups I and II

Table 9. Asterion Breadth (M 12).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	91	108,5 ± 0,48	4,54	98–120	73	104,9 ± 0,44	3,73	97–116
II. North-East Greenland	22	113,0 ± 0,99	4,66	106–124	18	107,6 ± 0,72	3,81	101–118
III. Kap York Distr.	6	108,3 –	–	105–114	1	113 –	–	–

(men 4,5 mm and women 2,7 mm), with t-values of 4,16 ($P < 0{,}001$) and 3,24 ($0{,}01 > P > 0{,}001$) it is significant. To be true, the distribution is not quite satisfactory in the case of the men, but in return it is, in the case of the women, beautifully normal. There is no other material available for comparison.

The final breadth measure is the *mastoidal breadth.* Here we find a difference of 1,9 mm between the measures for the male crania in groups I and II, but as the mean errors, as a result of a somewhat irregular distribution, are comparatively high, we cannot attach any importance to this difference. The irregularities in the distribution may be explained by the not quite safe determination of the measuring point, and by the great individual differences in size and shape of processus mastoideus.

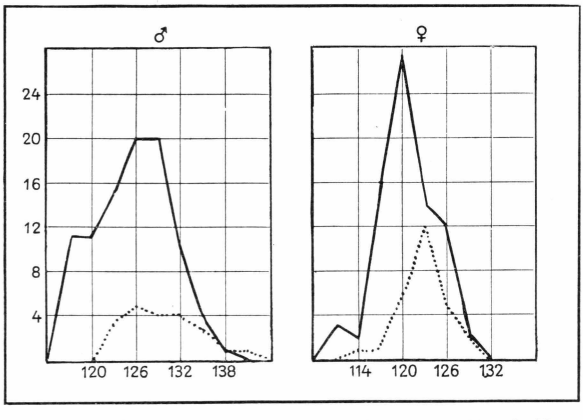

Fig. 7. Asterion Breadth ——— Inugsuk ····· North-East Grld.

As usual, Hoessly's measures appear larger in the case of the men, and smaller in the case of the women, than the measures for the rest of the Inugsuk crania.

Altogether we have then by examination of *6 different breadth measures proved significant differences between the groups I and II in the case of 3 of them*, and in all these 3 cases *for men as well as women.* The 3 measures concerned are maximum breadth, biauricular breadth, and

asterion breadth, all of which are characteristic and well defined. The remaining 3 have not shown differences between the 2 groups; one of them, the minimum frontal breadth, is likewise a safe and unambiguous measure, but in the case of the other 2, mastoidal breadth and maximum frontal breadth, we must take into account that the points from where they are measured, are chosen on a rough estimate, so that the safety of the measuring is considerably reduced.

The few crania from Kap York all agree with the North-East Greenland crania.

Hoessly's measures have proved larger in the case of the men, and smaller in the case of the women, than the corresponding measures for the Inugsuk crania. The West Greenland crania from Crania Groenlandica have in no case proved to be decisively different from the Inugsuk crania.

The Height of the Cranium.

To characterize the height of the cranium 3 measures have been included, basion-bregma height, calvarial height, and auricular-bregma height.

Table 10. Basion-Bregma Height (M 17).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	92	138,7 ± 0,54	5,20	129–152	76	133,0 ± 0,53	4,62	124–147
II. North-East Greenland	20	137,7 ± 0,89	4,00	130–145	29	130,4 ± 0,67	3,61	122–137
III. Kap York Distr.	6	139,8 –	–	135–146	3	130,3 –	–	129–131
A. Inugsuk (Hoessly) ...	17	141,8 –	–	137–146	10	135,0 –	–	130–144
D. West Grld. (Cr. Groenl.)	101	138,4 ± 0,46	4,62	127–147	94	134,6 ± 0,48	4,67	123–143

Maximum Height

	Males & Females			
	n	M ± m	s	var.
B. North-East Grld. (Pansch)	6	139,5	–	–
C. Kap York Distr. (Bessels).....	99	138,2 ± 0,63	6,29	130–148
D. West Greenland (Cr. Groenland)...	283	137,5 ± 0,29	4,89	123–149

The conditions regarding basion-bregma height appear from table 10, upper part; in the lower part of the table we find the maximum height which is used by Pansch, Bessels, and Fürst & Hansen.

Outside Hoessly's very high figures in group A there is nothing remarkable in the male groups. In the case of the women there is, on the other hand, a difference between the means in groups I and II of

2,6 mm, to which answers a t-value of 2,74 ($0{,}01 > P > 0{,}001$), i. e. a significant difference. The female crania from Crania Groenlandica are 1,6 mm higher than the corresponding unmixed, but the mean error on this difference is so high that we cannot attach any safe importance to it.

Hoessly's figures are, like in the case of the men, much higher than the rest.

The values for the maximum height appear to be some mm higher than the values for basion-bregma height, which is to be expected from

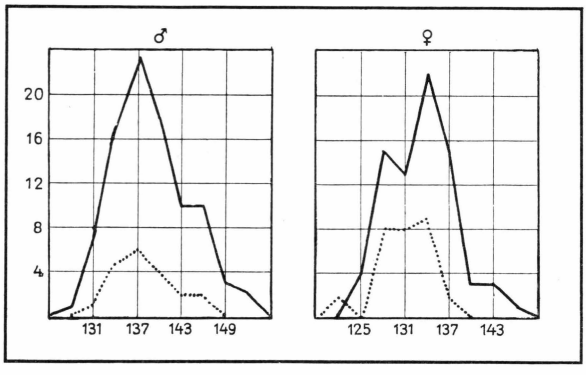

Fig. 8. Basion-Bregma Height ——— Inugsuk ····· North-East Grld.

the definition of the 2 measures. Outside this there is nothing remarkable in the 3 means for this measure.

Compared with Martin's (55) quotations for other races, the Eskimos show a basion-bregma height which is among the largest, though surpassed by several.

Fig. 8 shows the distribution of basion-bregma height, the 4 curves are even and regular.

The means for the *auricular-bregma height* in groups I, II, and III are quite near to each other, whilst Hoessly's figures are a little higher. In Crania Groenlandica the auricular height has, instead of to bregma, been measured to vertex, which as a rule gives a higher figure. This may explain a small difference between these crania and the Inugsuk crania.

Table 11. Calvarial Height (M 22a).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	94	101,6 ± 0,53	5,14	88–111	77	98,2 ± 0,51	4,47	85–110
II. North-East Greenland	20	101,0 ± 0,96	4,29	94–110	29	98,3 ± 0,84	4,52	86–106
III. Kap York Distr.	7	98,6 –	–	90–109	4	93,8 –	–	87–98
D. West Grld. (Cr. Groenl.)	112	100,0 ± 0,47	4,92	87–113	100	98,5 ± 0,52	5,16	86–115

The Calvarial Height, table 11, shows no divergence between groups I and II, whilst the mean for group III is somewhat lower than those of the others. The West Greenlanders from Crania Groenlandica show means that are very near to those of group I.

Thus the 3 height measures have *only in a single case shown a statistically tenable divergence between the Inugsuk crania and the North-East Greenland crania*, namely in the basion-bregma height for women, and no difference has been found between the Inugsuk crania and the late crania from Crania Groenlandica. Hoessly's figures are in all cases higher than the rest.

The Proportions between Length, Breadth, and Height.

These proportions are expressed first and foremost in length-breadth, length-height, and breadth-height index, of which length-breadth-index, at anyrate hitherto, has been considered one of the most important craniological characteristics, on which are based extensive racial classifications. It was first described by Retzius already more than a hundred years ago.

In table 12 we find means etc. for *length-breadth index* in the Greenland material, fig. 9 shows the distributions in groups I and II.

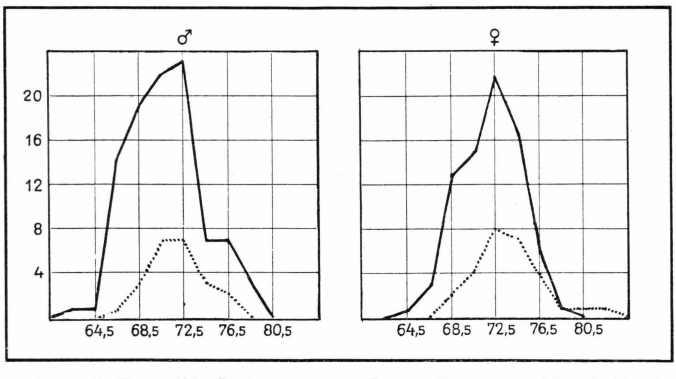

Fig. 9. Length-Breadth Index ——— Inugsuk ····· North-East Grld.

From the table will be seen that there in no case is any considerable difference between the single groups; especially where mean errors are calculated, and a statistic estimate possible, we find no differences which, compared with their mean error, are significant. The means of the Kap York series for men are somewhat higher than the rest, but, as is seen, it has been arrived at from only 7 single observations. The figures given by Pansch for his non-sex-determined crania come, like those for the single measures, very near to the mean for men from North-East Green-

Table 12. Length-Breadth Index (M 8/M 1).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	97	71,2 ± 0,35	3,85	62,9–78,8	78	72,4 ± 0,32	2,73	64,5–78,9
II. North-East Greenland	23	72,2 ± 0,51	2,41	67,9–76,4	29	74,0 ± 0,63	3,39	65,4–82,4
III. Kap York Distr.	7	74,1 –	–	–	4	74,4 –	–	72,0–78,9
A. Inugsuk (Hoessly) ...	18	70,1 –	–	–	9	72,0 –	–	–
D. West Grld. (Cr. Groenl.)	106	71,1 ± 0,26	2,67	65,3–79,8	91	72,0 ± 0,28	2,68	63,5–78,2

	Males & Females		
	n	M	var.
B. North-East Greenland (Pansch)	6	72,9	71,3–76,6
C. Kap York Distr. (Bessels)	100	70,3	–

land (group II). Bessels's series is much lower, but as we cannot exclude that Bessels's breadth measure, according to its definition (biparietal breadth), is somewhat lower than the rest, we should not attach too much importance to this.

The distribution of *length-height index* in the 2 main groups appears from fig. 10. In the case of men as well as of women the North-East

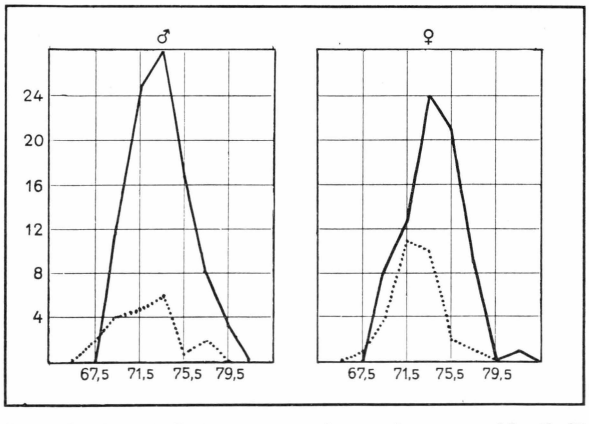

Fig. 10. Length-Height Index ——— Inugsuk ····· North-East Grld.

Greenland curve seems displaced a little to the left. In table 13 we find the corresponding figures.

As indicated by the curves the means in group II appear lower than in group I. The t-values may be calculated at 2,36 ($P = 0,02$) in the case of the male crania, and at 3,07 ($0,01 > P > 0,001$) in the case of the female crania, which means that only the difference between the

Table 13. Length-Height Index (Bregma) (M 17/M 1).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	92	73,9 ± 0,26	2,46	69,5–80,1	76	74,2 ± 0,28	2,53	69,0–81,3
II. North-East Greenland	20	72,5 ± 0,59	2,66	68,4–78,1	29	72,6 ± 0,37	1,98	67,2–77,6
III. Kap York Distr.	6	74,9 –	–	74,0–76,0	3	73,4 –	–	70,4–75,0
A. Inugsuk (Hoessly) ...	17	73,4 –	–	–	9	73,7 –	–	–

Maximum Height

	Males & Females		
	n	M	var.
B. North-East Greenland (Pansch).....	6	74,2	69,9–79,6
C. Kap York Distr. (Bessels)	99	74,5	–
D. West Greenland (Cr. Groenl.).....	274	73,6	–

female crania is significant. The Kap York crania come closest to the North-East Greenland crania, whilst Hoessly's lie between the 2 groups, though nearest the Inugsuk crania. The common figures for men and women given by Pansch and Bessels and in Crania Groenlandica are much like each other, but are a little higher than the first mentioned. The said writers have, however, used the maximum height as height measure, which gives somewhat higher figures than the usually employed basion-bregma height.

Breadth-Height Index should, as we have found differences between groups I and II in the height as well as in the breadth, and as these differences go in different directions, as the crania in group II are broader and lower than the crania in group I, show specially distinct differences between the 2 groups.

Table 14 shows that this is indeed the case, and that the difference between the means is highest for women, where the greatest differences between the individual measures were found. The t-values are for men 2,58 ($0{,}01 > P > 0{,}001$), and for women 4,35 ($P < 0{,}001$), which is, in both cases, below the significance border. Hoessly's South-East Greenland crania show a considerably higher index than the others, agreeing with their larger height measures. The West Greenland common figure for men and women from Crania Groenlandica lies between the male and the female values in group I. Besides, it has been calculated with maximum height as basis, and is therefore not comparable.

In order that the said t-values may represent a real difference, the 2 materials must be normally distributed. That this cannot be assumed

Table 14. Breadth-Height Index (Bregma). (M 17/M 8).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	91	103,8 ± 0,52	4,93	91,5–116,1	75	102,4 ± 0,49	4,20	93,4–114,0
II. North-East Greenland	20	100,8 ± 0,78	3,50	93,5–110,1	29	98,4 ± 0,80	4,31	89,9–109,9
III. Kap York Distr.	6	101,4 –	–	97,1–106,8	3	98,1 –	–	94,9–101,6
A. Inugsuk (Hoessly) ...	17	105,4 –	–	–	10	106,5 –	–	–

(Maximum Height)

	Males & Females		
	n	M ± m	s
D. West Greenland (Cr. Groenl.)	268	102,8 ± 0,26	4,32

as a matter of course is seen from fig. 11; at anyrate not in the case of the Inugsuk male crania, as this curve has a somewhat irregular, double humped course. By comparison with the normal distribution curve with the same mean value and deviation, by aid of the χ^2 test, we get, however, a P-value of about 0,05, which is generally considered sufficient for re-

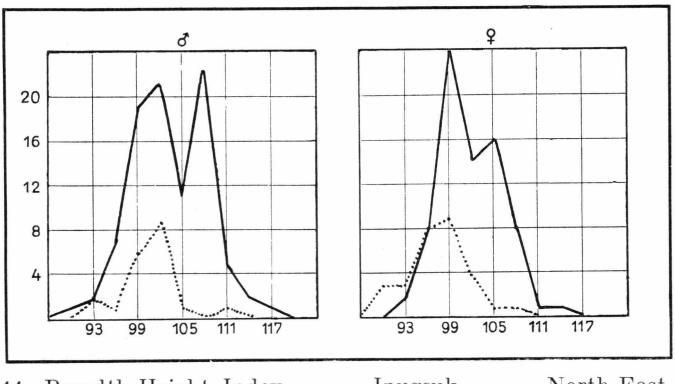

Fig. 11. Breadth-Height Index ——— Inugsuk ····· North-East Grld.

garding the material at issue as a section of a normally distributed population with the said mean value and deviation.

The curves for women are of such regular appearance that in this case we may with fair safety take it for granted that the difference is significant.

The proportion between the length and the height of the cranium is expressed in length-auricular-height and calvarial height index

besides in length-height index. *Length-auricular-height index* follows closely length-height index, also with regard to differences between groups I and II. The distributions are however not very regular, so that the mean errors become high, which again results in the differences between the means not reaching the significance limit.

Table 15. Calvarial Height Index. (M 22a/M 2).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	94	56,1 ± 0,32	3,06	48,4–62,7	77	56,8 ± 0,36	3,17	50,3–67,1
II. North-East Greenland	20	55,3 ± 0,64	2,87	50,8–60,8	29	57,5 ± 0,52	2,82	50,6–63,2
III. Kap York Distr.	7	54,4 –	–	49,7–59,9	4	55,1 –	–	52,4–58,4
D. West Grld. (Cr. Groenl.)	99	54,8 ± 0,35	3,38	47,8–64,9	93	55,6 ± 0,32	2,99	49,7–63,3

The *calvarial height index*, Table 15, appears somewhat diverging, as the mean values in group I for men are higher, and for women are lower than in group II. The differences are not so big that we may attach any importance whatever to them. The Inugsuk crania, on the other hand, show both in the case of the male and the female a higher calvarial height index than the mixed West Greenland crania in Crania Groenlandica. The t-values may be calculated at 2,71 ($0{,}01 > P > 0{,}001$) and 2,50 ($0{,}02 > P > 0{,}01$), respectively, so that in both cases it lies on the border of significance.

Thus the 3 main indices have shown a *decisive divergence between the Inugsuk crania and the North-East Greenland crania in the case of the women, and a somewhat smaller in the case of the men.* The difference stands out *most distinctly in breadth-height index*, tallying with the formerly shown difference in breadth and height.

Outside a not entirely safe difference in calvarial height index, no disagreement has been found between the pure Inugsuk crania and the mixed West Greenland crania.

With a length-breadth index of about 72 the present crania are typically dolichocephalic, which agrees well with previous investigations. Length-breadth index is, however, not excessively low, as has been stated now and again. Whilst length-height index is of medium size compared with the means for other races, breadth-height index is very high, and in Martin's (55) survey of the means for a great number of different races is only exceeded by the figures for Babases and Kurgans. According to the last 2 indices the crania in the present material are ortho- and acrocranic.

Basis Cranii.

The most important measure on basis cranii is *the basis length.*

Fig. 12 shows the distribution curves for groups I and II, and from table 16 appear means, mean errors, etc. Between the male groups there seem to be no differences of importance. The means in group III and group A are a little higher than the rest, but the 2 groups are not so big that any importance may be attached to the differences. In the case of the women, on the other hand, we find a decisive disagreement between, partly groups I and II, and partly group I and group D. To the difference

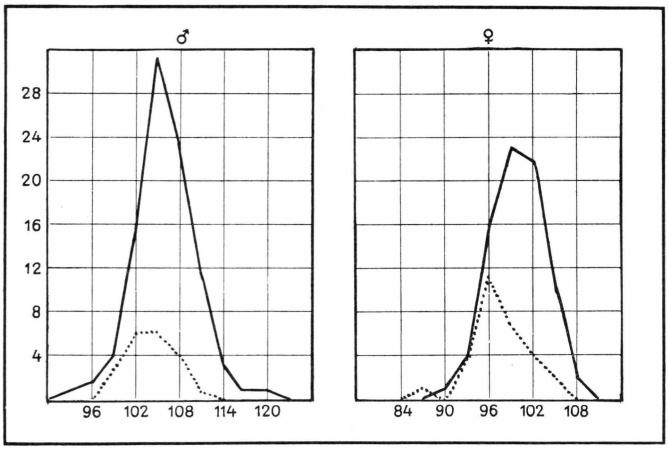

Fig. 12. Basis Length ——— Inugsuk ····· North-East Grld.

2,4 mm between groups I and II there is a corresponding t-value of 3,01 ($0{,}01 > P > 0{,}001$), and to the difference between the means in groups I and D, 2,3 mm, a t-value of 4,11 ($P < 0{,}001$).

Hoessly's figures join in reasonably with the others. Those of Pansch's prove to answer exactly to the figure for the male crania from North-East Greenland in group II.

To the basis measures belong moreover *length, breadth, and length-breadth index of foramen magnum.* Both length and breadth are somewhat higher for the North-West Greenland men than for those of the Inugsuk Culture; compared with the mean errors, the differences, however, only reach the significance limit in the case of the breadth. Neither length nor breadth measures from the female groups show disagreements of any importance.

Length-breadth index for foramen magnum is, for both sexes, a little higher for the North-East Greenland than for the Inugsuk crania. The difference between the means is, however, not nearly of a size to, compared with the mean error, be significant.

Table 16. Basis Length (M 5).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	92	106,0 ± 0,44	4,12	94–119	78	99,8 ± 0,41	3,61	91–109
II. North-East Greenland	20	104,2 ± 0,75	3,33	100–112	29	97,4 ± 0,71	3,86	87–106
III. Kap York Distr.	6	107,5 –	–	105–112	3	102,7 –	–	101–105
A. Inugsuk (Hoessly) ...	16	108,2 –	–	–	9	100,4 –	–	–
D. West Grld. (Cr. Groenl.)	112	105,8 ± 0,41	4,36	96–118	102	102,2 ± 0,37	3,76	94–110

Thus the basis measures have only shown a *decisive difference between the female crania from North-East Greenland and those from the Inugsuk area in basis length.* This measure moreover shows a *significant difference between the early crania* from the period of the Inugsuk Culture *and the late*, mixed crania described in Crania Groenlandica.

The Angles of the Cranium.

The values for *the angle of glabella-bregma chord* with the horizontal plane appear from table 17. The means in group I are somewhat higher, for men as well as for women, than the figures in group II. The difference is, however, in the case of the men, not so big that we may attach any safe importance to it, while, on the other hand, according to the calculated t-value (2,97) ($0{,}01 > P > 0{,}001$), it seems significant in the case of the women. Because of the somewhat irregular distribution in group II (fig. 13) it would hardly be justifiable to attach any decisive importance to this difference.

Table 17. Glabella-Bregma Angle.

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	86	44,5 ± 0,32	2,92	38–50	75	45,4 ± 0,28	2,33	39–51
II. North-East Greenland	20	43,0 ± 0,63	2,94	37–50	28	43,7 ± 0,62	3,32	39–51
III. Kap York Distr.	6	45,2 –	–	43–47	3	44,3 –	–	42–47

The nasion-bregma angle follows in all details the glabella-bregma angle, also with an irregular distribution in group II for women, and, judging by the calculations, with a significant difference between groups I and II ($t = 2{,}90$) ($0{,}01 > P > 0{,}001$). Hoessly has measured the nasion-bregma angle; his male figures tally reasonably well with the rest of the male figures from Greenland, whilst the figure for women is about 7° lower.

The frontal curvature angle, a measure for the dome of the frontal bone over the nasion-bregma chord, presents, as is seen in table 18,

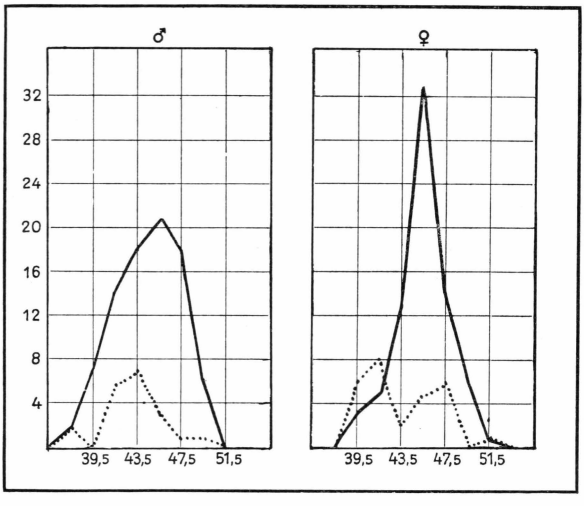

Fig. 13. Glabella-Bregma Angle ——— Inugsuk ····· North-East Grld.

no differences between the Greenland groups. It is strange that the difference between men and women is no more than about 2°, as we know that great importance is generally attached to the dome of the forehead when it is a question of distinguishing between male and female crania. The explanation is no doubt that the more prominent glabella area on the male crania makes the part of the forehead over it look flatter.

Table 18. Frontal Curvature Angle (M 32(5)).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	95	129,7 ± 0,37	3,59	120–139	79	128,3 ± 0,41	3,63	120–136
II. North-East Greenland	21	130,4 ± 0,55	2,49	126–135	29	127,7 ± 0,65	3,50	120–134
III. Kap York Distr.	7	129,6 –	–	126–134	4	128,5 –	–	127–131

Lambda-inion angle with the horizontal plane is practically the same for the North-East Greenland crania as for the Inugsuk crania, whilst the values from the Kap York District are somewhat lower; this fact may, however, very well be due to the small number of finds from this district.

The inclination angle of foramen magnum presents (table 19) an apparently significant difference of 3,7° between groups I and II for women.

Table 19. Inclination Angle of Foramen Magnum (M 34).

	Males				Females			
	n	M ±	s	var.	n	M ± m	s	var.
I. Inugsuk area	83	÷5,6 ± 0,54	4,88	÷16–4	72	÷6,4±0,59	5,02	÷17–3
II. North-East Greenland	18	÷7,9 ± 1,36	5,77	÷20–0	28	÷10,1±0,92	4,87	÷22–÷1
III. Kap York Distr. ...	6	÷4,5 –	–	÷11–2	3	÷7,7 –	–	÷10–÷6

Fig. 14 shows, however, that the distribution curves, especially for women, are not quite satisfactory.

The angles in the triangle nasion-bregma-inion are almost completely identical for the North-East Greenland crania and the Inugsuk crania (table 20—21). On the other hand it appears that there is a small difference between the Inugsuk crania and the West Greenland crania in Crania Groenlandica, in the nasion-bregma-inion angle. The difference is significant with t-values of 2,85 and 3,00 ($0{,}01 > P > 0{,}001$) for men and women respectively. In the case of the male crania it is evenly equalized on the other 2 angles, so that no significant differences arise in these cases. In the case of the female crania, on the other hand, we find

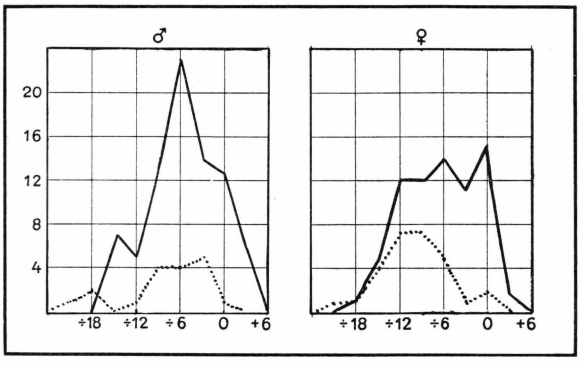

Fig. 14. Inclination Angle of Foramen Magnum····· North-East Grld.

a disagreement between the bregma-nasion-inion angles with a $t = 3{,}18$ ($0{,}01 > P > 0{,}001$), whilst the difference between the bregma-inion-nasion angles is quite small.

Thus we have altogether only found *difference between the 2 main groups in the case of the women, namely between the inclination angles for the glabella-bregma and nasion-bregma lines and for foramen magnum*, and in none of these cases the differences are convincing.

Between the Inugsuk and the mixed West Greenland crania we have found a safe *disagreement between the nasion-bregma-inion angles for both*

sexes, a difference which is found again, significant, *between the bregma-nasion-inion angles for women.*

Table 20. Nasion-Bregma-Inion Angle.

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	95	80,4 ± 0,32	3,14	72–88	79	79,4 ± 0,35	3,14	71–87
II. North-East Greenland	21	80,0 ± 0,65	2,97	76–87	29	79,2 ± 0,56	2,99	73–87
III. Kap York Distr.	7	81,7 –	–	76–88	4	81,5 –	–	79–84
D. West Grld. (Cr. Groenl.)	95	81,8 ± 0,37	3,59	72–92	86	81,0 ± 0,39	3,59	74–89

Table 21. Bregma-Nasion-Inion-Angle.

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	95	60,3 ± 0,30	2,93	53–68	79	60,6 ± 0,28	2,48	54–67
II. North-East Greenland	21	60,4 ± 0,56	2,55	55–64	29	60,5 ± 0,55	2,93	55–67
III. Kap York Distr.	7	59,7 –	–	55–65	4	59,5 –	–	59–60
D. West Grld. (Cr. Groenl.)	95	59,5 –	–	49–68	86	59,2 ± 0,33	3,02	53–66

The Single Components of the Median Sagittal Curve.

The figures for the 3 curves which together form the median sagittal curve appear from tables 22—24.

The frontal curves in the different groups show no decisive differences, even though the values in group I are a little smaller than in group II and in the group from Crania Groenlandica. The Kap York crania show the lowest figures for both men and women, while Hoessly's figures are higher than those in group I in the case of the men, lower in the case of the women. Pansch's non-sex-determined series are about half way between the values for men and women in the other series.

The parietal and occipital curves show, contrary to the frontal curves, rather great disagreements between groups I and II, as the parietal curves are considerably smaller for the North-East Greenland crania than for the Inugsuk crania, while the opposite is the case with the occipital curves. This applies to men as well as women, and thus must indicate that with the North-East Greenlanders lambda lies somewhat more to the front on the cranium. The difference between the means amounts to 4,4 and 2,4 mm for the parietal, and 6,8 and 2,3 mm for the occipital curves. The mean errors are, however, rather high, so that

Table 22. Frontal Curve. (M 26).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	95	128,8 ± 0,67	6,51	113–148	82	125,7 ± 0,64	5,81	109–137
II. North-East Greenland	23	130,2 ± 1,38	6,61	115–145	29	126,5 ± 1,07	5,77	115–138
III. Kap York Distr.	7	126,3 –	–	119–138	4	121,5 –	–	113–129
A. Inugsuk (Hoessly) ...	18	131,2 –	–	–	11	123,6 –	–	–
D. West Grld. (Cr. Groenl.)	108	129,8 ± 0,50	5,19	111–142	91	127,9 ± 0,59	5,68	115–144

Table 23. Parietal Curve. (M 27).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	94	127,4 ± 0,79	7,63	100–149	80	123,3 ± 0,79	7,11	101–139
II. North-East Greenland	23	123,0 ± 1,97	9,46	108–140	29	120,9 ± 1,21	6,51	108–132
III. Kap York Distr.	7	127,6 ± –	–	115–138	4	118,0 –	–	115–120
A. Inugsuk (Hoessly) ...	18	133 –	–	–	11	126 –	–	–
D. West Grld. (Cr. Groenl.)	106	127,0 ± 0,69	7,09	109–143	81	124,1 ± 0,92	8,30	102–140

Table 24. Occipital Curve. (M 28).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	91	119,1 ± 0,81	7,67	106–140	76	114,8 ± 0,88	7,63	101–137
II. North-East Greenland	20	126,7 ± 1,85	8,26	114–143	29	117,1 ± 1,49	8,01	106–145
III. Kap York Distr.	6	119,3 –	–	117–122	4	113,2 –	–	101–127
A. Inugsuk (Hoessly) ...	17	118 –	–	–	10	110 –	–	–
D. West Grld. (Cr. Groenl.)	100	121,6 ± 0,84	8,42	105–148	92	117,4 ± 0,73	6,97	104–134

we only find a statistically significant difference between the occipital curves for men, $t = 3{,}96$ ($P < 0{,}001$). Fig. 15 shows the distributions of the occipital curves. It will be seen that also the curves point to a difference, and that they agree so well with normal distribution curves that we may rely on the statistic calculations.

