DANMARK-EKSPEDITIONEN
TIL GRØNLANDS NORDØSTKYST 1906—1908

MEDDELELSER OM GRØNLAND

UDGIVNE AF

KOMMISSIONEN FOR
LEDELSEN AF DE GEOLOGISKE OG GEOGRAFISKE
UNDERSØGELSER I GRØNLAND

BIND XLI

MED 4 PORTRÆTTER OG 24 TAVLER

KØBENHAVN
I KOMMISSION HOS C. A. REITZEL
BIANCO LUNOS BOGTRYKKERI
1913

Hos C. A. Reitzel faas følgende af Kommissionen udgivne Skrifter:

MEDDELELSER OM GRØNLAND.

De med * mærkede ere udsolgte.

I. Undersøgelser i Godthaabs og Frederikshaabs Distrikter (Indlandsisen) i 1878 ved **Jensen, Kornerup, Lange og Hoffmeyer.** Med 6 Tavler og 3 Kort. 1879. Andet Oplag. 1890. Kr. 6.

*II. Undersøgelser i Julianehaabs (Sandstenen og Syeniten), Holstensborgs og Egedesmindes Distrikter i 1876 og 1879 ved **Steenstrup, Kornerup, Jensen, G. Holm og Lorenzen.** Med 8 Tavler. 1881. Kr. 6. Udsolgt.

III. Conspectus Florae Groenlandicae. 1ste og *2den Afdeling: Fanerogamer og Karsporeplanter ved **Joh. Lange**; Grønlands Mosser ved **Joh. Lange og C. Jensen.** 1880—87. 3die Afdeling: Lichener, Svampe og Havalger, samt Tillæg til Fanerogamer og Karsporeplanter ved **Deichmann Branth, Grønlund, Kolderup Rosenvinge og Rostrup.** Med 2 Tavler og 3 Kort. 1887—94. Kr. 14.

IV. Undersøgelser i Jakobshavns, Ritenbenks Umanaks og Upernivíks Distrikter samt paa Øen Disko (Isbræer, Basalt og tellurisk Jern) i 1878—80 ved **Hammer, Steenstrup og Lorenzen.** Med 7 Tavler og 1 Kort. 1883. Andet Oplag. 1893. Kr. 6.

V. Forsteningerne i Kridt- og Miocenformationen i Nord-Grønland ved **Steenstrup. O. Heer og de Loriol.** Med 2 Tavler og 1 Kort. 1883. Andet Oplag. 1893. Kr. 6.

Tillæg til V. Afbildninger af Grønlands fossile Flora ved **Oswald Heer.** 4°. Med Titelkobber, 100 Tavler og 1 Kort. 1883. Kr. 30. Udsolgt.

VI. Forberedelser til Undersøgelsen af Grønlands Østkyst ved **Wandel og Normann**, og Undersøgelse af Ruinerne i Julianehaabs Distrikt 1880 og 1881 ved **G. Holm.** Med 35 Tavler og 2 Kort. 1883. Andet Oplag. 1891. Kr. 6.

VII. Undersøgelser af Grønlandske Mineralier ved **Lorenzen og Rørdam**; de hydrografiske Forhold i Davis-Strædet ved **Wandel**; entomologiske Undersøgelser ved **Lundbeck**; Bemærkninger til Kortet fra Tiningnertok til Julianehaab af **Bloch**; Bidrag til Vestgrønlændernes Anthropologi ved **Søren Hansen.** Med 14 Tavler og 2 Kort. 1882—93. Kr. 6.

VIII. Undersøgelser i Distrikterne ved Disko-Bugten, i Holstensborgs, Sukkertoppens, Godthaabs og Upernivíks Distrikter i Aarene 1883—1887 ved **Hammer, Jensen, Ryder, Lange, Warming, Th. Holm, Rørdam, Rink og Carlheim-Gyllenskköld.** Med 21 Tavler. 1889. Kr. 6.

*IX—X. Den østgrønlandske Expedition i Aarene 1883—1885 (Angmagsalik) ved **G. Holm, V. Garde, Knutsen, Eberlin, Steenstrup, S. Hansen, Lange, Rink, Willaume-Jantzen og Crone.** Med 59 Tavler. 1888—89. Kr. 20.

*XI. The Eskimo tribes, their distribution and characteristics, especially in regard to language. Af **Dr. H. Rink.** Med et Supplement og 1 Kort. 1887—91. Kr. 7. Udsolgt.

XII. Om Grønlands Vegetation af **Eug. Warming.** 1888. Kr. 3,50.

XIII. Bibliographia Groenlandica ved **P. Lauridsen.** 1890. Kr. 3,50.

XIV. Undersøgelser af Grønlandske Nefelinsyeniter af **N. V. Ussing.** Mineralogiske Undersøgelser i Julianehaab-Distrikt af **Gust. Flink.** Undersøgelser i Egedesminde-Distrikt i 1897 af **Frode Petersen, Helgi Pjetursson og C. Kruuse.** Med 10 Tavler. 1898. Kr. 8.

XV. Bidrag til Vest-Grønlands Flora og Vegetation af **N. Hartz og L. Kolderup Rosenvinge.** Mosser fra Øst-Grønland af **C. Jensen.** Diatoméer af **E. Østrup.** Forekomst af Cohenit i tellurisk Jern ved Jakobshavn af Dr. **E. Cohen.** Med 2 Tavler. 1898. Kr. 8.

XVI. Undersøgelser i Julianehaabs Distrikt 1893 og 1894. Skjærgaardsopmaaling, Undersøgelse af Indlandsis og Bræer, Misvisning m. m. ved **V. Garde, C. Moltke og A. Jessen.** Arkæologiske Undersøgelser af **D. Bruun, F. Petersen og V. Boye.** Med 20 Tavler. 1896. Kr. 10.

XVII—XIX. Den østgrønlandske Expedition i Aarene 1891—92 (Scoresby-Sund) ved **C. Ryder, H. Vedel, N. Hartz, E. Bay, H. Deichmann, C. Christiansen, Willaume-Jantzen, Rørdam, S. Hansen, Børgesen, Rostrup, Deichmann Branth, Østrup, Posselt, Lundbeck, H. Hansen, Wesenberg-Lund og Lundgren.** Med 40 Tavler. 1895—96. Kr. 25.

XX. Grønlands Alger, Flora og Vegetation af **L. Kolderup Rosenvinge.** Om Steenstrupin af **Joh. Chr. Moberg.** Grønlands gamle Topografi af **Finnur Jónsson.** Brade Ransons Forde af **Frode Petersen.** Med 3 Tavler. 1899. Kr. 6.

XXI. **1ste Afdeling:** Grønlands Fugle af **Herluf Winge.** 1899. Kr. 4,50.

2den Afdeling: Grønlands Pattedyr af **Herluf Winge.** 1902. Kr. 3.

Ikke sluttet.

XXII. Ikke udkommen.

XXIII. **1ste Afdeling:** Grønlands Brachiopoder og Bløddyr af **Henr. J. Posselt**, udgivet

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DANMARK-EKSPEDITIONEN

TIL GRØNLANDS NORDØSTKYST 1906—1908

UNDER LEDELSE AF

L. MYLIUS-ERICHSEN

BIND I

INDHOLD

I.

REPORT ON THE DANMARK EXPEDITION TO THE NORTH-EAST COAST OF GREENLAND 1906—1908

BY

G. AMDRUP

1913

PROTECTOR OF THE EXPEDITION

HIS MAJESTY

KING FREDERIK VIII

H. M. KING FREDERIK VIII

PROTECTOR OF THE EXPEDITION

FOREWORD

On the return of the Expedition the artist Mr. Achton Friis published an extremely interesting, popular account of the voyage. The Committee have deemed it desirable, nevertheless, that the scientific publications should be prefaced by a brief description of the genesis, equipment and course of the Expedition, based on the memoranda of Mylius-Erichsen and on the various reports etc. With the agreement of all the members of the Expedition who would be sending in papers on the scientific work, it was left to the Committee to arrange for the drawing up of such a descriptive [1] report, and this honourable task the Committee delegated to the undersigned member of the Committee.

The description, based mainly on reports etc., of an Expedition in which one has taken no part, must of necessity be restricted to a dry, objective account of what actually occurred.

I have endeavoured to picture these events in such a way, that posterity may obtain a clear conception of the incredible energy with which the Danmark Expedition has worked and of the magnificent results it has attained to.

If I have succeeded in this, my wish is accomplished.

[1] It should be mentioned that this report was written before Captain Einar Mikkelsen returned home from his expedition to the N. E. coast of Greenland

G. Amdrup.

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I. Brief account of earlier expeditions to the east coast of Greenland.

Plate I.

The year 1908 will always remain a memorable year in the history of Greenland's exploration. With the return of the Danmark Expedition and the news of the magnificent results achieved by the Expedition, the coping stone was laid on a work, which had engaged the unwearied attention of numerous explorers for centuries. The last wide stretch of unknown coast on the north-east of Greenland had been investigated and surveyed by this Expedition and the extensive coast line of Greenland was now known in the whole of its length [1].

Over 900 years had passed since the Norseman Erik the Red landed on the south-west coast of Greenland in the year 986 and settled down at Brattelid in Eriks Fjord (probably the present Tunugdliarfik and Igaliko Fjord) [2]. In 877 already or perhaps even somewhat earlier it is possible, that the land was seen by the Norseman Gunbjørn [3], and in 983—985 Erik the Red had visited Greenland and passed the winter of both years on the south-west coast, but it was not until 986, that he and many other northerners, attracted by his report of the country, made a definite settlement on Greenland and thus founded here the first northern colony [4].

The immigration to Greenland continued during the following years and gradually two inhabited districts arose, Østerbygden and Vesterbygden, regarding which we have learnt later, that the former lay in the present Julianehaab district and the latter in the Godthaab district [5].

For more than 400 years the connection was maintained with these colonies and there can hardly be any doubt, that the navigators

[1] A complete account of the "earlier expeditions to the east coast of Greenland north of 66° N. lat." up to the year 1891 is given by C. Ryder in "Geografisk Tidsskrift", Bd. 11, 1891—92, p. 62.

[2] Grønlands historiske Mindesmærker, B. III, p. 864.

[3] Grønlands historiske Mindesmærker, Bd. I, pp. 71—77.

[4] Grønlands historiske Mindesmærker, Bd. I, pp. 206—207.

[5] H. P. v. Eggers. "Om Grønlands Osterbygds sande Beliggenhed". Kjøbenhavn 1794.

K. J. V. Steenstrup. "Om Osterbygdens Beliggenhed". Meddelelser om Grønland. Bd. IX, pp. 1—51.

of that time had a very detailed knowledge of the colonized part, at least, of Greenland and presumably also of much beyond. But from about the middle of the 15th century the connection was lost and practically nothing of the knowledge which had been gained up to that time, regarding the navigation of the coasts of Greenland, was preserved for posterity. Nor was this all. Knowledge of the geography of the land was also lost in part and as time passed, the erroneous belief, as it has since proved, arose, that Østerbygden had lain on the east of Greenland.

Although the first colonisation had thus contributed very little to the exploration of Greenland, yet it was this, that gave the stimulus to the repeated voyages to the land, and even the belief, that Østerbygden at least had been situated on the east coast of Greenland, was the inducement which led to the beginning of the investigation of this, extremely inaccessible coast by comparison with the west coast.

In the following the earlier explorations of the east coast of Greenland up to the despatch of the Danmark Expedition may be briefly reviewed.

The desire to regain the connection with the lost colonies Østerbygden and Vesterbygden has always been strong in Denmark But the first real attempt in this direction was not made until the time of King Frederik II, who in 1579 sent out an expedition under the charge of the Englishman Jacob Allday [1] and in 1581 a second expedition under the Færoese Mogens Heineson [2]. Both of these expeditions afford a striking example of the fact, that the earlier knowledge of the navigation of the Greenland colonies had been quite lost, for both set their course north round Iceland and in towards Greenland's east coast under the impression, that Østerbygden must lie there. However, the ice prevented them from reaching the coast and both expeditions were fruitless.

The expeditions, which were sent out by English merchants in the years 1585, 86 and 87 under the command of John Davis [3], with the object of finding round the north of America an easier route to China and India than the previously used route round the south of Africa, contributed nothing to the exploration of the east coast of Greenland; yet they should be briefly mentioned here, for they led, so to speak, to the despatch of the later expeditions.

John Davis discovered or rather rediscovered [4] the Straits now

[1] C. Pingel. "Nyere Rejser til Grønland". Grønlands historiske Mindesmærker, Bd. III, pp. 637—50.

[2] Grønlands historiske Mindesmærker, Bd. III, pp. 650—60.

[3] Grønlands historiske Mindesmærker, Bd. III, pp. 666—70.

[4] It is obvious, that the southern part of Davis Straits must have been well known in the centuries when the connection with Osterbygden and Vesterbygden was maintained.

called by his name and on all three voyages, in his efforts to solve the task given him, he sailed up along the west coast of Greenland, in the first year to 64°15′, in the second to 66°33′ and in the third even right up to 72°12′ N. lat. Thus, JOHN DAVIS was the first to give us information in any way reliable of the situation, direction and extent of the west coast. Add to this, that DAVIS landed at several places, where he met with natives, and it will be readily understood, that his discoveries were of great importance for the later expeditions.

The reports about these voyages of DAVIS have certainly contributed to the decision, that the expedition sent out by King CHRISTIAN IV in 1605 had as goal the southern part of Greenland's west coast, to discover if possible any descendants of the old northern colony. The expedition was led by the Scotch nobleman JOHN CUNNINGHAM [1], then in the Danish service, with the Englishman JAMES HALL as pilot. The expedition consisted of 3 vessels, Trost, Løven and Katten; the first was commanded by CUNNINGHAM himself, and Løven by the Dane GODSKE LINDENOV.

After passing round the south point of Greenland Løven separated from the other two vessels. All three reached into the coast. It is not known, where exactly Løven landed, but probably it was at some place near Fiskernæs [2]. The other two ships sailed into a fjord at about 66½° N. lat. and from there HALL with Katten explored the coast right up to ca. 69° N. lat. When HALL rejoined CUNNINGHAM they sailed for home. Both CUNNINGHAM and LINDENOV met with Eskimo.

The successful result of this expedition induced King CHRISTIAN IV to send out a new expedition already in the following year, again with the southern part of Greenland's west coast as goal. The chief in command was GODSKE LINDENOV [3], whilst HALL as in the previous year served as pilot. LINDENOV sailed up the Cunningham Fjord discovered in the previous year (probably the present Søndre Kangerdluarsuk north of Holsteinborg) [4] and explored all the fjords and bays in the district, without finding anything, however, to indicate that the old northerners had been there.

Thus, the voyages of DAVIS, CUNNINGHAM and LINDENOV along the west coast had discovered not the slightest trace of the old northern colonists, nor had the land seen that verdant and luxuriant appearance the old reports spoke about. It was no wonder, therefore, that the conviction grew in strength, that Østerbygden at least must have lain on the east coast, almost due west of Iceland.

With this part of the coast as goal King CHRISTIAN IV then sent

[1] Grønlands historiske Mindesmærker, Bd. III, pp. 670—686.
[2] Grønlands historiske Mindesmærker, Bd. III, p. 689 note.
[3] Grønlands historiske Mindesmærker, Bd. III, pp. 689—692.
[4] C. C. A. GOSCH. "Danish arctic expeditions 1605 to 1620". Bd. I, p. 59.

out a new expedition in 1607 under the command of the Holstener Carsten Richardsen [1], who had been one of Lindenov's officers the previous year; Hall again serving as pilot. But Carsten Richardsen met with the same fortune as Jacob Allday and Mogens Heineson. He sighted the land, but the heavy drift-ice prevented him from approaching the coast; he was, indeed, nearly crushed by the screw-ice and was obliged to sail for home without achieving anything.

