Photo: C. Vibe

Fig. 1. Young Thule girls in front of a skin tent.

THE FRENCH GEOGRAPHICAL EXPEDITION TO THULE, 1950-1951: A PRELIMINARY REPORT

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THE French Geographical expedition to Thule in 1950–1951 was organized to develop and extend field studies that had been carried out in the Disko Bugt area of west Greenland in conjunction with the Paul Emile Victor expedition of 1948–1949. The plans were approved by the Comité national de Géographie française and financial support was received from the Centre National de la Recherche scientifique française. On 1 June 1950 the necessary authorizations were granted by the Danish government, and I wish to thank Eske Brun, Director of Grønlandsdepartementet, for the various facilities, particularly transport, that he made available.

I left Copenhagen by ship on 1 July 1950, arriving at Thule on July 23. Winter quarters were established at Siorapaluk 125 miles north of Thule, and from here long distance trips were made with sledge and dogs during the winter months through the inhabited parts of the Thule area to collect demographic and social data on the Eskimo. In the spring Siorapaluk was used as base for a geomorphological expedition to Inglefield Land, Washington Land, and to Ellesmere Island. I finally left Thule on 15 July 1951, having completed my research program. This paper summarizes the results of the expedition; detailed results have been published elsewhere.[1]

Demography and human geography

The Polar Eskimo who live in the Thule area on the northwest coast of Greenland are the world's most northerly inhabitants. Between October 1950 and February 1951 I visited all their camps, spread over the 250 miles from Etah to Savigsivik, and was able to assemble complete demographic data on the population. According to the nominal and genealogical census I drew up on 31 December 1950, there were 302 Eskimo living at ten different settlements: Etah, 21 inhabitants; Neke, 10; Siorapaluk, 34; Kangerdluarssuk, 12; Kuinassuk, 14; Kekertat, 17; Nunatarssuak, 3; Thule, 137; Kekertak, 13; and Savigsivik, 41 inhabitants (Fig. 2).

The Eskimo of the Thule area were situated on the migration route by which all native groups reached Greenland from Canada. According to Holtved, Eskimo appear to have travelled by this route to northwest Greenland "prior to the year 1000 A.D." and by the twelfth and thirteenth centuries a distinct early Thule culture had developed (Holtved, 1944, pp. 177–8).

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[1]Malaurie, J., L. Tabah, and J. Sutter. 1952. "L'isolat esquimau de Thulé (Groenland)". *Population* (Paris), Vol. 7, pp. 675–692.