The values for the West Greenland mixed crania answer reasonably well to the values of the Inugsuk crania; it is, at anyrate, not possible to prove reel differences by determination of t-values.

The remaining groups present nothing special. Hoessly's crania rather follow the Inugsuk crania, showing only still greather difference

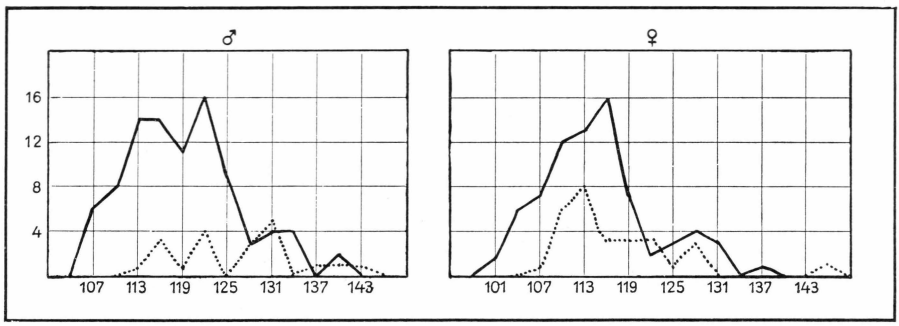

Fig. 15. Occipital Curve. ——— Inugsuk ····· North-East Grld.

from the North-East Greenland crania. Also the Kap York crania usually show great likeness to the Inugsuk crania, while Pansch's side with the North-East Greenlanders.

Sagittal fronto-parietal index show no dicisive differences between any of the groups; neither was this to be expected as there are no significant differences between the single components of this index.

The chords matching the curves follow these in all details. Thus we find a significant difference between the occipital chords in groups I and II in the case of the male crania, $t = 3{,}70$ ($P > 0{,}001$). The rest

Table 25. Occipital Chord. (M 31).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	91	98,1 ± 0,59	5,61	86–110	76	95,8 ± 0,62	5,39	85–108
II. North-East Greenland	20	103,1 ± 1,10	4,91	94–112	29	97,1 ± 0,96	5,19	88–114
III. Kap York Distr.	6	98,3 –	–	94–103	4	94,0 –	–	83–100
A. Inugsuk (Hoessly) ...	17	97 –	–	–	10	92 –	–	–

show agreement between the 2 groups. For the mixed West Greenlanders only the frontal chord is available for comparison; as in the case of the curves there is no difference between these and the Inugsuk crania.

The 3 curvature indices corresponding with curves and chords show in all 3 cases extremely good agreement between the different groups, as the means vary only a few tenths for each index. Neither between male and female crania are there differences of any importance.

Thus we have, by a thorough *analysis of the single elements of the median sagittal curve and their mutual proportions, only in a few cases, occipital curve and -chord, found a decisive divergence between 2 of the groups, namely between male crania from North-East Greenland and from*

the Inugsuk area. In all other cases the differences have not exceeded the limits for casual variation. No difference has been found between the indices of the male and female crania.

The Size of the Cranium.

The best measure for the size of the cranium is no doubt the capacity, even though the very determination of this latter implies certain problems. In the first place the definition of the capacity is not clear, as there is no indication of any fixed border answering to the many holes and canals of the cranium, especially not of foramen magnum, and secondly the measuring is in itself subject to some uncertainty. With the method employed here (filling with millet grains) the result obtained no doubt depends to some degree on how firmly the millet grains have been stuffed into the cranium, and afterwards into the measuring glass, and this again, on the size of the funnels used, on the velocity of falling in the glass, etc. If we want to compare the results of different investigators, we must therefore no doubt reckon with some uncertainty as a consequence of the great dependance of the measuring technique on the technique of the measurer.

Table 26. Capacity. (M 38).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	69	1492,8±14,20	117,4	1210–1855	56	1358,8±14,70	110,0	1105–1615
II. North-East Greenland	12	1577,9±36,00	124,7	1440–1870	18	1352,5±15,49	65,85	1250–1470
III. Kap York Distr.	4	1601,3 –	–	1500–1700	2	1457,5± –	–	1435–1480
A. Inugsuk (Hoessly) ...	12	1504,1 –	–	1395–1690	8	1262,5 –	–	1190–1350
D. West Grld. (Cr. Groenl.)	110	1535,7±10,8	113,7	1260–1785	96	1446,9±10,7	103,5	1282–1728

Table 26 shows the capacity in the present series. There are no significant differences between the groups from the Inugsuk Culture area and from North-East Greenland, though the difference between the means for men is 81 cm^3. The Kap York crania are rather large, so that the capacity of the male crania is very near to the North-East Greenland crania, whilst the female are considerably larger than the female crania in groups I and II. Hoessly's male crania are very near to those of the Inugsuk group, but the female crania considerably below.

The capacity for the mixed West Greenland crania is, for both men and women, somewhat larger than for the crania in the Inugsuk groups. For women the difference is significant ($t = 4{,}28$, $P < 0{,}001$), whilst

for men it is on the border (t = 2,43 0,02 > P > 0,01). There is, as stated, hardly any reason for attaching too great importance to this difference, as a systematic difference in the measuring technique may be the cause.

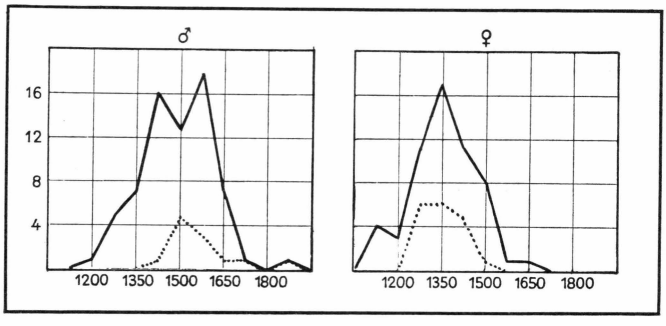

Fig. 16. Capacity ——— Inugsuk ····· North-East Grld.

The modulus of the cranium, the total of length, breadth, and height divided by 3, is also expressive of the size of the cranium. Modolus shows no disagreement between groups I, II, and III; just the contrary, the means are almost identical.

Table 27. Horizontal Circumference. (M 23).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	88	521,1 ± 1,44	13,45	490–563	73	499,8 ± 1,40	11,93	467–524
II. North-East Greenland	22	532,1 ± 2,29	10,76	505–555	28	503,5 ± 1,49	7,86	490–530
III. Kap York Distr.	6	524,7 –	–	512–545	4	498,2 –	–	484–519
A. Inugsuk (Hoessly) ...	18	530 –	–	511–547	10	492,1 –	–	469–508
D. West Grld. (Cr. Groenl.)	111	524,2 ± 1,21	12,76	490–555	92	508,8 ± 1,33	12,78	488–548

	Males & Females		
	n	M	var.
B. North-East Greenland (Pansch).....	6	525,0	502–545
C. Kap York Distr. (Bessels)	101	515,5	380–572

Also the 3 dimensions, *horizontal*, *transversal*, *and the median sagittal curves*, are closely tied up with the absolute size of the cranium. All 3 curves show very good agreement between the Inugsuk crania and the North-East Greenland crania, though with a single exception; the horizontal circumference of the North-East Greenland male crania

is 11 mm larger than that of the Inugsuk crania, a difference statistically significant with $t = 3{,}49$ ($P < 0{,}001$).

There is considerably greater disagreement between the Inugsuk crania and the mixed West Greenland crania, as the latter show significantly higher means for all 3 curves for women ($t = 4{,}60$, 4,37, and 3,53, respectively, $P < 0{,}0001$), and besides for the transversal curves for men ($t = 3{,}02$, $0{,}01 > P > 0{,}001$). This tallies with the difference found in the capacity and maximum length of the crania. The values in Hoessly's series are very near to the corresponding values for the Inugsuk crania, Pansch's figures mostly answer the figures for men from North-East Greenland, and Bessels's figure for the horizontal curve lies between the values for men and women separately, whilst in the case of the median sagittal curve they are quite near to the values for men alone.

Between the crania from North-East Greenland and from the Inugsuk area, we have thus among the 5 measures examined *only found significant difference in horizontal circumference for men. The mixed West Greenland crania, on the other hand, are, both regarding capacity and dimensions, in all directions larger than the Inugsuk crania.*

The Visceral Cranium.

The Length, Breadth, and Height of the Face.

The facial length is measured to the foremost part of the lower jaw, and to the foremost part of the upper jaw. Of these 2 measures the sup. facial length is the best defined, as even small displacements in the occlusion of the teeth during the measuring may effect great variation in the figures for the inf. facial length, and it is difficult to judge safely the occlusion position itself.

The sup. facial length is, however, not determined, quite unanimously either, as some investigators have measured it to prosthion and others to alveolon, foremost and lowest point respectively on the alveolar

Table 28. Sup. Facial Length. (M 40).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	81	103,0 ± 0,55	4,91	90–114	71	97,9 ± 0,56	4,68	87–107
II. North-East Greenland	18	101,3 ± 1,25	5,32	93–112	22	94,5 ± 1,13	5,30	87–106
III. Kap York Distr.	5	102,6 –	–	100–109	3	99,0 –	–	96–104
A. Inugsuk (Hoessly) ...	16	104,3 –	–	–	8	98,3 –	–	–
D. West Grld. (Cr. Groenl.)	105	105,0 ± 0,55	5,60	95–119	94	101,9 ± 0,57	5,52	90–120

edge between the central incisors. Here, according to Martin (55), the sup. facial length has been measured to prosthion.

Table 28 shows the results, together with the corresponding figures for Hoessly's and Fürst & Hansen's series. The means for the Inugsuk crania lie somewhat above the values for the North-East Greenland crania, the difference is, however, only significant for women ($t = 2{,}92$, $0{,}01 > P > 0{,}001$). Neither the Kap York crania nor Hoessly's South-East Greenland crania diverge noticeably from the rest. The figures for the mixed West Greenland groups are, on the other hand, considerably higher than for the pure. In the case of both men and women the dis-

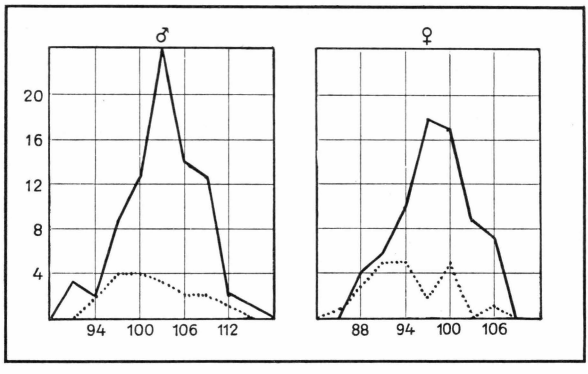

Fig. 17. Sup. Facial Length ——— Inugsuk ····· North-East Gr.

agreement is significant with t-values of 2,60 $P = 0{,}01$ and 5,00, $P < 0{,}001$, respectively. This difference cannot be the result of a different measuring technique, as the measure in group I is a maximum measure, and yet the smallest.

The inf. facial length shows no difference worth mentioning between the 2 main groups. Hoessly's means are somewhat higher than the others, especially for men, but the observation series are very small (8 men and 3 women). As usual Pansch's figures answer very closely to the mean for men from North-East Greenland.

The bizygomatic breadth is the most commonly used breadth measure for the face. It is no doubt of great importance for the physiognomy as a whole, likewise as it is a very well defined measure.

Table 29 gives the figures regarding the bizygomatic breadth. As will be seen there is rather great difference between the means for men in groups I and II, whilst the corresponding figures for women are almost identical. However, the mean error for men in group II is comparatively high, so the difference between the means is not significant ($t = 2{,}49$, $0{,}02 > P > 0{,}01$).

Table 29. Bizygomatic Breadth. (M 49).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	83	137,3 ± 0,66	5,97	124–151	68	129,6 ± 0,61	5,03	116–143
II. North-East Greenland	20	141,0 ± 1,37	6,13	130–152	28	129,7 ± 0,80	4,22	120–138
III. Kap York Distr.	6	142,3 –	–	137–146	3	129,3 –	–	122–138
A. Inugsuk (Hoessly) ...	13	142,4 –	–	133–151	8	128,3 –	–	123–133
D. West Grld. (Cr. Groenl.)	93	140,0 ± 0,66	6,35	126–154	77	131,8 ± 0,55	4,77	119–147

	Males & Females		
	n	M	var.
B. North-East Greenland (Pansch).....	6	141	125–154
C. Kap York Distr. (Bessels)	86	133,6	122–155

Fig. 18 shows the distributions, and it will be seen that the curve for men from North-East Greenland is very flat and non-distinctive, which is reflected in the high standard deviation and mean error. The rest of the curves present no striking deviations from corresponding normal distribution curves.

Between group I (the Inugsuk group) and group D (the crania from Crania Groenlandica) there is, on the contrary, a safe disagreement in

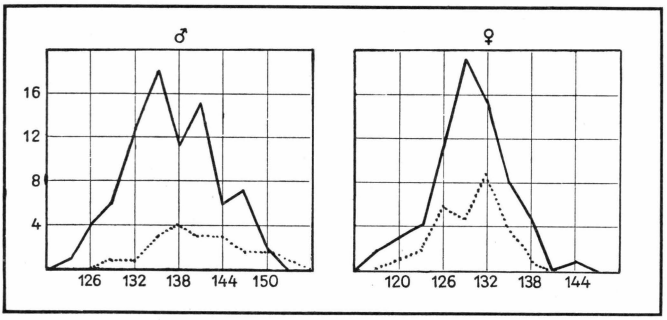

Fig. 18. Bizygomatic Breadth. ——— Inugsuk ····· North-East Grld.

the case of both men and women, with t-values of 2,87 and 2,68 ($0{,}01 > P > 0{,}001$).

Sup. facial breadth and *biorbital breadth* show no differences between any of the Greenland groups. There are no figures from Crania Groenlandica for comparison.

Neither does *the maxillar breadth*, table 30, show any disagreement between the pure Eskimo groups (I—II—III—A—B). Between the

Table 30. Maxillar Breadth. (M 46).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	82	100,8 ± 0,57	5,23	87–115	71	95,3 ± 0,55	4,58	86–107
II. North-East Greenland	21	100,1 ± 1,17	5,39	90–115	26	93,3 ± 0,93	4,74	87–107
III. Kap York Distr.	5	102,8 –	–	94–110	2	93,0 –	–	92–94
A. Inugsuk (Hoessly) ...	15	103,3 –	–	–	7	93,0 –	–	–
D. West Grld. (Cr. Groenl.)	115	102,7 ± 0,58	6,27	89–119	100	97,2 ± 0,52	5,23	83–113

	Males & Females		
	n	M	var.
B. North-East Greenland (Pansch).....	6	98	84–108

pure Inugsuk groups and the mixed groups from West Greenland there is, on the other hand, a difference between the means of 1,9 mm, for both men and women. The corresponding t-value may be calculated at 2,41 and 2,56 ($0{,}02 > P > 0{,}01$), so that the difference, although not significant, however borders hereon.

The facial height is given to the lowest point of partly the upper jaw, and partly the lower jaw.

Table 31. Sup. Facial Height. (M 48).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	85	74,3 ± 0,43	4,00	67–85	73	69,0 ± 0,46	3,95	60–78
II. North-East Greenland	18	73,7 ± 0,71	3,00	67–79	24	68,1 ± 0,82	4,03	61–74
III. Kap York Distr.	6	72,3 –	–	68–80	3	69,7 –	–	67–75
A. Inugsuk (Hoessly) ...	16	76,2 –	–	–	8	68,3 –	–	–
D. West Grld. (Cr. Groenl.)	104	75,1 ± 0,45	4,20	64–86	94	71,1 ± 0,45	4,29	58–81

Table 31 shows the conditions of the *sup. facial height.* There is no decisive difference between any of the pure Eskimo groups. The only mean showing a fair-sized divergence is the figure for Hoessly's male crania, which we know on the whole have appeared bigger than the rest. Between the Inugsuk crania and the crania from Crania Groenlandica there is, in the case of the men, a rather small, in the case of the women, a somewhat larger disagreement. In the latter case it is significant, as its t-value may be calculated at 3,30 ($0{,}01 > P > 0{,}001$).

The entire *facial height* shows no important divergencies between any of the groups, neither so between the pure Inugsuk crania and the mixed ones from Crania Groenlandica.

The proportion between the facial height and -breadth finds expression in 3 indices: facial index (facial height/bizygomatic breadth), Kollmann's sup. facial index (sup. facial height/bizygomatic breadth), and Virchow's sup. facial index (sup. facial height/maxillar breadth).

Table 32. Sup. Facial Index (Kollmann). (M 48/M 45).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	79	54,0 ± 0,35	3,14	47,0–61,8	65	53,2 ± 0,37	2,98	46,7–57,8
II. North-East Greenland	17	53,0 ± 1,02	4,19	47,9–63,8	22	53,7 ± 1,01	4,74	44,2–65,8
III. Kap York Distr.	6	50,8 –	–	47,9–56,3	3	53,8 –	–	52,3–54,9
A. Inugsuk (Hoessly) ...	13	54,1 –	–	–	8	53,5 –	–	–
D. West Grld. (Cr. Groenl.)	85	53,8 ± 0,32	2,86	47,4–60,9	72	53,8 ± 0,41	3,45	44,2–61,4

Table 33. Facial Index. (M 47/M 45).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	56	89,4 ± 0,64	4,77	78,5–101,5	40	88,8 ± 0,72	4,58	77,4–96,9
II. North-East Greenland	13	87,3 ± 1,48	5,34	78,9–97,7	16	87,1 ± 1,32	5,26	78,3–96,0
III. Kap York Distr.	3	82,6 –	–	81,5–83,8	–	– –	–	–
A. Inugsuk (Hoessly) ...	6	86,5 –	–	–	4	84,7 –	–	–
D. West Grld. (Cr. Groenl.)	65	87,5 ± 0,59	4,77	75,6–96,9	58	88,1 ± 0,67	5,11	77,8–100,0

None of these indices show disagreements between any of the groups available. The figures for facial and sup. facial index (Kollmann's) are found in tables 32—33.

The distribution of sup. facial index appears from fig. 19. The curve for the North-East Greenland crania is seen to be somewhat broad and irregular, which we find again in the rather high standard deviations and mean errors. Thus we have found *a small difference in the length between the North-East Greenland female crania and the Inugsuk female crania. Otherwise there are no differences between any of the groups of pure Eskimo crania* from Greenland, neither for men nor for women.

The late crania from Crania Groenlandica show, on the other hand, significantly higher facial length and -breadth for both sexes than the Inugsuk crania, and a height difference that just reaches the limit for significance.

None of the facial indices show differences of importance between any of the groups, which agrees very well with the fact that the facial skeletons of the late crania larger than those of the original Eskimo crania, in all directions.

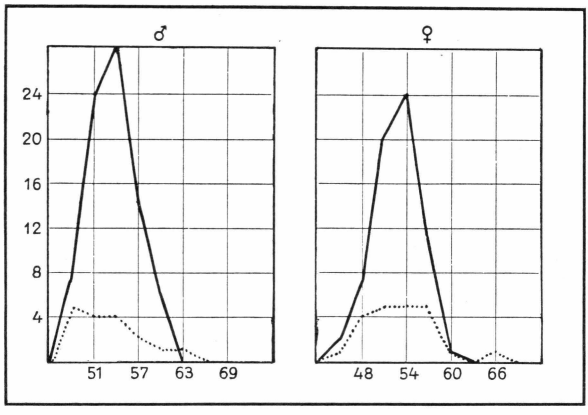

Fig. 19. Sup. Facial Index ——— Inugsuk ····· North-East Grld.

Orbitae.

The orbital breadth is by some investigators measured from dacryon, by others from maxillo-frontale. In the present it has been measured from maxillo-frontale. The same is the case in Crania Groenlandica, where, however, dacryon breadth, too, is entered.

Table 34 shows the values for orbital breadth. Very good agreement is seen between all 5 groups in the case of both men and women.

Table 34. Orbital Breadth. (M 51).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	90	43,2 ± 0,22	2,03	38–47	77	41,7 ± 0,22	1,96	35–46
II. North-East Greenland	21	44,0 ± 0,35	1,58	41–48	27	41,3 ± 0,35	1,81	38–46
III. Kap York Distr.	6	44,8 –	–	44–46	3	41,3 –	–	38–44
A. Inugsuk (Hoessly) ...	16	44 –	–	–	9	42 –	–	–
D. West Grld. (Cr. Groenl.)	107	43,0 ± 0,26	2,80	37–50	88	41,4 ± 0,26	2,50	35–47

Table 35 shows *the orbital height*; also this measure presents, on the whole concordant means. There is, however, a distinct difference between men from North-East Greenland and from the Inugsuk area. The difference is significant with $t = 3{,}61$ $(0{,}01 > P > 0{,}001)$.

The distribution curves appear from fig. 20, they seem to affirm the disagreements found.

Table 35. Orbital Height. (M 52).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	90	35,9 ± 0,20	1,89	32–40	77	34,9 ± 0,22	2,02	30–39
II. North-East Greenland	21	37,5 ± 0,33	1,50	35–40	28	35,5 ± 0,40	2,09	32–41
III. Kap York Distr.	6	36,0 –	–	35–37	3	35,0 –	–	33–37
A. Inugsuk (Hoessly) ...	16	34,4 –	–	–	9	33,6 –	–	–
D. West Grld. (Cr. Groenl.)	116	36,3 ± 0,20	2,19	31–44	99	35,4 ± 0,17	1,79	31–41

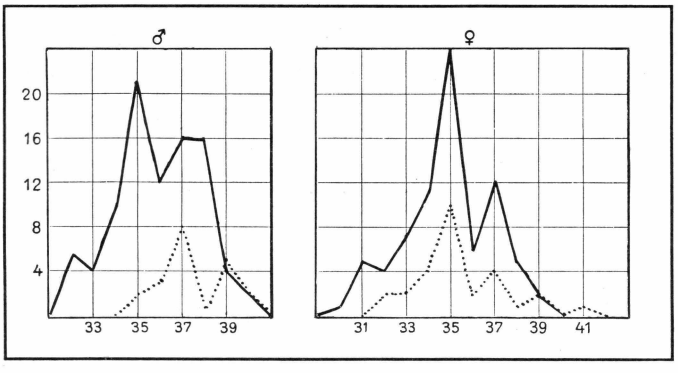

Fig. 20. Orbital Height ———— Inugsuk ..... North-East Grld.

Table 36. Orbital index. (M 52/M 51).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	90	83,4 ± 0,52	4,89	70,2–95,0	77	83,6 ± 0,52	4,55	71,4–92,9
II. North-East Greenland	21	85,2 ± 0,88	4,02	77,8–93,0	27	85,9 ± 0,89	4,63	77,3–92,9
III. Kap York Distr.	6	80,3 –	–	77,8–84,1	3	84,8 –	–	79,5–88,1
A. Inugsuk (Hoessly) ...	16	78,5 –	–	–	9	80,2 –	–	–
D. West Grld. (Cr. Groenl.)	105	84,5 ± 0,57	5,76	68,8–100,0	87	86,0 ± 0,61	5,65	73,8–102,8

The size of *orbital index* appears from table 36. There appear to be moderate differences between groups I and II; they are, however, not big enough to be significant. Between the Inugsuk group and the mixed West Greenland group we also find disagreements, in the case of the women significant ($t = 3{,}00$, $0{,}01 > P > 0{,}001$).

Index for Hoessly's series lies somewhat lower than the rest, which tallies with the breadth being larger, and the height smaller, than in the rest of the groups.

Table 37. Post. Interorbital Breadth. (M 49).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	81	21,5 ± 0,22	1,92	18–26	65	20,1 ± 0,20	1,53	17–24
II. North-East Greenland	18	21,2 ± 0,49	2,08	18–26	23	20,1 ± 0,41	1,95	17–24
III. Kap York Distr.	6	21,2 –	–	20–22	3	20,3 –	–	19–21
A. Inugsuk (Hoessly) ...	16	21,9 –	–	–	4	20,5 –	–	–
D. West Grld. (Cr. Groenl.)	116	22,2 ± 0,20	2,03	17–28	100	21,3 ± 0,20	2,05	16–29

Table 37 shows the value of *post. interorbital breadth.* While all the pure Eskimo groups show almost identical means, the figure for the mixed West Greenland crania is somewhat higher. For men the difference is, however, not significant, but for women t may be calculated at 4,29 ($P < 0{,}001$).

Ant. interorbital breadth shows corresponding good agreement with the pure Eskimos, whilst in this case there are no figures for the mixed Greenlanders available for comparison.

Interorbital index, the proportion between interorbital breadth and biorbital breadth, shows, like the single components, no difference between the groups of pure Eskimo crania.

In Crania Groenlandica a much higher index is given, but Fürst & Hansen have in the numerator of the fraction used the post. interorbital breadth, and in the denominator a biorbital breadth which is a little lower than the one used here.

The Nose.

The following measures are available: Nasal breadth and -height and the minimum and maximum breadth of the nasal bones. The figures for *breadth and height* appear from tables 38 and 39.

There is practically no difference between the values for any of the pure Eskimos, neither for men nor for women. On the other hand, the means for the female crania from Crania Groenlandica are somewhat higher than for the pure Eskimos. The difference is just significant with t- 2,67 ($0{,}01 > P > 0{,}001$).

The nasal index, table 40, reflects the condition of the absolute measures and shows no reel differences between any of the groups, not even between the pure and the mixed West Greenlanders.

Min. breadth of the nasal bones presents no disagreement between any of the series. The same applies to *max. breadth.* In the case of this

Table 38. Nasal Height. (M 55).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	87	53,7 ± 0,30	2,81	47–61	75	49,8 ± 0,30	2,58	45–55
II. North-East Greenland	21	54,4 ± 0,63	2,91	48–58	28	50,0 ± 0,53	2,78	45–56
III. Kap York Distr.	6	54,2 –	–	51–59	3	50,7 –	–	49–52
A. Inugsuk (Hoessly) ...	16	56 –	–	–	9	51 –	–	–
D. West Grld. (Cr. Groenl.)	116	53,7 ± 0,28	3,06	48–66	97	51,0 ± 0,33	3,25	41–59

	Males & Females		
	n	M	var.
B. North-East Greenland (Pansch)	6	57	53–63

Table 39. Nasal Breadth. (M 54).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	88	22,9 ± 0,20	1,89	19–27	75	22,3 ± 0,17	1,38	19–25
II. North-East Greenland	21	22,7 ± 0,50	2,30	18–27	27	21,6 ± 0,32	1,66	19–26
III. Kap York Distr.	6	22,8 –	–	21–25	3	21,3 –	–	19–25
A. Inugsuk (Hoessly) ...	16	24 –	–	–	8	23 –	–	–
D. West Grld. (Cr. Groenl.)	118	23,2 ± 0,17	1,73	20–28	100	22,2 ± 0,20	1,93	18–29

Table 40. Nasal Index. (M 54/M 55).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	86	42,9 ± 0,48	4,44	34,4–52,9	75	45,1 ± 0,37	3,30	35,8–55,6
II. North-East Greenland	21	41,9 ± 1,07	4,90	34,0–51,0	27	43,2 ± 0,67	3,50	36,5–50,0
III. Kap York Distr.	6	42,3 –	–	35,6–47,2	3	42,0 –	–	38,8–48,1
A. Inugsuk (Hoessly) ...	16	43,6 –	–	–	8	44,6 –	–	–
D. West Grld. (Cr. Groenl.)	115	43,2 ± 0,33	3,55	36,3–54,9	98	43,9 ± 0,42	4,19	32,7–52,0

latter we have, however, no other figures for comparison. Neither does the proportion between the 2 measures, transversal index of the nasal bones, naturally enough, show disagreements of any importance whatever. The value of this index is no doubt on the whole very problematic, which appears from the variation breadth alone, which reaches 0—76,5, and the standard deviation, which, with a mean of about 40, lies round 14.

The Upper Jaw.

The shape of the upper jaw may be characterized by aid of *maxillo-alveolar length and breadth* and the *palate length and breadth* plus the *corresponding indices.*

Tables 41 and 42 show the values of the *palate length and breadth.* The length appears concordant for the pure Greenland material (I, II, III, and A), while the palate length of the mixed Greenlanders diverges considerably from the rest, being almost 1 cm larger. A difference so great would hardly be actually significant as a racial difference. It is no doubt due to a disagreement in the measuring, a fact quite conceivable, as in the present material the palate length is the smallest length measure one would think of taking. It can, however, not be fully determined, as Fürst & Hansen give no information as to the technique used by determination of this measure.

