



## Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

## ON "SAVSSATS": A CROWDING OF ARCTIC ANIMALS AT HOLES IN THE SEA ICE

By MORTEN P. PORSILD

Director, Danish Arctic Station, Disko, Greenland

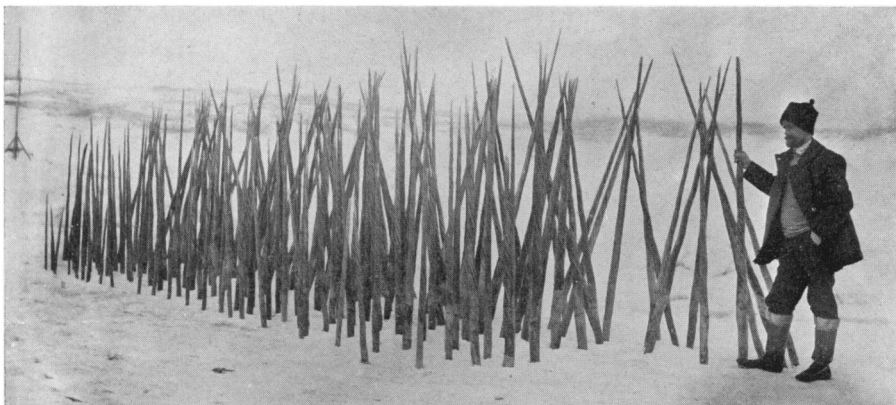


FIG. 1—Over 200 narwhals' tusks planted in the snow at Godhavn. They were obtained from the two savssats in the winter of 1914-15.

On the west coast of Greenland, at the 69th parallel, is situated Disko Bay, to the north of which lies the large island of Disko. Aligned across the mouth of the bay are several groups of islands, formerly called Whale Islands, in the modern Danish charts named Hunde Öer (the southern group) and Kronprinsens Öer (the northern group).

### ICE CONDITIONS IN DISKO BAY

In summer the surface temperature of the waters of Disko Bay is considerably higher than that of the adjacent open sea in spite of the fact that two of the largest and most productive ice fiords, those of Jakobshavn and Torsukatak, there discharge large numbers of great icebergs. In winter, however, the bay is ice-covered as a rule and sometimes the covering lasts for months.

Normally the ice covering of most of the fiords and open bays of west Greenland begins to form at the head of the fiords, where the glaciers and glacier rivers debouch, and thence gradually approaches the open sea. In Disko Bay, on the contrary, the phenomenon often is reversed; the ice covering begins when the drifting ice of Baffin Bay, the so-called "west ice," has approached the coast, an event which ordinarily takes place during the last days of December.

The weather at this time of the year is apt to be rough and stormy; but after the approach of the west ice it becomes quiet; intense cold sets in;

the sky gradually clears, and the ice now grows rapidly from the island groups inward.

#### ICEBOUND NARWHALS

Then it often happens that schools of white whales or narwhals are cut off from the still open parts of Baffin Bay and are gradually driven in towards the head of Disko Bay. Freezing continues, and finally the schools