In the same year that Carsten Richardsen undertook his voyage to the east coast of Greenland, the renowned Henry Hudson [2] set sail from England with the fantastic aim of finding some way over the North Pole to China. Hudson sighted the east coast of Greenland several times, the last time at ca. 73° N. lat., and he was thus the first to give us any information regarding the northern part of Greenland's east coast.

After Carsten Richardsen's unsuccessful voyage Christian IV gave up trying to rediscover the old northern colonies. It was not until the time of King Frederik III, that the attempts were begun again, though not by the King himself, but by a rich private gentleman Henrik Møller, who sent out 3 expeditions in the years 1652—54, all three under the command of a foreigner, David Danell [3], probably a Dutchman.

Of Danell's three voyages the first especially is of importance. With the vessels St. Peder and St. Jakob he sailed north round Iceland on the way towards the east coast of Greenland. On June the 2nd he came in sight of the coast and was able to follow this from ca. 64°50′ N. lat. right down to Cape Farvel, practically the whole way in sight of the coast and often so near, that he believed he would manage to land. But the ice conditions rendered this impossible.

On Danell's second voyage in 1653 he again sailed along the east coast from ca. 64° N. lat. to Cape Farvel, but the ice conditions seem to have been worse than in the foregoing year and there was no possibility of landing.

In the attempts to find a more easily navigable route to China and East India than that already known, one of which by Henry Hudson is referred to above, Spitzbergen was discovered in the year 1596 by Jacob van Heemskerk and William Barentsz. On returning home the expeditions reported, how the waters there were rich in whales and walrus and with this attraction the first English whalers set sail for Spitzbergen already in 1608. The following years saw the arrival of the Dutch, French and Spaniards and the Danes came there in 1615 [4]. Year by year thereafter great numbers of whalers flocked

[1] Grønlands historiske Mindesmærker, Bd. III, pp. 696—698.

[2] G. M. Asher. Henry Hudson, the Navigator. pp. 1—7. London 1860.

[3] Grønlands historiske Mindesmærker, Bd. III, pp. 713—725.

[4] C. Normann: "Hval-, Hvalros- og Sælhundefangstens Historie og Udvikling", Tidsskrift for Søvæsen, Bd. I, p. 511 and Bd. II, p. 26.

to Spitzbergen. During these whaling voyages the whalers have certainly often sighted the east coast of Greenland. Among other evidence of this we find, that an old Dutch chart of the east coast of Greenland has the following notes on it[1].

at ca. 78½° N. lat. t. Land van LAMBERT opgedaen 1670.
- - 77° - - t. Land van EDAM opgedaen 1655.
- - 74° - - Baey van GALE HAMKES opgedaen 1654.
- - 73° - - t. Land van BROER RUYS opgedaen 1655.

After DANELL's three voyages no further attempt was made under FREDERIK III to reestablish the connection with Greenland; but no sooner had CHRISTIAN V mounted the throne than he sent out an expedition in 1670 under a captain by name OTTO AXELSEN[2]. We know nothing of the course of this voyage except that AXELSEN returned successfully the same year. In the following year AXELSEN was again sent out, never to return. Nothing definite is known of what became of him, but probably his vessel became jammed in the ice and destroyed during his attempts to reach into the east coast of Greenland.

Thus, at the end of the 17th century, in spite of numerous expeditions the attempts to rediscover the old northern colonists had not succeeded, nor was any new colony founded in Greenland. In the beginning of the 18th century, however, in the reign of FREDERIK IV a colony was settled there and the first step was thus made towards the present colonisation and the subsequent investigation of the whole of Greenland, both the west and the east coast.

The initiative was taken by the Norwegian priest, HANS EGEDE, who with burning zeal for the conversion of the Eskimo to christianity, settled down on July 3rd 1721 at the island Imeriksok and here laid the foundations of the colony Godthaab, which was moved later over to the mainland[3]. HANS EGEDE was sent out by a Greenland company under the patronage of the King and founded by himself in Bergen.

At the request of the King, HANS EGEDE in 1723 made an endeavour to discover Østerbygden, which was still believed to have been on the east coast. On August 9th EGEDE departed from the colony with two sloops, and endeavoured to penetrate through the Frobisher Straits, which were marked on all the charts of that time, over to the east coast. EGEDE discovered, that these straits did not exist and consequently, he did not succeed in reaching the east coast, being

[1] De groote nieuwe vermerderde Zee-Atlas ofte Water-Waerld door GERARD VAN KEULEN. Printed by JOANNES VAN KEULEN, Amsterdam 1718. This chart in the Atlas mentioned bears however the year 1706. The Atlas is in the "Store Kongelige Bibliotek" of Copenhagen.
Grønlands historiske Mindesmærker, Bd. III, p. 767.
[2] Grønlands historiske Mindesmærker, Bd. III, pp. 725—726.
[3] Grønlands historiske Mindesmærker, Bd. III, pp. 727—728.

obliged to turn at Nanortalik owing to the advanced time of the year. On September 13th he returned to the colony [1].

In the following year the Greenland Company of Bergen sent out a ship with the object of penetrating through the ice in to the east coast to search there for Østerbygden. But this expedition had no better fortune than the earlier. The heavy mass of drift-ice which lay along the land prevented the vessel from approaching the coast and the expedition returned without accomplishing anything.

In 1726 the Greenland Company of Bergen was dissolved and the government itself now took over the management of the trade with Greenland. For this purpose Major Claus Enevold Paars was appointed governer in Greenland in 1728 and journeyed there the same year. Major Paars took horses with him, with the intention of endeavouring to ride across the inland ice and thus reach Østerbygden. The horses died, however, before the plan could be carried out [2].

In the winter of 1728—1729 Lieutenant Richardt with the galiot West-Vlieland stayed at the colony in Greenland. In the month of June 1729 he sailed from the colony and on the homeward journey made an attempt to approach the east coast. But as with the others the ice prevented this [2].

Right to 1736 Hans Egede remained in Greenland and in the course of these 15 years acquired a thorough knowledge of all things in Greenland. In his book written on his return home to Denmark [3] he explains, that the attempt to penetrate up along the east coast, to be successful, should be made by boat along the land, as the water flowing out from the fjords keeps the ice at some distance from the land and thus forms a narrow channel of open coastal water. As we shall see, it is just in this way that the east coast has been explored, right from Cape Farvel to Scoresby Sound.

The first to follow Egede's recommendation was the Danish trading agent Peder Olsen Walløe [4], who had lived in Greenland from the year 1739. On August 13th 1751 he sailed away from the colony of Godthaab with a women's boat (umiak) and arrived on October 2nd at Igaliko Fjord, where he stayed the winter. On May 20th 1752 Walløe continued the journey and on July 6th he set up his tent for the first time on the east coast. On August 3rd, according to his own account, he had reached up to 60°56′ N. lat.[5] but was then

[1] Hans Egede. "Det gamle Grønlands nye Perlustration eller Naturel-Historie", pp. 19—20. Kjøbenhavn 1741.
Grønlands historiske Mindesmærker, Bd. III, pp. 729—730.
Meddelelser om Grønland, Bd. IX, pp. 28—29.

[2] Grønlands historiske Mindesmærker, Bd. III, pp. 732—734.

[3] Hans Egede. "Det gamle Grønlands nye Perlustration eller Naturel-Historie", pp. 20—21. Kjøbenhavn 1741.

[4] Grønlands historiske Mindesmærker, Bd. III, pp. 741—750.

[5] Both Graah and Holm, however, are of opinion that Walløe did not

compelled by his companions to return. Once more WALLØE was obliged to overwinter on the way, in Agluitsok Fjord on the west coast, before he reached the then southernmost colony, Frederikshaab, on June 25th 1753. Thus, so far as we know, WALLØE was the first white man to set foot on the east coast of Greenland and he will, therefore, always hold a prominent place among the explorers of Greenland.

In the light of our present knowledge it is not to be wondered at, that WALLØE found no ruins or remains of Østerbygden on the east coast. But at that time the only effect of WALLØE's journey was, that Østerbygden was assumed to have lain further north and the expeditions sent out in the years 1786—87 were thus directed to the coast about the 65th degree of latitude as goal.

The first of these, in the year 1786, was commanded by Lieut.-Captain POUL DE LÖWENÖRN [1]. With the old whaling vessel, Grev Ernst Schimmelmann, he sailed from Copenhagen on May 2nd to Reykjavik on Iceland, where he was joined by the 2nd ship of the expedition, the yacht "Den nye Prøve".

LÖWENÖRN left Iceland on June 27th. On July 3rd he sighted the east coast of Greenland at ca. 65° to 66° N. lat., but on the very same day was forced eastwards by the drift-ice. From the 8th till the 23rd of July Löwenörn lay in the fjords on the north-west coast of Iceland, waiting for an improvement in the ice conditions. But when he again ventured out on the 23rd, the ice was even worse than before, for which reason he gave up further attempts at reaching the east coast of Greenland that year. On July 31st he anchored with both his vessels in Havne Fjord in Iceland.

The second commander of the expedition, First-lieutenant C. F. GROVE, who had previously been in command of the yacht, now again went on board the "Grev Ernst Schimmelmann" and the command of the yacht was given to Second-lieutenant CHRISTIAN THESTRUP EGEDE, a son of Bishop P. EGEDE, to whose unwearying energy the expedition of LÖVENÖRN owed its existence. As second in command EGEDE had Second-lieutenant C. A. ROTHE.

On the morning of August 8th LÖWENÖRN left Havne Fjord to sail for Denmark and in the evening of the same day EGEDE set off to make one more attempt that year to reach in to the east coast of Greenland [2].

On August 16th he sighted the east coast of Greenland at ca. 65°24′ N. lat., but as the ice prevented him from reaching in he held

reach further north than ca. 60°28′ N. lat. See W. A. GRAAH: "Undersøgelses-Rejse til Østkysten af Grønland, udført i Aarene 1828—1831", pp. 71—72. Kjøbenhavn 1832 and Meddelelser om Grønland, Bd. IX, p. 162.

[1] Grønlands historiske Mindesmærker, Bd. III, pp. 751—754.

[2] EGEDE: "Rejsebeskrivelse til Oster-Grønlands Opdagelse, foretaget i Aarene 1786 and 87". Kjøbenhavn 1789.

his course southwards in the following days along the edge of the ice, hoping always to find an opening in the ice which he could follow and thus attain to his highest wish, to land on the east coast. On August 20th he again came in sight of the coast at ca. 64°59′ N. lat. He succeeded in reaching in to about 10 miles from the coast, but the ice then became so dense, that not even a jolly boat could get through it. Autumn was now approaching, however, and from the 25th one storm followed on another, so that it was only with the greatest difficulty, that EGEDE managed to bring the yacht in a miserable state into Holmens Havn in Iceland on September 18th. On the 22nd EGEDE again ran out of Holmens Havn and made for Havne Fjord, where it was his intention to pass the winter. On the 27th he anchored here, after being nearly lost on the way in a terrible storm from the west.

On April 1st of the following year already Egede again set out to sea, but was obliged to make in for Dyre Fjord on the 23rd of the same month owing to a leakage made by the ice. Here he was joined by the cutter "Hvidfisken". On May 8th both vessels left Dyre Fjord, Hvidfisken led by EGEDE and the yacht by ROTHE. On May 17th they came in sight of the east coast of Greenland at ca. 65°16′ N.lat., and on the 18th at ca. 65°54′ N. lat., but the continuous sheet of drift-ice only allowed them to come 25—30 miles from land, thus further off than in the previous year. On May 28th EGEDE ran into Havne Fjord with both vessels to make some small repairs. In the course of the summer he made three more attempts to reach the east coast of Greenland, but ice and storms prevented it and in these attempts he did not even manage to see the coast. On October 9th he left Havne Fjord and sailed home to Denmark.

This brought the exploring of Greenland's east coast in the 18th century to a close. In spite of the great efforts which had been made in the 100 years that had passed, extremely little was added to the previous knowledge of the east coast of Greenland. The Dane PEDER OLSEN WALLØE was still the only one who had journeyed on the east coast and no further north than to 60°56′ N. lat. None of the numerous sailing expeditions had succeeded in reaching in to the coast and knowledge of this north of 60°56′ N. lat. was thus restricted to a number of scattered observations taken outside the ice belt by vessels which had sighted the coast.

In the course of the 19th century all this was completely changed. Numerous expeditions were fitted out and the majority returned home with excellent results; by the end of the century the whole of the east coast from Cape Farvel to Cape Bismarck (ca. 77°01′) had been travelled over and in part explored.

The first white man to set foot on the east coast in the 19th century was the German K. L. GIESECKE. In 1806 he set out from the southernmost establishment on the west coast and advanced in a women's

boat (umiak) as far as the island Alluk (ca. 60°09′). But GIESECKE did not reach even so far northward as WALLOE, so that in geographical regards his journey resulted in nothing new[1].

The next to be mentioned is the English whaling captain W. SCORESBY junr., who had sighted the east coast of Greenland on his whaling voyages both in 1817 and in 1820[2] and who succeeded in 1822 in landing on the coast. This last voyage especially is worthy of note and may be mentioned in more detail[3].

On June 8th 1822, when SCORESBY found himself at 74°06′, the coast came in sight. The ice did not allow him, however, to approach the coast nearer than 10 miles; but in the following days the weather was clear and he was able to make a survey from the ship and chart the coast over a distance of ca. 90 miles. On June 18th he again sighted the coast at 73°01′ N. lat. and on July 19th at 71°02′ N. lat. On July 24th he landed at Cape Lister (70°30′) and on the 25th he sailed into Scoresby Sound[4]. The same day he landed at Cape Hope and on the following day at Cape Stewart, whilst some of his men went on land at Cape Brewster in the night of the 26th and 27th. From the 28th to the 30th he sailed southwards and charted the coast as seen from the ship from Cape Brewster to Cape Barclay (69°13′). On July 30th SCORESBY again turned northwards and on August 10th landed on the east coast of Traills Island (72°12′). He sighted the coast several times more before he set sail for England on August 27th.

SCORESBY's voyage was epoch-making. It was SCORESBY's good fortune to be the first to penetrate with a vessel through the ice belt and land on the coast and his chart of the outer coast of Greenland from ca. 69¼° to 75° N. lat. was, considering the circumstances under which he worked, a remarkable achievement, even though later expeditions have been obliged to improve and supplement it in many details.

In the following year, 1823, a second English expedition under CLAVERING and SABINE sailed northwards with the east coast of Greenland as goal. The vessel of the expedition, the brig "Griper", was commanded by CLAVERING and the intention was, that SABINE should land at some northerly point on the east coast and there determine the length of the seconds pendulum, with the object of arriving at a

[1] Grønlands historiske Mindesmærker, Bd. III, p. 760.

[2] R. E. SCORESBY-JACKSON. "The life of WILLIAM SCORESBY". London 1861. pp. 111 and 157.

[3] Journal of a voyage to the Northern-Whale-Fishery; including researches and discoveries on the Eastern coast of West-Greenland, made in the summer of 1822 in the ship "Baffin" of Liverpool, by WILLIAM SCORESBY junior. Edinburgh 1823.

[4] Scoresby Sound, which SCORESBY called after his father, was most probably discovered already in 1761, for our countryman, the Friesländer VOLKERT BOHN on a chart drawn by himself, had marked off a large fjord at 70°40′, which in 1761 he had entered with a Dutch vessel. See Grønlands historiske Mindesmærker, Bd. III. Note p. 770.

more accurate conception of the form of the globe. Such observations had been made by Sabine in the previous years at other places on the globe [1].