Table 41. Palate Length. (M 62).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	83	47,9 ± 0,35	3,21	39–54	71	45,8 ± 0,33	2,77	39–51
II. North-East Greenland	17	47,4 ± 0,62	2,58	42–52	23	44,5 ± 0,46	2,20	40–52
III. Kap York Distr.	6	48,8 –	–	46–51	2	43,5 –	–	42–45
A. Inugsuk (Hoessly) ...	16	47,9 –	–	–	7	45,8 –	–	–
D. West Grld. (Cr. Groenl.)	108	56,5 ± 0,35	3,62	47–63	97	54,8 ± 0,35	3,44	47–63

Table 42. Palate Breadth. (M 63).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	85	39,6 ± 0,30	2,73	34–46	74	37,8 ± 0,33	2,82	32–47
II. North-East Greenland	18	38,4 ± 0,99	4,17	28–46	24	36,0 ± 0,52	2,55	79–41
III. Kap York Distr.	6	39,2 –	–	35–46	2	36,0 –	–	35–37
A. Inugsuk (Hoessly) ...	16	38,6 –	–	–	7	35,4 –	–	–
D. West Grld. (Cr. Groenl.)	111	41,1 ± 0,32	3,38	33–48	98	39,7 ± 0,36	3,53	31–49

The palate breadth, contrary to the length, shows difference between the North-East Greenland and the Inugsuk crania, as well as between these and the mixed West Greenland crania from Crania Groenlandica. In the former case the difference is, however, only significant for women, $t = 2{,}77$.

Palate index shows for the pure Eskimos no safe differences between the mean values, whereas palate index for the crania from Crania Groen-

landica is considerably lower than the rest, which was to be expected from the difference found between the corresponding palate lengths.

Maxillo-alveolar length is for the male Inugsuk crania 2,2 mm larger than for the male North-Eastern crania, a difference which, with a t-value of 2,91 ($0{,}01 > P > 0{,}001$), is significant. The distribution curves affirm this difference and appear reasonably regular.

Maxillo-alveolar breadth closely follows the palate breadth. Thus there is a small, but apparently significant ($t = 2{,}84$, $0{,}01 > P > 0{,}001$), difference between the female crania from North-East Greenland and those from the Inugsuk area.

In *maxillo-alveolar index* none of the disagreements between its single components are found again; on the contrary, the means for the different groups prove to be very near to each other.

The Lower Jaw.

The breadth of the lower jaw may be expressed partly by the bicondylar breadth, and partly by the bigonial breadth. The most important of these 2 measures, that which most characterizes the whole shape of the face, is *the bigonal breadth.* Table 43 shows the values for this measure.

Table 43. Bigonial Breadth. (M 66).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	55	112,2 ± 0,94	6,98	97–129	48	102,8 ± 0,81	5,69	90–119
II. North-East Greenland	18	113,2 ± 1,73	7,32	97–126	16	101,4 ± 1,08	4,33	96–111
III. Kap York Distr.	3	112,7 –	–	109–116	–	– –	–	–
D. West Grld. (Cr. Groenl.)	54	112,3 ± 1,14	8,41	95–130	47	106,6 ± 1,01	6,90	90–120

	Males & females		
	n	M	var.
B. North-East Greenland (Pansch).....	3	106	104–109

As will be seen, the means for men are very near to each other, whilst for women there is a small non-significant difference between groups I and II, and a more considerable, no doubt real, difference ($t = 2{,}95$, $0{,}01 > P > 0{,}001$) between the Inugsuk crania and the mixed West Greenland crania. The mean for Pansch's 3 lower jaws lies between the figures for men and women from North-East Greenland.

Fig. 21 shows the distribution curves of the bigonal breadth. It will be seen that the curve for the female Inugsuk crania is rather irregular, with a double humped course. If we divide the lower jaws according to these 2 humps on the curve, in one group with a bigonial breadth of over 103 mm, and one with a bigonial breadth of under 103 mm, we find just the same that there are no local variations, but that the proportion between lower jaws with bigonial breadths of over and under 103 mm is reasonably the same in the different districts.

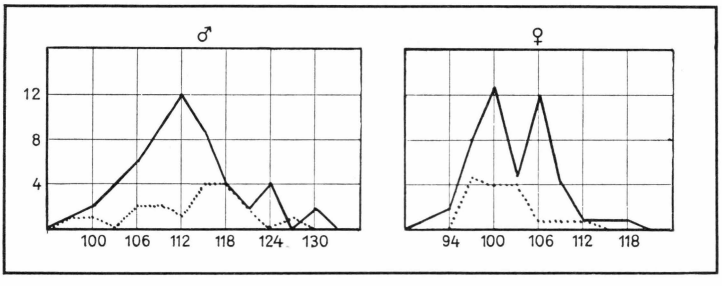

Fig. 21. Bigonial Breadth ——— Inugsuk ····· North-East Grld.

The bicondylar breadth follows the bigonial breadth fairly closely, and thus shows good accordance among all means for men, but differences among those of the women. None of these differences are, however, significant, although they tend in the same direction as in the case of the bigonial breadth.

Jugo-mandibular index, the proportion between bizygomatic breadth and bigonial breadth, shows no disagreements of any importance between the jaws from the Inugsuk area and those from North-East Greenland.

Neither does the *mental height of the lower jaw* show divergence between the North-East Greenland and the Inugsuk crania, nor between the latter and the mixed West Greenland crania.

The values for *ramus breadth and height* appear from tables 44 and 45. Between the male crania from the Inugsuk area and those from North-East Greenland there are no disagreements in the case of any of the 2 measures. We find, however, in both cases differences between the corresponding female crania, although this difference is only significant in the case of ramus breadth ($t = 2{,}91$, $0{,}01 > P > 0{,}001$). Ramus height for the mixed West Greenland crania is considerably higher than for the pure Inugsuk crania, both for men and women. The difference far exceeds the significance limit, so far that we have to consider if it may not be owing to a disagreement by the measuring. And it does in fact appear that Fürst & Hansen have measured ramus height right

Table 44. Ramus Breadth. (M 71).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	59	40,2 ± 0,39	2,97	31–47	47	38,3 ± 0,48	3,27	32–45
II. North-East Greenland	18	39,8 ± 0,52	2,21	35–44	18	35,9 ± 0,46	1,95	33–40
III. Kap York Distr.	3	42,3 –	–	41–44	–	– –	–	–
D. West Grld. (Cr. Groenl.)	86	40,9 ± 0,33	3,09	29–51	72	38,8 ± 0,37	3,16	32–46

from the plane of basis mandibulae, which is somewhat further down on ramus than the point from which the measure in the present investigation has been taken, and the differences between the means tally very well with the distances between the 2 points. Thus we may hardly speak of any racial disagreement in this case.

Table 45. Ramus Height. (M 70).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	58	58,8 ± 0,59	4,49	49–69	45	54,6 ± 0,51	3,42	47–61
II. North-East Greenland	17	58,5 ± 1,04	4,30	50–69	18	51,9 ± 1,14	4,84	43–61
III. Kap York Distr.	3	57,3 –	–	56–59	–	– –	–	–
D. West Grld. (Cr. Groenl.)	82	63,3 ± 0,65	5,83	49–76	69	59,4 ± 0,41	3,48	53–67

	Males & females		
	n	M	var.
B. North-East Greenland (Pansch).....	3	52	49–56

Ramus index shows no disagreements between any of the pure Inugsuk groups. No figures from Cr. Groenlandica are available for comparison.

The means etc. of *mandible angle* appear from table 46. The small differences existing between the different groups are in no case significant.

On the whole we have thus found *no disagreements between the lower jaws from the Inugsuk area and those from North-East Greenland, except for ramus breadth in the case of women*, where there is a small but significant difference.

Between the pure Inugsuk crania and the late crania from West Greenland we have found difference in bigonial breadth in the case of women, and

Table 46. Mandible Angle. (M 79).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	57	125,0 ± 0,89	6,73	108–139	48	124,9 ± 0,77	5,39	115–139
II. North-East Greenland	18	126,6 ± 1,62	6,67	113–139	18	127,8 ± 1,30	5,52	120–139
III. Kap York Distr.	3	117,0 –	–	115–118	–	– –	–	–
D. West Grld. (Cr. Groenl.)	84	122,7 ± 0,75	6,89	100–146	77	126,5 ± 0,81	7,14	111–149

	Males & females		
	n	M	var.
B. North-East Greenland (Pansch).....	3	120	115–124

in ramus height in the case of both sexes. In the case of ramus height the difference is no doubt due to a difference in the measuring.

The Profile Angles of the Face.

3 angles have been decided upon, namely *entire profile angle*, *nasal profile angle*, *and alveolar profile angle.*

Tables 47 and 48 show the values for entire profile and alveolar profile angles.

Table 47. Profile Angle. (M 72).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	76	83,8 ± 0,33	2,87	78–92	62	83,8 ± 0,39	3,00	76–90
II. North-East Greenland	17	83,9 ± 0,59	2,45	79–90	22	85,2 ± 0,55	2,56	80–90
III. Kap York Distr.	6	84,8 –	–	80–90	2	85,5 –	–	85–86
A. Inugsuk (Hoessly) ...	16	86,3 –	–	–	8	83,7 –	–	–
D. West Grld. (Cr. Groenl.)	106	83,3 ± 0,30	3,16	75–90	94	83,1 ± 0,32	3,12	75–90

Table 48. Alveolar Profile Angle. (M 74).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	73	78,2 ± 0,71	6,09	65–89	58	75,2 ± 0,84	6,40	64–89
II. North-East Greenland	14	80,1 ± 1,34	5,02	71–90	15	78,8 ± 1,50	6,13	69–88
III. Kap York Distr.	4	82,5 –	–	75–88	2	80,0 –	–	75–85
A. Inugsuk (Hoessly) ...	16	75,1 –	–	–	8	69,2 –	–	–

In no case do we find significant difference between the groups, neither so in the case of the nasal profile angle. Hoessly's values for the alveolar profile angles are rather low, but, together with the uncertainty due to the small number of observations, we must also here reckon with a fair possibility of divergencies in the measuring itself, as both terminii (prosthion and nasospinale) of the line, the inclination of which towards the horizontal plane we are measuring, are rather vaguely defined, and the distance between them only a couple of centimetres.

The Proportion between the Neuro and the Facial Cranium.

To illustrate this proportion different indices have been advanced: in the case of the lengths *alveolar index* (facial length/basis length), and in the case of the breadths *jugo frontal index* (minimum frontal breadth/bizygomatic breadth), *fronto orbital index* (minimum frontal breadth/sup. facial breadth, and *cranio facial index* (bizygomatic breadth/maximum breadth of the cranium), of which the latter no doubt is the most descriptive. However, none of them have proved of any great interest by the treatment of the present skeletal material, as none of them have shown differences between the 2 main groups, not even in cases where there are differences between the absolute measures. Tables 49 and 50 show the conditions in the case of alveolar and cranio-facial index.

Table 49. Alveolar Index. (M 40/M 5).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	80	97,4 ± 0,44	3,91	85,8–105,2	70	98,0 ± 0,41	3,42	88,0–104,3
II. North-East Greenland	18	97,8 ± 1,22	5,17	88,1–107,9	22	96,5 ± 0,70	3,29	89,4–103,8
III. Kap York Distr.	5	95,0 –	–	91,8–97,3	3	96,4 –	–	95,1–99,0

Table 50. Cranio-Facial Index. (M 45/M 8).

	Males				Females			
	n	M ± m	s	var.	n	M ± m	s	var.
I. Inugsuk area.....	83	102,5 ± 0,54	4,90	92,2–113,8	66	99,6 ± 0,54	4,34	89,5–109,9
II. North-East Greenland	20	102,6 ± 0,84	3,75	97,1–116,3	28	98,1 ± 0,66	3,46	90,2–103,2
III. Kap York Distr.	6	103,2 –	–	98,6–109,8	2	97,9 –	–	92,8–103,0
A. Inugsuk (Hoessly) ...	13	103,7 –	–	–	8	100,0 –	–	–

Summary.

The total result of the examination of the individual measures is thus seen to be this: in certain cases we find differences, and in other cases great likeness between the 2 pure Eskimo groups mutually, as well as between the early, pure, Inugsuk crania and the late, mixed, West Greenland crania.

As to the difference between the North-East Greenland and the Inugsuk crania, this is most clearly seen in the breadth of the neuro cranium, as the 3 most important breadth measures, as well as the horizontal circumference, are significantly larger for the North-East Greenland than for the Inugsuk crania, both for men and women. Also in height there is a difference between the groups, though not so distinct as in the breadth, as the North-East Greenland crania are lower than the Inugsuk crania. Between the length measures, on the other hand, there is no disagreement of importance. According to the proportions of the individual measures, breadth-height index should be the index most distinctly reflecting the difference, and this also proves to be the case. There are, however, also minor differences between length-height and length-breadth index of the groups, though in the case of the latter they are not significant. In table 51 we find the most important differences.

Table 51. The Most Important Differences between Inugsuk and North-East Greenland Crania:

		Maximum breadth	Biauricular breadth	Asterion breadth	Horizonsal circumfer	Basion-bregma height	B/H 100	H/L 100
Males	Inugsuk	133,6	125,5	108,5	521,1	138,7	103,8	73,3
	North-East Greenl.	136,9	130,0	113,0	532,1	137,7	100,8	72,5
Females	Inugsuk	129,8	120,7	104,9	499,8	133,0	102,4	74,2
	North-East Greenl.	132,4	123,1	107,6	503,5	130,4	98,4	72,6

In this connection it is of great interest to notice that Morant (67) and Woo and Morant (102) find that, by comparison between different cranial series, and particularly so between those of the Eskimos, the most important figures are exactly maximum breadth, breadth-height and length-breadth index.

Of other differences between the neuro crania of the 2 groups there is special reason to mention that on the North-East Greenland crania lambda is situated somewhat more to the front than on the Inugsuk crania. On the other hand we may hardly attach any safe importance to the differences between basis lengths and glabella-bregma angles for

women, although numerically they are significant, as in such case we should expect to find them by both sexes, and also in other measures, which is, however, not the case.

The facial measures show no decisive difference between the 2 main groups. In the case of the women there are, however, disagreements of statistic significance between a few scattered measures. It applies to sup. facial length, orbital height, ramus breadth, and palate and maxillo-alveolar breadth.

That is to say then that the North-East Greenland crania differ decisively from the Inugsuk crania by being broader and lower, and by having a larger horizontal circumference than the latter. Lambda is moreover situated more to the front on the North-East Greenland crania than on the Inugsuk crania. Finally there are various minor disagreements between the crania in these 2 groups.

Between the pure Inugsuk crania and the late crania from Crania Groenlandica the differences are found in the absolute size, rather than in the proportions. This applies to the neuro as well as to the visceral cranium. In the case of the neuro cranium we thus find the most important differences between the capacities, and between the horizontal, transversal, and median sagittal arches, where there are significant differences in the case of both the male and the female crania. (Table 52).

Table 52. The Most Important Differences between Inugsuk and Late West Greenland Crania:

		Capacity	Horizontal circumfer.	Transv. arch	Sagitt. arch.
Males	Inugsuk	1492,8	521,1	310,4	376,3
	Cr. Groenlandica ...	1535,7	524,2	314,3	378,5
Females	Inugsuk	1358,8	499,8	300,5	363,8
	Cr. Groenlandica ...	1446,9	508,8	306,7	369,8

There is, besides, a small difference in the triangle nasion-bregma-inion for both sexes, and also in maximum length and basis length for women.

Also the facial skeletons show disagreements in all 3 dimensions, facial length, height, and breadth (bizygomatic breadth, maxillar breadth, and bigonial breadth), and, in the case of nearly all these measures, for both sexes. Besides these we only find a very few minor disagreements between the 2 cranial series.

The crania from Crania Groenlandica thus prove to be somewhat larger than the Inugsuk crania in all directions, but their proportions

are the same. Not in a single case have we found significant difference in an index between these 2 groups.

Comparisons between the present cranial series and the materials of other writers have given the following result:

That Hoessly's figures in certain cases diverge somewhat from the rest of the Inugsuk figures. As a rule, however, the male and female crania show differences in opposite direction. The reason no doubt is that Hoessly's material originates from a single locality, a small island in the Sermilik fjord by Angmagssalik, and in a material of that kind family likeness may well assert itself to an exceptional degree, especially when it is a question of a locality so isolated as the present.

Pansch's crania come in most cases very near to the figures for men from North-East Greenland, so that we may presume that in the main it actually is a matter of male crania.

Comparison with Bessels's crania has not yielded any new information.

The Relationship between the Mediaeval Norsemen and the Eskimos.

Before levaing the questions about Greenland, it is fair to touch on the problem of a possible racial connection between the Eskimos and the mediaeval Norsemen.

The historical sources are, particularly in this respect, rather few. It is mentioned, however, that in the 15th century, during the decline of the Norse culture, there were Norsemen who fell away from their Christian faith and assumed the heathen mode of life. The Norsemen's connection with the Eskimos seems, on the other hand, not to have been of any peaceful kind. There are tales of frequent Eskimo assaults on Norse settlements, and of punitive expeditions sent out by the Norsemen against the Eskimos.

Neither have we so far been able to answer the question of what has happened to the last remaining Norsemen, and until this question is solved, we cannot exclude the possibility that they may have assimilated with the Eskimos, though it can hardly have been in any great number.

In the case of the Eskimos the archaeological conditions suggest a certain contact with the Norsemen, in such a way that the presence of certain Norse elements is part of the Inugsuk Culture. There is, however, nothing to indicate any intimate contact.

The anthropological investigations of Norse skeletons (Fischer-Møller, (19)) have not revealed any racial mixture of importance, even though a few crania show certain Eskimo-like features.

Thus according to existing information there should be small possibility of a mixture of races of importance for the Eskimos. To this may be added that at the time when the immigration of Eskimos into Greenland began on a large scale, the Norsemen were already declining, so that the numerical proportion between the 2 peoples decidedly must have been in favour of the Eskimos.

So as to elucidate once more this proportion, we have in the table below compared the most important cranial measures for the mediaeval Norsemen (Fischer-Møller (19)) with the corresponding measures for the 3 main Eskimo groups.

Table 53.

	Males				Females			
	Inugsuk	N.-East Greenl.	Cran. Groen.	Norse-men	Inugsuk	N.-East Greenl.	Cran. Groen.	Norse-men
Max. length	187,8	189,8	188,9	181,8	179,5	179,1	182,7	173,9
Max. breadth	133,6	136,9	134,5	139,3	129,8	132,4	131,4	137,6
Bas.-br. height	138,7	137,7	138,4	126,3	133,0	130,4	134,6	124,2
L-Br. index	71,2	72,2	71,1	76,6	72,4	74,0	72,0	79,1
Br.-H. index	103,8	100,8	105,4	90,5	102,4	98,4	106,5	90,6
Sup. facial height	74,3	73,7	75,1	70,8	69,0	68,1	71,1	66,9
Bizygom. breadth	137,3	141,0	140,0	128,9	129,6	129,7	131,8	123,4
Sup. facial index	54,0	53,0	53,8	55,6	53,2	53,7	53,8	54,6
Orbital breadth	43,2	44,0	43,0	41,3	41,7	41,3	41,4	39,9
Orbital height	35,9	37,5	36,3	33,0	34,9	35,5	35,4	32,7
Orbital index	83,4	85,2	84,5	80,5	83,5	85,9	86,0	82,2
Nasal height	53,7	54,4	53,7	49,0	49,8	50,0	51,0	48,2
Nasal breadth	22,9	22,7	23,2	22,0	22,3	21,0	22,2	21,5
Nasal index	42,9	41,9	43,2	44,9	45,1	43,2	43,9	44,9

As it appears, there is an extraordinary great difference between the figures for the Norsemen and for the Eskimos in all 3 groups. Only the nasal index shows fairly concordant values. It will furthermore be seen that none of the 3 Eskimo series is more like the Norsemen than are the others. Thus nothing seems to point to the fact that a mingling, leaving lasting marks in the Eskimo population, should have taken place between Eskimos and Norsemen.

VII. GENERAL DESCRIPTION OF THE GREENLAND CRANIA

Some of the qualities of the cranium cannot be expressed in figures, but will have to be described in verbal terms, in accordance with the general impression of the investigator concerned, and may then be roughly graded according to scales like this: below medium—medium —above medium. In the case of such qualities it is difficult to compare the results obtained by different investigators, for the very reason of there being a large subjective factor in the judgment. The investigator may with somewhat more safety compare 2 descriptions, both carried out by himself, although also in this case the result must be judged with some reservation.

In the following some features by the Eskimo cranium will be gone through, features not expressed in the measures and indices formerly dealt with. The main importance is attached to the description of, and comparison between, the various Greenland materials, and comparison with the (very scarce) results arrived at by other investigators has, because of the aforementioned great uncertainty attached hereto, only been carried out to a smaller extent.

Norma temporalis.

While Pansch (72) finds a marked *prognathy* on his crania from North-East Greenland, Fürst & Hansen (20) arrive at the result that light and heavy prognathy are found together on the Greenland crania, and that no special kind is typical. Hrdlicka (35) finds by comparison between different Eskimo groups that the degree of prognathy varies much, and is most strongly developed by the Lower Yukon and on Greenland, and least by Point Hope and by Hudson Bay. From table 54 it appears how the present material distributes itself according to a subjective classification as stated.

As is seen, most cases are classified as light or medium, although in the Inugsuk group many female crania show heavy prognathy. From the table on the means for the alveolar profile angles (table 48, page 80) the same appears, as the means for women in the Inugsuk group is 3°—5° lower than the rest. This must mean that the subjective

Table 54. Prognathy.

	Males				Females			
	None	Light	Medium	Heavy	None	Light	Medium	Heavy
Inugsuk	16	26	35	6	6	21	24	25
North-East Greenland	4	9	3	2	7	10	5	3
Kap York	3	2	1	0	0	1	2	0
Naujan	0	4	2	1	0	2	1	1

estimate regarding the prognathy just the same has been able to illustrate a difference, which expressed in figures is rather small, so maybe the corresponding investigations in the following will also be found to be of some value.

The profile of the nasal bones is as a rule straight or slightly concave, and nasion not very deep-lying. *The upper part of the facial profile* appears different for men and women, as the glabello-superciliary area of the male crania is more prominent and more powerfully modelled than that of the female crania, parallel to what we find by other races, but not so well pronounced. The forehead by the men is receeding or arched, by the women steep or arched. Although the different dome of the forehead by the 2 sexes is much used to distinguish between them, the frontal curvature angle shows remarkably enough (as shown in table 18, page 60) only a sex difference of a few degrees. The explanation is no doubt this, that although the forehead actually is more slanting on the male crania, the more powerful glabello-superciliary part, and the deeper lying nasion, are nevertheless causing the height over the nasion-bregma chord to become almost as high as on the female crania.

Behind bregma we find in certain cases a small depression in the profile line, *clinocephaly*. Table 55 shows the frequency hereof.

Table 55. Clinocephaly.

		Inugsuk	North-East Grl.	Kap York Distr.	Naujan
Males	number	22	5	1	0
	%	23	22	12	0
Females	number	20	13	1	1
	%	25	41	25	12

We see that clinocephaly is found on about 20 % of all the crania, on the female from North-East Greenland, even, to all appearance, more frequently still. The difference is, however, not significant ($0{,}05 > P > 0{,}02$).

This tallies very well with Fürst & Hansen's (20) observation that the Greenland cranium "often" shows "light clinocephaly".

Behind bregma the profile of the crown and the neck is in most cases smoothly arched, though the neck is now and again found to be more or less steep or sloping. Table 56 shows the frequency of the different shapes:

Table 56. The Shape of the Neck.

	Males				Females			
	Smoothly arched	Rather steep	Steep	Sloping	Smoothly arched	Rather steep	Steep	Sloping
Inugsuk	78	14	2	2	72	7	2	1
North-East Greenland	21	2	0	0	24	3	1	1
Kap York	7	0	0	0	4	0	0	0
Naujan	8	4	0	0	5	1	0	0

As a rule, however, the smooth arch is broken by a *knot, tuber occipitale*, which appears like a rounded forward vault in both norma temporalis, verticalis, and basilaris, as though drawing out the cranium to the back, though without any sharp points or edges.

Table 57. The Development of Tuber Occipitale.

	Males				Females			
	None	Small	Medium	Large	None	Small	Medium	Large
Inugsuk	1	32	23	40	1	27	36	17
North-East Greenland	0	8	4	11	0	6	15	7
Kap York	0	0	2	5	0	2	1	1
Naujan	0	2	3	6	0	4	1	1

As appears from the table, tuber occipitale is as a rule well developed, especially on the male crania, and reasonably uniform in the different groups. Already Winsløw (98) has drawn attention to this shape of neck, and later Quatrefage & Hamy (79), as well as Pansch (72) and Fürst & Hansen (20), have mentioned it as characteristi · for the Eskimos, especially the Greenlanders. Hrdlicka (32) has in a small collection of Indian crania found tuber occipitalis on 25 $^{0}/_{0}$.

Thickening of the edge of os tympani is a classic Eskimo mark. It is mentioned by Pansch (72) and by Fürst & Hansen (20), and Brierley and Parson (8) state that 10 of their 17 crania from West Greenland show thickening of pars tympanica. Stewart (91) has shown that this thickening is characteristic of the Eskimos and separates them from

certain Indian peoples. The cause of it must in his opinion be a hereditary predisposition; it cannot be explained as a result of the powerful development of the Eskimos' chewing apparatus or by their monotonous food. Finally, and partly in opposition to this, Oetteking (69) has found a great frequency of thickening of the edge of os tympani by North-West American Indians.

For the description of the thickening in the present material, measures have been taken of os tympani, partly vertically and partly horizontally. The results appear from table 58, where furthermore Stewart's figures have been entered. They are, however, not directly comparable, as Stewart has taken the 2 measures parallel and at right angles, respectively, with the length axis of porus acusticus externus. There is, however, hardly any considerable disagreement, as the length axis of porus acusticus externus as a rule only diverges little from the plumb-line.

Table 58. The Thickness of the Edge of Os Tympani.

	Horizontal								Vertical							
	Males				Females				Males				Females			
	n	M	m	var.	n	M	m	var.	n	M	m	var.	n	M	m	var.
Inugsuk area	97	2,8	± 0,10	1–5	81	2,8	± 0,10	1–5	97	5,9	± 0,14	2–10	81	6,5	± 0,17	3–10
North-East Greenland .	21	2,8	± 0,22	1–5	29	2,8	± 0,14	2–4	21	5,0	± 0,36	2–8	29	5,2	± 0,26	3–9
Greenland (Stewart) ...	38	3,3	± 0,09	–	48	3,4	± 0,09	–	38	6,8	± 0,18	–	48	7,3	± 0,15	–
Alaska (Stewart)	50	3,6	± 0.09	–	50	3,4	± 0,12	–	50	7,7	± 0,17	–	50	7,6	± 0,17	–

It is seen from the table that the horizontal measure is the same for the 2 Greenland main groups, both for men and women 2,8 mm. This figure is somewhat lower than Stewart's, both for Greenland and Alaska. The vertical measure is somewhat higher for the Inugsuk crania than for the North-East Greenland crania, for men as well as for women. The difference is significant in the case of the women ($t = 4{,}14$, $P < 0{,}001$). The distribution curves for the vertical measure appear from fig. 22, which also shows that the thickness of the edge of os tympani may be right up to 1 cm. In this case there is no safe difference between the Greenland figures from the Inugsuk area and those of Stewart's.

Pterion, the junction between os frontale, os parietale, os temporale, and ala magna ossis sphenoidalis, shows in the present material in 2 cases a contact between os frontale and os temporale, but everywhere else the characteristic H-shape. Oetteking (69) gives the frequency for the different races at between 1 and 20 %, so this configuration in unusual by the Eskimos in the present material. Temporo-frontal contact is

generally considered a sign of primitivity, is for instance quite common among the anthropoid apes. So in this respect the Eskimo cranium is far from primitive.

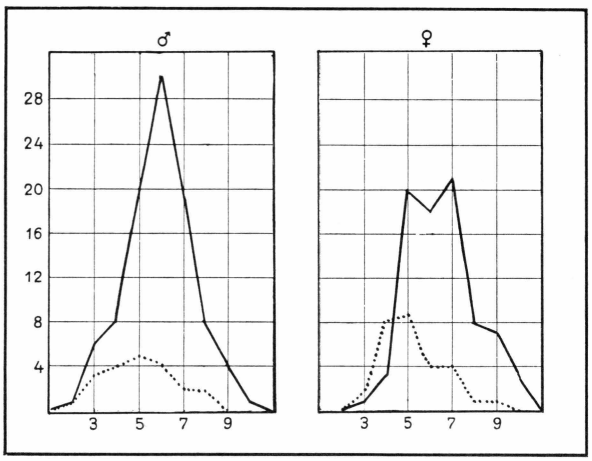

Fig. 22. The Edge of Os Tympani ——— Inugsuk ····· North-East Gr.

In some cases the H-shape shows a special design, as we often find small *sutural bones in pterion.* The frequency appears from table 59.

Table 59. Sutural Bones in Pterion.

	Males			Females		
	None	One-sided	Doubl.-sid.	None	One-sided	Doubl.-sid.
Inugsuk	56	2	8	35	5	9
North-East Greenland.....	9	1	2	8	3	2
Kap York	3	0	1	0	0	1
Naujan	1	1	1	3	0	0

As will be seen, sutural bones are found in pterion in nearly $^1/_3$ of all the cases where we have been able to judge pterion. In many cases this part of the cranium has been so defective, or the sutures so indistinct, that it has been impossible to form a judgment.