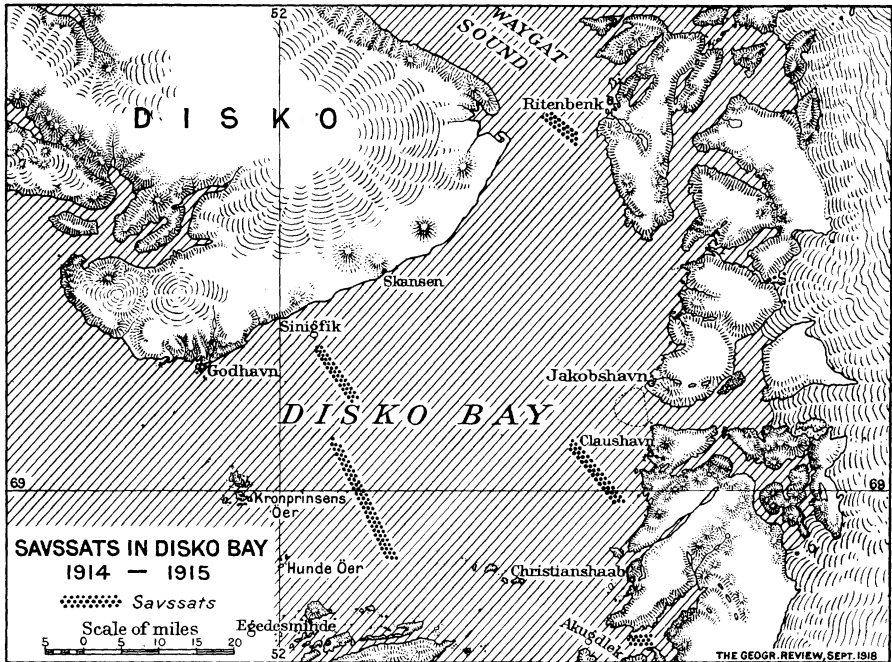


FIG. 2—Map of Disko Bay showing *savssats*. The map has been traced from the author's copy from the Royal Danish Admiralty's chart of West Greenland. Scale 1:1,600,000.

are restricted to the last smaller or larger open spaces in the ice, whence they cannot escape unless the weather changes and the ice is broken. If no such change occurs a large school of whales may eventually find itself enclosed in a very small pool. When the temperature of the air is below  $-20^{\circ}$  to  $-25^{\circ}$  C., condensing vapors, visible at long distances, rise from every hole or every tidal crack. If a school of whales be inclosed in one of these pools the breath of the animals will expand the thin cloud to a substantial column and thus the inclosed animals may be easily detected, even from a distance, and they then become an easy prey for the inhabitants of the neighboring shores.

Although this phenomenon has been known for over 200 years and is by no means rare, it has never been described in literature from first-hand information; previous accounts have all been based on second or third-hand narratives. As I have had the good fortune to witness the behavior of

some extraordinarily large schools of narwhals thus caught in the ice, a little more detailed description of this peculiar phenomenon may perhaps be of interest.

#### EARLIER ACCOUNTS OF "SAVSSATS"

The natives of Greenland have an Eskimo term, *savssat* (pronounced s'set), meaning something like "crowding" or "overcrowding" and used of living creatures crowded in large numbers into a small space. To the best of my knowledge, the *savssats* of Disko Bay are first mentioned by Paul Egede, eldest son and successor of the first missionary in Greenland, in his accounts of Greenland written from diaries kept from 1721 to 1788.<sup>1</sup> Since his time they have been mentioned by C. L. Giesecke,<sup>2</sup> H. Rink,<sup>3</sup> R. Brown,<sup>4</sup> E. Vanhöffen,<sup>5</sup> H. Winge,<sup>6</sup> and perhaps others. Lastly, I have published<sup>7</sup> a drawing by a native hunter and catechist, G. Kleist of Godhavn, showing the typical form of a *savssat* (see Fig. 5); and during the winter of 1914-15, I twice witnessed another form of *savssat*, heretofore not described, of which a record in Danish has been published.<sup>8</sup> The present paper is a somewhat elaborated translation of a part of the last-named publication.

#### THE SEVERE WINTER OF 1914-15

The winter of 1914-15 was so extraordinary that even the old people do not remember its like. Severe cold set in with the new year, and the weather remained practically unchanged until late in April. The ice covering that developed was exceptionally heavy. From the middle of February to the last of March the ice was unbroken, at least from the 68th parallel (and perhaps farther south) to Etah on Smith Sound, 78° 20' N. How far from the coast the unbroken ice extended at its maximum cannot be stated. To the west of Disko Island the firm ice, even in good years, seldom ranges more than six to eight miles and lasts ordinarily only for a very short time. But this winter, from heights of 3,000 feet on the west coast not the slightest indications of water could be discerned. The ice covering began to form at the outer termination of Disko Bay, from

<sup>1</sup> Paul Egede: *Efterretninger om Grønland, uddragne af en Journal, holden fra 1721-1788*, Copenhagen 1788. German edit., *ibid.*, 1790.

<sup>2</sup> C. L. Giesecke: *Bericht einer mineralogischen Reise in Grønland (1806-13)*, Copenhagen, 1878. 2nd and complete edit. in *Meddelelser om Grønland*, Vol. 35, *ibid.*, 1910, pp. 1-478.

<sup>3</sup> H. Rink: *Grønland geographisk og statistisk beskrevet I, II*, Copenhagen, 1852-57. English trans.: *Danish Greenland: Its People and Its Products*, Robert Brown, edit., London, 1877.