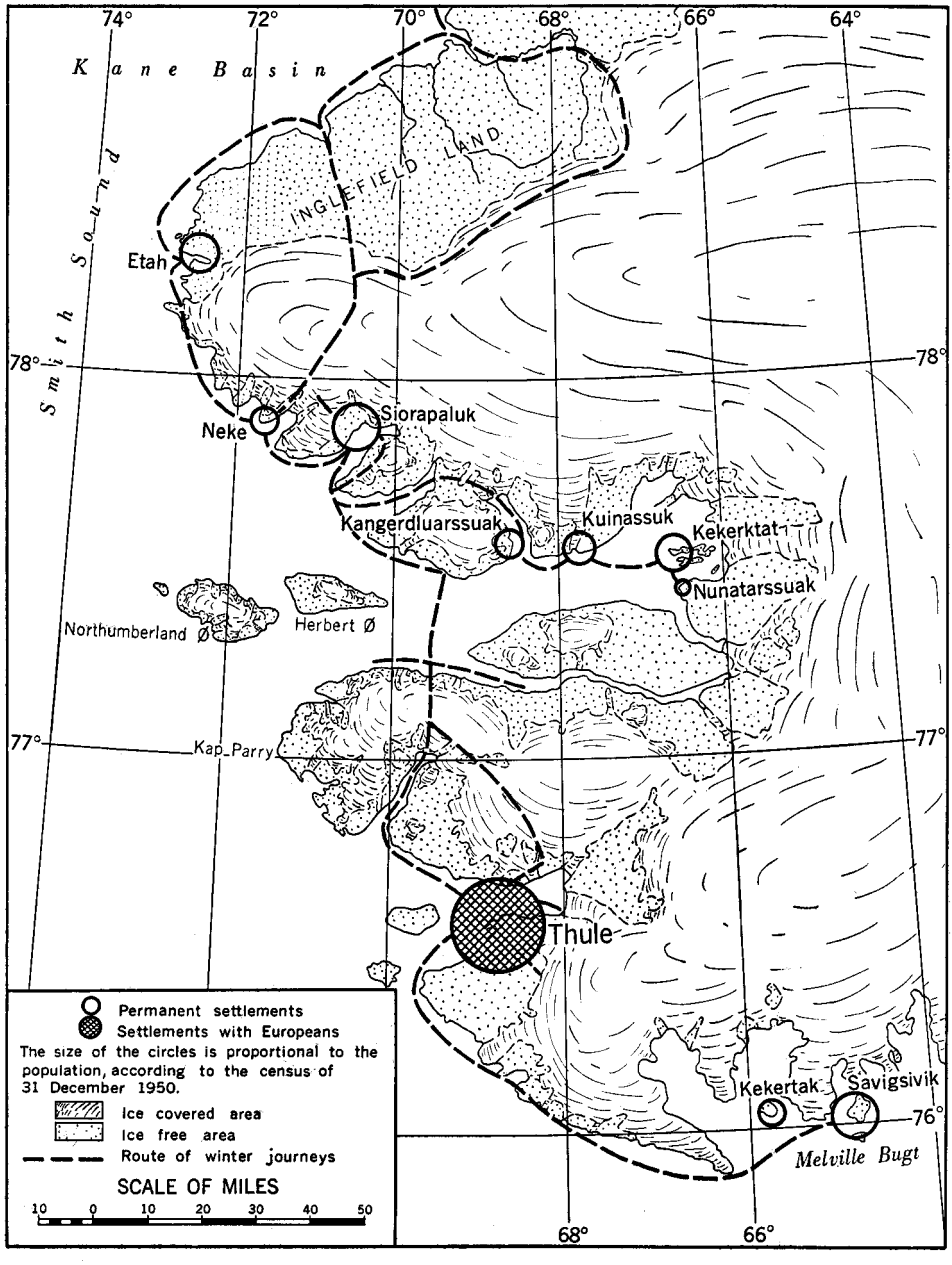

Fig. 2. Settlements of the Polar Eskimo at the time of the expedition, and routes followed during the winter months.

Evidence suggests that after 1600 the Polar Eskimo were cut off from regular contact with the west coast of Greenland. They were not discovered by Europeans until 1818 when Sir John Ross came across his "Arctic Highlanders" (Ross, 1819, pp. 164–87).

The first nominal census of the group was taken by Peary in 1895. It shows a total of 253 persons, 140 male and 113 female. A second census taken by Peary in 1897 gave a total of 234 inhabitants, and a third census in 1906, a population of 207 (Peary, 1907, p. 393; Steensby, 1910, p. 256). Rasmussen counted 235 inhabitants in 1918, and 251 in a census taken five years later. He thought that the natural increase over this period had been reduced by an influenza epidemic brought from Europe after the First World War. Accurate data is not obtainable before 1895, but archaeological evidence indicates that the population at the close of the eighteenth century was numerically similar to that of the first census. Calculations, which were certainly incomplete, by Kane (1856, Vol. 2, p. 211) of 140 Eskimo, by Hayes (1868, p. 448) of 100 Eskimo, and by Bessels (1875) of 102 Eskimo should all be considered minimum figures.