Norma verticalis.

The circumference of norma verticalis varies between pentagonoid, ovoid, and ellipsoid with all the shades between, approaching brisoid in 2 cases only. Fürst & Hansen (20) likewise find all the crania in Crania Groenlandica ovoid—ellipsoid. The same applies to Stewart's (92) Labrador crania. As first pointed out by Retzius (80), the most conspicuous

part in norma verticalis is the very broad zygomatic arches, so that in many cases the maximum breadth of the whole cranium is the bizygomatic breadth.

Norma occipitalis

is typically house-shaped with parallel walls and a high roof. In some cases, however, the cranium is more rounded, so that the shape in norma occipitalis becomes more arcade-like.

Norma basilaris

according to its nature, shows the same outline as norma verticalis, but besides this there are certain conditions by basis cranii externa that deserve special comments.

Thus *fossae mandibulares* are considered to be particularly flat by the Eskimos. Table 60 shows the conditions in the material examined here.

Table 60. Fossae Mandibularis.

	Males			Females		
	Deep	Medium	Flat	Deep	Medium	Flat
Inugsuk	11	49	38	14	27	40
North-East Greenland	1	13	7	3	9	17
Kap York	0	0	6	0	2	1
Naujan	1	4	7	1	3	4

We see that there is a considerable majority of medium deep and flat fossae mandibularis, especially in the case of the female crania, where the flat decidedly dominate in both main groups. On the other hand there is no safe difference between the main groups. The difference between the male and female crania is, however, not significant by a comparison by aid of the $\varkappa^2$ test ($0{,}1 > P > 0{,}05$).

The shape of foramen magnum as a rule is elliptic (about 65 %), though in a number of cases almost pear shaped (25 %), and more seldom circular (10).

Processus mastoidei are generally rather small, especially on the female crania; absolute figures cannot be given.

Norma frontalis.

It is in this norm that the characteristic Eskimo features stand out most distinctly, so that we often, merely by looking at a cranium from in front, can determine if it is an Eskimo cranium. As a rule the outline is pentagonal with an angle at the top, corresponding to the keel-shaped

crown, and 2 angles on each side, corresponding to the broad zygomatic arches and to the obtuse angles of the lower jaw.

Scaphocephaly, keel-shaped crown, has since Winsløw's (98) time held a central position in the description of the Eskimo cranium. Winsløw writes of the cranium from Hundeø: "le sommet du crane aigu ou en angle". Pansch (72) finds extreme scaphocephaly on his North-East Greenland crania, and the same applies to the West Greenland crania of Brierley and Parson (8). Duckworth and Pain (14) remark that scaphocephaly is typical for the Eskimos, and is here, contrary to what we find by other races, not combined with a too early closing of sutura sagittalis. Also Fürst & Hansen (20) and Stewart (92) state the fact that scaphocephaly is prominent in their cranial material. In the material examined here we have attempted at a graduation of this characteristic, as shown in table 61.

Table 61. Scaphocephaly.

	Males				Females			
	None	Light	Medium	Heavy	None	Light	Medium	Heavy
Inugsuk	0	26	33	40	2	26	31	23
North-East Greenland	1	3	12	7	0	20	5	4
Kap York	0	1	2	4	0	1	1	2
Naujan	0	5	4	3	0	3	3	1

As appears, the development of this crest of the crown is most pronounced by the men in all groups, and appears to be more distinct in the Inugsuk and Kap York groups than in the North-East Greenland and the old Thule Culture groups. Otherwise scaphocephaly is seen to be lacking entirely on 3 crania only out of the whole material.

In nearly all cases the localization of the crown crest is along sutura sagittalis, but on a single cranium it is, however, most distinct right in front of bregma, so that we may almost speak of a frontal crest. That the scaphocephaly is not due to too early closed sutures, appears from the fact that it is found on numerous crania with entirely open sutures, and even on a few non-developed infant crania, though considerably less developed on these latter. The Sarasin craniogrammes are very suitable for judging the degree and localization of the scaphocephaly. A typical example is shown in fig. 49.

Orbitae are, as it appears from the measures, large and high, at times almost quadratic.

Fissurae orbitales inferiores immediately give a very broad impression (fig. 27), which was already pointed out by Retzius (80), but has

been noticed by later writers. So as to be able to judge the size better, we have in the present material taken a breadth measure (the maximum breadth at right angles with the length axis of the fissure). Table 62 shows the result hereof.

Table 62. The Breadth of Fissura Orbitalis Inferior.

	Males			Females		
	n	M m	var.	n	M m	var.
Inugsuk	81	6,5 ± 0,20	2–12	70	6,9 ± 0,24	3–12
North-East Greenland	16	6,9 ± 0,50	4–10	23	7,3 ± 0,36	4–11
Naujan	12	6,9 ± 0,53	3–9	5	7,6	4–14

It is seen that the breadth on the whole is just under 7 mm, a little higher for women than for men, and a little higher for the North-East Greenland than for the Inugsuk crania. The differences are, however, in no ways significant.

The lateral demarcation of fissura orbitalis inferior is in most cases, though not in all, os zygomaticum. In the exceptional cases we frequently find a small sutural bone as demarcation of the fissure.

Hoessly (28), Oetteking (69), and several others consider large, flat *fossae caninae* as being characteristic of the Eskimo crania. Contrary to this, Pansch (72) nevertheless finds deep fossae on the North-East Greenland crania, while Fürst & Hansen's (20) investigations show that both deep and flat fossae are usual, while shapes between the two are rare. The present material affirms Fürst & Hansen's result. In all cases fossae caninae are large, and maybe this, more so than their possible shallowness, is what determines the large flat impression of the Eskimo facial skeleton as a whole.

The nose is high and narrow, and the nasal bones as a rule very narrow. In a single case they are even so small that processus frontales of the 2 maxillae meet at the top.

The lower demarcation of apertura pyriformis is of special interest in phylogenetic respect. The highest stage of development is a very sharp edge, as found by Europeans, the lowest stage, that there is no lower demarcation at all, but that the floor in cavum nasi in a furrow passes smoothly into the front plane of processus alveolaris, as it is found very pronounced by the anthropoid apes. By the Eskimos a suggestion of a sulcus praenasalis (fig. 28) of this kind is often found, though of course not to the same degree as by the said apes. In certain cases, finally, we find a small fossa praenasalis, which is also a sign of primi-

tivity. Fischer-Møller (17) and Hrdlicka (31) have both mentioned sulcus praenasalis and found that it is rather usual to find it on Eskimo crania. Table 63 shows the shape of the lower demarcation of apertura pyriformis in the present material.

Table 63. Lower Demarcation of Apertura Pyriformis.

	Males			Females		
	Anthrop.	Fossa	Sulc.	Anthrop.	Fossa	Sulc.
Inugsuk	30	6	48	15	3	50
North-East Greenland	9	3	7	14	1	9
Kap York	5	0	1	0	0	2
Naujan	6	1	5	2	0	3

As it appears, a sulcus praenasalis is found on more than half of the Inugsuk crania, and especially by the women this shape is frequent. The North-East Greenland crania more frequently show an antropin lower demarcation of the aperture. The difference between the North-East Greenland and the Inugsuk crania is, in the case of the women, significant ($P < 0{,}001$).

The lower jaw is big and powerful with very great bigonial width. In some cases the robust appearance is accentuated by some peculiar *edges on the chin* (fig. 30). They have previously been mentioned by Søren Hansen (23), and in the present material are found exclusively on male jaws, and far more frequently in the North-East Greenland group than in the Inugsuk group.

Altogether the *Inugsuk cranium* (fig. 23—24) appears in norma frontalis as large, high as well as broad, with a well developed crown crest, broad zygomatic arches and a broad lower jaw. Orbitae are large, rather high, with broad fissurae orbitales inferiores, which laterally as a rule are demarcated by os zygomaticum. The nose is high and narrow, and the lower demarcation of apertura pyriformis is frequently obtuse, like a sulcus praenasalis. Fossae caninae are large and may be flat or deep. In a few cases the male crania have some peculiar edges on the chin.

The North-East Greenland cranium (fig. 25–26) resembles, broadly speaking, the Inugsuk cranium, but the crown crest is not so well developed, and the lower demarcation of apertura pyriformis is more often antropin than shaped like a sulcus. And edges on the chin, finally, are found much more frequently on the North-East Greenland than on the Inugsuk jaws.

The Conditions of the Sutures.

In determining the age of crania we avail ourselves, as already mentioned (page 36), of the ossification degree of the sutures, as it appears that the sutures close in a fixed succession and at different ages. The 3 age groups, adultus—maturus—senilis, thus correspond to open—partly closed—and entirely closed sutures, as we limit our investigation mainly to sutura sagittalis, coronalis, and lambdoidea. For Europeans, adultus answers an age of 20—35 years, maturus 35—55 years, and senilis ages over 55 years. For the Eskimos we know nothing for certain regarding the time for the closing of the sutures. Søren Hansen (23) is of the opinion that the sutures by the latter close very early, about the age of 30, but does not give any reasons for this assumption. Pansch (72) found the sutures closed on most of the adult crania in his East Greenland series.

Even though we do not know its exact connection with the age of the individual, the ossification degree of course naturally gives information as to the period of growth, that is the biological age of the individual.

In a few single cases in the present material the sutures do not show the usual ossification pattern. Thus on a cranium from North-East Greenland sutura sagittalis has entirely disappeared, while the rest of the sutures, and also synchondrosis sphenobasilares, are quite open. And on a cranium from Kap York all sutures are closed, whilst the shape is so typically infantile that we cannot believe that it originates from a grown up individual.

Metopism is found only on one single of all the Greenland crania. This is in good agreement with Martin's (55) and Oetteking's (69) information, according to which metopism is rare with primitive people, especially in America, and more usual with Europeans. In agreement herewith Torgersen (95) has shown that metopism is far more frequent on Nordic (10 %) than on Lapp crania (3 %). There are no other signs of lacking fusion of bones of normal double sided predisposition on the said Greenland cranium.

A lot of *sutural bones* are found in the sutures of the crania examined, especially in places where several meet. The largest are found by lambda, where we find sutural bones on about 10 % of all the crania. In 2 cases there is a rather large os bregmaticum; in both cases it is a matter of male crania, one from North-East Greenland, the other from the Inugsuk area. Oetteking (69) has found a few single cases of os bregmaticum in his great material of North-West Indian crania, and Hrdlicka (32) has found it on 1 % of his Lenape crania.

On $^1/_3$ of the present crania there are small bones by the lateral demarcation of fissura orbitalis inferior, and in the same way there are

small sutural bones on $^1/_3$ of the crania, on the spot where os temporale, parietale, and occipitale meet. Finally we have, as already pointed out, found sutural bones in pterion on 20—30 % of the crania.

This means that the sutural bones are found just in the places where by the birth there normally are defects of the bony wall of the cranium, corresponding to the 6 fontanelles.

Judging from these investigations we thus find a difference between the North-East Greenland and the Inugsuk crania in the shape of the crown crest, in the demarcation of apertura pyriformis, and in the shape of the chin. But otherwise there is good agreement between the 2 groups mutually, and between these and the, scarce, other Eskimo material available for comparison.

As regards the primitivy of the Eskimos, we may say that *the characteristic general sulcus praenasalis and the unusual metopism are typical signs of primitivity, while on the other hand the condition of the sutures by pterion is characteristic of a high stage of development, racially.*

Keel-shaped crown, broad fissurae orbitales inferiores, and thicknened edges of os tympani are found very frequently on Eskimo crania, whilst flat fossae mandibulares and flat fossae caninae are hardly so characteristic for Eskimos as hitherto presumed.

VIII. COMPARISON BETWEEN GREENLAND CRANIA AND OTHER ESKIMO, ASIATIC, AND INDIAN CRANIA

Having gone through the racial conditions on Greenland and determined the 2 main types, it must be our object to compare the Greenland skeletons with other Eskimo skeletons. In the survey of the existing literature we have already pointed out the most suitable materials. It is a matter of:

"Old stone grave" skeletons from Labrador (Stewart (92))
Southampton Island crania (Hrdlicka (31))
"Old Igloo" skeletons from Point Barrow (Hrdlicka (35))
Crania from Gambell on St. Lawrence Island (Hrdlicka (39))
Early crania from Point Hope (Hrdlicka (39))
Late crania from Point Hope (Hrdlicka (39)).

The earliest of the crania are from Gambell, from the old Bering Sea Culture. Then comes the "Old Igloo" series from the Birnirk period, and a little later, the Thule Culture skeletons from Southampton Island. The Labrador skeletons are so old that they are unmixed, but may not be safely referred to any culture period. The 2 series from Point Hope are likewise not dated, but have been included here, partly because of their size, partly because the late possibly may originate from new immigrated Thule Culture Eskimos.

Besides these we have 2 newly examined groups. They are:

Group IV: skeletons from Naujan (Thule Culture)
Group V: skeletons from Alaska (recent).

The Naujan skeletons have previously been published by FISCHER-MØLLER (17), but have been re-examined, partly as a single new one has been added, and partly because the sex division has been re-arranged a little, and the measures finally corrected.

The few skeletons from Alaska are only a couple of centuries old, but no doubt from before the last immigration to the Point Hope area, from where the greater part of them originate.

As described in the introduction we must, judging by the archaeological conditions, assume that the Eskimos originate from Asia, more precisely from the areas round the great Siberian rivers, from where they have wandered to America during the last milleniums before Christ. Therefore it will be of interest to compare the Eskimo skeletons with skeletons from Asia. There is a rather copious literature on the physical anthropology of Asiatic people, but in this connection it will be of special importance to compare, partly with prehistoric cranial series, especially from the regions round the Siberian rivers, partly with modern Mongols, especially those living nearest to the Bering Sea. WOO and MORANT (102) have collected measures for altogether 26 cranial series from the whole of the Asiatic continent and the surrounding islands. They have combined them and compared the groups by aid of "the coefficient of racial likeness". They have arrived at the result that all the peoples examined from Siberia and Mongolia form one great, reasonably uniform group of people, the prehistoric and recent Chinese crania another group, which differs somewhat from the Mongol-Siberian group, and the crania from Tibet, Nepal, the Philippines, and the South Sea Islands have each their own distinguishing marks, but these populations have either been entirely isolated or are, just the contrary, mixed with the neighbouring people (Hindues f. inst.). Going through Woo and Morant's description of the cranial series, we find of fair-sized series suitable for comparison with the Eskimos, DAVIDSON BLACK'S (6) prehistoric Chinese crania and the same auther's 86 recent male crania from the northern parts of China, Hrdlicka's collection from Urga in Mongolia, and finally a small series of Tschuckt crania. The Tschuckts are the Eskimos' nearest Asiatic neighbours.

Still more important are, however, 76 neolitic Siberian skeletons, described by HRDLICKA in 1942 (38). Hrdlicka states, regarding the conditions by the finds, that the skeletons may with great safety be referred to neoliticum, at anyrate to before the year 2000 B.C., which means that the skeletons originate from the regions where it is thought that we must seek the Eskimos' original home, and from about the time for their exodus from here. Hrdlicka has compared these skeletons with various Eskimo series and with some recent Siberian, and found that they are closely related to the Eskimos, but differ to some degree from the now living population in Siberia.

Among HRDLICKA'S recent series we find partly the one previously mentioned from Urga in Mongolia (38), partly a collection of Tschuckt crania, much larger than Woo and Morant's, and no doubt comprising some of the crania examined by these investigators. Hrdlicka finds that there is so great likeness between Tschuckts and Eskimos (from St.

Lawrence Island) that we may with full safety consider the Tschuckts to be Eskimos by build, even though culturally they differ from the latter. MONTANDON (66) had already in 1926 advanced an assumption to this effect, out from studies of a much smaller bone material.

According to the present we have the following Asiatic series for comparison with the Eskimos:

Prehistoric Siberian skeletons (Hrdlicka (38))
Prehistoric Chinese skeletons (Davidson Black (6))
Recent Mongol crania (Hrdlicka (38))
Recent Chinese crania (Davidson Black (6))
Recent Tschuckt crania (Hrdlicka (38)).

Finally, a comparison between Eskimos and Indians will be of importance, as both peoples no doubt originate from Asia, and because, as mentioned in the survey of the literature, SELTZER (85) and SHAPIRO (86), by their examination of living people, believe to have shown that certain Indian tribes are so closely related to the Eskimos, physically, that we must presume that the Eskimos simply are members of these tribes, who years back have wandered north and thus have been forced to change their mode of life. As mentioned, STEWART has however gone against this theory, and, as it seems, for good reasons.

The Indians in question are the nearest neighbours of the Eskimos, namely, westwards, Athapaska- and, eastwards, Algonqin tribes. There are only very few examinations of the skeletons of these Indians, as of Indian skeletons on the whole. Thus BONIN and MORANT (7) have found no examinations whatever fit for use of Canadian tribes, and only scattered publications of measures of Algonqin skeletons. From Western America they have collected a number of Californian cranial series, but none from Canada nor Alaska.

The most important of the Algonqin skeletons were originally published by HRDLICKA (32). More precisely it is a matter of Iroqeese, who according to their build clearly belong to the Algonqin group.

From Western America it would be natural to choose a series of Sho-Sho crania for comparison, as these are the most northern that are reasonably well examined (HRDLICKA (34)).

OETTEKING's (69) great and very detailed work on crania from "the north pacific coast" would have been excellently well suited, if the individual series had been somewhat larger. If we try to remedy this scarcity by pooling some of the groups, this does not prove justifiable, as the individual series show very great mutual disagreements.

HRDLICKA's measures of "Athapascans" are likewise too few in number to be given any importance in this connection.

The comparison between Eskimos and Indians must therefore, in the case of the Indians, be confined to comprise 2 cranial series, namely

Iroqeese crania (Algonqin) (Hrdlicka (32))
Sho-Sho crania (Hrdlicka (34)).

The best measure for the size of the cranium is the *capacity*, but even small defects in the wall of the cranium complicates the determination hereof, so that the number of observations in each series becomes rather small. Besides, many investigators entirely omit to determine the capacity. The comparison material therefore becomes small, as is seen from table 64, where furthermore only 6 of the means are based on more than 20 single observations. The only fact that may be safely deducted from this comparison, is that the Mongol crania are somewhat larger than the Eskimo crania.

Table 64. Capacity.

	Males	Females
Point Hope (late)	*1474*	*1316*
Naujan	1492	1325
Inugsuk	*1493*	*1359*
South. Isl.	1558	—
Mongols	*1573*	*1403*
North-East Greenland	1578	1353
Alaska	1610	1418

Instead of the capacity we may use *modulus* L + B + H/3 to express the size of the cranium. In this way we manage to include a considerably greater number of crania in the judgment, but fail to obtain differences in basis and in the curvatures of theca. It appears from table 65 that the Eskimo crania generally are somewhat smaller than the Asiatic, and especially the figures for the Inugsuk and Labrador series are among the lowest.

Maximum modulus is found for the prehistoric Siberian crania. The figures for the Indians are rather small.

If we consider the proportions regarding the *maximum length*, it will be seen (table 66) that the Chinese crania, prehistoric as well as recent, are considerably shorter than any of the rest, and that the prehistoric Siberian crania are considerably longer; all the other series are reasonably near to each other, although the Mongols, the western Eskimos, and the Indians are somewhat shorter, and the 2 Thule Culture groups, the North-East Greenland group, and the Old Igloo crania somewhat longer than the middle group, consisting of the Inugsuk, the

Table 65. Modulus.

	Males		Females	
Sho-Sho	21	150	11	144
Gambell	5	151,1	1	149,3
Inugsuk	91	153,3	74	147,2
Labrador	27	152,7	28	145,3
Point Hope (late)	128	153,9	89	147,2
Iroqeese	32	154,1	21	148,0
Tschuckts	54	154,8	68	148,4
North-East Greenland	20	154,8	29	147,3
Old Igloo	51	155,0	43	146,8
Alaska	6	155,0	5	149,5
Mongols	144	155,1	73	147,3
Naujan	12	155,2	5	148,3
Point Hope (early)	32	155,5	26	149,5
South. Isl.	10	156,1	4	151,3
Prehist. Siberians	33	157	18	150

Table 66. Maximum Length.

	Males		Females	
Chinese	86	178,5		—
Prehist. Chinese	41	180,3		—
Mongols	113	184,0	73	173,6
Sho-Sho	21	184,0	11	174
Point Hope (late)	131	184,0	92	175,7
Point Hope (early)	32	184,4	26	179,8
Tschuckts	55	185	70	177
Gambell	5	185,0	1	178
Alaska	6	186,5	5	176,8
Labrador	38	187,7	37	179,6
Inugsuk	97	187,8	81	179,5
Iroqeese	34	188,0	22	178,8
South. Isl.	10	188,7	4	181,8
Naujan	12	189,5	7	179,4
North-East Greenland	23	189,8	29	179,1
Old Igloo	52	191,1	44	180,2
Prehist. Siberians	46	194	26	185

Labrador, and the Iroqeese crania. This applies to the male crania. In the case of the women we find again the great deviations, whilst there are smaller differences in the succession in the middle groups.

The maximum breadth lies, for the male groups, between 134 and 143 mm, though with the Mongols right up on 150 mm. Besides, we may distinguish between 2 main groups, one with a very narrow cranium,

Table 67. Maximum Breadth.

	Males		Females	
Inugsuk	98	133,6	82	129,8
Old Igloo	52	134,2	44	127,3
Labrador	34	134,6	32	129,1
Gambell	5	134,6	1	134
North-East Greenland	23	136,9	29	132,4
Naujan	12	137,3	7	133,3
Sho-Sho	21	138	11	133
Chinese	86	138,2		—
Prehist. Chinese	42	138,6		—
Point Hope (late)	131	138,6	92	134,3
Iroqeese	32	139,4	21	132,3
South. Isl.	10	139,9	4	136,8
Point Hope (early)	32	140,9	26	134,5
Alaska	6	141,7	5	138,5
Tschuckts	55	143	70	137
Prehist. Siber.	46	143	26	139
Mongols	113	150,1	73	143,1

consisting of the Inugsuk, Labrador, and Old Igloo series, and another, comprising all the rest of the groups in rather diffused order, though with the prehistoric Siberian crania as the broadest (table 67).

According to the *basion-bregma height*, finally, the Mongols and the Sho-Sho Indians are plainly standing out as being much lower than the rest. Also the prehistoric Siberian crania are a great deal below the other groups, in the case of both men and women. Otherwise there is no regular variation among the other groups. (Table 68).

Length-breadth index table (Table 69) shows that only the Mongolian crania stand entirely alone. The rest of the groups show a gentle increase from very low values for the Old Igloo, Labrador, and Inugsuk groups, which are strongly dolichocephalic, past figures a little higher, bordering between dolicho- and mesocephaly for the central and western Eskimos, up to typically mesocephalic values for Tschuckts and prehistoric and recent Chinese. The 2 Indian groups lie, in the case of the eastern, among the eastern Eskimos, and, in the case of the western, among the western Eskimos. The prehistoric Siberian crania show figures practically answering the mean for all the groups and lying reasonably half way between values for east and west Eskimos.

This is in accordance with the already, by de QUATREFAGE & HAMY (79) and later by numerous other investigators, established fact that length-breadth index for the Eskimos is increasing from east towards

Table 68. Basion-Bregma Height.

	Males		Females	
Sho-Sho	21	129	11	124
Mongols	111	131,0	18	125,3
Gambell	5	133,6	1	136
Prehist. Siber.	33	134	26	125
Labrador	31	136,0	24	129,0
Tschuckts	54	136,5	68	131,5
Alaska	6	136,8	5	133,8
Prehist. Chinese	42	137,0		—
Chinese	86	137,2		—
North-East Greenland	20	137,7	29	130,4
Inugsuk	92	138,7	76	133,0
Naujan	12	138,8	5	134,6
Point Hope (late)	128	139,0	89	132,0
South. Isl.	10	139,8	4	135,5
Iroqeese	32	141,1	21	133,0
Point Hope (early)	32	141,1	26	134,1
Old Igloo	51	142,1	43	132,8

Table 69. Length-Breadth Index.

	Males		Females	
Old Igloo	52	70,3	44	70,6
Inugsuk	97	71,2	78	73,4
Labrador	34	71,8	31	72,2
North-East Greenland	23	72,2	29	74,0
Naujan	12	72,5	7	74,4
Gambell	5	72,8	1	75,3
Iroqeese	34	73,1	22	74,0
Prehist. Siber.	46	73,5	26	75,4
South. Isl.	10	74,1	4	75,2
Sho-Sho	21	75,2	11	76,0
Point Hope (late)	131	75,3	92	76,4
Alaska	6	76,0	5	77,0
Prehist. Chinese	40	76,0		—
Point Hope (early)	32	76,4	26	74,8
Tschuckts	55	77,3	70	77,5
Chinese	86	77,6		—
Mongols	111	81,4	73	82,4

west. Also does the gentle transition from west Eskimos to prehistoric Siberians, Tschuckts, and Chinese point to a relationship between these peoples.

However, apart from the Mongolians, the total variation of length-breadth index is only from 70,3 to 77,6. And as it appeared from the

Table 70. Breadth-Height Index.

	Males		Females	
Mongols°)	111	87,3	—	
Prehist. Siber.°)	33	93,0	—	
Sho-Sho°)	21	93,1	—	
Tschuckts°)	54	95,3	—	
Alaska	6	96,7	5	98,6
Prehist. Chinese	38	99,2	—	
Gambell°)	5	99,3	—	
Chinese	86	99,5	—	
South. Isl.°)	10	100,0	—	
Point-Hope (early)°)	32	100,1	—	
Point Hope (late)°)	128	100,3	—	
North-East Greenland	21	100,8	29	98,4
Iroqeese	32	101,0	21	100,5
Naujan	12	101,1	5	101,5
Labrador	27	101,1	29	100,1
Inugsuk	91	103,8	75	102,4
Old Igloo°)	51	105,8	—	

previous section on the conditions on Greenland alone, length-breadth index is not well suited to separate Eskimo groups.

The greatest variations were found in *breadth-height index*, answering to Woo and MORANT's (102) statement that this index and maximum breadth are the most important figures for distinguishing between groups of Asiatic Mongolians.

Table 70 shows the conditions regarding breadth-height index for the existing materials.

This index is not given in any of Hrdlicka's series, so the figures for the series marked with °) are calculated out from the mean of the 2 incoming components. As is seen, breadth-height index shows a considerably larger spreading than length-breadth index, from (87,3) 93,0 to 105,8, and the different series join together into larger groups within this interval. Lowest are the Mongol crania with an index of 87,3. The next group comprises the prehistoric Siberians, the Sho-Sho Indians, and the Tschuckts, with an index between 93 and 95. The figures for the Chinese series lie round 100, together with the figures for the 2 very small Eskimo series from Gambell and "Alaska". All the rest of the Eskimos, finally, lie between 100 and 101,1, with the exception of the Inugsuk and Old Igloo series, which come right up on 104—5.

Length-height index shows values for the present Eskimo materials that are very near to each other, but differ somewhat from the figures for the 2 Chinese series.

Table 71. Basis Length.

	Males		Females	
Chinese	86	99,0		—
Gambell	4	101,0		—
Prehist. Chinese	40	101,6		—
Labrador	30	103,0	35	98,1
Alaska	6	103,2	5	97,4
Tschuckts	55	104	70	99
North-East Greenland	20	104,2	29	97,4
Point Hope (late)	128	104,9	89	98,9
Naujan	12	105,7	5	102,2
Inugsuk	92	106,0	78	99,9
Point Hope (early)	32	106,4	26	101,7
Prehist. Siber.	33	106,5	17	99,1
Old Igloo	51	106,8	43	101,5
South. Isl.	10	108,1	4	102

Table 72. Facial Length.

	Males		Females	
Alaska	5	98,8	5	93,0
Naujan	12	100,8	5	99,0
North-East Greenland	18	101,3	22	94,5
Labrador	23	101,6	31	96,8
Gambell	4	102,5		—
Inugsuk	81	103,0	71	97,9
Point Hope (late)	105	103,1	76	97,2
Old Igloo	40	104,9	31	101
Tschuckts	55	105	70	101
Point Hope (early)	23	105,2	19	101,2
Prehist. Siber.	33	106,8	14	100,8
South. Isl.	9	107,3	3	99

Basis length (table 71) plainly separates the Chinese and, to a somewhat smaller degree, the prehistoric Chinese crania from the rest. The Gambell crania come nearest to this latter Chinese group, but otherwise there does not seem to be fundamental differences between the existing materials. The succession, when arranged according to the size of the basis length, seems casual, and the differences between the individual series are very small. Most striking are the figures for the crania from Southampton Island.

To *the facial length* (table 72) applies exactly the same: that the crania from Southampton Island show a very high value, and that the rest of the groups vary but little, and in no regular way.

Table 73. Facial and Sup. Facial Height.

	Sup. fac. height				Facial height			
	Males		Females		Males		Females	
Sho-Sho	21	73	11	66	21	115	11	106
Gambell	5	73,4	–	–	3	117	–	–
North-East Greenland	18	73,7	24	68,1	14	123,7	16	112,9
Inugsuk	85	74,3	73	69,0	59	122,5	45	114,2
Labrador	32	73,3	32	69,1	12	123,2	11	116,1
Prehist. Chinese	35	75,2	–	–	–	–	–	–
Point Hope (late)	118	75,2	78	70,6	4	124,0	2	125
Chinese	84	75,3	–	–	–	–	–	–
Prehist. Siber.	25	76,0	18	70,2	12	125,9	5	112,4
Naujan	13	76,4	6	70,7	11	123,0	2	118,5
South. Isl.	10	76,6	3	71,0	7	125,7	1	117
Point Hope (early)	24	77,1	21	72,1	23	128,7	20	120,6
Alaska	4	77,5	5	71,8	3	129,3	5	116,8
Mongols	79	77,6	64	70,9	29	125,8	26	114,2
Old Igloo	44	77,8	35	71,3	21	126,0	19	113,4
Tschuckts	50	80	62	74	10	132	12	117

Sup. facial and *facial height* (table 73) show mutually entirely agreeing conditions; very high figures are found for the Tschuckts, and the lowest for the Gambell and Indian series. Outside this we find that the lowest facial heights are found on Greenland, Labrador, Naujan, and late Point Hope crania, while the rest of the west Eskimo crania, especially the "Old Igloo" and the Asiatic, have a somewhat higher face.