<sup>4</sup> Robert Brown: *On the History and Geographical Relations of the Cetacea Frequenting Davis Strait and Baffin's Bay*, *Proc. Zool. Soc.*, No. 35, 1868, pp. 533-556. Reprinted in T. R. Jones, edit.: *Manual of the Natural History, Geology, and Physics of Greenland and the Neighbouring Regions*, London, 1875, pp. 69-93.

<sup>5</sup> E. Vanhöffen: *Die Fauna und Flora Grønlands. Grønland-Expedition der Gesellschaft der Erkunde zu Berlin, II*, Berlin, 1897.

<sup>6</sup> Herluf Winge: *Grønlands Pattedyr, Meddelelser om Grønland*, Vol. 21, 1902, pp. 319-521.

<sup>7</sup> M. P. Porsild: *Studies on the Material Culture of the Eskimo in West Greenland (Arbejder fra den Danske Arktiske Station paa Disko, No. 7)*, *Meddelelser om Grønland*, Vol. 51, 1915, pp. 111-250.

<sup>8</sup> *Idem*: *Om nogle vestgrønlandske Pattedyr og Fugle, I, II (Arbejder fra den Danske Arktiske Station paa Disko, No. 10)*, *Meddelelser om Grønland*, Vol. 56, 1916.

South Disko to the mainland at Egedesminde; the inner parts of the bay, about the colony of Ritenbenk and the southern part of the Waygat Sound, were closed early in February.

#### DISCOVERY OF TWO "SAVSSATS"

At Godhavn, the chief trading post on Disko, and more especially at Skansen, a smaller station on south Disko some thirty miles east of Godhavn every one was certain that a *savssat* would occur unless the weather changed. Every day sledges went out eagerly searching, and finally, on the evening of February 10, Ludvig Geisler, the most clever and experienced hunter of the region, actually found a *savssat*. On his way home he met a sledge from Godhavn, which brought the news to that place late in the evening, and a few hours after midnight every one from Godhavn went out to the *savssat* with all the dogs and sledges the settlement afforded.

We followed the ordinary track along the shore to Sinigfik, nearly midway between Godhavn and Skansen, thence about six miles in a south-southeasterly direction, and came to a belt of ice some 200 yards broad and about 6 miles long that had been frozen one day later than the surrounding area. This belt was not much thinner than the ice in general; but whereas the surrounding ice had a thin covering of snow on its surface, this field was studded only by the ordinary crystallizations always found on young sea ice and was thus far more transparent than the older sheet. There were no natural openings at all in it, but the school of narwhals finding this transparent belt assisted themselves by breaking open a number of holes, extending throughout the whole distance of the field (Figs. 3 and 4).

The natives took their position astride or close to the holes over the entire area. Every time a herd of narwhals appeared, they shot one or two and tied them to the ice or took them up and began flensing immediately. As the daylight lasted only a short time the slaughter had to be abandoned early. Towards evening the animals appeared to have avoided holes with blood until all holes were equally bloody. The next morning only a few live individuals were seen here.

Early in the proceedings Geisler had had the impression that the number of animals frequenting the *savssat* was far greater and that many had left the place frightened by the slaughter. As soon therefore as he had taken home the products of his kill, he went out in search of the next *savssat* and succeeded in finding it on February 19. As I was not at home and did not see that *savssat* until after my return on the 25th, when I visited the place a number of times, I have supplemented my observations with data collected by Mr. A. Bistrup, the chief factor of the colony of Godhavn.

The new *savssat* was of the same type as the former. This time the

series of holes extended over a distance of about twelve miles. The position of the northern end of the series I determined to be at  $69^{\circ} 3.2' N.$ ,  $52^{\circ} 36' W.$ , its main direction being north-northwest to south-southeast, east of Kronprinsens Öer. This school was far more numerous than the first, and moreover we got the impression that every day brought new herds. They were apparently coming from great distances, were nervous, fatigued, and suffering from dyspnoea. At earlier *savssats* the Eskimos have had similar



FIG. 3—The northern end of the small *savssat* of Febr. 11th, 1915. To the right, towards the older ice is seen the border of the transparent icefield. Along the line of broken breathing holes are men occupied in flensing. In the background is the shore of Disko Island.

experiences, so that newcomers are confidently awaited as long as the weather conditions remain undisturbed. The fact that living animals were found at the holes on March 1 and 3, and probably still later, after several days had elapsed on which no live ones had been observed at all, seems to prove that they often come from great distances.