The first official census by the Danish administrators was taken on 1 October 1930 and gave a total of 266 natives. My direct count of the Polar Eskimo in 1950–51 gave a total of 302 people. During the survey each Eskimo was asked for details of his ancestors and descendants. This information enabled me to trace back a genealogy for four or five generations. The whole genealogy was represented on a circular chart with every three years from 1850 to 1950 marked by a circle (Fig. 3). Each living or dead Eskimo is indicated by number and symbol, according to sex and origin (descendant of Greenlander or European) on the circle corresponding to the year of birth. Each individual is linked to his children by a group of straight lines. Thus, all the details about the birth-rate, age of parents at the birth of each child, sex, length of intergenetic intervals, the number of children in the family, and the number of half-breeds can be shown on one chart.

The chart also permits an easy calculation of the consanguinity coefficients of individuals and couples, as well as the average co-efficient of consanguinity. For events in the past, calculations were made on the following basis: the average age of the mother at the birth of the first child is 18 years, and of the father, 23 years: the average genetic interval is about 32 months. Figure 3 shows a fragment of this genealogy as it concerns Pualuna, an Eskimo bearing the number 1.

Born in 1872, and still alive at the time of the expedition, Pualuna had an excellent memory; he was well informed on all the questions of geneology and was extremely useful during this study of the demography of the tribe. His father came from a family of 3 children; his mother was one of 9 children, of whom 5 had a different mother. Pualuna was the eldest of a family group of 6 brothers and sisters. He had 4 wives. By his first wife, bearing the number 2, Pualuna had 2 children, one of whom died very young, while the other, later, had 11 children. By his second wife, number 3 (Fig. 3), who was already the mother of 3 children, Pualuna had a daughter, who herself became the mother of 3 children. By his third wife, number 4, Pualuna had 3 children, the first of whom had 7 children, the second died young, and the third had 6 children. Pualuna had no children by his fourth wife, not represented in Figure 3, but she was already the mother of 6 children.

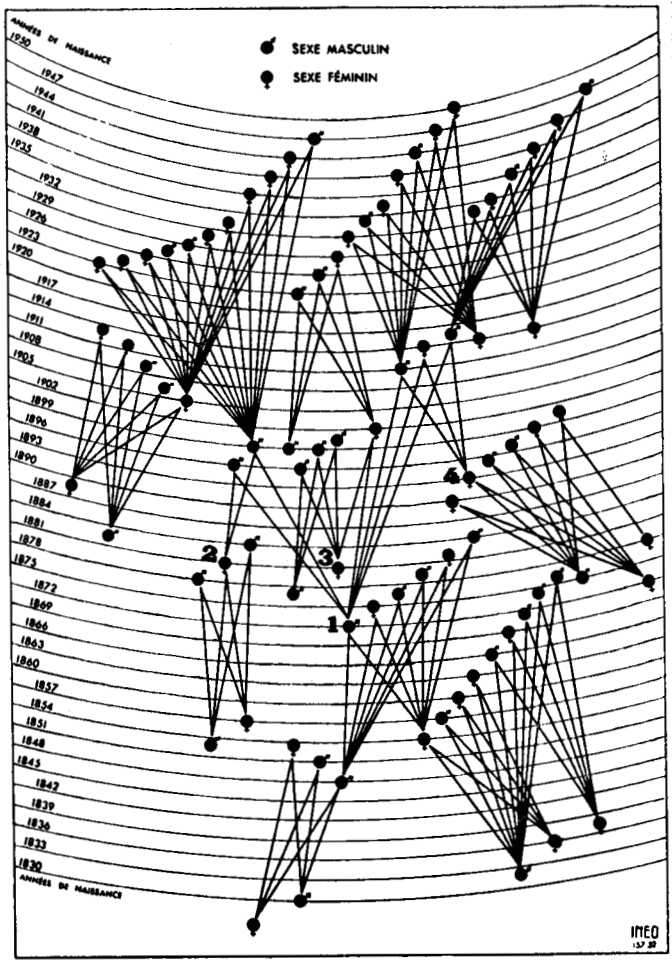

Fig. 3. Part of a circle showing the genealogy of the Polar Eskimo. This section shows the genealogy of Pualuna, number 1. From *Population, No. 4, Oct.-Dec. 1952, p. 690.*