The bizygomatic breadth (table 74) very plainly separates the 2 Chinese materials from the rest. Furthermore there is quite some difference between the Inugsuk, Labrador, (and Gambell) crania together with the Iroqeese on the one side, and the more western Eskimos and Indians and the Asiatic series on the other.

In *facial and sup. facial index* (table 75) we find again the differences between a big middle group and Sho-Sho and the Gambell crania, with low indices, and the Tschuckt crania, with high indices. In the middle group there is no provable regular variation.

The *orbital* measures are generally considered to be of great importance for the judgment of raceological conditions. This does not, however, apply so much to Eskimos as to others, as pointed out by MORANT (67). This circumstance makes it less regrettable that we are not able to compare the orbital measures of our different Eskimo materials with other cranial series, in the same way as we have done with the most important other measures, for this reason that there are decisive differences in the

Table 74. Bizygomatic Breadth.

	Males		Females	
Prehist. Chinese	37	132,2		—
Chinese	83	132,7		—
Labrador	28	136,5	27	128,3
Gambell	4	137,2		—
Inugsuk	83	137,3	68	129,6
Iroqeese	24	137,5	17	129
Sho-Sho	21	139		—
Naujan	13	140,8	6	132,3
North East Greenland	20	141,0	28	129,7
Tschuckts	50	141	62	132
Old Igloo	48	141,8	41	131,4
Mongols	102	142,0	69	131,6
Alaska	5	142,4	5	133,0
Prehist. Siber.	31	142,4	18	131,3
Point Hope (late)	124	143,1	84	133,2
Point Hope (early)	32	143,8	25	133,4
South. Isl.	10	144,3	3	137,7

Table 75. Facial and Sup. Facial Index.

	Sup. fac. index				Facial index			
	Males		Females		Males		Females	
Sho-Sho	21	52,0	11	51,8	21	81,1	–	–
Point Hope (late)	114	52,5	77	53,1	4	86,7	2	88,3
Gambell	4	52,6	–	–	3	86,0	–	–
North-East Greenland	17	53,0	22	53,7	13	87,3	16	87,1
South. Isl.	10	53,1	3	51,6	7	87,2	1	86,7
Prehist. Siber.	24	53,6	16	53,6	12	88,5	5	85,3
Point Hope (early)	24	53,9	21	54,2	23	89,9	20	90,9
Inugsuk	79	54,0	65	53,2	56	89,4	40	88,8
Alaska	4	54,2	5	54,0	3	89,7	5	87,8
Naujan	12	54,3	6	53,5	11	87,8	2	90,0
Mongols	74	54,5	63	53,1	27	88,8	25	87,7
Labrador	27	54,7	26	53,9	10	89,6	8	89,4
Old Igloo	43	54,9	34	54,7	21	88,5	19	87,5
Tschuckts	50	56,5	62	56,0	10	94,1	12	87,7

measuring technique. Thus in all his series Hrdlicka has measured the orbital breadth from dacryon. So has Stewart, while Davidson Black and the present writer have taken this measure from maxillo-frontale. There could, however, hardly be any hidden differences of importance between the groups, as the measures are very near to each other, with the dacryon breadths only about 3 mm smaller than the maxillo-frontale

Table 76. Orbital Height.

	Males		Females	
Point Hope (late)	115	33,6	76	35,4
Prehist. Chinese	32	33,8		—
Prehist. Siber.	27	34,2	16	33,3
Gambell	5	34,3		—
Sho-Sho	?	35,0	?	33,5
Chinese	74	35,5		—
Point Hope (early)	31	35,7	25	35,5
Mongols	112	35,9	73	34,8
Inugsuk	90	35,9	77	34,9
Old Igloo	47	35,9	33	35,7
Labrador	29	36,0	32	35,0
Naujan	13	36,4	6	35,8
South. Isl.	10	36,5	3	37
Alaska	6	36,7	5	34,8
Tschuckts	54	37	66	35,5
North-East Greenland	21	37,5	28	35,5

breadths. Also the *orbital height* shows only small variation, though the Eskimo crania, broadly speaking, seem to have somewhat higher orbitae than the Asiatic. This also seems to appear from the relations of orbital index. It applies to this index, as well as to the orbital breadth, that its value is much reduced when comparing the examined materials, because of the said inconsistent measuring technique.

The shape of *the nose*, expressed by length, breadth, and the proportion between these measures, shows several characteristic variations. This is least conspicuous by the *height of the nose*. (Table 78). It is seen to vary between 51 and 57 mm, so that the Eskimos show values between 51 and 55 mm, and the Asiatic series chiefly over 55 mm.

In the case of the *breadth* (table 79) the differences are more distinct, as the values for all the Eskimos lie closely round 23—24 mm, while all the rest of the series lie on 25 mm or over, the Mongols even as high as 28. Neither height nor breadth show disagreements between the Eskimo groups mutually.

The *height-breadth* index of the nose shows considerable spreading: from about 41 to 52. The Eskimos show the lowest figures, from 41—42 for the crania from Naujan, North-East Greenland, and Alaska, to about 43 for the Inugsuk, Labrador, "Old Igloo", and Southampton Island crania, and right up to 45 for the series from Point Hope. The values for Tschuckts and recent Chinese also lie about 45, while the figures for the prehistoric Chinese, the Siberian, and the recent Mongol and Sho-Sho crania are 48, and finally the Iroqeese are right up on 52.

Table 77. Orbital Breadth and Orbital Index.

	Orbital breadth				Orbital index			
	Males		Females		Males		Females	
From Dacryon:								
Gambell	5	38,3			5	88,8	–	–
Mongols	112	39,3	73	37,4	112	91,5	93	93,1
Prehist. Siber.	27	39,4	16	38,0	27	86,3	16	87,6
Old Igloo	47	39,7	33	38,7	47	90,6	33	92,4
Sho-Sho	?	40	?	37,5	?	87,7	?	90,1
Tschuckts	54	40	66	39	54	90,7	66	91,5
Labrador	27	40,2	31	38,2	27	89,5	31	91,6
Point Hope (late)	116	40,2	76	38,9	116	90,5	76	91,2
Point Hope (early)	31	40,2	25	39,4	31	88,8	25	90,2
South. Isl.	10	40,5	3	39,5	10	90,0	3	93,7
From Maxillo-Frontale:								
Inugsuk	90	43,2	77	41,7	90	83,4	77	83,5
North-East Greenland	21	44,0	29	41,3	21	85,2	29	95,9
Chinese	62	44,0	–	–	62	80,7	–	–
Prehist. Chinese	34	44,4	–	–	32	76,2	–	–
Alaska	6	44,7	5	41,2	6	82,6	5	84,8
Naujan	13	44,7	6	42,3	13	81,4	6	84,7

Table 78. Nasal Height.

	Males		Females	
Gambell	5	51,4		—
Sho-Sho	?	52	?	47
Labrador	31	52,4	34	49,0
Prehist. Siber.	28	53,6	17	49,8
Inugsuk	87	53,7	75	49,8
Point Hope (late)	126	53,6	86	50,4
South. Isl.	10	54,1	3	50,7
Point Hope (early)	32	54,3	25	50,8
North-East Greenland	21	54,4	28	50,0
Old Igloo	52	54,6	39	50,8
Prehist. Chinese	42	54,7		—
Tschuckts	55	55	67	52,3
Chinese	86	55,3		—
Alaska	6	55,3	5	52,0
Naujan	13	56,1	6	50,8
Mongols	114	56,6	73	51,9

Table 79. Nasal Breadth.

	Males		Females	
Labrador	31	22,6	32	21,9
North-East Greenland	21	22,7	27	21,6
Alaska	6	22,7	5	22,6
Naujan	13	22,8	6	22,2
Inugsuk	88	22,9	75	22,3
South. Isl.	10	23,0	3	22,2
Old Igloo	52	23,7	39	22,9
Point Hope (late)	126	23,9	86	22,8
Gambell	5	24,1		—
Point Hope (early)	32	24,4	25	22,9
Tschuckts	55	24,5	67	24,5
Chinese	86	25,0		—
Sho-Sho	?	25	?	24
Prehist. Siber.	28	25,7	17	24,4
Prehist. Chinese	41	25,8		—
Mongols	114	27,5	72	25,6

In addition to illustrating plainly the difference between the Eskimo and the Asiatic and Indian crania, the nasal index also shows difference between the Eskimo groups mutually, so that these fall into 3 main groups: Naujan and the North-East Greenland crania with the lowest index, the West Eskimo crania with the highest, and the Labrador, Inugsuk, and "Old Igloo" series half way between.

From the table on *maxillo-alveolar* index (table 81) we see that there is no regular variation between the groups. The most striking in the table is the comparatively small variation breadth, compared to the variation breadth for an individual group, for inst. the Inugsuk group.

Neither do *maxillo-alveolar length and breadth* give any possibility for separation between any of the present series, and show, on the whole, only very small differences between them. Besides, the 2 measures have not at all been published for many of the materials.

Thus we find as characteristic of the Eskimos: narrow and high cranium with low length-breadth and high breadth-height index. The size is varying, the facial measures medium large, as are also the facial indices. The nose is of medium height, narrow with very low nasal index. Orbitae are rather high, and maxillo-alveolar index of medium size.

If we try to gather together the various Eskimo groups into certain main types, we find:

1) that *the Inugsuk and Labrador crania in all dimensions and proportions are almost identical*, so that the only difference we are able to

Table 80. Breadth-Height Index of the Nose.

	Males		Females	
Naujan	13	40,8	6	43,7
Alaska	6	41,0	5	43,5
North-East Greenland	21	41,9	27	43,2
South. Isl.	10	42,6	3	43,8
Inugsuk	86	42,9	74	45,1
Labrador	31	43,1	32	44,9
Old Igloo	52	43,4	39	45,2
Point Hope (late)	126	44,6	86	45,3
Tschuckts	55	44,6	67	46,8
Point Hope (early)	32	44,9	25	45,0
Chinese	86	45,3		—
Gambell	5	46,9		—
Prehist. Chinese	39	47,6		—
Prehist. Siber.	28	48,0	17	48,9
Mongols	114	48,6	72	49,4
Sho-Sho	?	48,9	?	50,7
Iroqeese	26	51,7	17	51,9

Table 81. Maxillo-Alveolar Index.

	Males		Females	
Gambell	4	114,0	1	123,0
Prehist. Siber.	25	114,9	15	113,1
Iroqeese	14	116,2	15	114,3
Point Hope (late)	99	117,7	73	118,7
Inugsuk	78	118,1	69	118,6
Tschuckts	40	118,1	52	119,8
Labrador	22	118,5	24	118,9
Old Igloo	39	118,7	33	117,0
North-East Greenland	17	118,7	21	117,5
Point Hope (early)	25	119,0	20	115,6
Alaska	4	119,0	4	116,0
South. Isl.	10	119,7	3	120,7
Naujan	8	123,6	4	119,4
Mongols	71	123,8	66	125,8

mention is the one between the basion-bregma heights, and it is only a matter of a few millimetres. There is a corresponding difference between breadth-height indices, but the 2 groups are nevertheless placed beside each other in the table, where all the series are arranged according to the size of breadth-height index. *The Old Igloo group is very near to these 2 groups*, the crania are, however, somewhat larger, especially in length

and height, but in such a way that breadth-height index very distinctly separates the Inugsuk and Old Igloo crania from the rest. The facial measures of the Old Igloo group are likewise somewhat larger than those of the 2 other groups, but the difference between indices is only small, and there is extremely good agreement between the nasal and maxillo-alveolar index of the 3 groups.

2) *Another type is made up by the Naujan and North-East Greenland crania, which show very great mutual likeness* in all measures and indices, so that the 2 series are next to each other in nearly all the tables. The Naujan crania have, however, a somewhat higher face, especially nose, than the North-East Greenland crania. *Joining in with these 2 groups are the crania from Southampton Island* with regard to cranial as well as facial measures, whilst their modulus is somewhat higher than that of the other 2.

Between these 2 types, the Inugsuk-Labrador-Old Igloo and the North-East Greenland-Naujan-Southampton Island type, there is a distinct difference in the proportions of the cranium, in breadth-height as well as in length-breadth index, as the crania in the former are narrower and higher than the crania in the latter, displaying itself in a striking difference between breadth-height indices. Also in the shape of the face does the Inugsuk-Labrador-Old Igloo group appear higher and narrower than the other one, though not strikingly so. Nasal index shows just the opposite, as the North-East Greenland-Naujan-Southampton Island group show the lowest figures.

3) *Hrdlicka's 2 series from Point Hope and the small series of late crania from "Alaska" differ from the rest by being considerably broader* in both the neuro-cranium, the facial skeleton, and nose, showing in high length-breadth, facial, sup. facial, and nasal indices. Of the 2 main types just described they come decisively nearest to the North-East Greenland-Naujan-Southampton Island type.

4) *The small series of very old crania from Gambell seem to take a place apart* (a fact that may very well be due to the small number of crania). All dimensions are very small. Length-breadth index is small, lies very near the values for the North-East Greenland-Naujan-South. Isl. type, but breadth-height index is much lower than that for the latter cranial series. In the facial skeleton there are likewise considerable disagreements between the Gambell crania and the rest of the Eskimos. The facial and sup. facial height and facial and sup. facial index of the Gambell series are very low, in the case of the indices among the lowest in all the groups. The nose is broad, so that nasal index is high and is fairly much above the figures for the rest of the Eskimo series.

*Thus the result of the comparisons between the Eskimo series is this; the oldest crania from Gambell are small, narrow, and rather low, with broad low faces, and especially a broad nose. Nearest to these come the crania with connection to the old Thule Culture, the North-East Greenland-Naujan-South. Isl. type,*though the latter are somewhat higher in neuro as well facial cranium, and their nasal index is much lower. *From these there is again a skip to the Inugsuk-Labrador-Old Igloo type*, which is still more long- and high-skulled and have a somewhat higher facial skeleton, while nasal index is a little higher than for the North-East Greenland-Naujan-South. Isl. type.

If we compare this result with the archaeological conditions, we have a special type of cranium answering to the central Thule Culture (North-East Greenland-Naujan-South. Isl. type), *whilst the other of the main types partly belongs to the Birnirk Culture* (the Old Igloo crania), *which is somewhat older than the Thule Culture, and partly to the Inugsuk Culture or its parallel in Labrador* (the Inugsuk and Labrador crania), and, judging from the archaeological conditions *these 2 cultures seem to have been derived from the Thule Culture.* The explanation must, judging from the physical anthropological conditions, be this: *evolution has taken its course directly from Birnirk to Inugsuk Culture people, without the population known to have lived round Hudson Bay at the time of the Thule Culture, and which has later reached the north-east coast of Greenland, as a stage between.* This is an explanation based on investigations of the existing skeletal materials, and whether on the whole we can imagine that the said development also has taken place in the cultures, is a question which must be solved archaeologically.

If we then turn to the *relation between Eskimos and Indians*, the comparisons between the Eskimo crania and the existing small Indian series show that *in the case of the Sho-Sho tribes there are few points of resemblance, but great differences.* Thus while there is reasonable agreement between length-breadth indices, breadth-height indices differ very much, about 93 for the Sho-Sho group against about 100 for the Eskimos. Also facial height and index are much lower than for the Eskimos, and the nose is lower, and nasal index therefore higher than in the Eskimo groups. *The Iroqeese show greater likeness with the Eskimos*, especially in the neuro cranium. On the other hand there is only a single facial measure for comparison, namely nasal index, which is about 52 against about 43 for the Eskimos.

Even though these Indian tribes are not those that show the greatest cultural likeness with the Eskimos, the great differences in the sizes and proportions of the crania are nevertheless decisively against the supposition of the Eskimos being directly descended from Indians. *Especially*

so, as the old Eskimo crania from Gambell on St. Lawrence Island, which is situated so to speak on the way from Asia, without difficulty fit in as a link in the series of Eskimo crania, only with a somewhat less prominent development of the Eskimo characteristics, tallying with the fact that they are the oldest.

It must be in *Asia* then that we shall seek the origin of the Eskimos. And it now so turns out that *the prehistoric Siberian crania, of all the crania used for comparison, are those that come nearest to the Eskimos.* On the whole they are slightly larger than the Eskimo crania, but in the values for length-breadth and breadth-height index we find a *gentle transition: the Prehist. Siber. — Gambell — Naujan + South. Isl. + North-East Greenl. type — Old Igloo + Inugsuk + Labrador type.* The same applies to facial, sup. facial, and nasal index, though with a few small deviations.

Both prehistoric and recent Chinese crania, on the other hand, show great disagreements with the Eskimo, as well as with the prehistoric Siberian crania, as length-breadth, as well as breadth-height and nasal index, are higher than those of the latter, and the bizygomatic breadths deviate strikingly. The recent Mongol cranial series show so great differences from the rest, in length-breadth and breadth-height index alone, that these are sufficient to place them in a group quite apart.

As to the Tschuckts, finally, the present materials do not seem to confirm Hrdlicka's theory that of body type they are Eskimos; in the facial skeleton especially, there are striking disagreements. It is, however, possible that by comparing them, like Hrdlicka, with closer living Eskimos than those used here, we might arrive at a different result.

The final result of these investigations will then be this: *that we have proved a gentle development from prehistoric Siberian crania to the Eskimo crania from Gambell, further on to a Thule Culture type (Naujan-North-East Greenland-South. Isl.), and from there further again to a type belonging to the Birnirk and Inugsuk cultures.* Morphologically this development has gone *in the direction of a higher and narrower neuro as well as facial cranium, especially nose.* On the other hand we have found *very great difference between the crania in this series and the recent Mongol crania, and likewise, though not quite so strikingly, between the crania in this series and the prehistoric and recent Chinese crania. We have found no sign of any close relationship between the Eskimos and the very scarce Indian materials.*

These results agree in the main with the culture wandering pointed out by the archaeologists (Larsen and Rainey (51)). There is, however, one exception, as we, as a result of the great likeness between the crania belonging to the Birnirk and Inugsuk cultures, must presume that the

evolution, physical anthropologically, has gone directly from Birnirk to Inugsuk, without the carriers of the Thule Culture as intermediary.

This hypothesis has not previously been advanced directly, though HRDLICKA (35) and FISCHER-MØLLER (17) have touched on it, as Hrdlicka has shown a very near relationship between the Old Igloo people and the Greenlanders, and this out from a considerably smaller Greenland skeletal material, and Fischer-Møller has pointed out the considerable difference between the Naujan skeletons on one side and the Greenland and Old Igloo skeletons on the other.

IX. THE LIMB BONES

In the previous sections the anthropological conditions regarding the crania have been gone through. In this connection no doubt the cranium is the most important part of the skeleton. And what adds to the importance, is the fact that many investigators limit their examinations to craniological studies, so that for comparison there is a much larger material of cranial measures than of measures of other parts of the skeleton.

As, however, also the limb bones may yield information as to racial conditions, these skeletal parts have been examined here too. It is a matter of bones from the Inugsuk area, from North-East Greenland, and from Naujan, 3 groups in all, belonging to the respective crania. All the limb bones have previously been examined by FISCHER-MØLLER, the Greenland bones in "Skeletons from Ancient Greenland Graves" (18), and the Naujan skeletons in "Skeletal Remains of the Central Eskimos" (17). Some alteration by the dating has, however, taken place since then, so that a number of bones have had to be excluded of the material, and they have all been re-measured, which explains the fact that the present figures do not tally entirely with those of Fischer-Møller, even though on the whole there is good agreement.

For comparison we have of Eskimo materials, STEWART'S (92) "old stone grave" skeletons from Labrador, HRDLICKA'S (35) "Old Igloos", and a series of recent Eskimo bones from Point Hope, likewise measured by HRDLICKA (38). Also HRDLICKA'S (38) prehistoric Siberians are included, although only a length measure is taken on each bone.

For comparison between Eskimo and Indian skeletons it has been difficult to find a suitable Indian material. In "Crania of Siberia" (38) HRDLICKA gives collected figures for a great number of Indian bones of "miscellaneous" origin. These figures have been used here, even though they are only for male bones.

Sex determination from limb bones alone, when there is no pelvis or cranium belonging to them, is very difficult, and is as a rule undertaken out from a general estimate of their size and robusticity, and of the development of the muscular marks. In the present material this

difficulty has not been eminent, as in most cases it has been possible to separate the individual skeletons, so that as a rule we have been able to base the sex determination also on the shape of the cranium, and in many cases on that of the pelvis, too.

The extremity bones originate from 135 individuals, 80 men and 55 women.

In the case of the men we find in

26 cases the whole skeleton incl. of cranium and pelvic remains,
37 cases the whole skeleton incl. of cranium but without pelvic parts,
4 cases limb bones and pelvic remains, but no cranium,
13 cases limb bones alone without cranium or pelvic parts.

In the case of the women the corresponding figures are:

24 cases the whole skeleton incl. of cranium and pelvic remains,
23 cases the whole skeleton incl. of cranium but without pelvic parts,
2 cases limb bones and pelvic remains, but no cranium,
6 cases limb bones alone without cranium or pelvic parts.

Thus it will be seen that in most cases the sex determination has been carried out with fairly great safety. The isolated bones have been divided up into males and females out from the said estimate, but in a few cases it has been impossible to make any decision. The bones in question have therefore been left out entirely of the material; it is, however, only a matter of parts from altogether 6 skeletons.

Humurus.

As to the length of humurus, it will be seen from table 82 that the figures for women in all the Eskimo groups lie reasonably chose together, round 280 mm, whilst the prehistoric Siberian bones show a somewhat greater length. In the case of the men the variation is greater, as the Labrador and Inugsuk bones are somewhat smaller than the bones from North-East Greenland, Naujan, Point Hope, and Point Barrow (Old Igloo). These latter have, on the other hand, almost exactly the same length measures. As in the case of the women, the prehistoric Siberian bones are somewhat larger than the Eskimo bones. The figure for the mixed Indian series lies between the figures for Eskimos and prehistoric Siberians. However, significance can hardly be ascribed to any of the disagreements between the different Eskimo series mutually; presuming, namely, that the mean error for the Inugsuk series may apply reasonably to the rest of the series, which is a very rough approximation, we should,

Table 82. Humerus.

	Males											
	M 1 maximum length		M 7 minimum circumf.		M 5 maximum diameter		M 6 minimum diameter		M 7 / M 1 length-thick. index		M 6 / M 5 diaphysis transv. index	
	n	M	n	M	n	M	n	M	n	M	n	M
Inugsuk area	30	302,9	37	59,5	39	22,6	39	16,4	27	19,5	39	72,6
North-East Greenland.	10	310,7	10	68,8	10	26,1	10	19,0	10	22,2	10	73,1
Labrador	17	293,9	–	–	17	21,9	17	17,5	–	–	17	80,0
Naujan	8	309,6	8	68,8	8	26,6	8	19,7	8	22,3	8	74,2
Old Igloo	35	311,7	–	–	35	24,7	35	18,6	–	–	35	75,2
Point Hope	67	310,7	–	–	67	24,6	67	18,6	–	–	67	75,8
Misc. Amr. Indians	378	318	–	–	378	22,2	378	16,3	–	–	378	73,1
Prehist. Siber.	25	324,6	–	–	–	–	–	–	–	–	–	–
	Females											
	M 1 maximum length		M 7 minimum circumf.		M 5 maximum diameter		M 6 minimum diameter		M 7 / M 1 length-thick. index		M 6 / M 5 diaphysis transv. index	
	n	M	n	M	n	M	n	M	n	M	n	M
Inugsuk area	20	280,5	23	54,9	26	20,1	26	15,3	19	19,6	26	75,8
North-East Greenland.	12	280,5	12	57,7	12	21,8	12	15,6	12	20,7	12	71,8
Labrador	10	277,0	–	–	10	19,9	10	14,4	–	–	10	72,8
Naujan	5	266,6	5	54,2	5	20,0	5	14,8	5	20,4	5	74,1
Old Igloo	27	284,1	–	–	27	21,1	27	16,0	–	–	27	76,1
Point Hope	55	288,3	–	–	55	21,6	55	16,3	–	–	55	75,4
Misc. Amr. Indians	–	–	–	–	–	–	–	–	–	–	–	–
Prehist. Siber.	6	304,8	–	–	–	–	–	–	–	–	–	–

in order to get significant differences, have to demand differences between the means of at least about 20 mm.

The robusticity of humerus, which may be expressed by the circumference of diaphysis, or better, by length-thickness index, appears to be near enough the same for the North-East Greenland and Naujan bones, whilst the figure for the Inugsuk group is considerably lower.

Maximum and minimum breadth of diaphysis and diaphysis-transversal index vary only little in the case of the Eskimo and Indian series, both for men and women. There are no figures for the prehistoric Siberians for comparison. Inside the Eskimo groups the bones from Naujan and North-East Greenland show the highest absolute figures.

The torsion angle in the 3 series examined here lies, for men as well as for women, round 145°, with the exception, however, that the female bones from the Inugsuk area show somewhat higher figures, about 152°. The number of angles measured is so small though that we

no doubt only may consider these values as pointing in the direction of the typical values.

Perforation of fossa olecrani is general, thus found in the Inugsuk group on 29 % of the male, and 50 % of the female humeri.

Radius.

The length measures vary a great deal, especially in the case of the male bones, though with no regularity between the Eskimo groups. The prehistoric Siberian bones are much longer than the Eskimo bones, the same applies to the Indian, though the latter are not quite so big as the Siberian bones.

Table 83. Radius.

	Males						Females					
	M 1 maximum length		M 3 / M 2 length-thick. index		M 5 / M 4 diaphysis transv. index		maximum length		length-thick. index		diaphysis transv. index	
	n	m	n	m	n	m	n	m	n	m	n	m
Inugsuk area	12	223,2	27	19,6	27	69,7	8	202,6	18	18,5	15	70,7
North-East Greenland.	6	232,7	8	21,3	9	70,4	7	209,7	9	18,2	11	67,2
Labrador	9	218,6	–	–	–	–	4	199,5	–	–	–	–
Naujan	5	225,4	7	21,0	7	66,6	2	195,0	4	20,6	4	66,2
Old Igloo	31	235,3	–	–	–	–	17	209,8	–	–	–	–
Point Hope	15	234,4	–	–	–	–	8	215,8	–	–	–	–
Misc. Amr. Indians	378	247	–	–	–	–	–	–	–	–	–	–
Prehist. Siber.	22	250	–	–	–	–	4	238,2	–	–	–	–

The robusticity, indicated by length-thickness index, appears to be somewhat greater in the North-East Greenland and the Naujan groups than in the Inugsuk group.

Ulna.

There are no other figures for comparison, but for the 3 present materials we find, exactly as for the rest of the upper extremity bones,

Table 84. Ulna.

	Males						Females					
	M 1 maximum length		M 3 / M 2 length-thick. index		M 11 / M 12 diaphysis transv. index		M 1 maximum length		M 3 / M 2 length-thick. index		M 11 / M 12 diaphysis transv. index	
	n	M	n	M	n	M	n	M	n	M	n	M
Inugsuk area	7	235,9	16	16,2	13	79,5	6	222,7	10	16,2	7	85,4
North-East Greenland	7	247,6	7	17,8	8	87,9	10	222,4	11	17,6	10	81,6
Naujan	4	246,3	7	17,8	5	83,4	2	214,0	3	16,0	3	80,8

that the Inugsuk bones are somewhat more gracile, and maybe slightly shorter, than the bones in the 2 other series.

Femur.

The length in natural position is somewhat lower for Inugsuk and Labrador femora than for the rest of the Eskimo bones, which show reasonably uniform values. This applies to both male and female bones, but the difference is greatest between the male bones. The figure for the Indian series is rather low, answering to the Inugsuk and Labrador values, whilst the prehistoric Siberian bones are somewhat longer than the Eskimo bones, especially the female, where the difference is about 20 mm.

Diaphysis circumference and length-thickness index are almost identical in the 3 groups examined, and the same applies to index pilastricus. The Labrador and Old Igloo bones come near to these, but the figure for the Point Hope bones is considerably higher. However, in the latter case the number of observations is only 10, so this difference may no doubt just as well be ascribed to a casual variation. The Indian bones show no difference from those of the Eskimos in the case of this index.

Index platymericus is seen to vary much more, but there is no regularity, and the condition is different for men and women. Finally we cannot entirely rule out the possibility of the disagreements being due to a different measuring technique.

The collo-diaphysis angle is for the 3 materials here examined about 127°, and the torsion angle about 12—14°. In the case of both angles there are only very small differences between the groups. The values are not exceptional in any direction.

Tibia.

The length measures appear, in the same way as in the case of femora, to be somewhat lower for the Inugsuk and Labrador bones than for the rest of the Eskimos, whilst the figures for the Indians and the prehistoric Siberians in the male groups correspond to the highest Eskimo figures, but in the female groups are above the latter.

Length-thickness indices are almost identical in the 3 present materials, both for men and for women.

Transversal index of diaphysis shows near enough the same means as for the first 4 groups in the table, whilst the figures for the 3 following are somewhat lower. As this difference just eliminates the materials measured by Hrdlicka, we must take into account that it may just as well be due to a difference in the measuring technique as to a real difference in the build of the bones.

Table 85. Femur.