#### METHOD OF KILLING THE NARWHALS

At the first *savssat* about seventy animals were secured. Here were only people from Godhavn and Skansen, most of whom were experienced in that form of hunting and knew how to proceed systematically, so that there was no competition amongst them. Every man placed himself astride a hole with his rifle loaded, awaited calmly the arrival of a school, shot one of the animals—if possible a male with tusk—and harpooned it immediately after the shot; or, if he were exceptionally clever, he simply seized the animal by its nostrils or by one of the flippers. He then enlarged the hole, pulled his prey up, and proceeded with the flensing. It is imperative that the animal be cut up while yet retaining its bodily heat, for should the carcass grow cold before being drawn up on the ice it would quickly freeze



FIG. 4—Men occupied in flensing. The hole has been enlarged for dragging the narwhal onto the ice. In it floats another dead narwhal. To the right is a hole broken by narwhals, with cakes of ice lying about it.

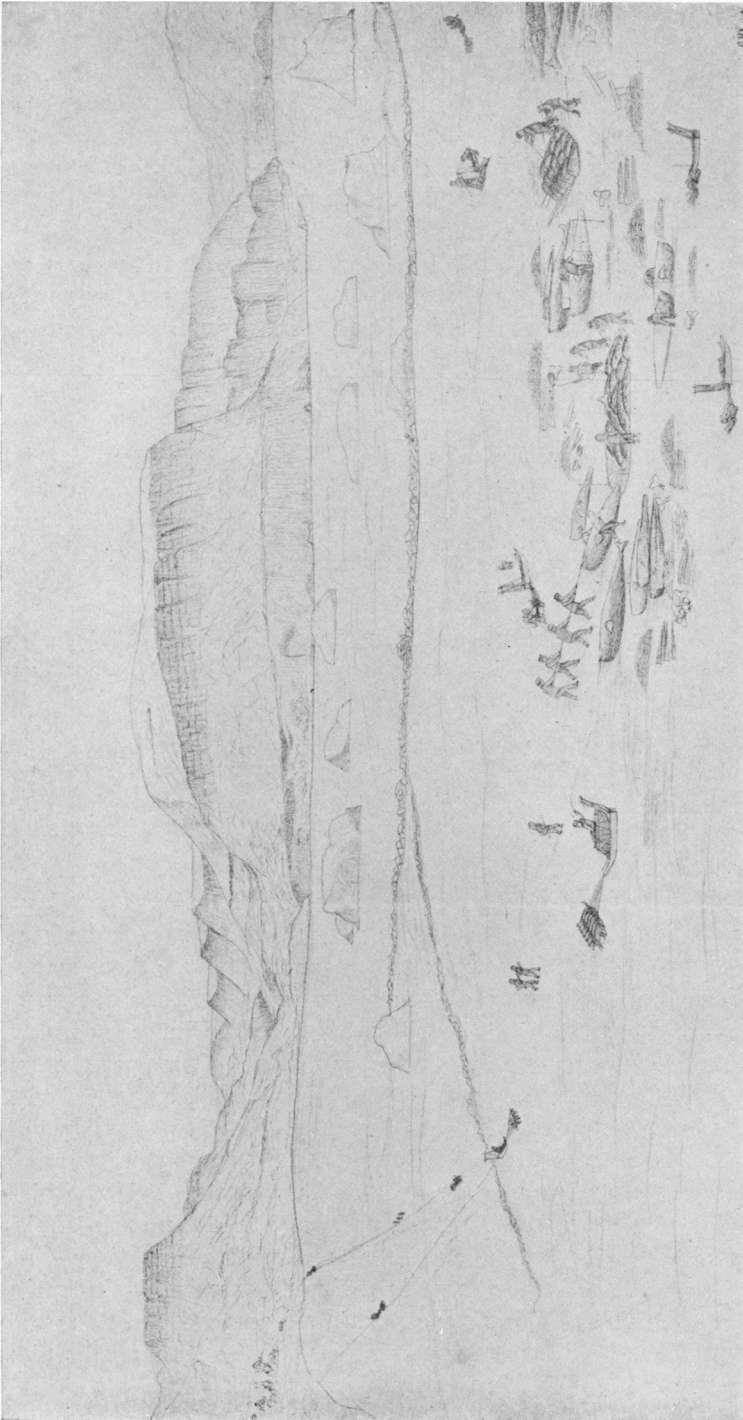


FIG. 5—A *arsussit* off Godhavn, West Greenland. Narwhals are crowded together in two small openings in the ice. Some people are securing right of possession by thrusting harpoons into them; others are drawing the blubber home on sieges. In the background, to the right, sieges are coming from the settlement at Skansen. From a drawing by the native Greenland hunter and catechist, G. Kleist. The original reproduction may be found in the author's paper mentioned in footnote 7.



so hard in the extremely cold air that saws and axes alone could effect the cutting.

When the school had run out the whole line, it would turn and come back; each hunter, apprised of its coming by the shooting of those before him, would in turn deliver his shot as before. By this procedure the cleverest and coolest of the hunters got up to seven animals a day without leaving the spot first chosen. Others, less experienced, were not so methodical; running bewildered from one hole to another, they got as a rule nothing of their own, but had at last to content themselves with assisting others in dragging up their prey. Some, lacking all experience and self-control, shot as soon as an animal came to the surface and succeeded only in piercing the cushion on the forehead, after which the harpooned animal could not be held or it would sink stupefied but not killed. The experienced hunters waited till the narwhal had blown, again breathed, and was in the act of turning downwards. The bullet then proved fatal every time, piercing the brain or the back of the head. According to the observations of Mr. Bistrup and myself and estimates made by experienced Eskimos of my acquaintance the number of animals killed at this *savssat* was between two and three hundred.