On August 8th the "Griper" approached the coast at about 74°20′ and on August 11th a landing was made on the south point of Shannon Island. On the afternoon of the same day the "Griper" again stood northwards but was stopped in the evening by impenetrable ice off the north end of Shannon Island, where Clavering landed (75°12′). In the north high land was seen and to the inside of Shannon Isl. were several fjords (Ardencaple Inlet). On August 13th Sabine began his observations on Sabine Island (ca. 74°30′), the largest of the Pendulum Islands. From Sabine Isl. Clavering made an excursion by boat southwards between the 16th and 29th, on which Gale Hamskes Bay, discovered in 1654, was explored. On the large island in the bay, Clavering Island, Clavering fell in with Eskimo, the first and only time Eskimo have been seen north of the Angmagsalik district.

On August 31st the "Griper" weighed anchor and stood southwards along the coast. On September 4th a landing was made on Jackson Island off Cape James and another on the 6th at Cape Broer Ruys. On the following day they sailed past a large bay, which was named "Foster Bay", the same bay that the 2nd German North Pole Expedition more closely explored in 1870 and called "Kejser Franz Joseph Fjord". The course southwards was held until the 13th; on the 14th the "Griper" sailed out through the ice belt and made for home.

Clavering's voyage meant a very great increase in our knowledge of the coast between 73° and 75°20′, which had been sketched in the previous year by Scoresby, though only to ca. 75°00′.

Scoresby's voyage was calculated naturally to make a great stir in Denmark. Here expedition after expedition had been sent out during centuries, without any succeeding in penetrating the ice belt and land on the east coast and now this had been accomplished by Scoresby, whose main object further was the whale fishing and not the exploration of the east coast.

With our present knowledge of the ice conditions along the east coast of Greenland, however, this was quite natural, for all the earlier expeditions had tried to get through the ice belt to the south of 69° or 70°, where the ice owing to the comparatively narrow breadth of the south-going arctic current is much denser at most places and more pressed together than north of 69° or 70°, where the current and thus the ice is spread out over a wider area. For the same reason there is no open, navigable coastal water between the ice belt and land south of ca. 69° or 70°, such as is usually found in summer north of 69° or 70° right up to at least 75° N. lat.[2].

[1] Petermann's Mittheilungen, 16. Band, 1870, p. 320.

[2] Meddelelser om Grønland, Bd. VI, pp. 44—45, Bd. XXVII, pp. 142—143.

But no one had any knowledge of this naturally at that time and we need not be surprised, therefore, when SCORESBY states in his report on his voyage in 1822, that if a vessel once succeeded in getting inside the ice belt it could follow the open coastal water from Scoresby Sound right to Cape Farvel and in this way discover the old northern colonies, which many still believed were to be found on the east coast [1].

As mentioned above, SCORESBY's successful voyage aroused great interest in Denmark and led to the appointment a few years later of a commission for the purpose of arranging an expedition to the east coast, to explore this between Cape Farvel and Scoresby Sound.

Fortunately, this commission did not follow the plan suggested by SCORESBY for navigating this stretch of the coast, but resolved that the investigation should be carried out in the same manner as the journeys of WALLØE and GIESECKE, along the route which HANS EGEDE had already stated to be the only feasible one [2]. As leader of the expedition they appointed Navy Lieutenant W. A. GRAAH [3].

On March 31st 1828 GRAAH sailed from Copenhagen and arrived at the colony of Frederikshaab on May 27th. The winter of 1828—29 was passed on the small island Nanortalik (ca. 60°08′) on the south-west coast of Greenland. On March 21st 1829 the expedition began the journey to the east coast. It was composed of 4 Europeans, 5 Greenlanders and 10 Greenland women distributed among two women's boats (umiak) and some kaiaks. For the Europeans provisions were taken to last about one year, whilst it was expected that food could be obtained for the Greenlanders partly by their own efforts and partly by trading with the Eskimo living on the east coast.

On April 1st GRAAH came to Kekertak, a small island a little inside the eastern inlet of Prince Christians Sound, where he was obliged to wait 25 days owing to the ice.

At last on April 26th the voyage could be continued. In the evening they came to the island Alluk, the end point of GIESECKE's journey in 1806 [4] and on May 1st they reached 60°28′ N. lat., the most northern latitude, which GRAAH believed, WALLØE had attained to [5]. Here the expedition was held up by the ice for more than 3 weeks.

On May 23rd the journey was continued, but already on the 28th the expedition was again enclosed for 17 days at Serketnua (60°59′). It was not until June 14th that this tenting place could be left behind, and from now on the expedition made fairly steady and sure progress,

[1] Journal of a voyage to the Northern-Whale-Fishery" by WILLIAM SCORESBY junior, pp. XLII—XLIII.

[2] HANS EGEDE: "Det gamle Grønlands nye Perlustration eller Naturel-Historie, pp. 20—21. Kjøbenhavn 1741.

[3] W. A. GRAAH: "Undersøgelses-Rejse til Ostkysten af Grønland, udført i Aarene 1828—31". Kjøbenhavn 1832.

[4] ibid. p. 18.

[5] ibid. p. 16.

until on July 24th they reached a small island, which Graah called "Vend om" (65°14′); here the ice prevented all further advance.

After one more month, which Graah utilised in making investigations of the land south of "Vend om", the ice was quite unchanged. Owing to the advanced time of year Graah now considered it impossible to advance any further that year. An enormous cairn was then raised on Dannebrogs Island (65°18′) and possession of the land was taken in the name of His Majesty the King; thereafter, on August 21st Graah turned southwards to go into winter quarters.

For this purpose Graah selected an old Greenland winter-house situated on the south side of a fairly large island at 63°22′ N. lat. The place was called Nukarfik (the present Imarsivik)[1]. The winter passed comfortably, though the winter-house itself was extremely bad; but when the spring came, all the provisions they had brought with them had been used up with exception of a small amount of bread. Nevertheless, Graah resolved to make one more attempt to reach further north than in the previous year.

On April 5th 1830 he abandoned Nukarfik. With great exertions Graah succeeded in reaching ca. 64°09′ N. lat. on July 12th, but to the north of this he found the drift-ice frozen solid to a huge mass with not a drop of water to be seen anywhere. Graah was shut in here 15 days, during which all his provisions were exhausted.

Under these circumstances there was nothing else to do but turn back. But it was not until July 28th that Graah succeeded in reaching the open water to the south and here, fortunately, they managed to shoot a seal. In the two previous days they had eaten nothing but ice and snow. Oppressed by constant hunger they now continued the journey southwards. Then Graah became seriously ill. But, fighting against sickness and hunger Graah managed on October 15th to reach to Frederiksdal on the west coast, though suffering greatly.

This was the end of Graah's journey to East Greenland. He had succeeded in travelling over and charting the coast right up to Dannebrogs Island (65°18′), from which he had viewed and sketched the land some distance further north.

This journey carried through with such great energy cannot but rouse the greatest admiration, and Graah's name will always be hailed with honour, whenever Greenland and the exploration of Greenland's east coast are mentioned.

Although Graah's journey had proved, that the way to explore the east coast of Greenland was by boat inside the ice-belt, yet in the year 1833 an expedition by vessel set out from France[2], with the

[1] Meddelelser om Grønland. Bd. IX, p. 197.

[2] Annales maritimes et coloniales 1834. Part 2, Vol. I, pp. 9—10 and Part 2. Vol. II, p. 918.

Bulletin de la Société de Geographie 1834. Vol. II, p. 400, with accompanying chart.

object not only of making magnetic observations at high latitudes, but also assuredly of approaching and if possible landing on the east coast of Greenland; in any case an ice pilot accompanied the vessel, by name DEFRANC, who had made no less than 7 voyages to Greenland.

The commander of the expedition was the French Lieutenant de vaisseau JULES DE BLOSSEVILLE. With the naval brig "la Lilloise" he sailed from Dunkirk in the night between the 2nd and 3rd of July and arrived in the Nord Fjord of Iceland already on the 7th. After a short stay here he stood over towards the east coast of Greenland, which he sighted on the 29th; with the aid of a series of bearings he then sketched the coast at a distance of ca. 70 miles between ca. 68½° and 69° N. lat. The ice prevented BLOSSEVILLE from reaching the coast and on the following day he set his course for Iceland to repair some small damages. Here he ran into Vopna Fjord. On August 5th "la Lilloise" left this fjord and disappeared utterly without a sign, probably crushed by the ice during continued efforts to chart more of the east of Greenland.

In 1834[1] Lieutenant de vaisseau DUTAILLIS with the naval brig "la Bordelaise" and in 1835[2] and in 1836[3] Lieutenant de vaisseau TREHOUART with the corvette "la Recherche" were sent out to seek information of "la Lilloise". But all search was in vain and none of the expeditions increased our knowledge of the east coast of Greenland.

This was the case, however, on the 2nd German North Pole Expedition, which under Captain KARL KOLDEWEY of the merchant service was carried out in the years 1869—70[4]. In the previous year, 1868, Koldewey had made a sort of reconnoitring voyage in a yacht bought in Tromsø, during which he had only once succeeded in sighting the east coast of Greenland from Cape Broer Ruys to Pendulum Island, at a distance of only 16 miles from the latter island[5].

The 2nd German North Pole Expedition numbered 2 vessels, the steamer Germania, which was commanded by KOLDEWEY, and the schooner Hansa commanded by P. F. A. HEGEMANN. On June 15th the expedition sailed from Bremen; but on July 20th, when the vessels were on the edge of the ice about 74°04′ N. lat. and 12°52′ W. long., they separated in the fog and did not meet again.

During its attempts to reach Sabine Island, which had been agreed upon as meeting place if the vessels separated, the Hansa was

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[1] Annales maritimes et coloniales 1834, Part 2, Vol. II, p. 542.

[2] Annales maritimes et coloniales 1835, Part 2, Vol. I, pp. 320 and 359.

[3] Annales maritimes et coloniales 1836, Part 2, Vol. II, p. 513.

[4] Die zweite Deutsche Nordpolarfahrt in den Jahren 1869 und 1870. Leipzig 1873.

[5] K. KOLDEWEY. Die erste Deutsche Nordpolar-Expedition im Jahre 1868. Ergänzungsheft No. 28 zu Petermanns Geographischen Mittheilungen. Gotha 1871.

several times in beset in the ice and at last on September 5th could not get free. The Hansa was then about 74° N. lat. and 17° W. long. but little more than 30 miles from Sabine Island and would probably have been able to reach the land had it been a steam ship. The ship now drifted southwards along the coast. On September 14th already at ca. 73½° N. lat. all the water round about the Hansa had frozen. Hegemann now saw, that they could not escape spending the winter on the ice and all preparations were made for such an eventuality. On October 13th they sighted Liverpool Coast at a distance of only 16 miles. The nearness of the land has evidently increased the pressure of the ice, for on October 19th the Hansa sprung a leak and in the night between the 21st and 22nd the ship sank at 70°52′ N. lat. The crew were now obliged to take to a large ice-field, on which previously a house had been built of brickets, the coal intended for the Germania. The crew now drifted with the ice-field down along the east coast and after many dangers and great hardships only arrived at Frederiksdal on the west coast on June 13th 1870[1]. About New Year the ice-field drifted so close in under land, that the crew could make out a large bay containing several islands. The crew expected, that their ice-field would be crushed against the land and they therefore called the bay "Skrækkens Bugt" (ca. 66°50′)[2].

On the following day after the vessels had parted the Germania stood through the ice and on July 29th came in sight of Cape Broer Ruys at 73°02′ N. lat. at a distance of over 70 miles. As it proved impossible, however, to reach in to the coast at this latitude, Koldewey again stood out of the ice, followed the ice-edge northwards and on July 31st again made his way into the ice at about 74° N. lat. This time success followed him and on August 5th the Germania anchored in "Griper Road" on Sabine Island. From here a number of excursions were made, among others to Cape Wynn.

As the intention was to reach a high northern latitude, according to the instructions prepared for Koldewey by Petermann, the Germania raised anchor again on the 11th and stood northwards along the east side of Shannon Island, but was stopped at 75°30.5′ N.

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[1] The crew of the Hansa were not the first castaways, who had drifted with the ice down along the east coast of Greenland. For example, it may just be mentioned, that no less than 28 whalers were enclosed in the ice between 74° and 75° N. lat. in the year 1777. Of these 12 could not get free again, but were one after another crushed in the ice as they drifted southwards. The crews of two of them were saved onboard two ships which later got free, whilst of the crews of the other 10 whalers, in all about 460 men, no less than about 320 perished. The remaining 120 or so who escaped death managed gradually to reach the west coast of Greenland and from there returned home to Europe.

C. Normann. En Rejse langs Grønlands Østkyst i Aaret 1777. Geographisk Tidsskrift. Bd. 2, 1878, p. 49.

[2] Skrækkens Bugt = Terror Bay.

lat. by an impenetrable mass of ice. On August 15th therefore, the Germania again steamed southwards and on the 16th anchored on the south side of Cape Philip Broke.

Whilst investigations were now made on Shannon Island, the vessel made an expedition to Pendulum Island from the 22nd to the 27th, but as the ice conditions to the north were still quite unchanged on the 27th, it was resolved by ship's council not to make any further attempt that year to penetrate northwards and on the same day the vessel again anchored south of Pendulum Island. On September 1st they anchored in Germania Harbour. From the 10th to the 13th an expedition was made by the ship to Flache Bay, where among other things Dronning Augusta Valley was explored, after which the ship was finally laid up in winter quarters in Germania Harbour on Sabine Island on September 13th.

Sledge journeys were now at once begun. The first was made by KOLDEWEY from the 14th to the 22nd of September and entered Fligely Fjord. The second was undertaken by the Austrian lieutenant PAYER from the 27th October to the 4th of November and went down along the land, outside Cape Borlace Warren and into the fjord, which was supposed to go north round Clavering Island down to Gale Hamkes Bay. This proved to be the case also and on both sledge journeys the chart originally prepared by CLAVERING was extended and improved. This ended the sledge journeys for that year.

In the course of the winter all preparations were made for the great sledge expedition, which in spring was to seek as far northwards as possible and almost entirely journey over regions, which had never before been visited by Europeans. The sledge journey was carried out from March 24th to April 27th 1870 by KOLDEWEY and PAYER, with some of the crew, who dragged the sledges themselves, no dogs being with them. Under great exertions the sledge expedition succeeded in charting and exploring the main features of the coast up to Cape Bismarck (77°01′), which was reached on April 11th.

During May, from the 8th to the 29th, PAYER undertook another sledge journey for the purpose of exploring Ardencaple Inlet. Owing to the deep snow, however, Payer only reached to the mouth of this fjord.

Some smaller excursions were also made before the Germania left Germania Harbour on July 22nd. After an attempt to push northward with the ship, without reaching higher than the north point of Shannon Island, the Germania on July 30th again turned southward and on August 9th steamed into Kejser Franz Josephs Fjord, the mouth of which had been seen by CLAVERING. From the 9th to the 13th they explored this extensive, previously unknown fjord, after which the Germania sought its way out through the ice and made for home.

After Graah's journey interest in the exploration of the east coast of Greenland seemed to be lost in Denmark for many years.

But in 1876 "Kommissionen for Ledelsen af de geologiske og geografiske Undersøgelser i Grønland" (Committee for the geological and geographical investigation of Greenland) was formed in Denmark on the instigation of Professor F. Johnstrup and a systematic investigation of the west coast of Greenland was begun; some years later the idea was also taken up of making a simultaneous investigation of the east coast.

In 1880 the Danish Navy-Commander C. O. E. Normann had put forward a complete plan for an investigation of the east coast right from the south point and up to the 70th degree of latitude. The main lines of this plan were, that an expedition by women's boat should closely explore the coast from Cape Farvel to ca. 66° N. lat., just in the same way as Graah had done, whilst the stretch from 66° to 70° N. lat. should be explored by an expedition from the sea, which after reaching the coast to the north of 70° N. lat. should explore the stretch referred to by means of a boating expedition landed from the ship [1]. Subsequently, this plan has been followed in the main by the expeditions which have solved this problem.