		Males								
		M 2 length	M 8 circumf.	M 6 sagittal diam.	M 7 transv. diam.	M 9 upper transv. diam.	M 10 upper sagittal diam.	M 8/2 length-thick. index	M 6/7 index pilas-tricus	M 10/9 index platy-mericus
Inugsuk area ...	n	58	73	80	73	73	73	55	73	73
	M	421,7	87,8	29,4	26,4	31,0	25,7	20,8	111,8	83,1
N.-East Greenl..	n	7	7	7	7	7	7	7	7	7
	M	441,3	93,8	31,2	28,3	35,0	28,6	21,4	110,2	81,7
Labrador	n	22		22	22	19	19		22	19
	M	424,4	–	30,1	27,5	33,0	24,6	–	109,2	74,4
Naujan	n	8	8	8	8	8	8	8	8	8
	M	425,4	95,9	32,1	28,9	34,7	27,7	22,6	111,2	80,1
Old Igloo	n	33		33	33	33	33		33	33
	M	438,6	–	33,7	29,0	35,1	27,1	–	116,2	77,2
Point Hope	n	10		10	10	10	10		10	10
	M	440,6	–	33,3	26,8	32,7	25,8	–	124,4	79
Mc. Amr. Indians	n	902		902	902	902	902		902	902
	M	427	–	29,5	25,8	32,7	24,2	–	114,5	74
Prehist. Siber. ..	n	31								
	M	443,6	–	–	–	–	–	–	–	–
		Females								
		M 2 length	M 8 circumf.	M 6 sagittal diam.	M 7 transv. diam.	M 9 upper sransv. diam.	M 10 upper sagittal diam.	M 8/2 length thick. index	M 6/7 index pilas-tricus	M 10/9 index platy-mericus
Inugsuk area ...	n	44	61	61	61	59	59	43	60	59
	M	388,3	80,7	26,7	24,4	28,8	23,3	21,0	109,6	81,5
N.-East Greenl. .	n	9	8	9	9	9	9	8	9	9
	M	400,1	84,5	28,6	24,9	30,1	25,4	21,2	114,3	84,5
Labrador	n	9		8	9	9	9		8	9
	M	383,6	–	25,1	24,2	28,8	20,8	–	103,7	72,5
Naujan	n	6	6	6	6	6	6	6	6	6
	M	393,7	82,7	27,0	25,6	28,0	24,3	21,0	105,7	86,9
Old Igloo	n	25		25	25	25	25		25	25
	M	403,1	–	28,8	25,1	30,9	23,0	–	114,5	74,4
Point Hope	n									
	M	–	–	–	–	–	–	–	–	–
Mc. Amr. Indians	n									
	M	–	–	–	–	–	–	–	–	–
Prehist. Siber. ..	n	6								
	M	421,8	–	–	–	–	–	–	–	–

Table 86. Tibia.

		Males					
		M 1 whole length	M 10 b minm. circumf.	M 8 sagittal diam.	M 9 transversal diam.	M 10 / M 1 length thickness index	M 9 / M 8 diaphysis-transversal index
Inugsuk area	n	47	58	62	62	44	61
	M	330,6	70,7	26,9	20,8	21,2	77,4
N.-East Greenland	n	10	10	10	10	10	10
	M	363,7	78,3	29,9	22,8	21,6	74,8
Labrador	n	12		12	12		12
	M	343,8	–	29,7	22,3	–	75,1
Naujan	n	3	3	3	3	3	3
	M	359,0	79,7	31,0	23,3	22,2	75,3
Old Igloo	n	29		29	29		29
	M	356,0	–	32,6	22,0	–	67,5
Point Hope	n	41		41	41		41
	M	364,0	–	32,6	22,0	–	67,4
Mc. Amr. Indians	n	324		324	324		324
	M	369	–	32,8	21,6	–	65,8
Prehist. Siber.	n	28					
	M	362,5	–	–	–	–	–
		Females					
		M 1 whole length	M 10 b minm. circumf.	M 8 sagittal diam.	M 9 transversal diam.	M 10b / M 1 length thickness index	M 9 / M 8 diaphysis-transversal index
Inugsuk area	n	27	39	41	41	26	41
	M	306,7	64,7	24,5	19,0	21,0	77,8
N.-East Greenland	n	7	10	10	10	7	10
	M	325,3	69,6	26,1	20,6	21,5	79,3
Labrador	n	11		11	11		11
	M	310,9	–	25,4	18,7	–	73,7
Naujan	n	5	4	4	5	4	5
	M	327,8	68,0	26,6	20,8	20,9	78,9
Old Igloo	n	24		24	24		24
	M	319,4	–	28,0	18,7	–	66,7
Point Hope	n	17		17	17		17
	M	329,0	–	28,0	19,2	–	68,8
Mc. Amr. Indians	n						
	M	–	–	–	–	–	–
Prehist. Siber.	n	5					
	M	342,8	–	–	–	–	–

The torsion angle is about 15° with no great disagreements between the 3 examined groups. This figure is rather low, a fact which FISCHER-MØLLER has explained as being a result of the Eskimos' way of walking. They turn in their toes in walking in order to get their big soft kamikker (boots) with them. Fischer-Møller has, however, no proof of the truth of this explanation.

Pelvis.

The pelvic bones in the examined materials are very defective, so that we have been able to take pelvic measures in a few cases only. The means determined in this way are unsafe, but show no conditions of special interest.

There is on the other hand a single, hitherto unnoticed, morphological feature which by closer investigation has turned out to be of great informatory importance. It is a question of sulcus paraglenoidalis on os coxae. This furrow, running along the front edge of the articular surface to os sacrum, is normally, by peoples other than the Eskimos, narrow and unconspicuous. Going through the Eskimo pelvic bones, we have found again and again that this sulcus was very strongly developed here, up to 14 mm broad and almost just as deep. So as to elucidate clearly its conditions, the breadth of it has been measured on all the bones where we have been able to point it out, and the cases where this has not been possible have also been entered. If we pool the 3 groups, and there does not seem to be any mutual disagreements in this respect, we get a total of 27 male and 26 female pelvic remains where these conditions have been judicable. We then see:

that of the 27 male pelvic remains show

22	no sulcus	(82%)	
1	a suspicion of a sulcus ...	(3%)	
4	a distinct sulcus	(15%)	with an average breadth of 6,7 mm

but out of the 26 female show

2	no sulcus	(8%)	
1	a suspicion of a sulcus ...	(3%)	
23	a distinct sulcus	(89%)	with an average breadth of 9,7 mm.

There is thus an extraordinarily great difference between the development of this sulcus by the 2 sexes. So great that the presence of a distinct sulcus with great probability indicates a female pelvis, while on the other hand there is great possibility of the pelvis being male if there is no sulcus.

The examination of the extremity and pelvic bones has then altogether given the following result:

We have found a certain difference between the size and build of the bones from the Inugsuk area and the bones from North-East Greenland, as the long upper extremity bones from North-East Greenland all are more robust than the corresponding Inugsuk bones, while the difference between the lengths of the upper extremity bones is of no importance. In the case of the lower extremity there are, on the other hand, differences between the lengths, whilst the robusticities are the same.

The Inugsuk bones agree in all examined conditions very plainly with the Labrador bones, and there is great likeness between the bones from North-East Greenland and Naujan.

The Point Hope and Old Igloo skeletons are generally a little larger than the rest, they are not particularly near to any special group of the others.

All the long prehistoric Siberian bones are much longer than the bones in all the rest of the series together. The Indian bones are somewhat larger than the Eskimo bones, least so in the case of femora.

The examination of the limb bones has thus strengthened the theory of a near relationship between Inugsuk and Labrador skeletons, and between North-East Greenland and Naujan skeletons with a minor difference between these 2 main groups. The Old Igloo bones, on the other hand, do not quite fit into the system. The bones from Point Hope show a transition in the direction of the prehistoric Siberian, which otherwise show no marked relationship with the Eskimos, in so far as we may judge from the length alone.

Between the Indians and the Eskimos we have found great difference between the lengths of the upper extremities, but much less between the lengths of the lower extremities. It is just this irregularity in the proportion between the 2 extremities that speak against any near connection between the 2 peoples, much more so than a uniform proportional difference between the absolute lengths would have done.

Stature.

Out from the lengths of the long bones the statures have been calculated for each single individual according to Pearson's method, after which the means have been determined in the usual way.

It is seen from table 87 that the values for men are almost identical in the 3 groups, even though the number of individuals is only 9 in the 2 of them. For women the figure for North-East Greenland is 4 cm higher

Table 87. Stature.

	Males					Females				
	n	M	m	s	var.	n	M	m	s	var.
Inugsuk	52	149,2 ± 0,55		3,95	151–168	37	147,9 ± 0,67		4,01	140–158
N.-E. Greenland	9	160,0	–	–	153–171	7	151,6	–	–	143–154
Naujan.....	9	160,8	–	–	155–168	4	147,5	–	–	137–152

than that of the other 2, but in this case the number of individuals is still smaller, so that we cannot attach any importance to the difference.

STEWART (92) has, likewise according to Pearson's method, calculated the height for Eskimos from "old stone graves" in Labrador, and found values very closely corresponding to the Greenland values, only a few millimetres lower than the latter.

Table 88.

	Males	Females
Inugsuk	159,2	147,9
N.-East Greenland.....	160,0	151,6
Naujan.....	160,8	147,5
Labrador (Stewart).....	158,4	147,3
Old Igloo°) Hrdlicka.....	163	150
Prehist. Siber.°) (Hrdlicka)	165	155
Indians°) (Hrdlicka)	163	–

Table 88 furthermore shows the statures for the Old Igloo, the prehist. Siberian, and the Indian series, calculated out from the mean values of the individual bones (in the table marked by an °)). It is seen that the Old Igloo Eskimos are somewhat taller than the rest of the Eskimos, the same for men and women, and the prehistoric Siberians still taller, while the stature of the Indians is the same as that of the Old Igloo Eskimos.

If we want to compare these calculated values with figures for living Eskimos (table 89), we have from Greenland first and foremost SØREN HANSEN'S (24) very great West Greenland material with mean values of 162 cm for the stature of men and 152 cm for that of women. These are a little higher than the calculated values, but the difference is no doubt due to the fact pointed out by Søren Hansen himself that his measures originate from the mixed Greenland population, and this mixing with Europeans no doubt tends towards an increase of the stature. Stewart's (92) figures for living Labrador Eskimos are seen to answer closely to the calculated heights for the skeletons from the "old stone graves".

Table 89.

	Males	Females	Writer
Greenland	162	152	Søren Hansen
Labrador	158,4	148,3	Stewart
Central Eskimos	160	–	Birket-Smith
Mackenzie Eskimos	169	156	Seltzer
Chipewa Indians	166	151	Grant (Stewart)

BIRKET-SMITH (4) has measured the stature of the now living Central Eskimos at 160 cm, which answers well to the values for all the Eastern Eskimo tribes. The Mackenzie Eskimos are considerably taller than any of the other Eskimo peoples, and seem to take a stand apart in the case of the stature. According to SELTZER (85) the explanation of this fact cannot be a mingling with elements of other races. Finally we see from the table that GRANT's values (quoted from Stewart) for the Chipewyan Indians lie above those of the Eastern Eskimos, though not nearly so high as the figures for the Mackenzie Eskimos.

Thus we have found practically the same stature for Inugsuk, North-East Greenland, Naujan, prehistoric Labrador, and now living Labrador Eskimos, whilst the now living Greenlanders are somewhat taller than the latter, a fact that can be explained by a mingling with taller Europeans. *The Old Igloo Eskimos as well as the prehistoric Siberians have statures taller than those of the East Eskimos.* The Mackenzie Eskimos take a stand apart, as they are about 10 cm taller than the East Eskimos.

X. TORI

By torus we understand a prominent bony part, as a rule with a rather smooth surface, although the shape may vary considerably. The forms of interest by investigations of Eskimo skeletons are torus mandibularis, on the inner side of corpus mandibulae, torus palatinus, along sutura mediana palatini, and torus alveolaris maxillae, along the alveolar edge of the maxilla.

Torus mandibularis

was first described by DANIELLI (13) in 1884, who found mandibular hyperostoses on 18 out of 35 examined Ostiak lower jaws, and on individual finds of lower jaws belonging to various other races.

SØREN HANSEN tells in 1895 (25) (and previously in a letter to Revue d'Antropologie in 1887) of "a peculiar deposit of a very hard bony mass on the inner side "on a number of Eskimo lower jaws"". He further writes: "the importance of this feature, also found by other arctic races who are otherwise not directly related to the Eskimos, is not clear".

RUSSEL & HUXLEY find 1899 (83) "quite marked" hyperostoses on some jaws of young Eskimos with only very slight wear on the teeth. Therefore they do not think that the hyperostoses can be due to "strain upon the teeth".

DUCKWORTH & PAIN describe 1900 (14) torus mandibularis as characteristic of the Eskimos, and find torus on 10 out of 32 Eskimo lower jaws from Labrador and Greenland.

OETTEKING also finds (68) torus mandibularis in his material from Labrador and Greenland. He thinks that the cause of torus is the great strain on the mastication apparatus.

In 1910 HRDLICKA (31) writes of the Central Eskimos that "a marked and general feature is a pronounced, bony reinforcement of the alveolar arch". Like Oetteking he thinks that the cause of it is the heavy strain on the whole chewing apparatus, though that by the Eskimos, torus is also partly due to a hereditary predisposition, as he has found torus on a cranium of a child.

In CRANIA GROENLANDICA (20) in 1915 the conditions regarding torus mandibularis are gone through very thoroughly, and torus shown on 85 % of all examined lower jaws. Fürst & Hansen find by comparison with other races (the Lapps) that the highest development of torus is found by the most northern peoples. They have also examined the structure of totus mandibularis and found it built up of a normal, compact bone tissue.

HOESSLY (28) has found torus on 2 out of 31 lower jaws from Angmagssalik. He hints at the possibility that it might be due to a disease (scorbut).

CAMERON and RITCHIE (82), like Oettening and Hrdlicka, explain the emergence of torus as a result of a heavy strain upon the jaws.

In 1930 HRDLICKA (35) finds very frequent appearance of torus mandibularis by the West Eskimos.

In 1933 MATTHEWS (63) has dealt with the question of torus by various peoples in connection with different forms of occlusion of the teeth, and has arrived at the following conclusion:

"These tori, brought about by physiological processes instituted in response to functional demands, are useful, acquired characters, not pathological lesions".

WEIDENREICH (97) has examined lower jaws of sinanthropus pekinensis ("the Peking man"), altogether fragments of 11 individuals, and in several cases found torus mandibularis.

STEWART (92) mentions that torus frequently appears on lower jaws from Labrador, and most frequently so on the oldest. The less frequent appearance by recent Labrador Eskimos, he thinks, is due either to less use of the teeth or to changed hereditary dispositions.

HRDLICKA has finally in 1940 (37) collected all available material on torus mandibularis, and in addition examined a very great number of lower jaws. His work ends in the following: "Taking everything thus far learned about these hyperstoses, both mandibular and maxillary, it seems impossible to reach any other conclusion than that they are caused by stresses on mastication in excess of the capacity of the individual bones, and that they are the effects of the organism to provide additional strenghening to the parts affected".

The frequency and the degree of development of torus mandibularis in the present material appear from table 90.

On 165 lower jaws we thus find torus in 125 cases: 76 %.

It will be seen that the total figure answers very well to that given by Fürst & Hansen for the mixed West Greenlanders in Crania Groenlandica (85 %).

And further it appears very plainly that the North-East Greenland lower jaws show more frequent as well as larger torus mandibu-

Table 90. Torus Mandibularis.

	Males		Females	
	Inugs. area	N.-East Greenl.	Inugs. area	N.-East Greenl.
None	16 (22 %)	0 (0 %)	24 (44 %)	0 (0 %)
Light	20 (28 %)	0 (0 %)	20 (36 %)	5 (24 %)
Medium	22 (31 %)	5 (29 %)	8 (14 %)	4 (19 %)
Heavy	14 (19 %)	12 (71 %)	3 (6 %)	12 (57 %)
Total	72	17	55	21

laris than the lower jaws from the Inugsuk area, in the case of both men and women.

The distribution of torus mandibularis inside the age groups from the Inugsuk area appears from table 91.

Table 91. Torus Mandibularis in Different Age Groups.

	None	Light	Medium	Heavy
Infans I	–	–	–	–
Infans II	3	2	–	–
Juvenis males	–	–	3	–
– females	2	3	1	–
Adult. males	12	7	12	7
– females	12	12	2	2
Matur. males	3	11	4	5
– females	7	2	4	1
Senil. males	1	2	3	2
– females	3	3	1	–

There seems to be no differences of importance between the frequency in the different age groups, the figures for the youngest groups are, however, so small that they do not permit of safe conclusions.

It appears from both tables that torus is somewhat larger and more frequent by men than by women.

To illustrate the question as to the causes of the emergence of torus mandibularis table 92 shows a comparison between the frequency by the Eskimos, the mediaeval Norsemen in Greenland, in Iceland, and in Scania and Halland.

It appears with extraordinary clearness that the differences in the frequency of torus mandibularis answers closely to the differences in life conditions, as the Eskimos and the Norsemen from Greenland and Iceland live under very much the same outer conditions, which are considerably different from the conditions under which the Norsemen in

Table 92. Torus Mandibularis by Eskimos and Mediaeval Norsemen.

Pure Eskimos from Greenland (Inugsuk area + North-East Greenland)	76 %
Mediaeval Norsemen from Greenland (Fischer-Møller (19))	66 %
Mediaeval Norsemen from Scania (Mellquist & Sandberg (64))	3 %
Mediaeval (?) Icelanders (Hooton (30))	67 %

Scania and Halland lived. And, vice versa, it is seen that the racial conditions have not characterized the frequency of torus mandibularis, as the 3 mediaeval groups are all from the same period (14—15. century) and in other ways must be very closely related.

It is the same result the three investigators mentioned have arrived at, and it finds further support from KAJAVA and SCHREINER (84), who have found torus mandibularis considerably more frequent by the Lapps than by the people in the more southern parts of the northern countries. This means *that torus mandibularis is characteristic of peoples living in arctic regions, reasonably independent of their raceological conditions.*

Torus palatinus

has been described already from the beginning of the 19. century. The first investigators were mostly inclined to believe that it was a matter of a pathological change, but gradually they understood that this was not the case. Numerous investigations on torus palatinus have been published since then, its cause, shape, structure, raceological importance, etc., but there is only agreement in very few cases.

HOOTON was the first to clearly advance the theory that torus palatinus, in the same way as torus mandibularis, is the reaction of the bone tissue to an extraordinary strain on the jaws, as we find it with peoples living in arctic regions. MILLER & ROTH (65), who in 1938 have treated a very great American bone material, are inclined to support Hooton's theory. JU KANG WOO has in 1950 (101) examined a material consisting of 2246 crania of various peoples. He goes into most of the problems concerning torus palatinus, thus amongst other things has examined the build of the bone tissue in torus, and is of the opinion that, all considered, torus palatinus must be a hereditary, specially human quality.

Torus palatinus by Eskimos has for instance been described by VIRCHOW (100) in 1878, who found a "vulst" in the plalate of a living Eskimo, Tobias, who lived in Berlin.

Duckworth & Pain (14) find that torus palatinus appears frequently on their Labrador crania, even on a couple of infant crania.

Brierley & Parson (8) have shown torus palatinus on 5 out of 17 crania from Greenland.

Oetteking finds in 1908 (68) frequent torus palatinus on 11 Labrador crania, and in 1930 (70) on 80 % of a collection of crania from Baffin Island.

Stewart thinks (92), as in the case of torus mandibularis, that the cause of torus palatinus must be either a hereditary predisposition or the great activity of the chewing apparatus, most likely the former.

In the present material the distribution of torus is as appears in table 93:

Table 93. Torus Palatinus.

	Males		Females	
	Inugs. area	N.-East Greenl.	Inugs. area	N.-East Greenl.
None	68 (72 %)	10 (55 %)	46 (61 %)	11 (41 %)
Light	14 (15 %)	7 (39 %)	23 (30 %)	8 (30 %)
Medium	6 (6 %)	1 (6 %)	5 (7 %)	5 (18 %)
Heavy	6 (6 %)	0 (0 %)	2 (3 %)	3 (11 %)
Total	94	18	76	27

On 215 crania we then find torus palatinus in 80 cases: 37 %.

It is seen that torus palatinus seems to be somewhat more frequent in the North-East Greenland material than in the Inugsuk material, though we cannot say anything decisive about this.

According to age torus palatinus distributes itself in the Inugsuk material as shown in table 94:

Table 94. Torus Palatinus in Different Age Groups.

	None	Light	Medium	Heavy
Infans I	1	–	–	–
Infans II	3	3	1	–
Juvenis males	2	4	–	–
– females	6	2	–	–
Adult. males	35	6	4	3
– females	25	10	4	1
Matur. males	24	1	1	2
– females	11	7	1	1
Senil. males	7	3	1	–
– females	4	4	–	–

As it is seen there is no distinct difference between the age groups, whereas the frequency for the existence of torus is somewhat higher for women: 65 %, than for men: 38 %. This answers to MILLER & ROTH (65) quoting the proportion between the 2 sexes as being just 2:1.

Table 95 finally shows a comparison between the frequences of torus palatinus in the same groups as were compared with regard to torus mandibularis:

Table 95. Torus Palatinus by Eskimos and Meadiaeval Norsemen.

Pure Eskimos from Greenland (Inugsuk area + North-East Greenland)	37 %
Mediaeval Norsemen from Greenland (Fischer-Møller (19))	85 %
Mediaeval Norsemen from Scania (Mellquist & Sandberg (64))	18 %
Mediaeval Icelanders (Hooton (30))	71 %

It is peculiar that the figure for the Eskimos is so far below the figures for the mediaeval Norsemen on Greenland and in Iceland; it is, however, considerably higher than the figure for the mediaeval Scanians. Even though the figures are not so convincing as in the case of torus mandibularis, they point, however, very much to the possibility of the surroundings being of decisive importance for the emergence of torus palatinus. In the same direction point some examinations by LASKER (52), where he finds a significant difference between the frequency of torus palatinus by immigrated Chinese and that by American Chinese, born in America.

The interdependence between torus mandibularis and palatinus appears from table 96, where men and women from the Inugsuk area have been pooled:

Table 96. The Connection between Torus Palatinus and Torus Mandibularis.

		None	Light	Medium	Heavy	Total
Torus palatinus	none	30	27	19	8	84
	light	7	6	6	5	24
	medium		4	4	2	10
	heavy	1	2		2	5
	total	38	39	29	17	123
		Torus mandibularis				

The table does not show any distinct regular connection, even though there is a certain tendency in the direction of direct proportionality between the development degree of the 2 tori.

Torus alveolaris maxillae

is the least examined of the three forms, no doubt because it is the least distinct. It is mentioned by SCHREINER (84), who has shown torus alveolaris maxillae on about 15 % out of 308 Lapp crania. In 1940 HRDLICKA (37) has gone through the conditions concerning this form of torus, and has come to the conclusion that it corresponds completely to torus mandibularis, and likewise is due to heavy strain on the jaw. FISCHER-MØLLER (19) and P. O. PEDERSEN (9) have shown that torus maxillaris is very frequent on mediaeval Norse crania, thus in Fischer-Møller's material torus alveolaris maxillae was found on 23 crania out of 40 = 58 %.

In the Eskimo material examined torus alveolaris maxillae is found, as appears from table 97, on about 15 % of all the crania:

Table 97. Torus Alveolaris Maxillae.

	Males	Females
Inugsuk area	15 %	10 %
North-East Greenland	17 %	15 %

Thus the total result of the examinations of the 3 forms of torus is this: *that torus mandibularis is found extremely frequently by Eskimos and by other arctic peoples, and no doubt must be due to the special life conditions in the arctic regions, and that the same is sure to apply to torus palatinus, though it does not appear so plainly by the examinations, and that torus alveolaris maxillae is somewhat less frequent by the Eskimos than by the Norsemen on Greenland, but that the conditions of this torus are still so little examined that its cause cannot be established.*

XI. PATHOLOGICAL CHANGES ON THE SKELETAL PARTS

Going through the skeletons we find several with pathological changes. They will be gone through in the following, each disease group separately. It would have been interesting to try and draw up figures for the morbidity of each individual disease; this is not done, however, because it is extremely difficult to get reliable values for the number of diseased, and more so, of healthy bones, because of the very different, as a rule rather poor, condition of preservation of the skeletons as a whole, and of the different sections of each single bone. Another source of faults is the fact that it is sometimes very difficult to make a diagnosis on a disease from the changes found on a bone which has been lying in the earth for several centuries. Finally it is very often difficult to distinguish between intra vital and post mortal changes, as for inst. weathering of the surface of the bones.

The diseased bones originate from the whole of the Eskimo skeletal material, that is from Greenland (the Inugsuk area, North-East Greenland, and the Kap York district), as well as from Naujan by Hudson Bay, and Alaska.

Development Anomalies.

Different minor abnormities, which may best be classified as development anomalies, are found in the material.

In the case of the crania we find in 2 cases a slight deformation with a small scoliosis, as it is seen by living persons with *torticollis*. 2 crania have a small *tap-shaped exostosis in foramen magnum* by basion, on one we find a small *3. condylus occipitalis* in front of the normal right, and on another a small *articular facet on the right processus jugularis* for articulation with processus transversus atlantis.

All the mentioned deviations from the normal are small, well known variations, rather unimportant. Of greater interest is the fact that in 2 cases we find a small *cleft palate* (fig. 33). In both cases it is a matter of a rather sharp cut, about $^1/_2$ cm deep, into the back edge of the hard palate, answering to sutura palatina mediana. The alveoles in the

upper jaw are in both cases very defective, but there seems to have been no abnormities in the number of the teeth or their position. P. O. PEDERSEN (73) has previously described a case of cleft palate on an Eskimo cranium where the cleft reaches $^2/_3$ parts through the hard palate, and in this case moreover found oligodonty in the upper as well as the lower jaw. A cranium from Mitimatalik on Baffin Island shows another form of foetal cleft formation in the facial skeleton. The cranium was brought home by V. Thule Expedition, but is not safely dated, and is therefore excluded from the material treated here. The abnormity in question is a *median alveolar cleft* (fig. 32), appearing as a $^3/_4$ cm deep, regular, rather sharp edged, symmetrical cut up into the alveolar protuberance of the upper jaw, stretching to the back as an even furrow on the under side of the palate. Answering to the defect, the 2 central front teeth are missing in the upper jaw, and there is no trace of their alveoles. In the lower jaw we find alveoles for all teeth, but front and canine teeth are pressed so tightly together that the canines seem like being pushed outside of the row of teeth. It cannot be ruled out entirely that the changes in the upper jaw are due to a lesion in childhood, but the complete symmetry and the simultaneous abnormal setting of the teeth in the lower jaw make this seem very unlikely.

Finally we find on 2 Greenland crania, almost completely identical, an entirely abnormal dental apparition. It is a matter of the development of a *tooth in the lower demarcation of apertura pyriformis* (fig. 34). In both cases the tooth is well developed with a conic, enamel covered crown, pointing up- and backwards, and a conic root going down into the alveolar protuberance of the upper jaw. The total length of the tooth is in both cases just under $1^1/_2$ cm. Otherwise the rows of teeth and the hard palate are normal in both cases. In one case we may also safely rule out the possibility of a simultaneous alveolar cleft, while in the other case the front part of processus alveolaris is so defective that we cannot settle the matter. This case has previously been published by P. O. PEDERSEN (74), who has examined the existing literature on the subject and found that the anomaly has only been shown by Eskimos once before, namely on a cranium from the American continent.

Spine bifida sacralis is seen in 8 cases; in 2 of these only can we imagine the possibility of meningocele, as the cleft in the rest is quite narrow. Altogether we find about 80 ossa sacri preserved, so that the frequency of this disease is about $10\,^0/_0$. Otherwise there are no figures for Eskimos in this respect, though we know cases of meningocele (BERTELSEN (1)). For comparison we may mention that KEMP (46) gives the frequency of spina bifida occulta at about $15\,^0/_0$, whilst LICHTENSTEIN (54) gives it at $5\,^0/_0$. There is no doubt no difference of importance. Besides

the said cases of spina bifida, which are localized to os sacrum, we find a single one, corresponding to the *4 upper lumbar vertebrae*, with a narrow cleft with no sign of meningocele formation (fig. 35).

Spondylolysis, by which we understand that the 2 epiphysis nuclei sometimes found in arcus (for arcus itself and radix respectively) of, most frequently, 5. lumbar vertebra, do not amalgamate, is according to STEWART (90) ("separate neural arch") very frequent by the West Eskimos (by 27 %), and probably also by the earliest Labrador Eskimos. SCHREINER (84) has shown this disease on 12 % of a great collection of Lapp skeletons. In the present material there are 3 isolated vertebrae which with safety can be said to display this abnormity; but it is not possible to give any percentage in proportion to the number of normal, because of the very different preservation condition of the skeletons.

In 2 cases we find bilateral osseous *sacralization* of 5. lumbar vertebra, both cases combined with spina bifida sacralis. In one case we find one-sided sacralization with a great articular facet between massa lateralis of os sacrum and the very big and plump processus transversus of 5. lumbar vertebra.

On one skeleton there is a 3 cm long *lumbar rib* coming from processus transversus of 2. lumbar vertebra.

One skeleton shows, in combination with spina bifida sacralis and sacralization of the lowest lumbar vertebra, *coalescence between 2 thoracic vertebrae*. It is no doubt a matter of a congenital anomaly, as the coalescence is limited to the 2 arcus and processus transversi, which on one side simply have amalgamated into one. SCHREINER (84) has described several similar cases by the Lapps, frequently combined with other abnormities in columna vertebralis.