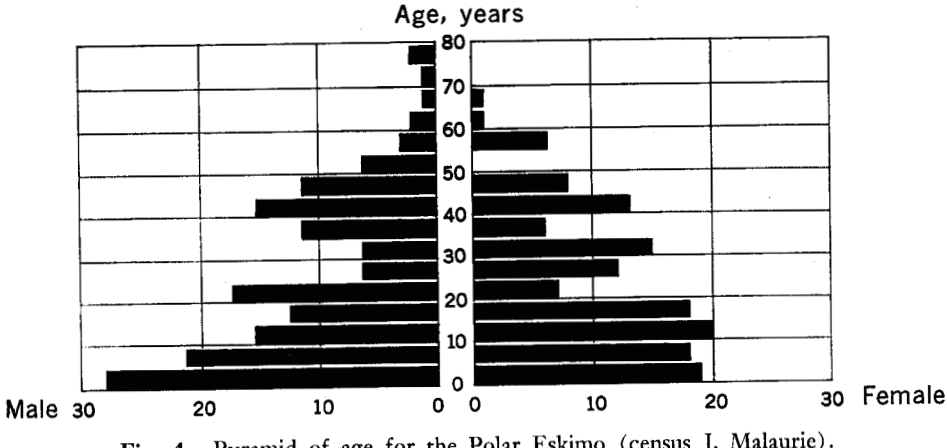

Fig. 4. Pyramid of age for the Polar Eskimo (census J. Malaurie).

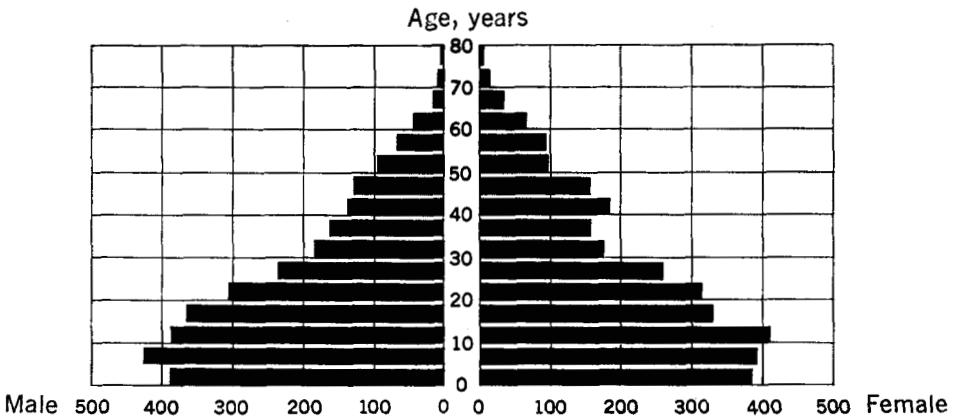

Fig. 5. Pyramid of age for northern Greenland.

This information has only a relative value for the third and fourth generations, compared with data collected for populations where demographic events are normally registered. Nevertheless, numerically, these results enable minima figures to be established. Figure 4 shows a population pyramid for the present population, very indented in shape because of the few subjects in each age group; it can be compared diagrammetically with that for northwest Greenland, south of Melville Bugt (Fig 5) (Denmark. Grønlands Styrelse, 1947). Figure 5 shows a broad-based, obtuse-shaped pyramid, characteristic of a population with a high birth-rate and a high death-rate.

The collected information is of great value in the studies of isolated groups, now being carried out at the Institut National d'Etudes Démographiques in Paris; it illustrates the influence of the size of the population on family relationships, degree of consanguinity, and of genetic homogenity (Tabah and Sutter, 1950; Sutter and Tabah, 1951). As the study of isolated groups or of minimum population is still concerned with genetic theories, it will be interesting, in the light of data from this group, and the second, third, and fourth generations of other isolated groups of primitive people, to clarify controversial questions like the Hardy-Weinberg law on the distribution of genes, and the selection and choice of marriage partners in the Eskimo environment. The chart, of which Figure 3 is a part, should not be considered on the scale of an individual but of the entire group.