#### SCENES OF CONFUSION

Rumors and news spread very fast in western Greenland, especially during winter, and after the second *savssat* had been found people came from nearly every inhabited place between the 68th and the 72nd parallels and from even further south. Some were over six days on the trail and had to cross the Nugsuak Peninsula with its two mountain ranges over 3,000 feet high. The settlement nearest to the *savssat*, Kronprinsens Æer, was the last of all to get the news.

According to narratives of persons who saw the first and worst days of the second *savssat*, a state of total anarchy prevailed. Those who came from a distance had not had much experience in these operations; there was constant confusion about the holes over the whole twelve-mile line. Consequently skillful hunters did things they otherwise would not have done; for instance, one young hunter killed on one day five large males, took merely the tusks, and let the carcasses sink. His profit for that day's work amounted to five months' wages of a day laborer in Greenland! At last people began to rob each other. Dogs starved from the long journey without rest, gnawed through their traces, and ran about loose and uncontrolled on the killing place; some were stolen and carried off; and only the deep-rooted Eskimo good nature and good behavior prevented serious trouble. The Greenlanders have a sort of self-government in their village councils, but neither the councils nor the Danish officials could maintain any order at this *savssat*. It is, and always has been, one of the principles of the Danish administration of Greenland not to interfere with Eskimo unwritten rules of hunting

and division of the spoil, rules which are handed down from one generation to another.

#### THE PROFITS

During the first days of the second *savssat* a far greater number of narwhals were thus killed than were secured, for most of them sank. On April 7 I traveled over the whole field of slaughter and counted on the ice over 200 carcasses. Assuming that the ratio of animals secured to animals killed was the same at the second *savssat* as at the first—though in reality the proportion lost was much greater at the second—we may conclude that over 1,000 animals were killed at the two *savssats* together.

And what was the ultimate gain of this unusual winter with its unusual *savssat*? For most of the people a rather negative one, as in such a season there is always the disadvantage of too much ice for successful sealing. At the two nearest settlements, Godhavn and Skansen, the people got plenty of hide—to the Eskimo the most palatable and desirable portion of a whale; they had plenty of meat; and from the sale of the blubber and tusks they deposited fair sums in the savings banks. But for people coming from afar, the profits were reduced to some hide, or at most a tusk, that would be converted into European luxuries at their own trading stations.