Before considering the first of these, it should be mentioned, that the schooner "Ingolf" of the Danish Navy, Commander Mourier, with Lieutenant C. F. Wandel as second in command sailed along the ice-edge in 1879 from about 69°00′ to 65°00′ N. lat. Favoured by excellent weather Mourier was able, in spite of the great distance, to keep the coast in sight practically the whole way. The distance was too great, however, to make out the lines of the coast in any way, but several well-marked, high mountains inland could be noted [2].

In 1883 already the "Kommission" sent out the women's boat expedition proposed by Normann. In command was First-lieutenant G. Holm of the Navy and the second in command was First-lieutenant Th. V. Garde, also of the Navy [3].

On May 3rd 1883 the expedition sailed from Copenhagen and arrived on July 18th at Nanortalik on the south-west coast of Greenland. In the same year, from July 23rd till September 16th, Holm travelled up the east coast as far as Kasingortok (60°49′) at the mouth of Iluilek Fjord (Danells Fjord) and explored the fjords on this stretch of the coast.

After spending the winter at Nanortalik Holm again set out on

[1] Meddelelser om Grønland, Bd. IV, pp. 31—66.

The views expressed in the plan regarding the conditions to be met with on this stretch of the coast, which were still in great part quite unknown, have later proved to be perfectly correct and we cannot but admire Normann's clear perception and farsightedness.

[2] Geografisk Tidsskrift, Bd. 4, p. 47.

Meddelelser om Grønland, Bd. VI, pp. 17—22.

[3] Meddelelser om Grønland. Bd. IX.

May 5th 1884 with 4 women's boats and 7 kaiaks. Owing to the ice HOLM did not reach the east coast until June 3rd. From the 11th till the 27th of June HOLM lay enclosed in the ice at the island Kekertatsiak (60°10′) and on July 6th he was stopped at Cape Adelaer (61°48′) by impenetrable ice. On July 23rd, however, the dreaded glacier Puisortok could at last be passed and on July 28th the expedition reached Tingmiarmiut (ca. 62°40′).

Here the expedition divided into two parties. GARDE went southwards to winter at Nanortalik with the intention of returning in the following summer to meet HOLM. On his journeys along the coast GARDE sailed up and explored all the fjords and sounds on this stretch.

The principal expedition under HOLM continued the journey northward. On August 25th Dannebrogs Island (65°18′) was reached; this was the end point of GRAAH's expedition. On August 30th Sermilik Fjord (Egede and Rothes Fjord) was passed and on September 1st HOLM arrived at Tasiusarsik (65°37′), where he passed the winter.

With Tasiusarsik as base HOLM now explored the whole of the large Angmagsalik district and its numerous fjords and sounds, on which dwelt a hitherto unknown Eskimo tribe. From here HOLM brought home a rare, ethnographic collection as well as extremely valuable ethnological information and Eskimo tales and fables.

On June 9th 1885 HOLM left Tasiusarsik and penetrated halfway up into the large and deep Sermilik Fjord, after which on July 4th he began the return journey. On July 16th the two parties of the expedition met at Umanak (62°53′) and then journeyed southwards in company. On August 18th Nanortalik was reached and on August 29th HOLM and GARDE started for home after a sojourn in Greenland of more than two years, during which they had succeeded in surveying and exploring the coast right from Cape Farvel to ca. 66° N. lat.

In the same year that HOLM journeyed to East Greenland, the renowned NORDENSKIÖLD sailed with the steamer "Sofia" to the west coast of Greenland, with the intention of penetrating into the interior of Greenland and exploring it. NORDENSKIÖLD was of opinion, namely, that it was by no means improbable, that the interior of Greenland might be covered with vegetation or woods. Further, NORDENSKIÖLD desired to carry out hydrographical investigations in the waters between Cape Farvel and Iceland.

Whilst engaged in the latter work NORDENSKIÖLD succeeded, on September 4th 1883, in penetrating the ice-belt and landing at 65°36′, after following along the edge of the drift-ice right from Cape Farvel. Here NORDENSKIÖLD remained until the 5th and thereafter proceeded northwards along the ice-belt, in order to make one more

attempt to reach the coast somewhat further north. He gave this up, however, and on September 9th he arrived at Rejkjavik in Iceland [1].

Before considering the next expedition to the east coast of Greenland, Nansen's daring exploit of crossing Greenland on skis in 1888 may be mentioned. To achieve this Nansen had to land somewhere on the east coast and this he accomplished by working his way in with great daring and energy in a boat set out from the ship which had carried him to the ice-edge. During his stay on the east coast, before he went up on to the inland ice, Nansen only journeyed, however, in the districts travelled over by Holm and Graah, and his expedition could in consequence only extend our knowledge of the east coast to a small extent [2].

The splendid result of Holm's expedition contributed without any doubt to the realisation of the expedition by sea which was proposed in Normann's plan. This was set on foot already in 1891 [3]. The leader of the expedition was First-lieutenant of the Navy C. Ryder with First-lieutenant of the Navy H. Vedel as second in command.

On June 7th 1891 the expedition set out with the hired Norwegian vessel "Hekla" of Tønsberg, which had been specially constructed to contend with the ice in the Arctic Sea. On July 9th the Hekla stood in through the ice and on the 20th Ryder landed at Cape Broer Ruys. On the same day the voyage was continued southwards and on August 2nd the Hekla steamed into Scoresby Sound. On August 8th the anchor was dropped in a small harbour on Danmarks Island, about 100 miles inside the mouth of Scoresby Sound. From here various boating expeditions were made. On the 20th the Hekla raised anchor and stood out towards the mouth of the fjord with the object of finding a place, where the expedition could be landed and its stores discharged. From here, namely, the intention was, that Ryder should sail by boat down along the coast and explore the unknown stretch between Cape Brewster and ca. 66° N. lat. But the ice conditions prevented this and on the 23rd the Hekla again anchored in the harbour of Danmarks Island, where Ryder resolved to overwinter.

During the winter the charting and exploration of the enormous fjord-complex, which is formed by the inner branches of Scoresby Sound, was completed by means of numerous boat and sledge journeys, a work, the magnitude of which can best be understood, when we remember, that Scoresby Sound is the largest fjord-complex in the world.

Owing to the ice Ryder was unable to leave Danmarks Island before the 8th of August 1892. On the 13th Cape Brewster was passed

[1] A. E. Nordenskiöld: Den andra Dicksonska Expeditionen til Grønland. Stockholm 1885.

[2] Fridtjof Nansen. Paa Ski over Grønland. Kristiania 1890.

[3] Meddelelser om Grønland, Bd. XVII.

and then RYDER held south-west down along the coast, but already on the 14th at 69°07′ all further progress was stopped by a solid mass of continuous sea-ice. RYDER was obliged to turn north again and out of the ice, after which he followed the ice-edge down to $68^1/_4°$ N. lat. without any chance presenting itself of penetrating through the ice and in to the coast.

From the 20th to the 29th of August the Hekla lay in Dyre Fjord in Iceland. When RYDER again went out, he did not succeed in reaching into the land until off Angmagsalik and on September the 10th Hekla anchored in Tasiusak, at the same place as NORDENSKIÖLD in 1883. From here RYDER made a journey by boat northwards but did not reach beyond the region already travelled over by HOLM in 1884. On September 26th RYDER left Tasiusak and sailed home to Denmark, without succeeding in the exploration of the stretch between 66° and Scoresby Sound.

Many years were not to pass, however, before this stretch was explored. During his winter stay at Angmagsalik HOLM had been able to learn, partly from his own observations, partly from information given by the eskimo, that in the autumn vessels could come into the coast without great hindrance from the ice, at least at Angmagsalik [1]. This led to Denmark founding a mission and trading station at Angmagsalik in 1894 [2], whereby specially favourable conditions were created for an exploration of the coast from 66° N. lat. and up to Cap Brewster.

It may be mentioned in this connection, that C. F. WANDEL already in 1879 had put forward the view [3], that if the east coast from Cape Farvel to Cape Brewster were to be reached by ship, the attempt should be made off Angmagsalik [4], and it was also just at this place that NORDENSKIÖLD, as mentioned above, reached into the coast and was the first to pass through the ice-belt with a vessel on this stretch. NORDENSKIÖLD, however, only remained about 24 hours in at the coast and was thus unable to determine, whether the favorable conditions he had met with were the normal or not and the honour of converting the supposition to a fact is thus due to HOLM.

With the founding of the trading and mission station at Angmagsalik a basis was laid for the exploration of the stretch between ca. 66° N. lat. and Scoresby Sound, whereby the districts explored respectively by HOLM and RYDER would become connected — an

[1] Meddelelser om Grønland, Bd. IX, p. 143.

[2] Geografisk Tidsskrift, Bd. 12, p. 247.

[3] Meddelelser om Grønland, Bd. VI, p. 31.

[4] Regarding the causes, why the ice in the autumn is more scattered off Angmagsalik than off other places on the coast between Cape Farvel and Cape Brewster, reference may be made to Meddelelser om Grønland, Bd. XXVII, p. 143.

enterprise that might be said to concern Denmark chiefly. Fortunately, scientific circles in Denmark were not blind to this duty and already in 1898 the "Carlsberg Fond" granted the necessary sum for the despatch of an expedition with this object in view.

Before discussing this expedition, however, it should be mentioned, that the Norwegian sealing vessel Hekla, commanded by Captain Knudsen [1], had in 1893 reached in to about 18 miles from land off Cape Grivel (ca. 68°35′) and observed here two fjords.

"Carlsbergfondets Expedition til Østgrønland 1898—1900" was commanded by First-lieutenant of the Navy G. Amdrup [2]. The expedition falls into two divisions, the first being made in 1898—99, the second in 1900.

On August 31st 1898 Amdrup with his 4 Danish companions landed at the trading and mission station in Angmagsalik (65°37′), where a house for the winter was built. From September 10th to October 3rd the first journey by boat was made to Depot Island (66°07′) and in the course of the winter several sledge journeys were undertaken. But the decisive boat journey was first made in 1899 from June 21st to August 18th, during which the expedition reached Aggas Island (67°22′). Further, on the stretch journeyed over depots were made for the boat expedition, which was intended to work its way down from Scoresby Sound to Angmagsalik in the following year [3].

On June 14th 1900 Amdrup sailed again from Copenhagen with the "Antarctic", a Polar Sea vessel commanded by himself. On July 5th the Antarctic stood in through the ice at about 74½° and on the 11th anchored in Griper Road in Sabine Island. After a short stay here Amdrup stood southward along the land as far as Cape Dalton (69°25′), where with three companions he left the ship to begin the boat expedition southwards.

After building a house for the winter Amdrup left Cape Dalton on July 21st and succeeded in reaching the station at Angmagsalik already on September 2nd.

The Second-in-command of the expedition, Dr. N. Hartz, took command of the expedition on board after Amdrup had left, whilst the 1st mate V. Kjøller became responsible for the navigation of the vessel.

Hartz now explored the coast from Cape Dalton to Scoresby Sound, the west side of Jameson Land, Flemming Inlet and the fjords west of Cape Gladstone: thereafter, on September 2nd, he sailed

[1] Geografisk Tidsskrift, Bd. 12, p. 158.

[2] Meddelelser om Grønland, Bd. XXVII.

[3] In contrast to Graah and Holm, who had both used women's boats with crew from Greenland on their memorable expeditions up along the coast, Amdrup used Danish-built wooden boats with Danish crew.

out of the ice. On September 11th the Antarctic arrived at Angmagsalik and the whole expedition once more together left for home on September 18th.

AMDRUP had thus solved the task allotted to him, as the coast from ca. 66° N. lat. to Scoresby Sound had now at last been explored.

In the same year that AMDRUP undertook his boat expedition northwards from Angmagsalik, a Swedish expedition sailed for the northern part of the east coast of Greenland. The intention of this expedition was, if possible, to find traces of ANDRÉE, who had ascended in a balloon on July 11th 1897 from Danish Island on Spitzbergen to explore the Polar regions. On July 13th he had despatched a message by a carrier pigeon and since then nothing had been heard of him [1].

With the Polar vessel "Antarctic" the expedition sailed from Stockholm on May 20th 1899, the Swedish Professor A. G. NATHORST being in command [2]. On June 27th the Antarctic stood into the ice and on July 6th a landing was made on Pendulum Island. After a short stay here the Antarctic on July 12th sailed southwards along the coast, landing at several places, and on the 29th anchored off Cape Stewart in Scoresby Sound. After exploring the head of Hurry Inlet, NATHORST again turned northwards on August 7th and from the 9th till the 30th of August travelled over and charted the whole of the large and previously unknown fjord complex, which is formed by the inner branches of Davy Sound and Kejser Franz Josephs Fjord, thus proving that these fjords were connected.

On August 30th NATHORST left the east coast of Greenland and passed out of the ice-belt already on September 1st.

In the following year a Swedish expedition again set sail for Greenland's east coast, but simply and solely for zoological purposes. The expedition, which was under the direction of GUSTAV KOLTHOFF, arrived on July 31st at Mackenzie Bay onboard the hired whaler "Frithiof". After making a detour northwards to 74°58′ N. lat. KOLTHOFF entered Kejser Franz Josephs Fjord on August 14th and Muskox Fjord on the 15th, where he remained until August 23rd. On August 25th the expedition left the east coast of Greenland [3].

It will thus be seen from the foregoing, that the whole of the east coast of Greenland right from Cape Farvel (59°46′) to Cape Bismarck (77°01′) had been surveyed and charted in the course of the 19th century.

[1] Ymer 1897. Heft 3, p. 221 and Heft 4, p. 267.

[2] A. G. NATHORST: Två Somrar i Norra Ishafvet. Senare Delen. Stockholm 1900.

Ymer 1900. Heft 2, p. 115.

[3] Ymer 1900. Heft 3, p. 345.

In the beginning of the 20th century Duke Philippe of Orleans[1] succeeded in reaching a little farther north, before the Danmark Expedition placed the coping stone on the work by journeying over and charting the last part of the east and north-east coast of Greenland.

On May 24th 1905 the Duke sailed from Bergen with his vessel the "Belgica", which was commanded by the well-known South Pole explorer A. de Gerlache. The object of the expedition was to make hydrographical investigations in the waters between Spitzbergen and East Greenland and here go as far north as possible, at the same time to take an attempt to reach into the east coast of Greenland north of Cape Bismarck.

After visiting several places on Spitzbergen, the Belgica on July 8th stood into the ice at 80°08′ N. lat., but at 80°24′ already all further progress northwards was stopped by the ice. The Belgica was obliged to turn and sail south and south-west, constantly following along the edge of an impenetrable mass of polar ice, until on July 22nd the course could be steered west and north-west in towards the east coast of Greenland at 75°35′ N. lat.

On July 24th, when the Belgica was in 75°58′ N. lat., the coast was sighted and on the 27th the Duke landed on a small rocky island Maroussia (76°39′)[2] south of Cape Bismarck. Here the Duke met a Norwegian sealing vessel, the schooner "Søstrene" of Tromsø, which had forced its way right up here from the 72nd degree along the edge of the fast land-ice, a witness af the unusually good ice conditions that year. The Duke now stood northwards along the land-ice and landed on the 28th at 77°36′ (Cape Philippe). From here the course was again steered northwards along the land ice, which extended to a fairly great distance out to sea and which made further landing north of Cape Philippe impossible.

On July 31st at 78°16′ the ice prevented further advance northwards. After a detour eastwards about 30 miles to make hydrographical observations, a course was again set in towards the edge of the land ice and from there southwards, following the same route as on the out journey. On August 3rd a landing was again made at Cape Philippe, which was found to lie on an island and on an excursion which the Duke made on August 4th in over the land ice in the bay south of Cape Philippe, he believed, that he had made the discovery, that Cape Bismarck did not lie on the mainland, as supposed by Koldewey, but on an island[3].