Livi (1949, p. 755) queried the numbers of people necessary and sufficient in a reduced group to ensure the biological maintenance of the species. The writer formerly thought that more than 500 people were necessary, and that isolated groups of 300–500 were unstable. The study of the Thule population shows that these figures were too exact. The factors that balance the number of people making up a given group are far too variable and complicated (sex ratio, choice of marriage partner, economic conditions) for any narrow limits to be fixed *à priori*.

At Thule, as in all Eskimo groups, a celibate person is an anomaly. Among the people over 30 years old in 1950, 6 cases of celibacy were noted—4 men and

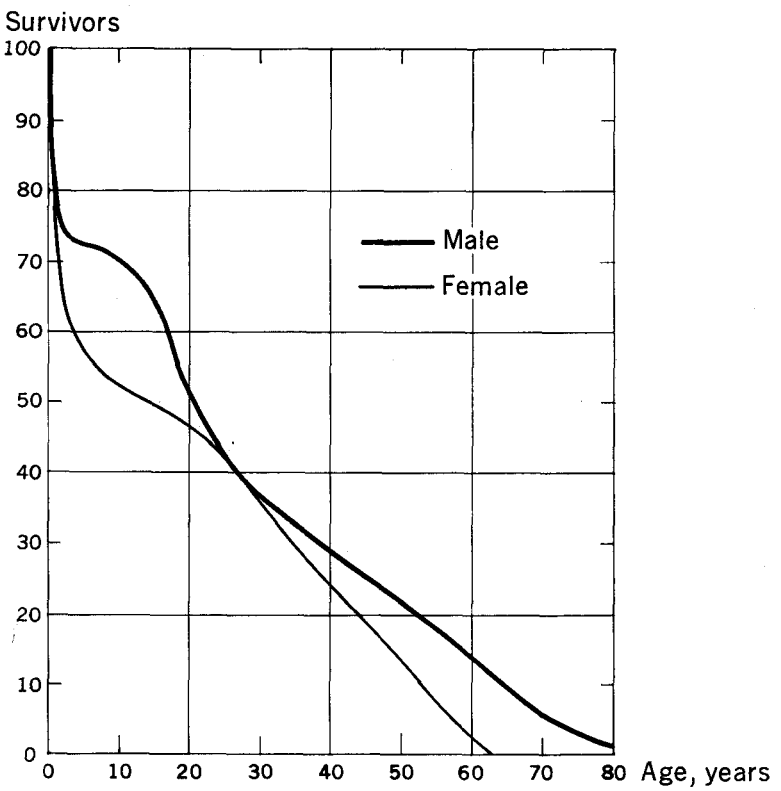

Fig. 6. Survival curve for the Polar Eskimo.

2 women, of whom 3, 2 men and 1 woman, were malformed. As in northern Canada, birth appears to have a seasonal character, the three winter months (January, February and March) being those with the greatest number of births (Robinson, 1944, p. 17). The period of conception is usually spring, when the sun returns, and resources are greater, and the travelling begins again.

The fertility rate, 173 per 1,000, is low for a population with a high marriage rate and which, apparently, knows nothing of contraceptive practices. It can be partially explained by the comparatively high rate of sterility. Out of 51 women who had reached their fertile period, 8 were sterile, a proportion of 16 per cent. If the sterile group is omitted, a rough calculation of the fertility rate gives a figure similar to that generally found in non-Malthusian groups, about 300 per 1,000.

The intergenetic interval is long; in the 106 intervals between birth for which the data was sure the intergenetic interval was 31.8 months. This is due to the prolonged nursing period, and the interval would be even longer were it not for the heavy infantile mortality. The average number of children for women over 45 years of age was between 4 and 5, whereas a century ago the Canadian women of the Province of Quebec, with a fertility fairly close to physiological fertility, had an average of 8 children by the time they were nearly 50 years old.