#### A HUMAN "SAVSSAT"

At Skansen, the nearest settlement on the way to the *savssat*, the people also participated in another and less pleasant kind of *savssat*. When I passed the place homeward bound, on February 25, the eight houses were overcrowded with foreign invaders never before seen here. They came worn out, lacking food and sleep, without dog food, without money—though in fact money was useless and undesirable because every inhabitant of the place was interested in keeping the contents of his own small store for himself and his fellow-villagers. This was particularly the case because the war in Europe, news of which had come to Greenland without definite reports as to its extent or the possibilities of Denmark's being involved, necessitated the utmost precaution in conserving as long as possible the limited supplies held in the stores. The men from Skansen came home late in the night, hungry and tired from their work and from a heavy sledge trip of five or six hours, slept a few hours, and went out again over the same way. In their houses they literally had to wade over the floors covered with sleeping intruders; while in front of the houses some three hundred greedy, masterless dogs ran about, storming the cached meat and hides, skins, rawhide thongs, whips, garments, boots, and all else eatable and constantly fighting with one another or with angry, scolding women and children.

When I passed the line of carcasses in April, it seemed to me that all the ravens of Greenland had assembled there. They rose in clouds. Some

days afterward the weather finally changed, and a part of the ice went out carrying off the carcasses. But as late as May 15, I saw large ice fields with carcasses driving slowly out of the bay, and the people of Kronprinsens Öer were now busied in securing dead narwhals that had reappeared.

#### SMALLER "SAVSSATS"

In addition to the *savssats* here described a small *savssat* of white whales occurred near the settlement of Akugdlek on January 8, yielding but half a dozen animals. According to records kindly sent by Mr. C. E. Lembeke-Otto, chief factor of the colony of Christianshaab, a *savssat* of narwhals was found on March 15 south of Claushavn. By people from the various settlements in this district some 130 animals were captured, of which 77 specimens had tusks. In addition some animals were killed by people of other districts, who delivered their products to their own trading posts. The *savssat* lasted about one week, when the ice became so badly tideworn that hunting was dangerous and had to be abandoned.

Finally in April a *savssat* of white whales near the colony of Ritenbenk yielded over 25 animals.

The following year there was a bad winter with not much ice. At nearly all neighboring settlements a larger number of sharks (*Somniosus microcephalus*) were observed than is usual, the capture of which is an important source of revenue to the natives. This increase in numbers was undoubtedly due to the abundance of food they had obtained from the *savssats*, to which they had been attracted during the year.

#### BIRD "SAVSSATS"

Sometimes sea fowl are surprised by sudden freezing of the sea. Eider ducks are often seen at the beginning of the winter crowded in hundreds in relatively small openings, but they always seem to be able to escape. Not so fortunate are various species of the Alcidae, viz. the black guillemot (*Cepphus grylle*), the little auk (*Mergulus alle*), and especially Brünnich's guillemot (*Uria arra*). Flocks of thousands of the latter species are not infrequently seen crowded in small openings. If such a guillemot *savssat* occurs near the shore, the birds are all captured. They are almost indifferent to their fate, as if they realized the futility of attempted escape. They only swim unquietly about and as a rule do not try to leave the hole.

If the hole be far from any settlement the whole flock gradually perishes here in the freezing. I saw such a case during the winter of 1908-09 near the Kronprinsens Öer. The opening here had originally had a diameter of over a mile; when I passed, the whole field was covered with ice, rather thin but safe enough for sledging. Over it could be seen elliptical humps of ice, some of them with a small fissure at the top, through which heads of birds protruded. A few birds could still withdraw their heads, dive for a few moments and return. Others could not withdraw the head, the

opening being narrowed to a mere fissure in which the head moved restlessly and without meaning, the water continually welling over through the fissure. By far the most had succumbed. Over the solid frozen humps rose their small black heads with closed eyes and beaks pointing straight upwards.

On one occasion sledges on the track over the Waygat between Ritenbenk and Disko met flocks of the little auk flying over the ice-covered sea.