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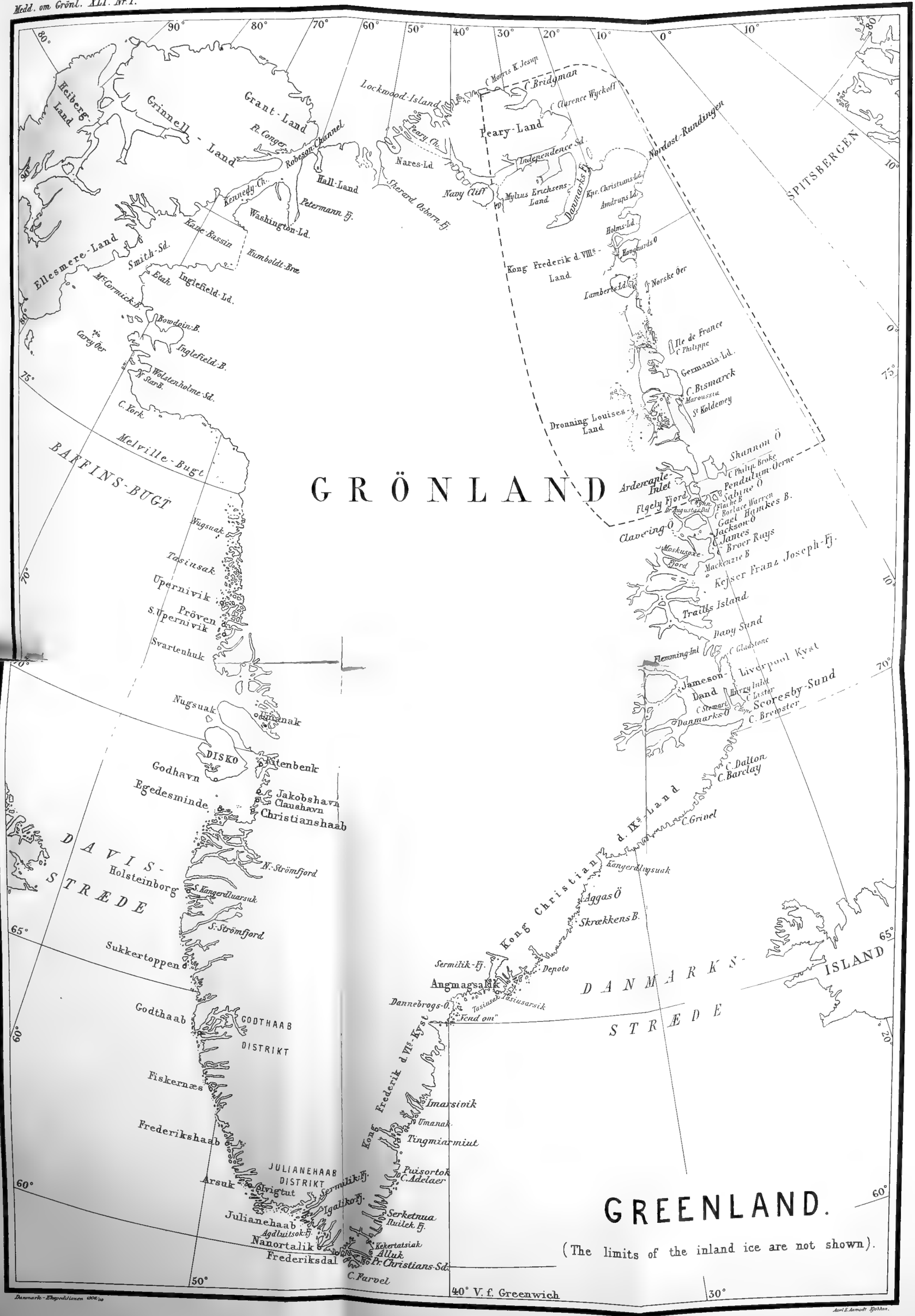
[1] Duc d'Orleans. A travers la banquise du Spitzbergen au cap Philippe, Mai-Aout 1905. Paris 1907. Ymer 1905. Heft 3, p. 342.

[2] The exact latitude determined by Capt. J. P. Koch is 76°39.7′.

[3] The Danmark Expedition has shown, however, that the Duke was mistaken, as Cape Bismarck really lies on the mainland.



GREENLAND.

(The limits of the inland ice are not shown).

Danmark-Ekspeditionen 1906/08

Axel E. Aamodt Kjøbhvn.

Danmark-Ekspeditionen 1906/08.

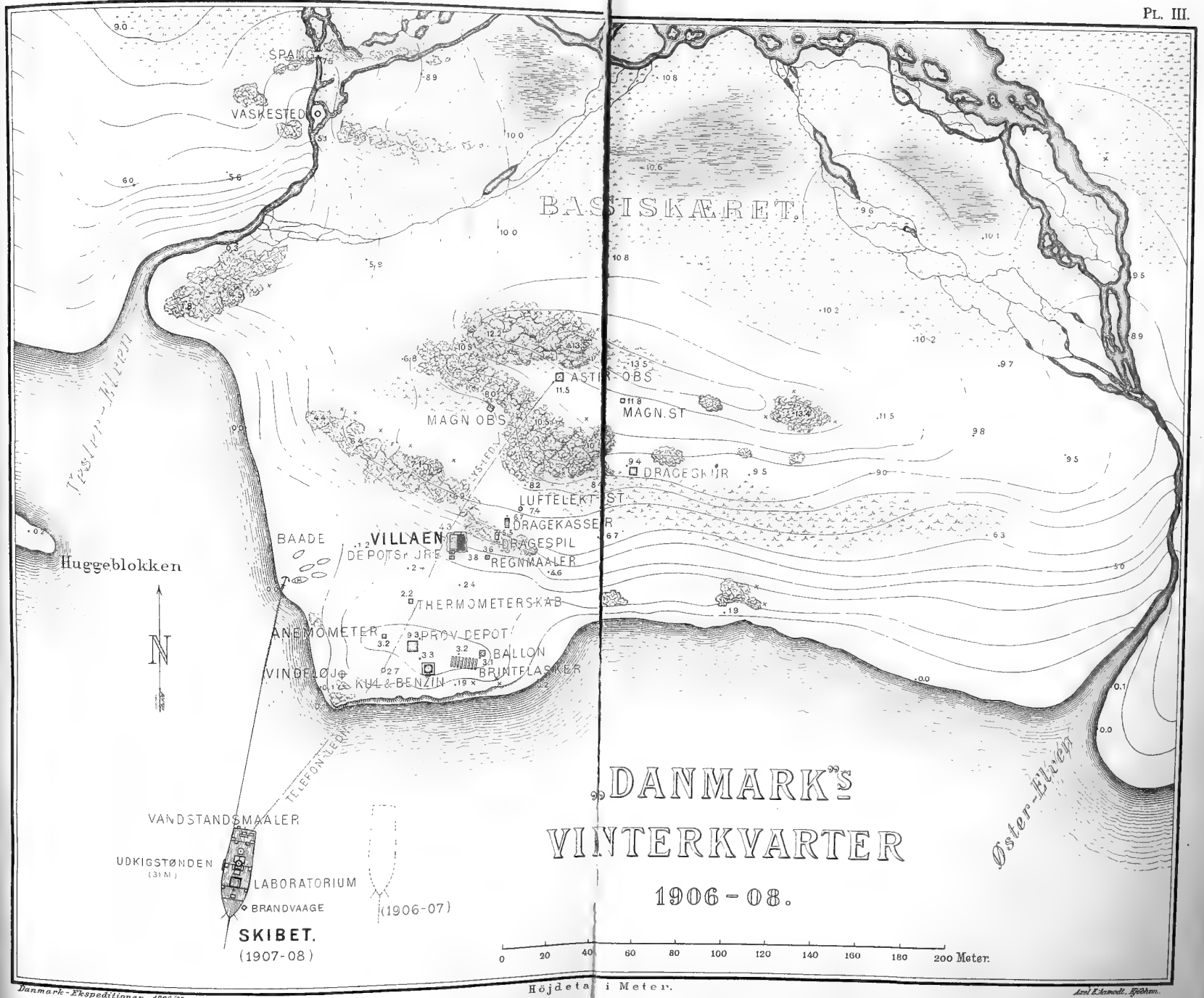
Højdetal

NORTH-EAST GREENLAND.

(The large, original charts from which this chart has been drawn, are given in Medd. om Grönl. XLVI. Nr 2)

Vessels track 1906
1908
Limit of ice 1906
1908

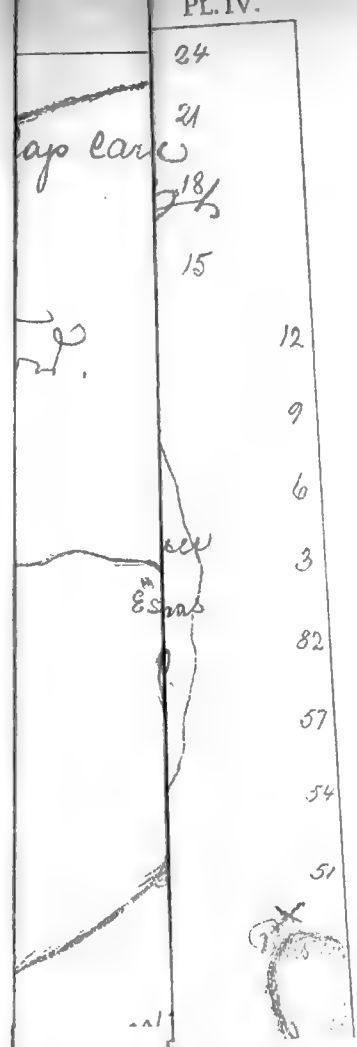
PEARY LAND
MELVILLE LAND
WANDELS HAV
Independence Sund
Heilprin Land
C Christensens Land
Navy Cliff
Academy Bræ
MYLIUS-ERICHSENS LAND
Dannebrogs Fjord
KRONPRINS CHRISTIANS LAND
Amdrups Land
Ingolfs Fjord
KONG FREDERIK
Holms Land
DEN VIIIs
LAND
Nioghalvfjerdsfjorden
Lamberts Land
Norske Öer
Zachariæs Isstrøm
HERTUGEN AF ORLÉANS LAND
Ile de France
Skærfjorden
Germania Land
DRONNING LOUISES LAND
Store Koldewey
Shannon Ö
Kuhn Ö
Sabine Ö
Clavering Ö
Gael Hamkes B.
SPITSBERGEN
Nordost-Rundingen
Prinsesse Thyras Ö
Hagens Fjord
Antarctic Bugt
Mallemukfjeldet
Hovgaards Ö
Dove-Bugt
Bredefjord
Hochstetters Foreland
Pendulum Öer
Bass Rock
Ll. Pendulum Ö
Greenwich



Danmark-Ekspeditionen 1906/08.

Højdeta i Meter.

Axel E. Arnoldt, Kjøbenh.


PL. IV.
24
21
18½
15
12
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6
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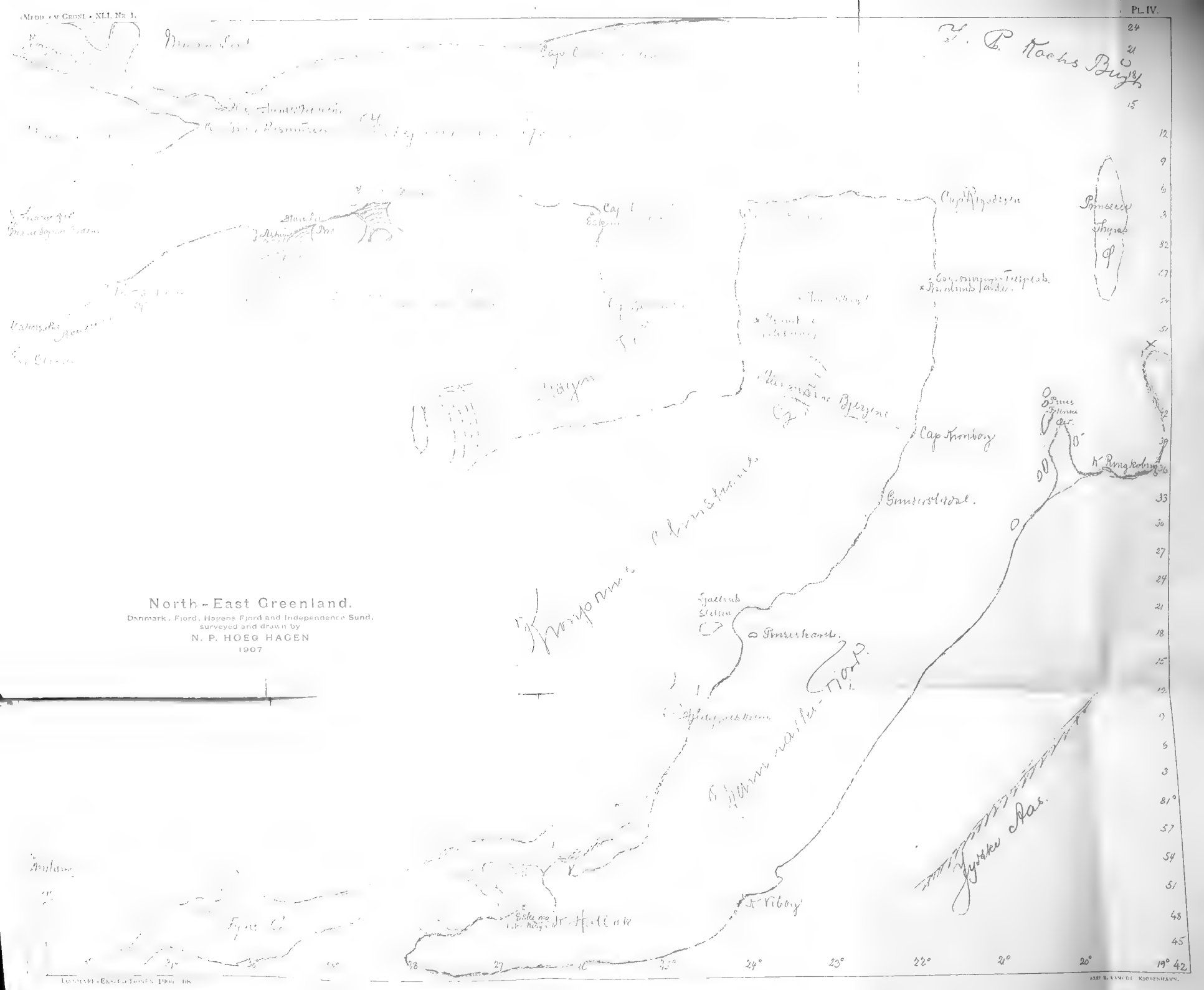
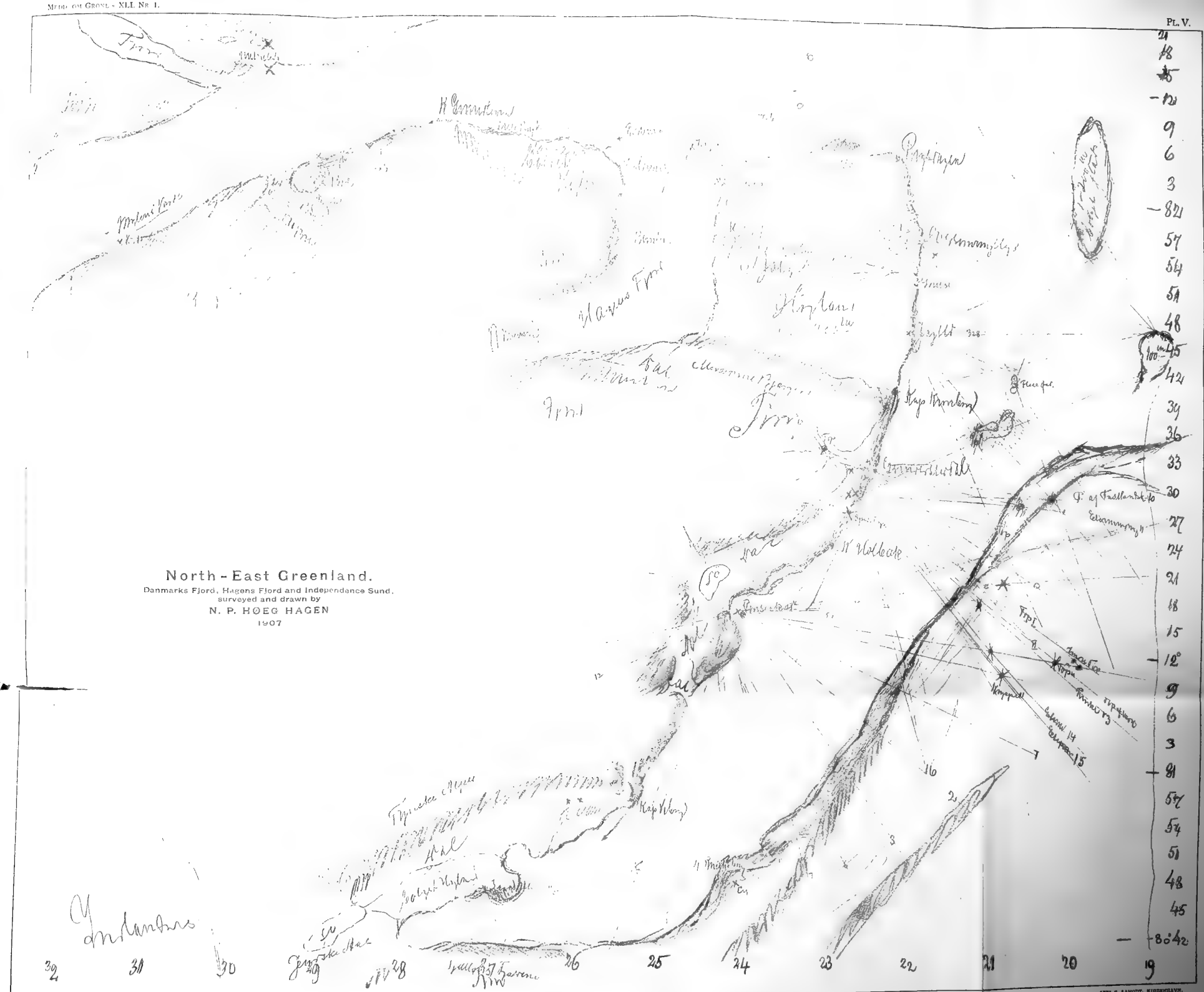
82
57
54
51