The gross death-rate for the 11 years from 1940–1950 was 27 per 1,000. This figure appears low when compared with a rate of 31 per 1,000 for the

west coast of Greenland from 1912–1921. It is, however, possible that the comparison is invalidated by the youthful composition of the Thule population and that a better index is a theoretical death-rate computed for a static population and based on the expectation of life at birth. The theoretical rates are 36 per 1,000 for men and 46 per 1,000 for women; and the expectation of life at birth for men is 26 years and for women 22 years. These figures show clearly that the women have a *predisposition to earlier death*; this is contrary to nearly all populations studied, including the other groups in Greenland. Amongst men the death-rate increases rapidly from the age of 18 onwards, due to hunting accidents. The survival curve for women is more regular although more abrupt, and from the age of 12 onwards is nearly linear (Fig. 6). Of 100 women 18 years old (the average age at the birth of the first child) 77 survive to reach the age of 50, and of 100 women 23 years old, 75 reach the age of 35.

Eskimo women who reach the age of fertility have an average of 5 children and therefore the gross rate of reproduction is 2.5. However, when the death-rate is taken into consideration, the net rate of reproduction is only slightly greater than unity. The renewal of the population is therefore ensured with only a small margin of security. Calculations show that the Thule population multiplies at the very low rate of 0.8 per cent, and has been, and still is in a precarious demographic position, like most small isolated communities.[1] The future of the Polar Eskimo appears to depend on increasing the size of the group so that it can survive epidemics and other brief but catastrophic rises in the death-rate. However, it is not at all sure that the local resources of the area can support an increased population.

Until recent years the Polar Eskimo were a good example of an isolated archaic society. The people were semi-nomadic and dependent on hunting walrus, seal, foxes, and more rarely, bear and caribou. When Knud Rasmussen founded the Kap York trading station in 1910 a barter economy was introduced into the area. The Eskimo became aware of the material benefits of western civilization, and today he is depending more and more on fox trapping to supply him with trade goods. In the Thule district game is plentiful and the people are prosperous. In 1909–10, 347 blue fox and 64 white fox skins were traded; in 1947–8, 722 blue fox and 212 white fox skins were traded (Denmark. Grønlandskommissionens Betækning, 1950, pp. 52–3). Between March 1950 and March 1951 the revenue from skins (fox and seal), articles such as narwhal and walrus tusks, souvenirs, and work, whether year-round employment by the Danish administration or occasional employment, such as unloading ships and making dog-team trips for the doctor or pastor, was 129,248 Danish Kroner. This was divided amongst 63 native families, and inquiries revealed that the average income per family per year in the different settlements was as follows: Thule, 1,800 Danish Kroner; Savigsivik, 2,640; Etah, 1,650; and Siorapaluk, 2,450 Danish Kroner per family. Despite the apparent economic prosperity of the Polar Eskimo the future is uncertain. If the population increases, or the needs

[1] A number of Polar Eskimo (about one third of the group) joined Peary's north polar expedition in 1905–6 and sailed away on his ship. If many had died, or had not returned, the group would have been doomed.

of the present people grows the local resources may not be sufficient, and in the harsh environment of northwest Greenland there are no natural other resources to which the Eskimo can turn, as he has been encouraged to do in southwest Greenland; here cod fishing and the raising of livestock have been introduced to take advantage of the change in climate.

Even if the society is able to retain its present economic prosperity it is, however, threatened from within its own structure. The school, the church, European expeditions to the area, and the introduction of modern techniques have all created a state of latent traumatism within the group, and under these repeated shocks the archaic society has begun to disintegrate. The traditional frames are still in existence, but only because of the isolation and segregation which the Danish administration has maintained. Signs of disintegration are visible in the discredit and disappearance of the *angakoks* (shamans) and the decrease in respect paid to the most successful hunters. Instead the younger people now respect the man who is most Europeanized and has scholastic ability, a bank account or administrative responsibility. Individual hunting and trapping is replacing collective hunting and the spirit of solidarity once upheld by common interests is becoming dulled (Malaurie, 1956).