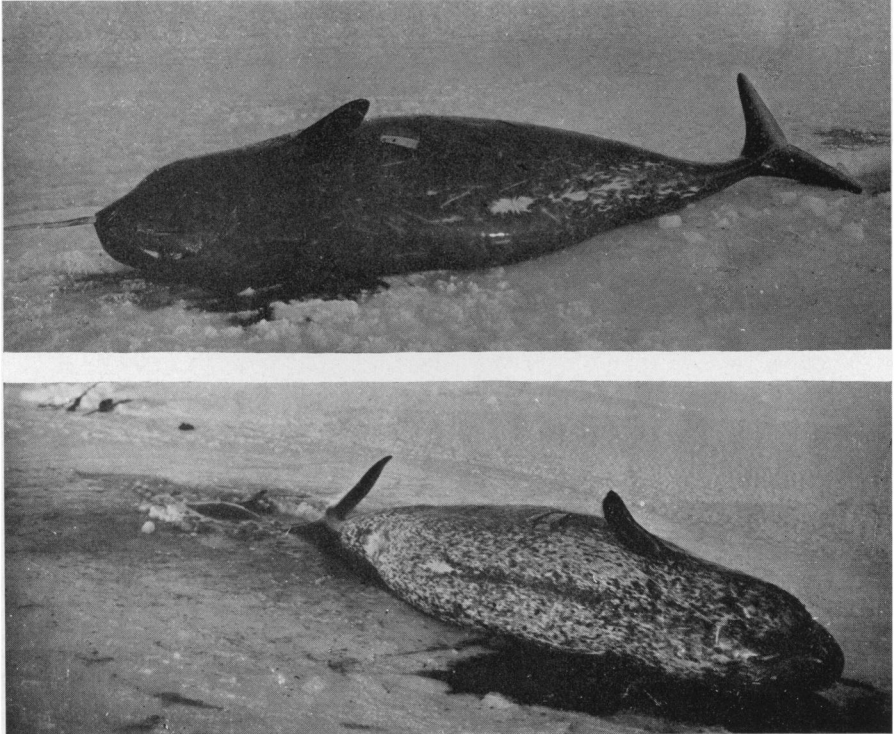


FIG. 6—Above a young male narwhal, ventral side. The small tusk is visible. Below a female narwhal of nearly the same size, ventral side. The lighter coloring of the female is apparent. Behind the female is a hole still undisturbed by the hunters, with a dead narwhal floating in it.

When the birds met the sledges, they fell in showers over them and the dogs. The Eskimos think that they become snow-blind in flying great distances over ice and that they then fall on every dark thing, supposing it to be an opening in the ice. When some days later I drove the same way, I saw no live birds, but along the whole route I saw scattered dead specimens, not yet eaten by sledge-dogs or by ravens.

It is a common tale among Greenlanders that the black guillemot sometimes winter under the ice, having a sort of chamber of snow on the surface of the ice above a small diving hole, like the birth chamber of the ringed seal. I never saw such cases, and although I have heard the story told in

the same manner from various parts of Greenland, I think that it can relate only to birds worn out in a snowstorm and frozen as in the instance of Brünnich's guillemot described above. I cannot understand that it is possible for any bird to keep its opening from freezing a longer time, even when it is burrowed under a layer of snow.

#### THE BREAKING OF BREATHING HOLES BY NARWHALS

The ability of the whale to break breathing holes in the ice is a somewhat obscure point. At the first *savssat* I visited the holes, when first seen, were