DANMARK-EKSPEDITIONEN 1906-08

ALBERT LUNDS KJØBENHAVN.



AXEL S. AAMODT, KJØBENHAVN.

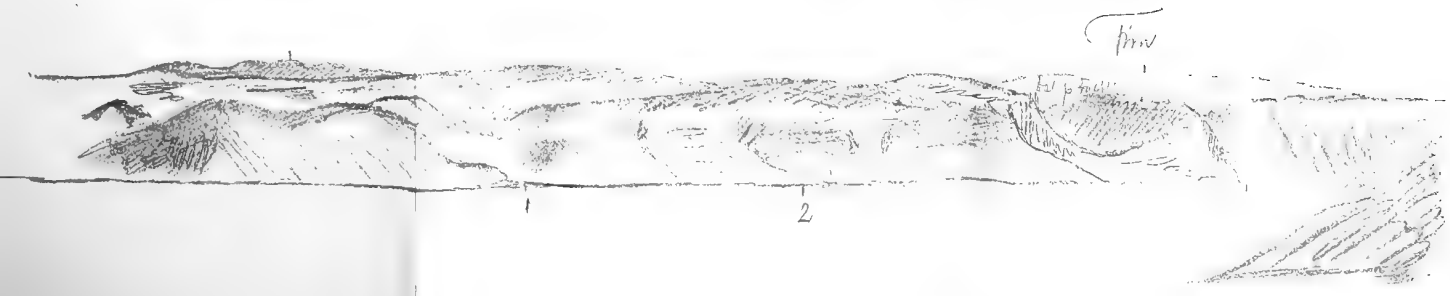
KJØBENHAVN.

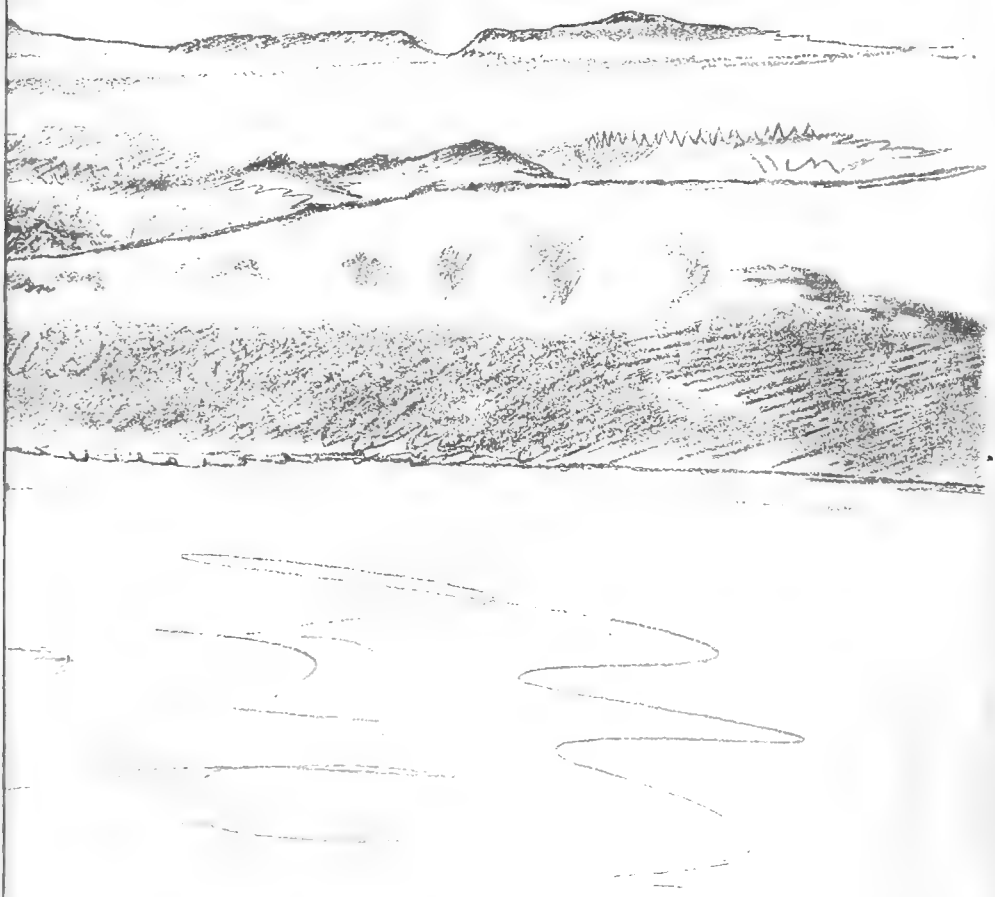
East side of Danmarks Fjord

from north to south, sketched from a hill top ca. 5 kilometres south of Gundersteddal on 14. May 1907 by

N. P. HØEG HAGEN

1907





rks Fjord

AXEL E. AAMODT. KJØBENHAVN.

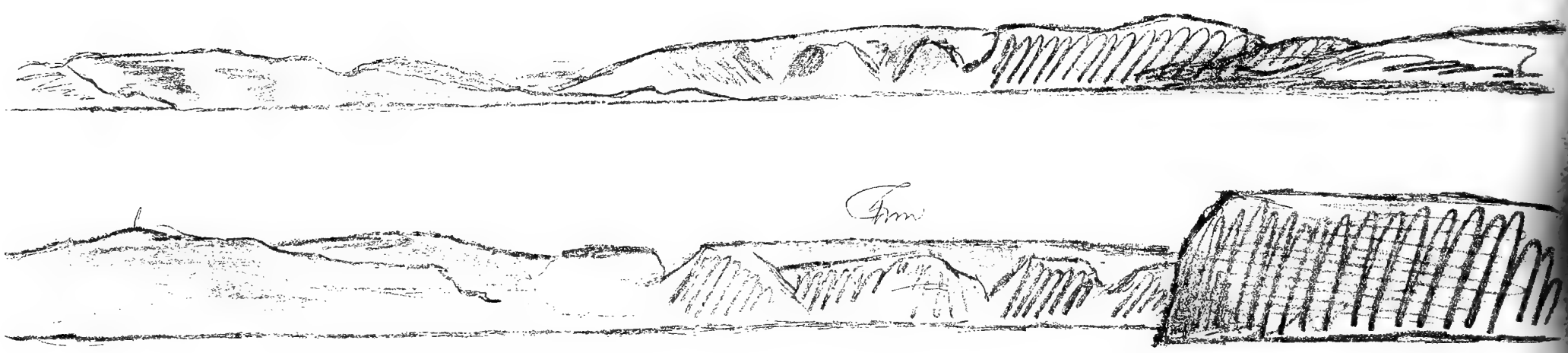
Etabliget paa Dannemark
d. 12/5 07

Gundersteddal in Danmarks Fjord
sketched on 12. May 1907 by
N. P. HØEG HAGEN

Axel E. Aamodt. Kjøbenhavn.

seen fr

Fellyklub Fjord i Independence Bay
(Bygtmindung)
d. 29/5 07.

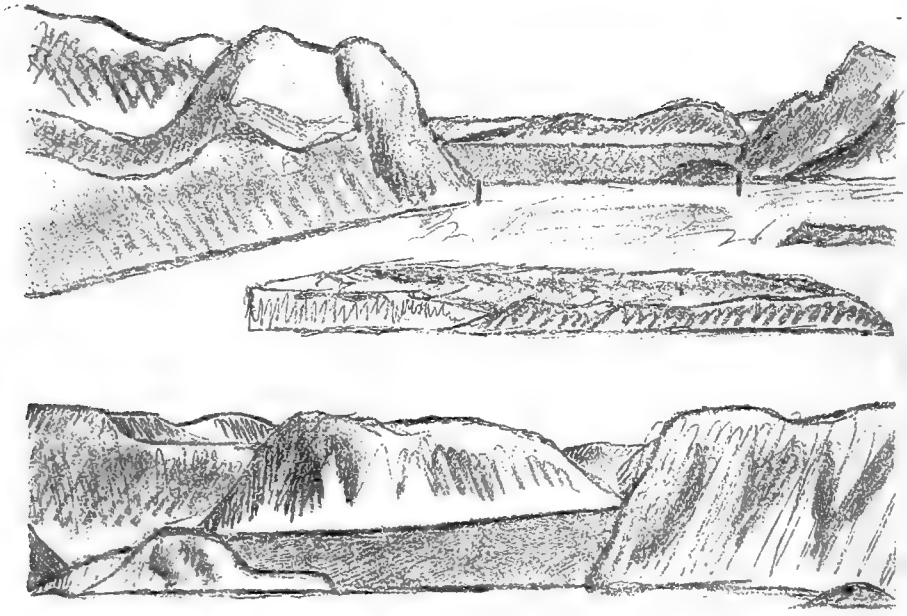


Mouth of Hagens Fjord

seen from an iceberg in the mouth, sketched on 29. May 1907 by

N. P. HØEG HAGEN

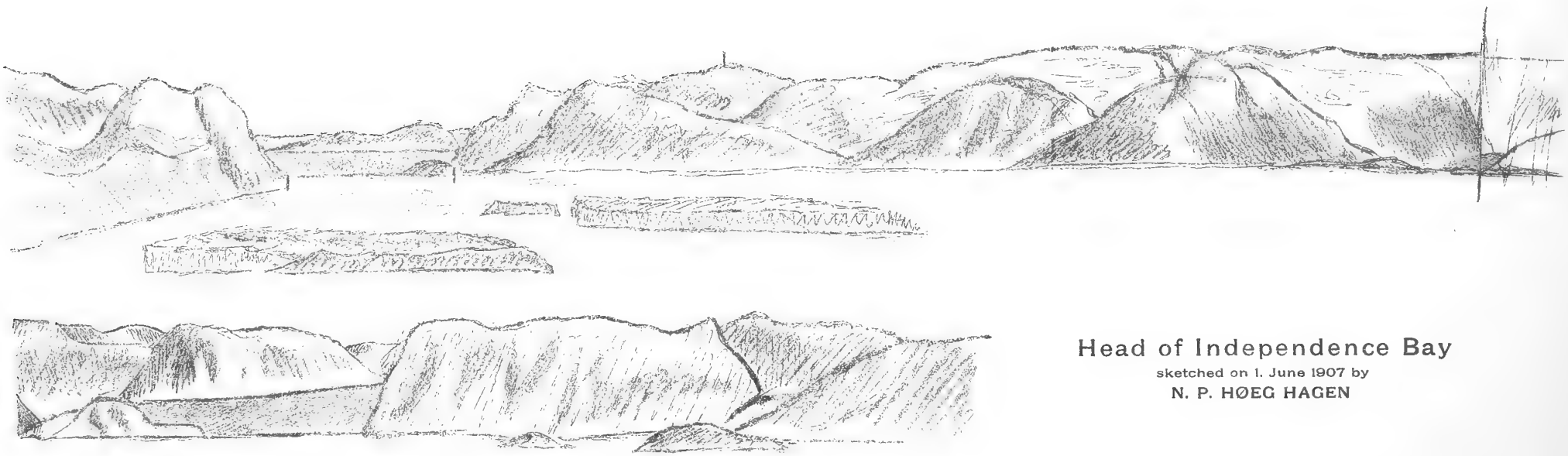
Axel E. Aamodt. København.



Danmark-Ekspeditionen 1906—08.

KJØBENHAVN

Bj. mdm. af Independence-bay
d. 5/6 1907.