This was the economic and sociological situation in 1951 when a Danish-American air station was constructed first at Thule, and later in Inglefield Land. The construction of these stations makes the future of the Eskimo even more uncertain. The immediate break up of the group in 1951 was avoided only by the policy of the local administration to forbid physical contact between the Eskimo and men of the air station. A temporary solution was found when the Eskimo decided to move 126 miles to the north creating a new settlement at the old village of Kanak (Rosendahl, 1954). The problem, however, still remains for psychological contact has been made; the permanent solution must lie in the planned integration of the Eskimo into the modern world. Shock contacts must be avoided, but integration must come before

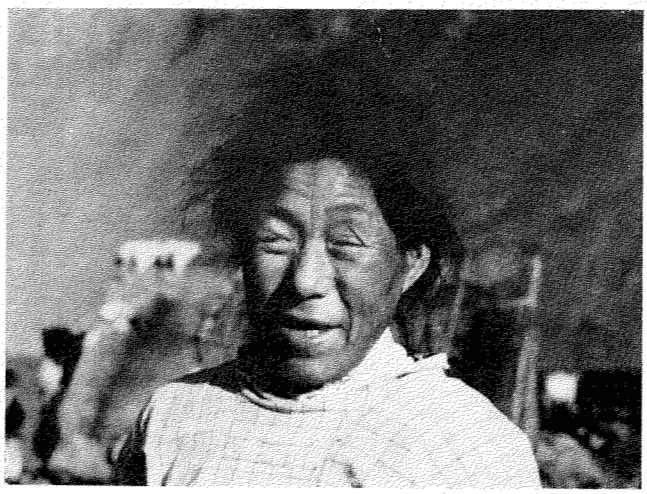

Fig. 7. Avortungiak, an Eskimo woman born in 1895 and living at Etah.

the present society is too degraded. Tests on the drawing of topics by school-age children,[1] after Rorschach (1921), Prudhommeau (1947), and Zazzo (1948), and the observations of the local administration emphasize the natural facility of the Eskimo for adaptation, as shown by their mechanical aptitudes, the ease with which they learn foreign languages, and their good will. Commercial fishing is not possible as an economic substitute for trapping, but some substitute must be found if integration with our society is to be successful and the Eskimo is to remain in the Thule area. Perhaps the answer lies in the development of international polar air routes which might use Thule as a refuelling stop. Certainly new opportunities for the native are offered by the existence of the air station (Malaurie, 1954), but care is necessary to ensure that the opportunities benefit the Eskimo and do not lead to poverty and break up the group.

Geomorphology

During the spring a number of journeys were made by dog team and on foot around the Kane Basin and over the inland ice to carry out geomorphological surveys. To add to the knowledge of the sea ice and the interpretation of the landscape and the geomorphic processes at work five maps were prepared, on a scale of 1:100,000, covering the coastal area of Inglefield Land, the front of the Humboldt Gletscher, and the southwestern part of Washington Land. These maps were prepared from the Map of North Greenland (Koch, 1932), United States Air Force World Aeronautical Charts, oblique air photographs,[2] and details were added by exploratory survey techniques employed in the field. Form lines were drawn in from altitude determinations with two aneroid barometers which had a probable error of about 75 feet. The first of these maps has now been published,[3] and final editions will soon be issued on a scale of 1:200,000.

The most significant factor in the geomorphology of northwest Greenland (Inglefield Land) at the present time appears to be the extreme aridity. Detailed climatological figures are still lacking, but Inglefield Land probably has about 4 to 5 in. (100 mm.) of precipitation in a year—practically a desert climate. The effective precipitation is even less as much of the snow is blown away by winds; it has been estimated that nearly half the snow on the ground in early June is blown on to the sea ice. The summer rains contribute little. At Thule in July 1950 a total rainfall of 0.78 in. (19.7 mm.) was recorded, July being the wettest month. The heaviest precipitation recorded in a twenty-four hour period was 0.22 in. (5.59 mm.). Such small amounts of water have almost no direct geomorphological effect.