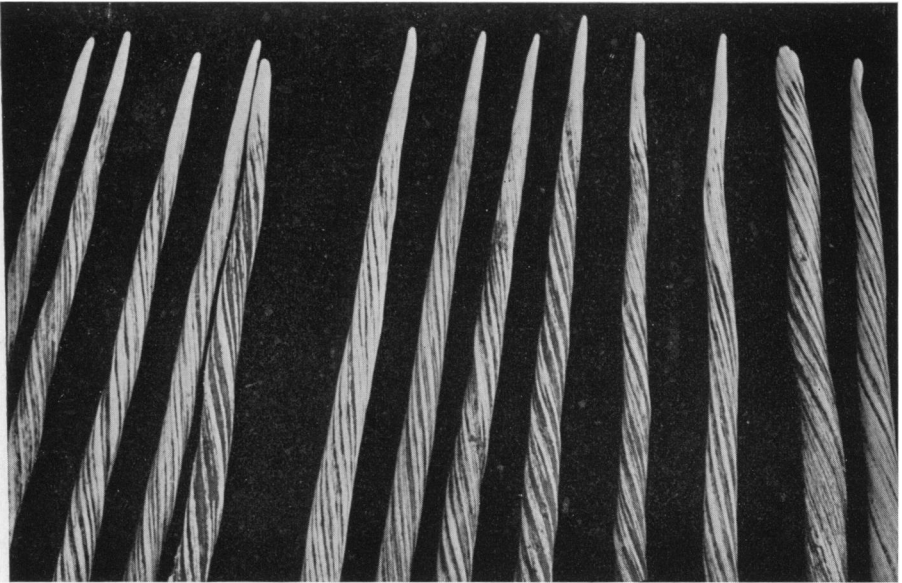


FIG. 7.—Points of 13 large tusks. The worn and polished white points, and the spiral grooves dark from algal growth, are clearly defined.

several feet long and from one to three feet broad. By lengthening and merging into each other, the holes first broken developed to cracks from six to eight yards in length. They formed a series distributed as groups of parallel openings, separated by intervals of ice intact for distances varying from fifty to a hundred yards (Figs. 3 and 4). Under the whole field of transparent ice small groups of the narwhal school, numbering from six to twenty animals, were constantly swimming to and fro, emerging now and then at the holes for breathing. It appeared to me that one of the foremost in the flock determined when the emergence should take place, the others following eagerly and crowding into the holes. At every emergence a dull rumble came from under the ice about the hole as if large tenpin balls had been thrown with great force from beneath up against the ice, and the ice we stood upon trembled considerably. I did not actually see new holes broken open, but I think I saw some holes enlarged. To be sure of this was

not easy, for with every emergence a great volume of water poured up through the hole. Since the cold was intense, about 30 degrees (centigrade) of frost, the water froze nearly instantly, and finally the holes became situated in the top of elongated ridges.

During the following days, the holes gradually narrowed by freezing. I once saw a hole used for breathing narrowed to a very small fissure without new breaking. Finally all holes of the first *savssat*, and most of the second, froze solid whilst other larger holes were made by the hunters for dragging up the carcasses. Towards the middle of March the ice had grown so thick that I do not think the narwhals were able to break it. At this time I noticed animals emerging for breathing in holes full of blood and flensing offal.

#### USE OF THE NARWHAL'S TUSK

The ice cakes broken by narwhals at the first *savssat* were about three inches thick, but at the second I measured some of six to seven inches in thickness (Fig. 4). Among the various conjectures made as to the probable use the male narwhal makes of his tusk, the view has been advanced and has found its way into textbooks of zoölogy that it is used to pierce openings in the ice. This suggestion must however be abandoned as quite wrong. The holes are broken by blows with the thick and firm cushion on the upper side of the head, in front of the so-called blowing hole, the exit of the nostrils. Eskimos at Godhavn and Skansen, well acquainted with the habits of the narwhal in ice, declare positively that the male carefully guards his tusk from bumping into firm and tough ice. Once Ludvig Geisler from Skansen found a single very large male sleeping near a lead in very hummocky ice, its mighty tusk projecting out over the surface of the ice and leaning against it. The animal awoke before Geisler could get his rifle clear and very slowly and cautiously drew the tusk back until it was quite clear, when it rapidly dived away.

In the drawing of G. Kleist (Fig. 5) illustrating the most ordinary form of *savssats*, may be seen a number of male narwhals emerging from a very small hole with their tusks resting upon the surface of the ice. Here a natural opening in the ice has gradually been diminished by freezing, and the stronger males have pushed off the weaker ones and the females. Eventually they become so worn out that they remain constantly at the hole, resting their tusks on the ice.

#### HOLES MADE BY OTHER WHALES

Whales of other species are also able to break breathing holes in ice. With white whales (*Delphinapterus leucas*) it is as common as with narwhals. Some natives state that the holes broken by white whales are somewhat trapeziform in shape and are thus distinguishable from those of the narwhals. Others deny this.

Giesecke mentions in his diary a case where a harpooned northern right whale ran with the line under the ice and broke ice that was over a foot thick. Old hunters relate numerous cases of a similar kind. The hump-back whale (*Megaptera boöps*) has ordinarily left the waters of Disko Bay when the ice covering sets in. But sometimes it happens that a single straggler is delayed by the lure of unusually large schools of the polar cod (*Gadus saïda*) and thus is surprised by the ice covering. It then breaks open large triangular or trapeziform holes.