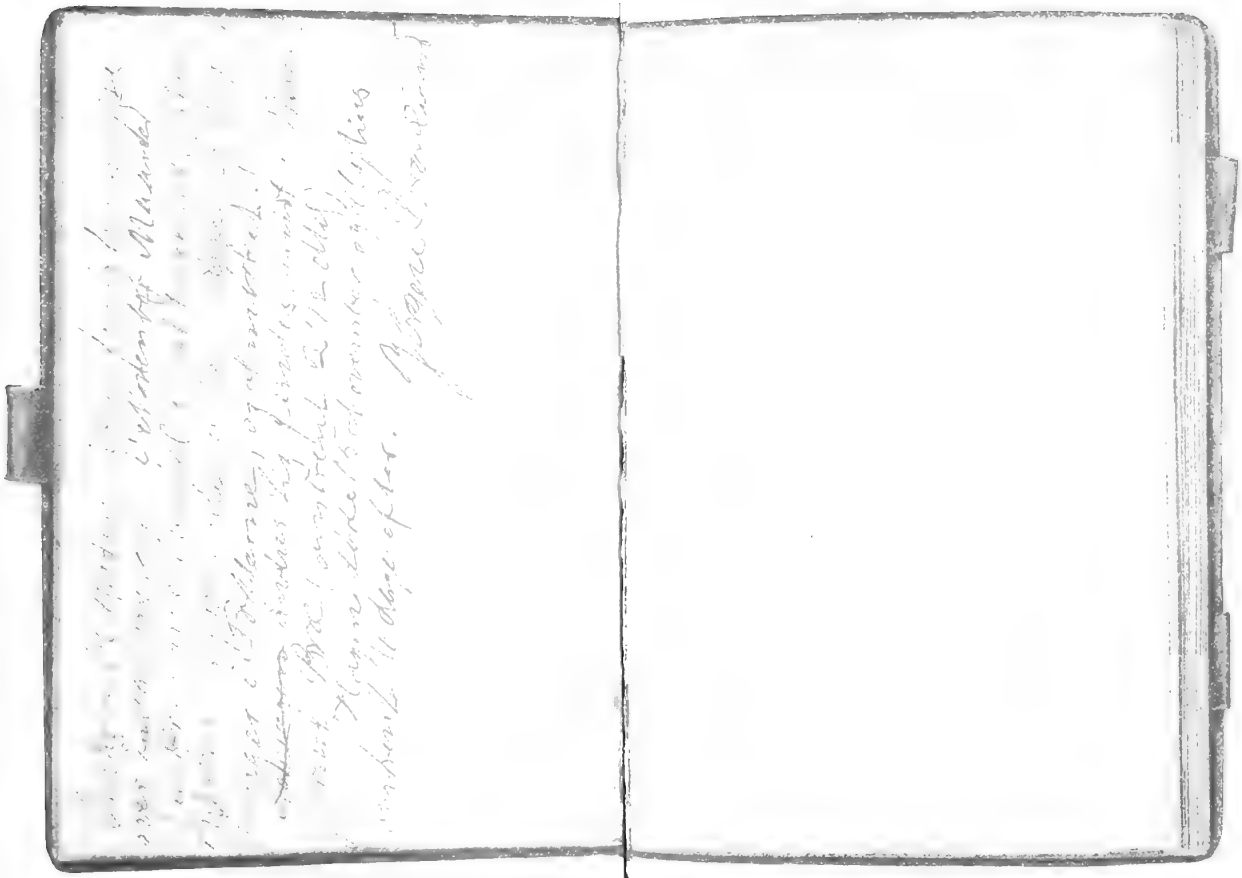
Head of Independence Bay

sketched on 1. June 1907 by

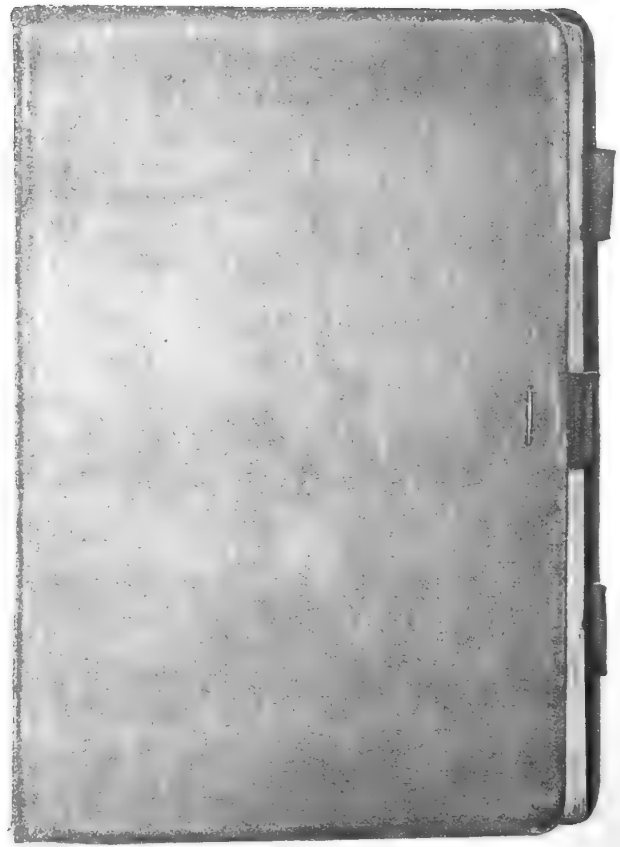
N. P. HØEG HAGEN

Axel F. Aamodt. Kjøbenhavn.

The page written in Danish



The page written in Danish in Jørgen Brønlund's diary.



Jørgen Brønlund's diary.

Axel E. Aamodt. Kjøbenhavn.

On August 5th a landing was made at Cape Bismarck, after which the Duke sailed southwards to attempt a landing on Shannon Island. The ice prevented this, however, nor did the Duke succeed in landing any farther south than this. On August 15th, when the Belgica was at 71°22′, only about 40 miles from Liverpool Coast, the Duke resolved, owing to the advanced time of year, to seek out of the ice, and on August 18th the Belgica was already outside the ice belt and on the way home.

The Duke had thus succeeded in reaching farther north than any one before him and also in making a rough sketch of the previously quite unknown land north of Cape Bismarck, thus determining the main direction of the coast up to ca. 78°30′. Further, the Duke had discovered some islands.

Lastly, the three journeys of the celebrated American, Arctic explorer R. E. Peary in 1891—92, 1893—95 and in 1898—1902 may be mentioned. The expeditions had not the east coast as the object of the explorations, but are nevertheless of interest in this connection, seeing that Peary on his first two expeditions, with the west coast as base, crossed right over the inland ice and reached a bay, which cuts into the north-east coast (Independence Bay), whilst on the third Peary reached the north point of Greenland. In this way the natural, end point was determined for the expedition (Danmark Expedition), which was intended to explore the still unknown part of the east and north-east coast of Greenland.

The object of Peary's expedition in 1891—92 [1] was to determine the northernmost point of Greenland. From April 30th to August 5th 1892 Peary undertook a sledge expedition over the inland ice from his winter quarters, Red Cliff House in Mc. Cormick Bay at 77°40′ N. lat. and 70°40′ W. long., in order to determine this point. On June 27th, however, almost on the 82nd degree of latitude Peary found his way northwards cut off, the inland ice coming to a complete end, and his course was now set towards the N. E. coast of Greenland, which was reached on July 4th. From a height, Navy Cliff at 81°37′ N. lat. and 34°05′ W. long., Peary saw out over a deep bay, which he called Independence Bay. Peary concluded also, that his journey had determined in the main the northern limit of the mainland of Greenland, as he believed, that the land seen north from Navy Cliff was separated from the mainland by a channel or sound, the eastern part of which was Independence Bay.

Partly to settle this question and to determine the boundaries of this land north of Greenland Peary again undertook a journey

[1] Robert E. Peary: Northward over the great ice. Vol. I, pp. 277—382. London 1898.

Eivind Astrup: Blandt Nordpolens Naboer, pp. 162—234. Kristiania 1895.

in over the inland ice in 1895[1]. Starting from his winter quarters, his intention was to reach Independence Bay and then pass over this bay to the land in the north and explore it. On April 1st 1895 Peary left his winter quarters in Bowdoin Bay, a bay close to the east of Mc. Cormick Bay, and arrived on May 15th at Independence Bay at the same place as in 1892. On his arrival here Peary had used up almost all his provisions, but fortune favoured him and just as in 1892 he succeeded in shooting a number of musk-ox. To penetrate further, however, was impossible. Peary was obliged to turn and on June 23rd he arrived again at Bowdoin Bay.

But Peary would not give up the aim he had once set his mind on and in 1898—1902[2] he made another attempt, this time however along the same route as Lockwood had followed in 1882.

On April 15th 1900 Peary set out from Fort Conger (81°44′ N. lat. and 64°45′ W. long.) on Grinnell Land, travelled right across Robeson Channel and then followed the N. W. coast of Greenland on the sea ice. On May 8th Peary reached Lockwood Island (83°24′ N. lat., 40°46′ W. long.), to which Lockwood had reached on May 13th 1882, and which had been the end point of the latter's sledge journey[3].

On May 13th Peary reached Cape Morris K. Jesup (83°39′ N. lat., ca. 33°30′ W. long.)[4], which he considered to be the "Arctic Ultima Thule", and thus also the northernmost point of the land north of Greenland.

Peary now advanced northwards on the sea ice, but on May 16th at 83°50′ N. lat. he came across open water and was obliged to return to the coast. He now continued eastwards along the coast; on May 19th he passed Cape Bridgman and arrived on the 20th at Cape Clarence Wyckoff (82°57′.7 N. lat., 23°09′ W. long.[5]), where a cairn was built and a report buried under it[6]. Here as practically during the whole time Peary was enveloped in a fog but believed he saw in a clear moment a magnificent, easily recognisable mountain

[1] Robert E. Peary: Northward over the great ice. Vol. II, pp. 437—524. London 1898.

[2] Bulletin of the Geographical Society of Philadelphia. January 1904. Philadelphia.

R. E. Peary: Nearest the Pole, pp. 321—333. London 1907.

[3] Adolphus W. Greely: Report on the Proceedings of the United States Expedition to Lady Franklin Bay, Grinnell Land. Vol. I, pp. 185—189. Washington 1888.

[4] Peary does not indicate the observed longitude, for which reason this has been omitted from the chart.

[5] Determined by Captain J. P. Koch.

[6] Peary built a cairn at the foot of a promontory, which he assumed lay on an island, Clarence Wyckoff Island. Koch has shown however that there is no island, the promontory which he calls Cape Clarence Wyckoff lying in reality on Peary Land.

which he thought was the same as he had seen in 1895 from the top of the inland ice south of Independence Bay.

Cape Clarence Wyckoff was the end of PEARY's sledge journey on this expedition. On May 22nd he began the return journey and on June 10th arrived again at Fort Conger.

The northern boundary of the Greenland Archipelago or land was determined and PEARY had reaped this reward for his unique, almost incredible energy.

II. Genesis of the Danmark Expedition, preparations and composition.

As described in the foregoing pages, the whole of the east coast of Greenland right from Cape Farvel (59°46′ N. lat.) to Cape Bismarck (77°01′ N. lat.) had been explored and charted by the beginning of the 20th century.

Further, the celebrated American, Arctic explorer R. E. PEARY had travelled right over the inland ice from the west to the east coast on his expeditions in 1891—92 and 1893—95 and had reached Navy Cliff (81°37′ N. lat. and 34°05′ W. long.) situated on the bay discovered by him, Independence Bay, which cuts in from the east coast.

Peary set the crown on his work, however, by his expedition of 1898—1902, when he travelled by sledge from Fort Conger (81° 44′ N. lat. and 64°45′ W. long.) on Grinnell Land across Robeson Channel and then up along the north-west and north coast of Greenland over to Cape Clarence Wyckoff (82°57′.7 N. lat., 23°09′ W. long.) on the north-east coast. At the same time he determined the north point of Greenland, Cape Morris K. Jesup (83°39′ N. lat., 33°30′ W. long.) [1].

But the whole of the extensive coast line from Cape Bismarck to the points reached by PEARY, Navy Cliff and Cape Clarence Wyckoff, was still quite unknown. It was only known, that in 1670 land had been seen at ca. 78½° N. lat. by a Dutch whaler, by name Lambert [2].

In 1905 our knowledge of this coast was somewhat increased, when Duke PHILIPPE OF ORLEANS with his vessel the "Belgica" succeeded in penetrating up along the edge of the fast land ice to 78° 16′ N. lat. and in landing on an island at 77°36′ N. lat. The Duke took a rough sketch of the land north of Cape Bismarck and determined the main direction of the coast up to ca. 78°30′. Further, some islands were observed by the Duke [3].

But, though the splendid pioneer work of the Duke is worthy of all praise, it did not appreciably lighten the work of the expedition which made the exploration of the coast its aim and object, a

[1] See pp. 33—35.
[2] See p. 15.
[3] See pp. 32—33.

L. Mylius-Erichsen

task at that time undoubtedly the most important, that still remained to be undertaken within the North Polar region [1].

In the different countries the circles interested in Arctic exploration had their attention directed, therefore, to the investigation of this stretch of coast and the realisation of the idea was several times urged in the foreign press.

Fortunately, however, it was recognised in Denmark, that the task should be taken up by Denmark as a fitting conclusion to the great work of exploring the east coast of Greenland, which had been carried out from this country for centuries.

Thus, in the beginning of 1902 already the leader of the "Carlsbergfondets Expedition til Øst-Grønland 1898—1900", Lieutenant G. Amdrup, had besought the Carlsberg Fund for the means necessary to defray a new expedition, with the above object as goal. Owing to the many other, large calls upon it, however, the Carlsberg Fund was not prepared to sacrifice large sums again on the alter of Arctic exploration and the expedition did not materialise.

It was fortunate, therefore, that the author Ludvig Mylius-Erichsen took up the idea about three years later and carried it successfully into life.

Mylius-Erichsen was born in Viborg on January 15th 1872. After becoming a student in 1895 he displayed some journalistic activity and published various works belonging to light literature, in which he repeatedly showed his open feeling for nature. In his sound and strong body dwelt an unconquerable energy, which could not rest until the goal aimed at was reached. And the aim of all his dreams was to become one of the band of Greenland explorers in the work on which so many Danes had spent years of their lives. In 1898 already it was his highest wish to accompany G. Amdrup on his first voyage to Greenland. But various conditions prevented him from thinking about it. Four years later he himself was leader of a Greenland expedition, the so-called "Danish literary Greenland's Expedition", of 1902—04, when, in addition to travelling over the greater part of the colonised portion of West Greenland, he also established his claim to pioneer work of exploration. Starting from Upernivik, our northernmost colony, he went off on a sledging expedition and explored Melville Bay, which for a great part had not been travelled over previously by other than Eskimo and thereafter overwintered at Cape York [1].

In 1904 Mylius-Erichsen returned home from this expedition, more enamoured than ever of Arctic exploration and enriched with

[1] This was also the view expressed by the well-known, Swedish Arctic explorer, Professor A. G. Nathorst, in Ymer 1902, Heft 4, p. 534 and Ymer 1905, Heft 3, p. 345.

[2] L. Mylius-Erichsen og Harald Moltke: Grønland. Kjøbenhavn 1906.

great experience. It is not surprising that he at once set himself a new task and this was no less than the exploration of the still unknown part of the east and north-east coast of Greenland. It was during his endeavours to start an expedition with this object in view, that Mylius-Erichsen once spoke at a lecture:

"The fortunate man who has but once assisted to lift if only a small fold of the curtain over unknown sceneries of land and sea, new coasts, new life, new fields of experience, will feel more than others the attraction of unknown regions. And he who knows, that such a region lies unseen, untrodden and unexplored, within the lands of his own nation, will consider it his national duty to rouse the endeavour which will solve this work of exploration.

And if he feels in himself an irresistible impulse and believes himself in the possession of at any rate some ability to carry out a pioneer work of exploration, then with trust and confidence he offers — two willing hands, two open eyes and all a sound young man's strength and endurance. For him the task becomes sacred, it seems to be not only his comrades' and his own; it belongs to the whole nation, even to our whole civilisation. He will reach the goal — if human power can reach it".

These words of Mylius-Erichsen show more clearly than anything else, what sacred fire burned in his breast to accomplish the task and gave him the qualities of a leader who stimulated his companions with the same fire and enthusiasm, so that they followed him with life and soul until the end was achieved. For it was granted to Mylius-Erichsen, that he himself should be the fortunate one, who accomplished the great task, the exploration of the still unknown part of Greenland's east and north-east coast.

Mylius-Erichsen returned from his "literary Greenland's Expedition" in 1904 and already in the beginning of the year 1905 he laid his first plans for an expedition to the north-east coast of Greenland before the four Danish naval officers, who earlier had taken part as leaders in the exploration of the east coast, namely, Captain G. Holm, Commander C. Ryder and Commander T. V. Garde and First-lieutenant G. Amdrup, all of the navy.

Mylius-Erichsen's plan at that time was, that he should be landed on Shannon Island with 4 European companions and 2 Eskimo and from there push as far northwards as possible with the sledges. Onboard the ship of the Expedition there should be a number of scientists, who should carry out investigations in Ardencaple Inlet and Tyroler Fjord in the course of the summer, but should not stay the winter there, the idea being to send back the ship in the autumn.

After exploring the N. E. coast MYLIUS-ERICHSEN should then seek to reach some point or other on the east or west coast, from which he could return home. The various lines for the return were indicated in detail in the plan, and the one chosen would depend naturally on the course of circumstances.