[1]The complete results of these psychological investigations will be published elsewhere.

[2]These photographs were kindly lent to the expedition by the Geodaetisk Institut, Copenhagen.

[3]Malaurie, J. 1953. "Présentation d'une carte de la région littorale de la Terre d'Inglefield (N.W. Groenland) au 1/100,000e et d'une carte de l'état des glaces de mer au large du dit littoral". *Comptes Rendus de séances de l'Académie des Sciences*, Vol. 236, pp. 2383–5.

Although it might be thought that wind erosion would be effective under these arid conditions, a microscope study of sands collected by the expedition showed a strong predominance of unworn over worn grains in a ratio of 9 to 1. The absence of any wind-rounded grains in recently formed or fluvioglacial sands indicates that there is no intense wind erosion today. As wind erosion in parts of northern Greenland is very pronounced (Fristrup, 1952–3) it is probable that the lack of erosion in the Inglefield Land may be due to low wind velocities.

Fig. 8. The Algonkian erosion surface, Inglefield Land, at the edge of the inland ice.

At present the Greenland inland ice reaches the sea to the south of the Kane Basin in Prudhoe Land, between Etah and Siorapaluk, and on the northeast of the Kane Basin in the Humboldt Gletscher. Inglefield Land lies between these two areas of ice; it is an ice free strip of plateau coast, thirty-five miles wide, and about 1,000 to 2,00 feet high, reaching 4,000 feet near the inland ice in the southern part of the Kakaitsut area. Glacial deposits are common throughout Inglefield Land, and it is clear that the inland ice recently covered the whole area. The plateau, which is part of the exhumed Algonkian erosion surface first reported by Koch (1933) and studied again by Troelsen (1950), has a remarkably unglaciated appearance (Fig. 8). Only in valleys and other preglacial depressions has the ice left erosional evidence of its presence. The limited erosive action of the ice is also shown by the absence of frontal moraines between the inland ice and the ice free plateau today (Fig. 9). There is a considerable quantity of moraine on the plateau in the form of a discontinuous, coarse rock mantle, but it apparently originated as ground

moraine, carried from the interior of northern Greenland, and was left on the Inglefield plateau as the ice wasted. It was this material that probably formed the corasive agent at the base of the ice when the valleys were glacially enlarged.

Although the Algonkian erosion surface shows that glacial erosion in the region has been limited, it also suggests that periglacial clastic erosion has also been insignificant. To test this conclusion laboratory experiments are at present being undertaken on basalt, sandstone, limonite, chalk and two varieties

Fig. 9. Etah Fjord, north of Kap Alexander, showing the Algonkian peneplain of Inglefield Land and the inland ice. Note the absence of frontal moraine.

of limestone to determine how readily they shatter under different temperature and moisture conditions. Although the experiments have not yet been completed so far they support the conclusions obtained in the field, that frost action in north west Greenland is weak and occurs only near the surface. Frost action is not only limited to the surface in horizontal strata, but also in talus covering steep rock slopes, which appears to be developing very slowly if at all.

Some slopes in Inglefield Land are retreating under the present climatic conditions. These are the slopes formed in the alluvial sands, and they are numerous especially in the lower parts of the main valleys. Although the available moisture is low and sand is extremely porous, the permanently frozen ground with ice included maintains a water table in summer within a few inches of the surface, and water erosion produces steep slopes which undergo parallel recession. This process is active during a few weeks in the year only. It is in sharp contrast with southern Greenland where the warmer summers

lead to a deeper active layer, and consequently limited fluvial erosion and enhanced solifluction (Malaurie and Guillien, 1953).

The processes in operation in Inglefield Land today seem in general to be insufficient to account for the present landscape. This landscape can only be explained by reference to the geological past and the formation of a Precambrian land surface that has subsequently been exhumed and modified under slightly damper conditions than prevail at present.[1] This may possibly have occurred in interglacial or immediate postglacial times.

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