Finally we must, together with the development anomalies, mention a great *exostosis* on the medial side of the lowest part of a femur. Otherwise there are no exostoses on the bones except along the edges of articular facets in joints with arthrosis.

It is hardly a mere coincidence that we find just the light cases of these congenital deformities; both HOLM and POULSEN (78) tell us that by the East Greenlanders it was nothing unusual to do away with children born with major defects.

Traumatic Lesions.

Traumatic lesions form a great part of the pathological changes we have found. Thus on 11 different *crania we find some minor grooves* with a quite smooth floor and a gentle, but fairly distinct, demarcation. As a rule they have a diameter of $^1/_2$—$1^1/_2$ cm. On 2 of these crania we

find even several such excavations. No doubt they are due to minor traumata and are nearly always located to the most exposed spot of the cranium, round the centre of squama ossis frontalis, that is in the middle of the forehead. 7 of the 11 crania are male, 3 female, and 1 is not determined as to sex. The frequency compared to the sex distribution of the whole material, we see, is highest for men; quite naturally so.

2 crania have somewhat heavier lesions in forehead and face. It is a matter of

1) a male cranium, in the forehead of which is seen a *flattened area the size of a child's hand, surrounded by traces of fracture lines*, in one place with a small, smooth-walled hole to the inside of the cranium. The fracture lines continue into the roof of both orbits, surrounding in the left a $1^1/_2 \times 2$ cm big defect in the roof, with smooth edges. The nasal bones, finally, deviate somewhat to the left, and the whole nose seems to have been flattened. So it has been a case of a heavy lesion of the whole of the upper part of the face, presumably because of blunt violence somehow or other. Judging from the completely finished healing processes the lesion must have been incurred long before death, and would hardly have had anything to do with this (fig. 36).

2) the cranium of a woman. In the right side of the forehead there is a $1^1/_2$ cm long, 2 mm broad, *irregular cleft in the wall of the cranium.* The edge is irregular, but the surface otherwise smooth, so that also here we find signs of healing. Thus the lesion has not been directly fatal, but how long before death it has been incurred, we cannot say. It mostly gives the impression of having been inflicted by a rather pointed instrument, or maybe a sharp stone.

On one cranium there are traces of a *fracture of the back edge of the chin* with the splitting off of a piece of bone, about $1^1/_2$ cm long, which has healed again with a dislocation of about 2 mm downwards-backwards (fig. 37). On the same skeleton we also find a supracondylar fracture of the right femur of earlier date. There are ostitic changes round the fracture, which has healed in a rather pronounced valgus position (fig. 39). Judging from the appearance of the 2 fractures it is quite possible that they have been brought about simultaneously.

Of upper extremity bones with sequelae from lesion there is only a single one. It is a question of a *radius with transverse fracture* of the middle of the diaphysis, healed with about 45° angulation, so that the function of the extremity concerned has been considerably reduced (fig. 40).

On an os ilium from the left side there are traces of a *fracture through ala, so that spina iliaca anterior superior with an adjacent* 8×4 *cm large part of the bone has been split off*, but has grown on again in practically

normal position. There is light arthrosis in the opposite knee; this could possibly be due to alterations of the strain as a result of the fracture; it may, however, also be a casual find.

Femur fractures are rather copiously represented, and there are examples of all the types generally occurring. Of fractures in the proximal end of the femur we find in the first place a *typical pertrochanteric fracture*, with traces of a fracture line sloping from the point of trochanter major downwards-medially to trochanter minor. The fracture has healed completely, but caput and collum are twisted somewhat to the back, and the collo-diaphysis angle diminished.

Then a somewhat weathered femur shows a very strong varus position of collum, so that the latter has a downward direction instead of the normal upward. Caput has disappeared entirely (crumbled?). It is presumably a matter of the sequelae of a *collum fracture*, but we cannot say anything for sure, because of the rather heavy crumbling. It may, however, be stated that ISAGER (42) has described a very similar case from the monastery churchyard by Øm, and feels fairly sure *that it is a matter of the sequelae of a fracture.* The changes tally completely with those found here, and especially the X-rays show quite the same conditions, only the varus position is not quite so pronounced in Isager's case (fig. 38).

On a 3. femur we find traces of an *oblique fracture almost through the middle of the diaphysis.* The fracture has healed completely without axis deviation, but apparently with some shortening; the other femur, however, is not there for comparison.

Also a *supracondylar fracture* is found in the material. It has healed, but we can still dimly trace that there have been several minor fragments. The position is rather bad with considerable valgus position and rotation (fig. 39). Strange enough, there is no sign of arthrosis in the knee joint.

There are 3 *tibia fractures*, namely 1 corpus- and 2 malleolar fractures. The *corpus-fracture* is only just traceable as a slight thickening of the bone with just a suspicion of angulation open to the back, and interruption of the normal surface relief. There is heavy arthrosis in the hereto belonging knee joint, especially in the medial joint cavity; this disease is, however, also found in the other knee joint, though not so pronounced. Hip and ancle joints are, on the other hand, normal.

The 2 *malleolar fractures* appear reasonably identical, as the distal half of the malleole is missing, and the lower surface of the malleole is horizontal, rather irregular. In the ancle joints there are light signs of arthrosis in both cases.

In one hip bone we find very serious pathological changes, the cause of which it is impossible to determine (fig. 41). The changes appear on

femur as well as on os coxae. On femur the whole of caput and collum have disappeared; where collum normally comes from, we find a thin shell of compact bone tissue, gently passing into the normal compacta on the upper end of the femur. On os coxae acetabulum is missing. Where it should have been we find the surface of the bone very rough, with furrows and holes interchanging with rounded bony protuberances. The whole area, which takes up the place of acetabulum and the nearest adjacent parts of os coxae, is lightly crater shaped with traces of the floor of acetabulum (fossa acetabuli) in the centre of the crater. The changes may possibly be due to congenital luxation of the hip, but in such case, considering the very heavy changes, we should have expected "acetabulum" to have been drawn considerably up on os coxae, which is not the case. The final result of a coxitis will, as a rule, be an osseous coalescence between the bones; but it is possible that the present case is an intermediate stage of this disease. It is, however, more likely a matter of the sequelae of a collum fracture with necrosis of caput and collum and ensuing secondary disturbances in the joint.

Inflammatory changes.

In the nature of things it is only the chronic changes in bones and joints that permit of a safe perception by skeletal examinations. There are, however, several interesting cases of this kind in the present material. Of a skeleton from Alaska, in many ways pathological, we thus find a femur with monstrous osteomylitic changes (fig. 42). The distal $^3/_4$ parts of the bone is enormously thickened, and, as it appears from the X-ray, sclerozed with irregular surface, from where deep channels progress into the marrow-cave. Out of these channels jut several sequesters, one of which is as big as a thumb.

The right elbow joint of the same skeleton is badly deformed with decay and new-formation of bone tissue, interchanging in such a way though, that the decay is dominant round the articular surfaces, while a sort of bone capsule has formed round the joint, more peripherically. The capsule is not complete, but, combined with the deformation of the articular surfaces, it causes the mobility in the joint to be very small, only a few degrees. The position is good, however, about 90° flexion and near enough half way between pro- and supination; whether this is a coincidence or the result of an appropriate therapy, is not certain.

In the left shoulder joint we find similar changes (fig. 43), though the bone decay is predominant here. Thus caput humeri has shrunk into an oblique, irregular elevation on the bone. The processes have progressed on to the epiphyseal cartilage, so that the bone as a whole is about 6 cm shorter than the opposite, and the whole proximal end of humerus is

irregular and twisted. Fossa glenoidalis on scapula is too defective for a closer judgment, there does not seem to have been major abnormities.

There are also changes in columna vertebralis; 3. and 4. lumbar vertebrae have fused together answering to corpus, the upper one after having shrunk considerably (fig. 44). The surfaces of the bones are otherwise quite even and smooth, and on the X-ray osseous trabeculae are seen to progress quite regularly from one vertebra to another. So there are no signs at all of fresh processes.

Finally the skeleton shows total osseous ancylosis of the metatarsophalangeal joints of the big toes in a typical hammer-toe position.

If we consider all these diseases by the same person, one by one, we can only make a safe diagnosis on the osteomyelitic changes in the femur. Of the left shoulder- and right elbow joints we can say that presumably there has been a heavy pyarthron in both places, but especially in the case of the elbow joint we cannot rule out the possibility that there has been a traumatic lesion as well. It might possibly have been an open lesion that has become infected. The changes in columna may be sequelae of a fracture, a tuberculous spondylitis, or a purulent osteomyelitis. In KAERN's (48) investigations on the latter, very unusual disease there are, however, so much agreement with the present case that, if anything, we must class it among this disease group. Kaern states for instance as characteristic that only 1, at the most 2, vertebrae are attacked, discus is being destroyed, collapse is likely to occur, no sequesters are formed, and "when the reparatory processes set in, a complete or partial fusion will take place of the 2 vertebrae, a process very characteristic of osteomyelitis", which is just what we have found in the present case.

Looking at the skeleton as a whole, we may well link up all these diseases and assume that it has been a case of *a chronic pyaemia with chronic osteomyelitis in the left femur. The pyaemia has furthermore caused focal inflammations in elbow- and shoulder joint and in columna*, in the latter case, however, healed when death occurred. The illness has been of very long duration as it appears partly from the look of the bones, partly from the considerable shortening of the left humerus as sequela of the diseased epiphyseal cartilage. That the individual has been invalidated is beyond doubt, and the illness has undoubtedly been the indirect cause of not only his own death, but also of that of his family. The fact is that the skeleton, according to Helge Larsen, was found on the plank-bed in a collapsed house, together with skeletal parts of a woman, in the position we know Eskimos lie down when death by starvation is approaching.

A femur of a skeleton from Greenland also shows sequelae of an *osteomyelitis*, though only in the form of thickening and sclerosing of the bone and with no sign of recent inflammation.

On another skeleton we find in one ancle joint sequelae of a severe *arthritis* (fig. 45). The distal ends of tibia and fibula have, together with talus, fused into an irregular mass of bone, on the surface of which we see some of the articular surfaces on talus. There seems to have been some decay of the bones, as we partly still see lacunae into the bone tissue, and partly find a considerable dislocation of talus. It is quite possible that the infection in the joint is due to an opening of this by a heavy trauma.

To the bones with inflammatory changes also belong *3 crania with sequelae of chronic otitis media.* On them all we see a distinct decay of the walls round the inmost part of meatus acusticus externus, in one case we even find a fairly big cavity with very hard, somewhat irregular, walls. The cavity has no doubt been caused by resorbtion of the bone tissue as a result of cholesteatom formation, and is so big and open that the disease, if the cholesteatom has been expelled, no doubt has been cured in the same way as we aim at by the so-called "radical operation" by chronic otitis media (fig. 46). Such "spontaneous radical operations" are well known and are not all together unusual (THORNVAL (96)).

Arthrosis.

This is the most common disease in the whole skeletal material. It appears on the skeletons as marginal osteophytes along the edges of the articular surfaces and smoothed "polished" areas on these. They are found in all degrees, from small changes in a single joint to a heavy deformation of the whole skeleton. In a few solitary cases we can as cause of it find some fracture or bone disease which has altered the strain conditions in the joint, but on the whole we can really say nothing about the cause of its appearance from the investigation of the present bones.

The most frequent localization in the present material, where the small joints in many cases are too defective for judgment, is in the knee joint, where the disease appears bilateral, as a rule, and generally is most severe in the lateral joint cavity. We have found typical knee-joint arthrosis by 12 individuals out of a total number of about 120 (10 %). Also elbow- and wrist joints are frequently attacked, though not quite so frequently as the knee joints (barely 10 %). In the knee, elbow, and wrist joints the changes can be very heavy (fig. 48), so that the mobility in the joint is limited to a few degrees by the shape of the articular surfaces alone. Lighter forms of arthrosis are found fairly frequently in mandibular and occipital joints, and in a solitary case we have found typical arthrosis in the small joints of columna vertebralis. Also spondylosis deformans is frequently found. It is remarkable that not in one single case have we found arthrosis in a hip joint, as by

Europeans this joint is one of the first to be attacked by this disease, and SCHREINER (84) has found that the joints are attacked in reasonably the same succession by the Lapps. It is not possible to give any explanation of this matter; it would hardly be a question of decisive differences in the strain on the lower extremities, as the knee joints of the Eskimos, as said, are very much exposed to arthrosis.

The Teeth.

The conditions of the teeth are on the whole left out of consideration in the present work. For this reason that a great part of the material has been gone through and has been, or will be, published by P. O. PEDERSEN (75). There are, however, a few things of special interest that should be mentioned. Inflammation in the alveoles of the teeth, with bone decay round the roots, is very common. On 2 crania these changes are so heavy that openings, the thickness of a pencil, have formed up to the sinuses. A number of teeth have been lost as a result of root inflammations, and, corresponding to this, we find alveolar atrophy. On 2 upper jaws this alveolar decay is so heavy (after loss of all the teeth) that the mastication surface of the jaw reaches right up to the sides of apertura pyriformis (fig. 47).

The pathological changes we have found, with frequent traumatic lesions and predisposition for rheumatic changes in the joints, answer altogether very well to what one would expect to find by a primitive people in arctic surroundings. In addition to these, there are a few cases of diseases so severe that one would think it utterly impossible to keep body and soul together under so difficult conditions.

XII. CONCLUSION

Going through the Eskimo skeletal material from Greenland we have demonstrated 2 different physical types, different from each other in the build of the cranium as well as in that of the limb bones. These 2 types correspond each to its own culture, Inugsuk and North-East Greenland culture.

The 2 Greenland Eskimo types show great concordance with different Eskimo peoples in Canada and Alaska: The Inugsuk type with the Eskimos from heathen graves in Labrador and with the old Birnirk people ("Old Igloo") from Point Barrow, the North-East Greenland type with the carriers of the Thule Culture round Hudson Bay.

In an attempt at stretching the comparison further west, we have found a fairly gentle transition from the Inugsuk—Labrador—Old Igloo type past the North-East Greenland and central Thule Culture type to the earliest Eskimos by the Bering Strait, and still further back to prehistoric hunting peoples in Siberia. This evolution answers in all essentials to the culture development and -wandering demonstrated archaeologically.

An exception forms the demonstration of the close relationship, physically, between the Inugsuk and Birnirk Culture Eskimos, a relationship strongly indicative of the Inugsuk people being directly descended from the Birnirk people, without the carriers of the Thule Culture as intermediaries.

We have found no close relationship between the Eskimos and recent Indians and Mongols.

The Eskimo crania in the material examined here, have proved different from the crania in Crania Groenlandica, as in all directions they are somewhat smaller than the latter. For this reason, presumably, that the material in Crania Groenlandica originates from a somewhat later time, with other living conditions and with some racial mixture with Europeans.

A comparison between the pure Eskimos and the mediaeval Norsemen has not revealed any features by the Eskimos which may be interpreted as results of a mixture between the 2 peoples.

Investigations into the appearance of tori have supported very strongly the earlier theory of these structures being dependent on environment rather than on racial conditions.

The pathological changes have, except in some very remarkable solitary cases, proved to answer well to what one would expect to find by a primitive people in arctic surroundings.

XIII. RÉSUMÉ

Chapter I. Introduction.

Chapter II. Outline of the Archaeological Conditions in the Entire Eskimo Region.

The principal lines in the archaeological and ethnological theories regarding the origin of the Eskimos are gone through, to some extent historically. As to the Eskimo region as a whole, the conclusion is this: that the latest theories refer the origin of the Eskimo culture to North Asia, and assume that the Eskimos since have spread in several waves right across America, from west to east.

On Greenland we distinguish between 3 culture areas, the Inugsuk area, comprising West and South-East Greenland, the North-East Greenland area in North-East Greenland, and a mixed area in the Thule district.

Chapter III. Previous Examinations.

First we go through the literature comprising the Greenland skeletons, pointing out that only a few works are usable as basis for comparison to-day. It is a matter of the bone materials of pure race described by Pansch (72), Bessels (2), and Hoessly (28), and of the, no doubt not racially pure, material in Crania Groenlandica (20).

Next we give a survey of the literature on living Greenlanders, and finally a survey of the most important examinations of Eskimos outside Greenland, pointing out here that among the numerous publications there are only very few with pure, well dated materials.

Chapter IV. Methodics.

The examinations have been made according to the technique given by Martin (55). In addition a few new measures have been introduced. By calculations for significant differences the t-test has been employed with the $1\,^0/_0$ niveau as significance limit.

Chapter V. The Origin and Dating of the Skeletal Material.

The majority of the material originates from Greenland, and may safely be referred to Inugsuk or North-East Greenland culture. There

is besides a small collection of not safely dated skeletons from the Thule district, and furthermore some small series from Naujan by Hudson Bay, and from various places in Alaska. The bones were all collected during archaeological excavations, of which is given a very short account in the same chapter.

Chapter VI. Measures and Indices for the Greenland Crania.

Measures and indices for the 3 new-examined Greenland groups (the Inugsuk—North-East Greenland—Thule district) are gone through and compared with corresponding figures from other works. Standard deviations and mean errors have been calculated in each single case, and t and P given where significant differences have been found. The total result of the investigations is this: there are unquestionable differences between the North-East Greenland crania and the Inugsuk crania, as the latter are higher and narrower than the former. Moreover we find the Inugsuk crania decisively different from the later, no doubt mixed, West Greenland crania from Crania Groenlandica (20), as the late crania are somewhat larger in all dimensions than the Inugsuk crania. Finally the Eskimos have been compared with the mediaeval Norsemen from Greenland (FISCHER-MØLLER (19)) and found to differ from the latter at so to speak all points.

Chapter VII. General Description of the Greenland Crania.

A number of more or less characteristic features, which are not expressed in measures and indices, are gone through. It is a matter of description of the crania in the 5 normae (lateralis—verticalis—occipitalis—frontalis—basalis) with a special view to prognathy, clinocephaly, thickening of os tympani, the conditions of pterion, fossae mandibularis, scafocephaly, fissurae orbitalis inferiores, apertura pyriformis, and the conditions of the sutures.

In this way we find differences between the 2 Greenland series in the development of the crest of the crown, the lower demarcation of apertura pyriformis, and the shape of the chin.

Chapter VIII. Comparison between the Greenland Crania and other Eskimo, Asiatic, and Indian Crania.

The 2 Greenland series are compared with the following other Eskimo crania:

From Gambell on St. Lawrence Isl. — Old Bering Sea Culture (39)
"Old Igloo" crania from Pt. Barrow. — Birnirk Culture (35)
From Southampton Island. — Thule Culture (31)
From Naujan. — Thule Culture (new-examined)
"Old stone grave" crania from Labrador. — Late Thule Culture (?) (92)

"Early" crania from Point Hope (39)
"Late" crania from Point Hope (39)
"Late" crania from Alaska (new-examined).

Here we find great agreement between the Inugsuk, old Labrador, and "Old Igloo" crania, and between the North-East Greenland crania and those from Naujan and Southampton Island round Hudson Bay.

By further comparison between the Eskimo crania and crania of different Asiatic peoples from various times, we find a gentle transition from late Eskimos, past early, and further back to neolithic hunting peoples in Siberia. On the other hand we have not found any special likeness between the Eskimos and early and recent Chinese and Mongols, nor between the Eskimos and the Indians examined.

Chapter IX. The Limb Bones.

The most important measures and indices for the long limb bones are gone through and compared with corresponding figures for other Eskimos, for Indians, and for the neolithic Siberians. We find a certain difference between the 2 Greenland series, but otherwise there are no differences to which we can attach any importance.

On the pelvic bones we point out a very powerful sulcus paraglenoidalis by women, a feature to which hitherto no attention has been paid.

The statures have been calculated from the lengths of the extremity bones, and it appears that we get practically the same value for all pure Eskimos east of and round Hudson Bay. The now-living, mixed Greenlanders, the pure "Old Igloo" Eskimos, and the prehistoric Siberians are, on the other hand, somewhat taller than the East Eskimos.

Chapter X. Tori.

After a short historical survey of works, especially on the aetiology, regarding tori, we go through the conditions regarding torus mandibularis, torus palatinus, and torus alveolaris maxillae in the present material: first the frequency and extension by all adults in the 2 main groups, and next the distribution according to age in the Inugsuk group. Finally the result is being compared with corresponding figures for mediaeval Norsemen from Greenland and from Scania, and we find very great likeness between the Greenland Norsemen and the Eskimos, while these 2 groups differ considerably from the mediaeval Scanians. These results support the earlier theory as to the surroundings being the decisive factor by the development of tori.

Chapter XI. Pathological Changes on the Skeletal Parts.

Different pathological changes are described. First development anomalies, which are not found in the more severe forms, presumably

because children with such anomalies have not been allowed to live. Next traumatic lesions, which are rather fully represented, from small infractions in theca cranii to heavy fractures of the extremity bones. Of inflammatory changes in the bones we find only very few; to make up for it, one of the cases is monstrous with osteomyelitis in a femur and in columna and severe changes in the one shoulder joint and elbow joint. Of special interest are, moreover, 3 crania with sequelae of inflammation round the middle ear, as is seen by chronic otitis mediae with cholesteatom formation. Finally is given a short survey of the rather frequent degenerative changes of the ends of the joints (arthroses).

Chapter XII. Conclusion.

Going through the Eskimo skeletal material from Greenland we have demonstrated 2 different physical types, different from each other in the build of the cranium as well as in that of the limb-bones. These 2 types correspond each to its own culture, Inugsuk and North-East Greenland culture.

The 2 Greenland Eskimo types show great concordance with different Eskimo peoples in Canada and Alaska: The Inugsuk type with the Eskimos from heathen graves in Labrador and with the old Birnirk people ("Old Igloo") from Point Barrow, the North-East Greenland type with the carriers of the Thule Culture round Hudson Bay.

In an attempt at stretching the comparison further west, we have found a fairly gentle transition from the Inugsuk—Labrador—Old Igloo type, past the North-East Greenland and central Thule Culture type to the earliest Eskimos by the Bering Strait, and still further back to prehistoric hunting peoples in Siberia. This evolution answers in all essentials to the culture development and -wandering demonstrated archaeologically.

An exception forms the demonstration of the close relationship, physically, between the Inugsuk and Birnirk Culture Eskimos, a relationship strongly indicative of the Inugsuk people being directly descended from the Birnik people, without the carriers of the Thule Culture as intermediaries.

We have found no close relationship between the Eskimos and recent Indians and Mongols.

The Eskimo crania in the material examined here have proved different from the crania in Crania Groenlandica, as in all directions they are somewhat smaller than the latter. For this reason, presumably, that the material in Crania Groenlandica originates from a somewhat later time, with other living conditions and with some racial mixture with Europeans.

A comparison between the pure Eskimos and the mediaeval Norsemen has not revealed any features by the Eskimos which may be interpreted as results of a mixture between the 2 peoples.

Investigations into the appearance of tori have supported very strongly the earlier theory of these structures being dependent on environment rather than on racial conditions.

The pathological changes have, except in some very remarkable solitary cases, proved to answer well to what one would expect to find by a primitive people in arctic surroundings.

XIV. REFERENCES

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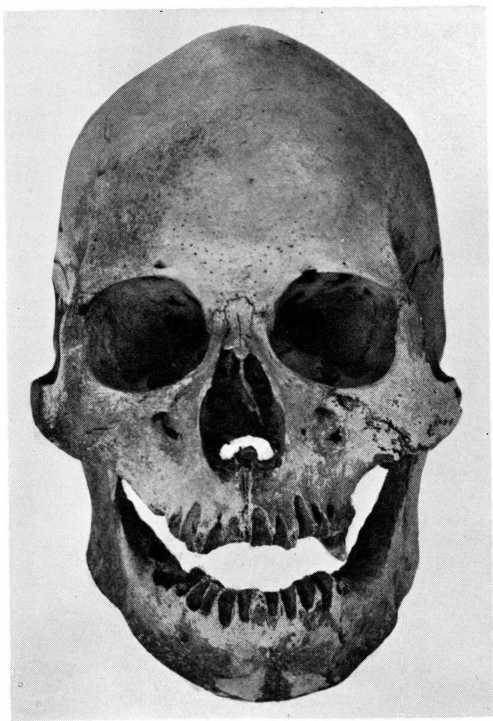
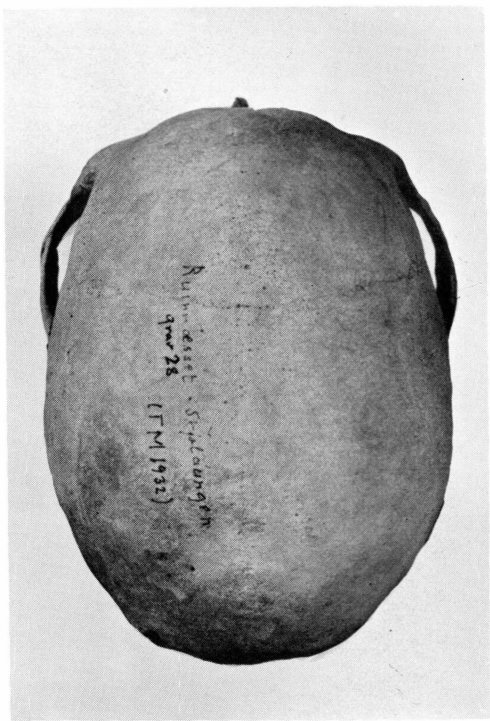
Færdig fra trykkeriet den 5. november 1953.

PLATES

Plate 1.

Fig. 23. Male Cranium from the Inugsuk Area. (No. 148 Ruinnæsset Grave 28 A.)





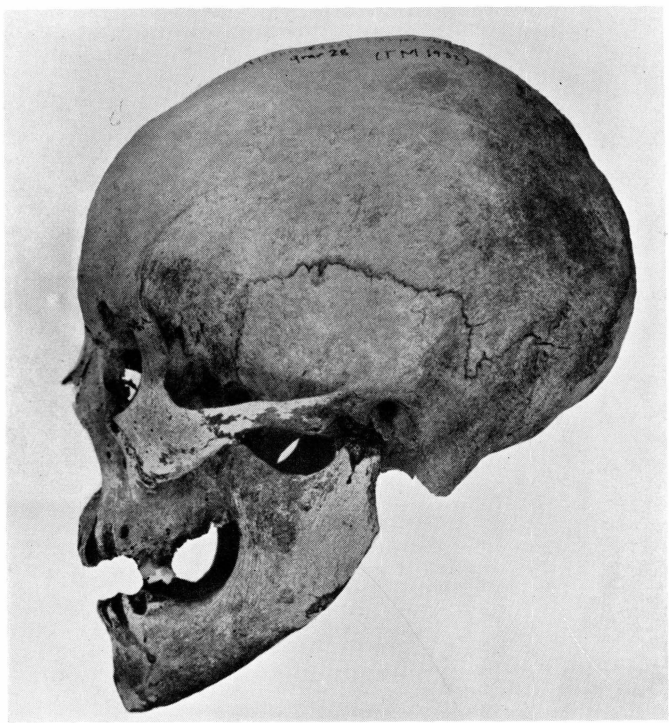


Plate 2.

Fig. 24. Female Cranium from the Inugsuk Area. (No. 3 Tunúngassoq Grave II C).

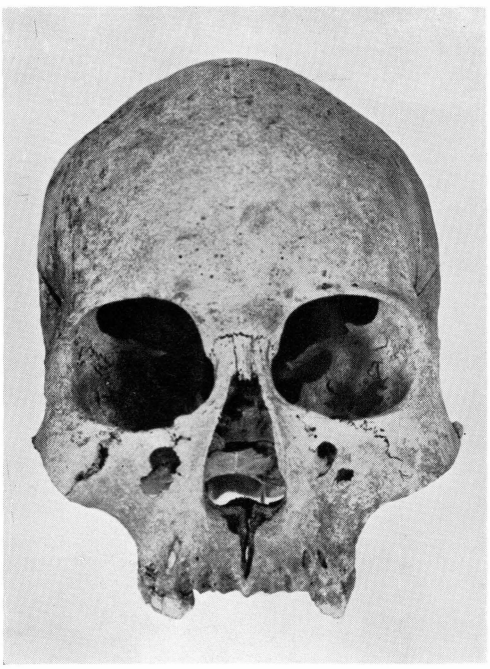
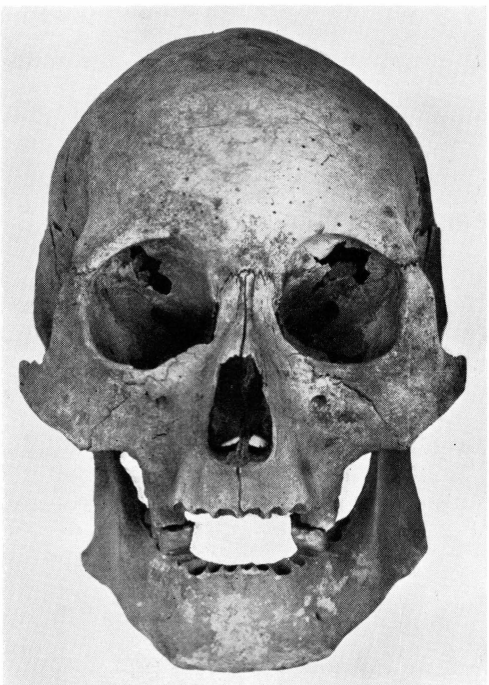
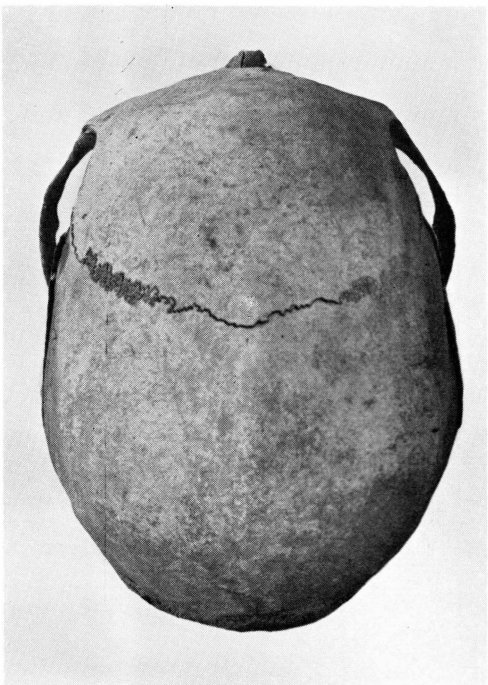


Plate 3.

Fig. 25. Male Cranium from North-East Greenland. (No. 243 Dødemandsbugten Grave 6).

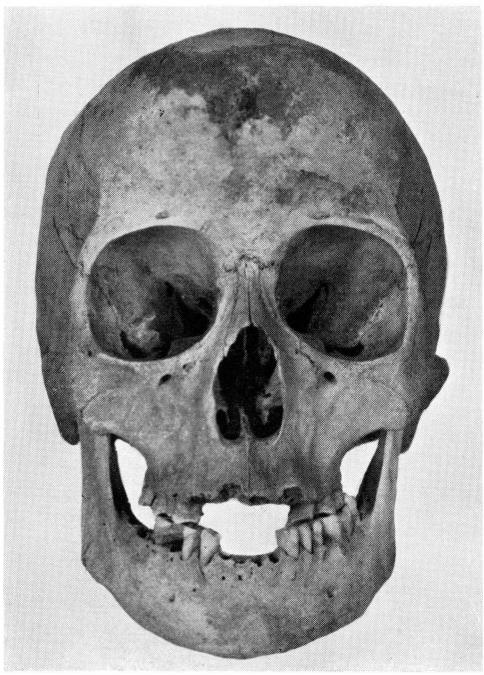


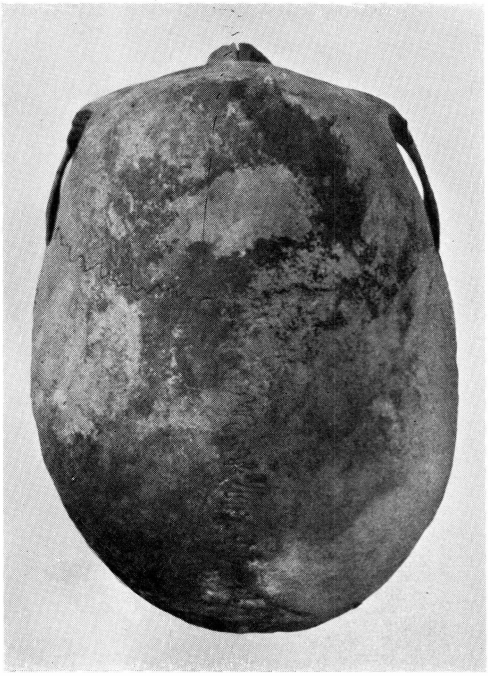



Nordöstkyst
Dödemandsbrat
grav
(LK 1932)

Plate 4.

Fig. 26. Female Cranium from North-East Greenland. (No. 260 Suess Land Grave XXV).






Nordöstkyst
Sucssland
grav XII
(LK 32-34)

Plate 5.

Fig. 27. Broad Fissurae Orbitales Inferiores. (No. 24 Igdlorssuit Grave 9 A).

Fig. 28. Typical Sulcus Praenasalis. (No. 136 Ruinnæsset Grave 2 A).

Fig. 29. Thickening of the Edge of Os Tympani. (No. 106 Ũnartoq Grave 9 B).

Fig. 27.

Fig. 28.

Fig. 29.

Plate 6.

Fig. 30. "Edges on the Chin." (No. 250 Dødemandsbugten Grave 16).

Fig. 31. Sulcus Paraglenoidalis. (No. 279 Dødemandsbugten Cape East).

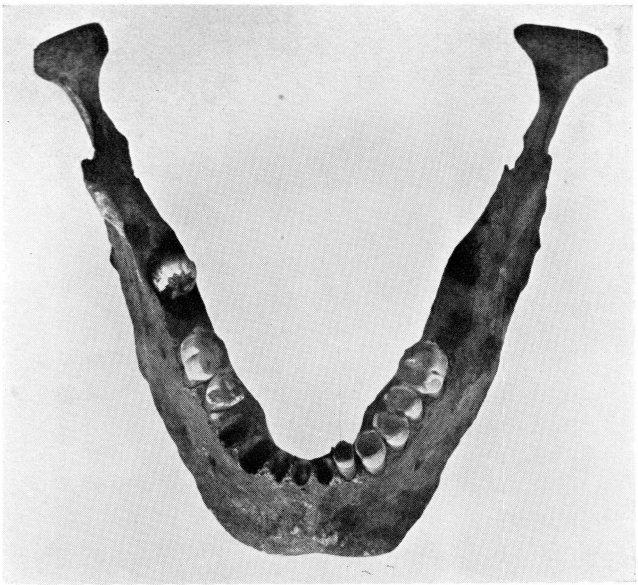


Fig. 30.

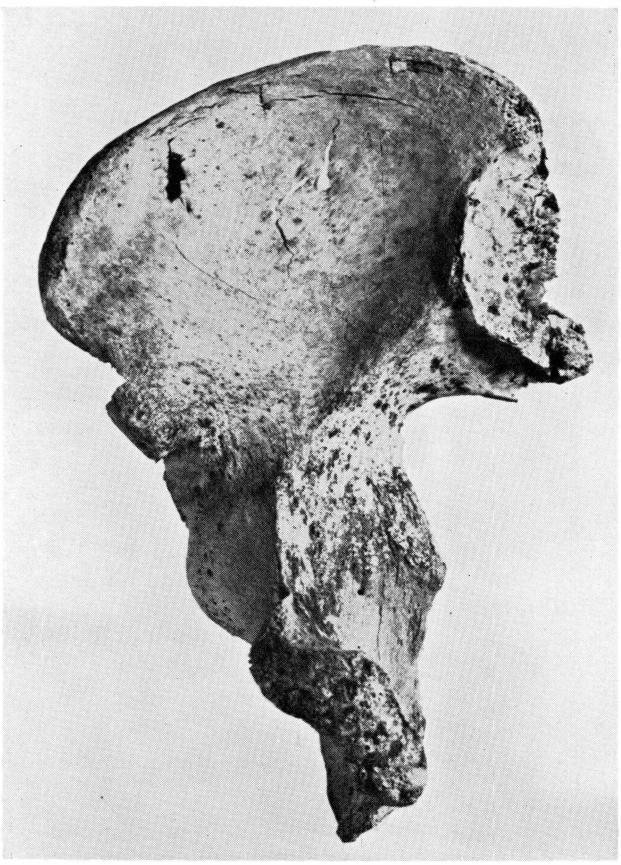


Fig. 31.

Plate 7.

Fig. 32. Median Alveolar Cleft. (Mitimatalik).

Fig. 33. Cleft Palate and Arthrosis in the Atlanto-Occipital Joints. (No. 221 Nualik).

Fig. 32.

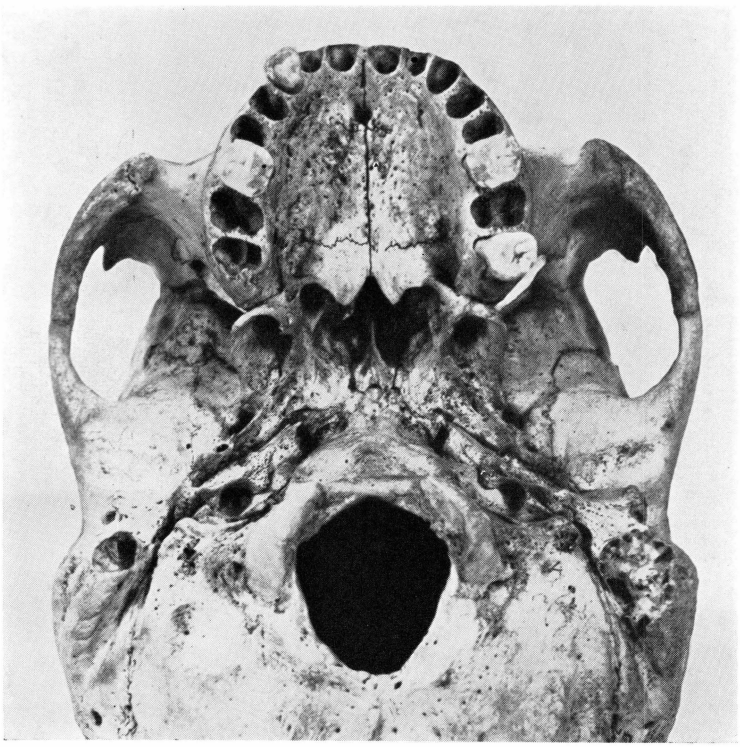
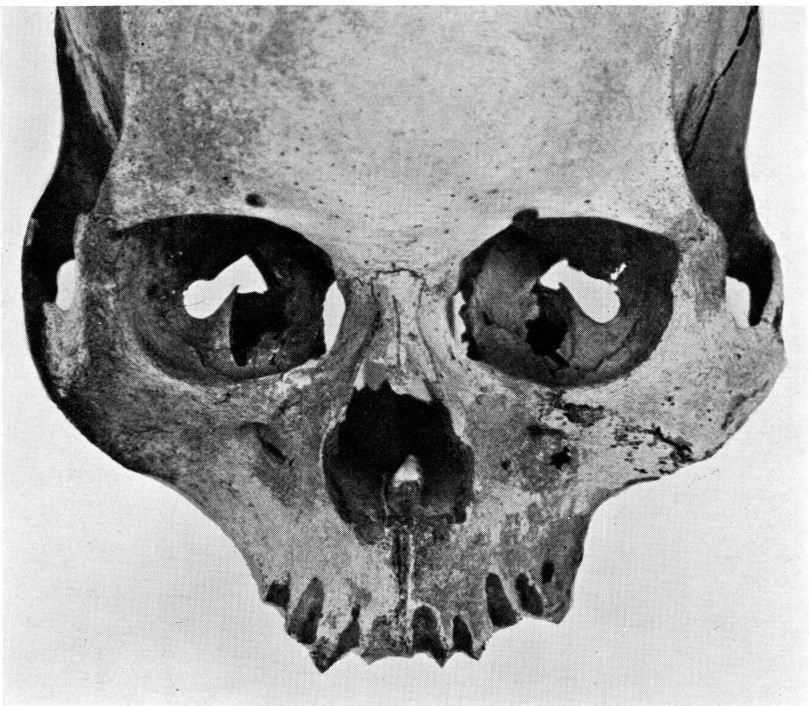


Fig. 33.

Plate 8.

Fig. 34. Tooth in the Nose. (No. 148 Ruinnæsset Grave 28 A).



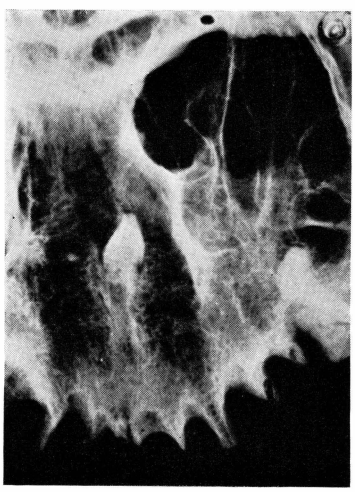


Fig. 34.

Plate 9.

Fig. 35. Spina Bifida Lumbalis. (No. 279 Dødemandsbugten Cape East).

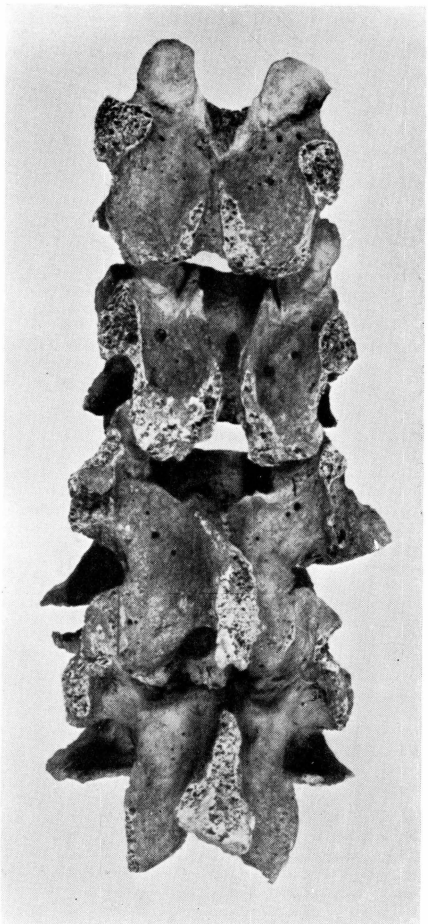


Fig. 35.

Plate 10.

Fig. 36. Healed Fractures in the Forehead. (No. 23 Igdlorssuit Grave 8 C).

Fig. 37. Healed Fracture of the Lower Edge of the Chin. (No. 250 Dødemandsbugten Grave 16).

Fig. 36.

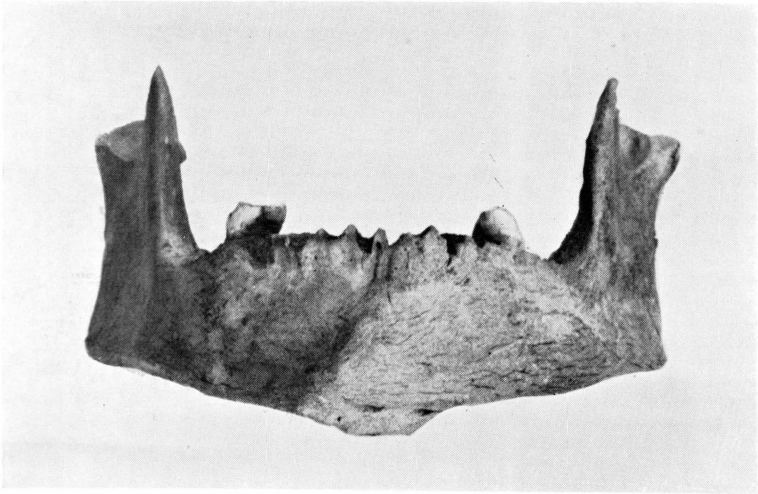


Fig. 37.

Plate 11.

Fig. 38. Coxa Vara, Presumably as Sequelae of an Old Collum Fracture. (No. 95 Ũnartoq Grave 6).

Fig. 39. Badly Healed Fracture of Lower End of Femur. (No. 152 Sûkersît Grave 1 A).

Fig. 40. Healed Radius Fracture in Bad Position. (No. 28 Igdlutalik Grave 9).

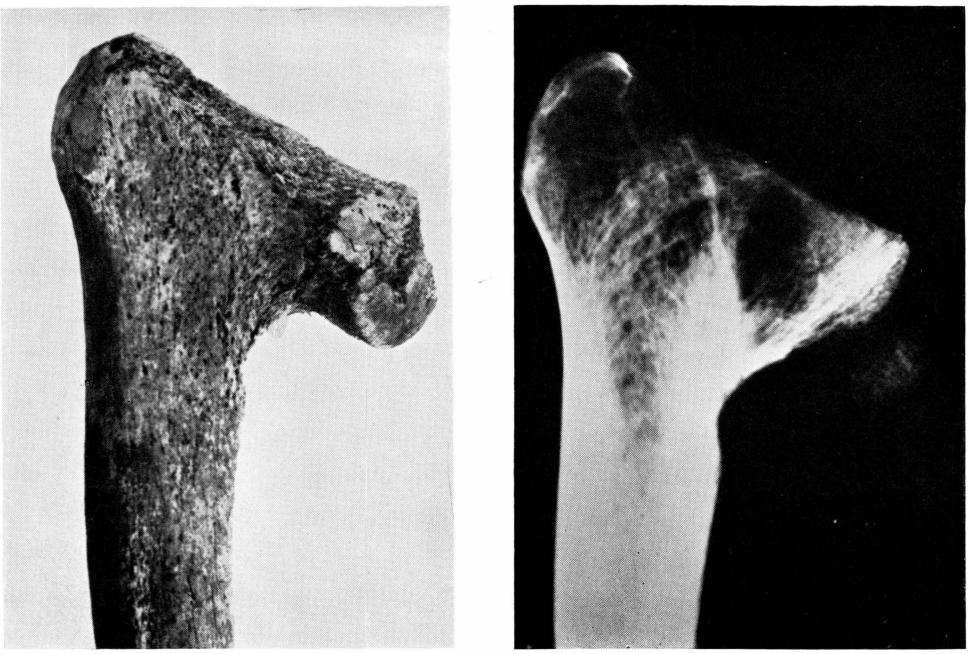


Fig. 38.

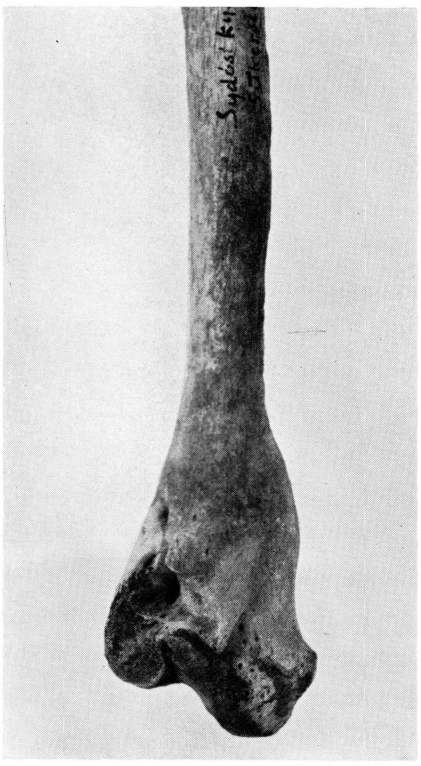


Fig. 39.

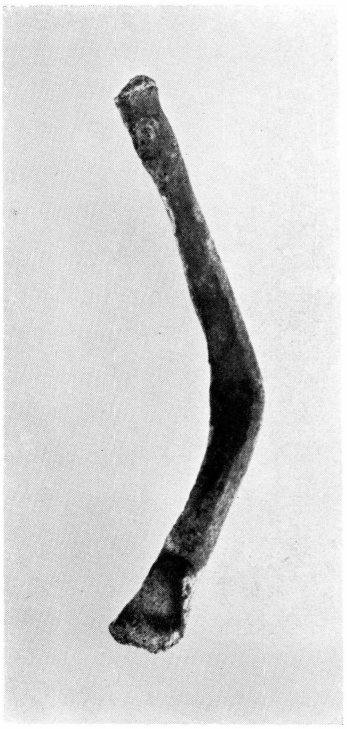


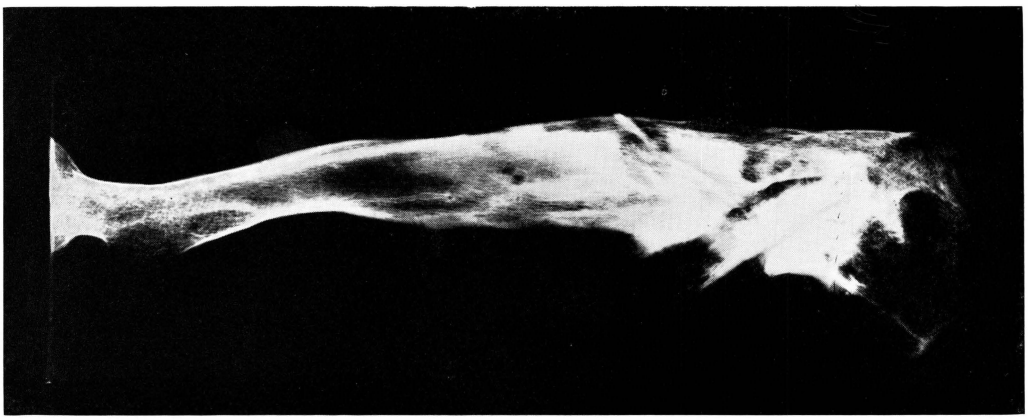
Fig. 40.

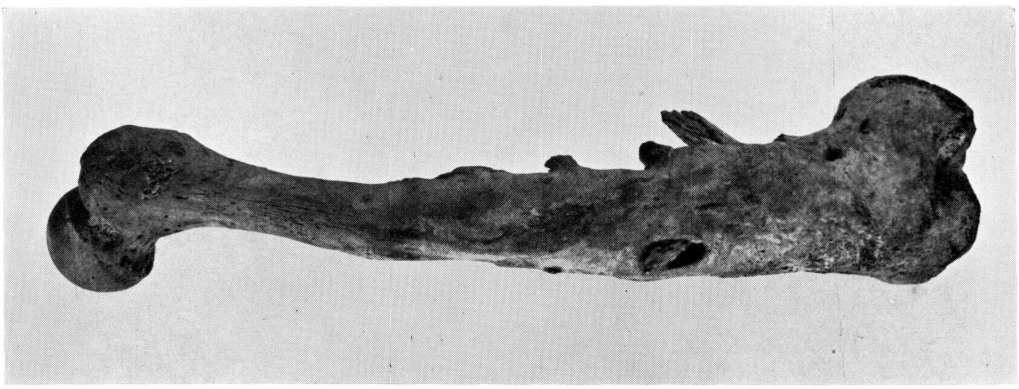
Plate 12.

Fig. 41. Hip Joint with Heavy Changes of Acetabulum and Caput Necrosis, Sequelae, maybe, of Fracture. (No. 348 Point Hope).

Plate 13.

Fig 42. Osteomyelitis Femoris with Great Sequesters. (Nr. 344 Kipoklak House 2 Skeleton 2).





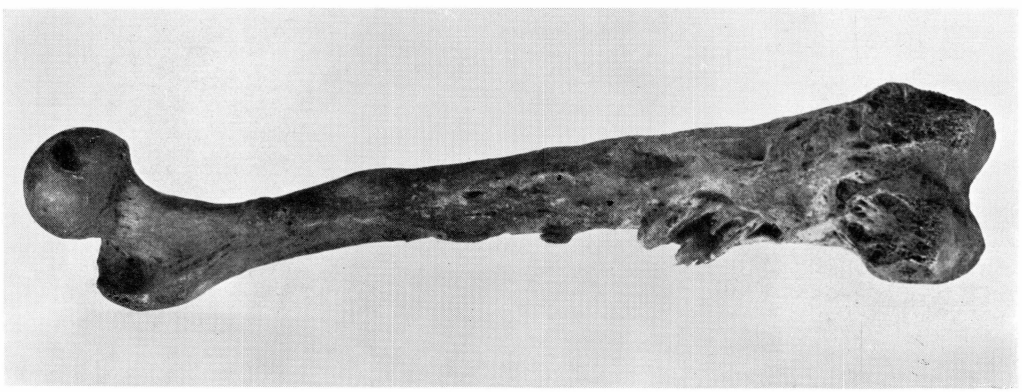


Plate 14.

Fig. 43. Arthritis in Left Shoulder and Right Elbow Joint. (No. 344 Kipoklak House 2 Skeleton 2).

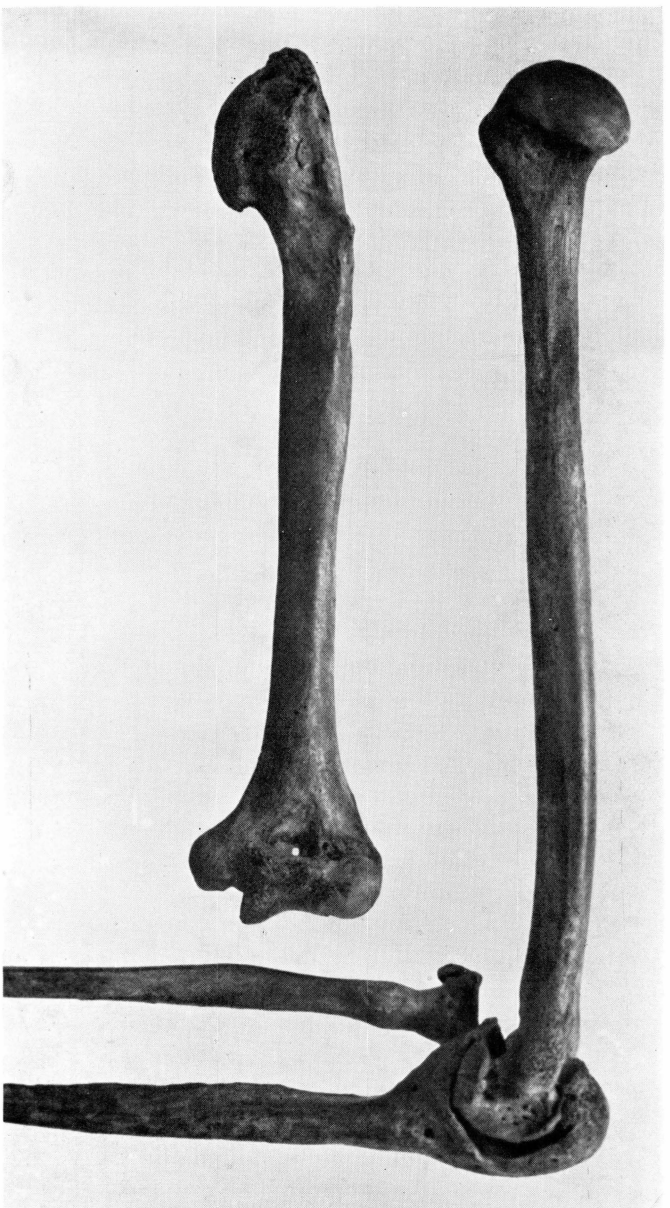


Plate 15.

Fig. 44. Sequelae of Osteomyelitis in Columna. (No. 344 Kipoklak House 2 Skeleton 2).

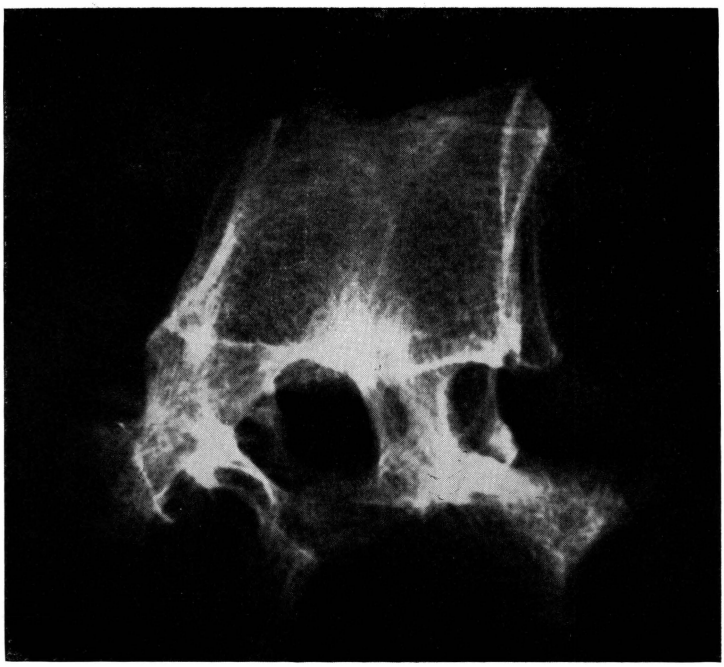


Plate 16.

Fig. 45. Heavy Inflammatory (?). Changes round the Ancle Joint. (No. 79 Igdlutalik Grave 2).

Fig. 46. Sequelae of Chronic Otitis Media. (No. 25 Igdlordduit Grave 9 b).

Fig. 46.

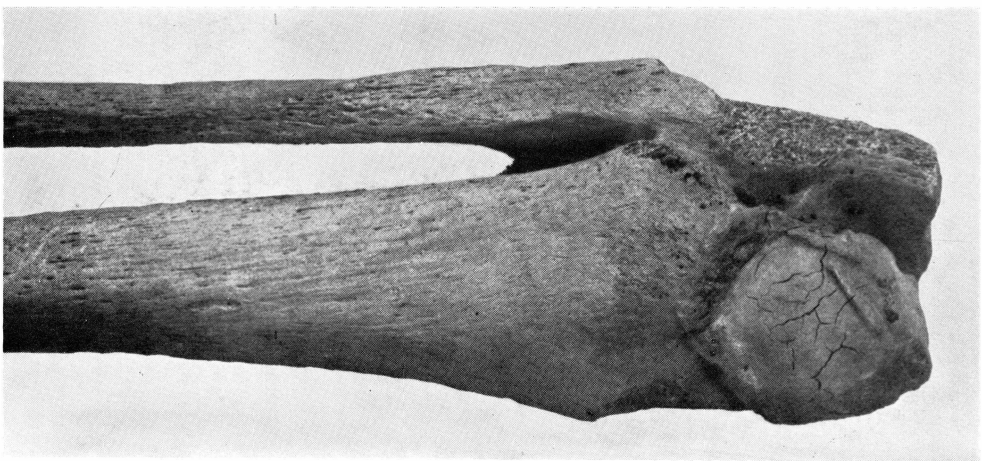


Fig. 45.

Plate 17.

Fig. 47. Heavy Atrophy of the Alveolar Protuberance of the Upper Jaw. (No. 245 Dødemandsbugten Grave 11).

Fig. 48. Arthrosis in a Knee Joint. (No. 259 Suess Land Grave XXIV).

Fig. 47.

Fig. 48.

Plate 18.

Fig. 49. Frontal and sagittal curves showing scaphocephaly. (No. 149 Ruinnæsset Grave 28 A).