Early in February 1905 the 4 naval officers mentioned gave their answer, which contained among other things the following passage:

"We think it best, however, that the Expedition should retain the ship during the first winter. In the first place, it is not excluded, that in favourable ice years the ship might be able to penetrate just as far north or perhaps even further than the 2nd German North Pole Expedition reached with sledges, namely to ca. 77° N. lat. Further, the crew of the ship would be of great use during the winter and the following spring for the purpose of laying out depots, and they would also be able to carry out investigations in the district round about the winter quarters and make expeditions in support of the northern party. Lastly, the retaining of the ship offers the simplest and quickest mode of retreat".

The view, that good ice years might permit the ship to reach up to at least 77° N. lat. and possibly further north, was confirmed already in the summer of 1905 by the Duke of Orleans and has later been further confirmed by the Danmark Expedition.

To keep the ship in Greenland, at least during the first winter, was also in reality MYLIUS-ERICHSEN's own wish. It was only consideration for the great expense connected with the ship's remaining one or two winters on the Greenland coast, which had influenced MYLIUS-ERICHSEN to say in his first plan, that the vessel should return home the same summer, after it had landed the Expedition.

In addition to this, other scientists and explorers to whom he showed the plan, were likewise of the opinion, that the Expedition should retain the ship one or more winters. MYLIUS-ERICHSEN then rearranged his scheme and in May 1905 sent out his new plan. In this he resolved, that the vessel should remain at the coast during the whole time, as he was now convinced that the money question should not be allowed to interfere with the success of the expedition, which necessitated the retaining of the vessel.

Among the many who assisted MYLIUS-ERICHSEN with expert advice during the preparation of his plans, he himself names, in addition to the four naval officers referred to above: Vice-Admiral WANDEL, Dr. phil. K. J. V. STEENSTRUP, Professor EUGEN WARMING, Professor HEKTOR JUNGERSEN, Captains of the navy HOVGAARD and R. HAMMER, Captain of the army DANIEL BRUUN, Director ADAM PAULSEN, Shipmaster H. V. BANG and the scientists Magister N. HARTZ, Magister

Adolf Jensen and Magister Morten Porsild and the linguist and ethnographer Magister W. Thalbitzer[1].

To rouse interest in the matter outside the circles specially concerned with arctic exploration a meeting was held in the Copenhagen Concert Hall on October 17th 1905 on the initiative of Mylius-Erichsen, the promoters of the meeting being Vice-Admiral Wandel, Captains G. Holm and A. P. Hovgaard as also Professor E. Warming and Dr. K. J. V. Steenstrup.

Invitations to the meeting were accepted by His late Majesty King Frederik VIII (who was Crown Prince at that time), His Royal Highness Prince Valdemar, members of the Government and the Parliament, representatives of the University, Scientific Society, Council and Directors of the Geographical Society, Polytechnic Institute, Naval Officers Society, the press and many more.

At the meeting Captain Hovgaard outlined the Danish exploration of Greenland, after which Mylius-Erichsen discussed the plan for the projected expedition. With the warmth and enthusiasm natural to him, behind which one felt the energy that never gives way, he reached the hearts of many of his listeners and the meeting has certainly been of great importance in advancing the cause of the Expedition, especially the collection of the necessary funds.

The Expedition was estimated to cost a sum of 260,000 Kroner. Mr. J. C. Christensen, the President of Council at that time, promised Mylius-Erichsen to lay a proposal before the Parliament for a vote of 130,000 Kroner towards the Expedition, if the other 130,000 Kroner could be obtained from private sources. From the very beginning Mr. J. C. Christensen had recognised, that the task on hand should be undertaken by Denmark and during the whole course of the Expedition he showed a never-failing interest in its affairs, an interest shared in by the Director of the Admiralty at that time, Captain O. Kofoed-Hansen, and also by his successor Captain T. V. Garde. It was under this Department that the Expedition came to be arranged.

The first, private person, who gave a contribution to the Expedition was the director of the East-Asiatic Company, Etatsraad H. N. Andersen, and this for the large sum of 10,000 Kroner. But, in addition, he supported Mylius-Erichsen in many other ways and it may be said, that his participation meant a great deal for the starting of the Expedition.

Further, the Direction of the Carlsberg Fund again showed their great interest in arctic exploration by voting another 10,000 Kroner, a sum later increased to 20,000 Kroner. But on the Carlsberg Fund the Expedition has also had an excellent advocate in Professor E.

[1] L. Mylius-Erichsen: "Plan til en dansk Skibs- og Slædeexpedition til Grønlands Nordøstkyst". Geografisk Tidsskrift, Bd. 18. 1905—06, p. 195.

Warming, a man who has taken a large share in the great revival of Greenland exploration during the last decennaries.

In spite of the splendid example given by Etatsraad Andersen, Mylius-Erichsen would hardly have succeeded in raising the necessary capital, had he not been so fortunate as to come into connection with Consul Erik S. Henius and Consul Valdemar Glückstadt.

Along with Mylius-Erichsen these gentlemen addressed themselves to numerous people, who through personal application might take some interest in the matter, Consul Glückstadt especially was untiring in his labours in this direction and Consul Henius later rendered the Expedition good service in other ways. Here the great personal knowledge of these men was very useful to the Expedition and in the beginning of March 1906 the 130,000 Kroner had been raised. Of this sum 40,000 Kroner was a loan free of interest given to the Expedition by the Landmandsbank against the assurance of the vessel. As the vessel bought later, however, was much less costly than had been calculated, the loan was reduced to 15,000 Kroner. Without this great favour shown by the Landmandsbank it would scarcely have been possible to raise the whole 130,000 Kroner.

As the Parliament had voted the 130,000 Kroner[1], a grant that was later increased by 63,500 Kroner[2], the Expedition was assured.

List of contributors.

Direct contributions in money.	Kr.
State grant. Supplementary vote 1905—1906	130,000.00
State grant. Supplementary vote 1906—1907	63,500.00
Carlsberg Fund	20,000.00
Etatsraad H. N. Andersen, Director East-Asiatic Co.	10,000.00
S. N. T. S.	10,000.00
Collected by the Society "De danske Atlanterhavsøer"	6,000.00
Director G. A. Hagemann, Fabrikejer	2,500.00
Landstingsmand Holger Petersen, Grosserer	2,000.00
Etatsraad Niels Andersen	1,000.00
Gehejmeetatsraad Is. Glückstadt	1,000.00
Consul Valdemar Glückstadt	1,000.00
General Consul Johan Hansen	1,000.00
Consul Erik S. Henius	1,000.00
P. Madsen, Grosserer (Firm. Simonsgaard & Madsen)	1,000.00
Engineer N. C. Monberg	1,000.00
Transp.	251,000.00

[1] Betænkning over Forslag til Lov om Tillægsbevilling for Finansaaret fra 1ste April 1905 til 31te Marts 1906.

[2] Anmærkninger til Forslag til Lov om Tillægsbevilling for Finansaaret fra 1ste April 1906 til 31te Marts 1907; p. 67, No. 18 (til § 23).

	Transp. Kr. 251,000.00
Peter Petersen, Grosserer (Firm. Petersen & Albeck)	1,000.00
Kammerherre E. Suenson	1,000.00
C. B. Thögersen, Grosserer (Firm. Christensen & Thögersen)	1,000.00
Etatsraad E. Arntzen, General Consul	500.00
A. Collstrop, Grosserer	500.00
Engineer A. Foss, Borgerrepræsentant	500.00
Director Carl Gammeltoft	500.00
Director Ivar B. Goldschmidt	500.00
Vilhelm Hansen, Kgl. Hof-Dekorationsmaler	500.00
B. Hertz, Guldvarefabrikant	500.00
Director Holger Hirschsprung	500.00
General Consul A. Karlson	500.00
Etatsraad I. Moresco	500.00
Ludvig Nissen, Grosserer	500.00
Director Carl Ruben, Grosserer	500.00
Gustav N. Salomonsen, Grosserer	500.00
Etatsraad Claus L. Smidt	500.00
Etatsraad R. N. Strøm	500.00
Robert Drucker, Grosserer	300.00
Joh. Guildal, Grosserer	200.00
Moses Melchior, Grosserer	200.00
	Kr. 262,200.00

Contributions in kind:	Kr.
A. Stelling, Grosserer	2,724.05
Thor E. Tulinius, Grosserer	2,204.28
Philip W. Heymann, Grosserer	2,000.00
P. Jørgensen, Maskinfabrik	2,000.00
Carl Joh. Janssen, Grosserer	1,339.00
De forenede Bryggerier	1,000.00
Dr. Arnold Gamèl	1,000.00
Jacob Holm & Sønner	1,000.00
Consul Valdemar Glückstadt	1,000.00
Copenhagen Pavillonbyggerier v. S. A. Falck	1,000.00
Det Danske Petroleums Aktieselskab v. C. Holm	940.50
Aktieselskabet C. Olesen v. C. Olesen	760.00
Baadh & Winthers Efterfølger v. G. Rohde	750.00
Director Simon Olesen	500.00
Ferdinand Andersen, Grosserer	500.00
Emil Hjort, Grosserer (S. Seidelin)	500.00
L. Levison jun., Grosserer	500.00
Kampmann & Herskind	500.00
Transp.	20,217.83

Transp. Kr.	20,217.83
Christianshavns Apothek	230.91
Cornelius Knudsen, Instrumentmager	204.09
Ad. Trier & Goldschmidt	200.00
Christianshavns Oplagsplads	100.00
General Consul Teilmann	100.00
F. A. Thiele, Instrumentmager	100.00
Zoologisk Have by Director J. Schiøtt	80.00
Robert Drucker, Grosserer	60.00
Kæhler, Keramikfabrikant	10.00
	21,302.83
	+262,200.00
Loan free of interest from Landmandsbank against vessel's insurance	+15,000.00
Kr.	298,502.83

These contributions sufficed for the fitting out of the Expedition; but during the preparations further gifts were received, as follows:

Commander G. Amdrup: a boat with belongings[1].
Gyldendalske Boghandel, Nordiske Forlag: a number of books.
A. Christiansens Forlag: a number of books.

and of the articles which Mr. Oskar Wesche of the United Steamship Company in Copenhagen was commissioned to purchase, the following were given free of cost:

De danske Spritfabrikker per Vilh. Hansen: yeast.
Proprietor Sørensen, Dildalsgaard: potatoes.
A. Korsgaard-Jensen: meat.
Chr. Ebstrups Sønner: meat.
C. F. Rich & Sønner: chicory.
Christiansholms Fabrikker per C. V. Slomann: salt.
Chr. Hansens kemiske Laboratorium: annato.

Lastly, the following must be mentioned:

Director H. Rothenborg lent the Expedition a large sewing machine. "Minimax" Company lent the Expedition two fire extinguishers and Kjøbenhavns Telefonselskab per Director Johansen telephone material.

After the funds for the Expedition had been collected, a Committee was formed at the end of March 1906, consisting in addition to Mylius-Erichsen of Consul Erik S. Henius and Consul Valdemar Glückstadt as the business members and Captain G. Holm and Commander

[1] This was the boat which G. Amdrup had used in 1900 on his boat expedition down along the east coast of Greenland from Cape Dalton to Tasiusak in the Angmagsalik district.

G. Amdrup as members experienced in Greenland exploration; the last two naval officers were appointed by the Ministry of Marine.

The Committee assumed the title "Komiteen for Danmark-Expeditionen til Grønland's Nordøst-Kyst 1906—08" and elected Consul Erik S. Henius as Treasurer. —

On the return of the Expedition in the autumn of 1908 the Committee desired to have a scientist among them, out of consideration for the large scientific material brought home. At the request of the Committee the Ministry of Marine then asked Professor E. Warming of the University, if he would be willing to accept the position of Chairman of the Committee. Professor Warming expressed his willingness and was duly appointed to the Committee.

On becoming acquainted, however, with the great extent of the scientific material brought home, Professor Warming expressed the desirability of the Committee having a more representative scientific composition. Professor Hector Jungersen and Professor N. V. Ussing [1] of the Copenhagen University then expressed their willingness, on being consulted, to take part in the work and were thereafter duly appointed members of the Committee by the Ministry of Marine.

Thus, on the return of the Expedition the Committee came to consist of 7 members. —

When the Committee had been appointed, all preparations were at once begun. The departure of the Expedition was fixed for Sct. Hansdag (St. John's Day), June 24th, and barely 3 months thus remained for fitting out and arranging the whole of the great Expedition. The work was greatly facilitated by the fact, that Consul Henius at once placed his office rooms at the disposal of the Expedition. So long as this continued and during the later working up of the large scientific collections brought home, all the meetings were held here, the extensive correspondence carried on here, all the accounts kept and all payments in and out were made here and so on, altogether a work, whose magnitude can only be understood by those who have had close acquaintance with such matters. Further, Consul Henius paid out about 35,000 Kroner in advance, a sum that only fell due in 1906—07. Further, in their capacity as merchants Consul Henius and Consul Glückstadt were able to make many of the purchases at a considerably cheaper rate than could have been obtained without their assistance.

As vessel of the Expedition the Committee bought the Norwegian Polar vessel Magdalene, which was renamed "Danmark". The Danmark was built at Peterhead in Scotland in 1855 for the seal and whale fishing. Like all Arctic vessels it was strongly built of wood with a special sheathing of timber against ice and in spite of its great age its timbers were in unusually good condition. The vessel was barque-

[1] Professor Ussing died in 1911, before the work was brought to an end.

rigged and had originally been provided with sails only, but in 1872 high pressure engines were fitted into it which enabled the vessel, in fine and calm weather, to steam at the rate of 3 to 3½ knots. The total amount of coal burnt during the whole Expedition was 274 tons. The propeller was a two-bladed screw of steel which could not be hoisted. The length of the ship was 37.4 m., breadth 9.2 m. and with a full load its draught was ca. 5.5 m. Its tonnage was 451 tons gross and 317 tons net.

The Danmark was said to have made an expedition some years previously and had at that time been fitted with an upper structure aft, in which were many berths as well as the galley. This structure was retained in its main features, but, in addition, a spacious laboratory was built in just before the main-hatch. Further, the body of the vessel, engines, boilers and rigging were subjected naturally to a careful overhaul.

In addition to 4 rowing boats and a pram, the ship was provided with 2 new-built motor-boats, which proved of inestimable value to the Expedition. The fittings of the ship, naturally, were also overhauled with the greatest care. Excluding the apparatus necessary in sailing through ice, such as towing warps, ice anchors, ice saws, ice axes, ice-borer, ice-hooks etc., the equipment was not essentially different from the usual fittings of a ship. But there was abundance of everything. The intention was, indeed, that the vessel would in any case be away over two years and should be prepared even for being away over 3 years. Reserve rudder as well as reserve screw was taken, as also all the necessary tools and material to undertake any small reparation in the ship itself or the machinery. Owing to the danger of fire the very large stock of petroleum was enclosed in large iron tanks and the ship was well provided with fire extinguishing apparatus.

The special equipment for the Expedition was mainly planned in accordance with Mylius-Erichsen's own experience on the literary Greenland Expedition of 1902—1904 conducted by him. It included all that was necessary both for long journeys by boat and by sledge. For the last he took with him some few Nansen sledges made in Norway, but most of them were made onboard after Eskimo models, which Mylius-Erichsen considered to be the most practical. For the sledge journeys about 100 dogs were bought in West Greenland; of these 40 were sent down to Copenhagen, whilst the remainder were kept at the Færoes and were taken onboard the Danmark when the vessel came there. The Expedition also took a motor carriage, which was expected to be of great use, for the transport of goods or luggage on even ice.

Owing to the great importance wild game might have for the Expedition, it was well provided with an excellent equipment of guns etc.

The provisions were chosen with great care, based on the experience of the many arctic expeditions of recent years. But Mylius-Erichsen himself had great experience. He had lived a winter with the Cape York Eskimo, in the winter of 1903—1904.

On the scientific side nothing was spared in the way of equipment. Each of the scientific members of the Expedition was left to equip himself quite according to his own wish in his own special field. The ship itself was provided with trawling apparatus, apparatus for soundings and for hydrographical investigations.

During the preparations the Expedition met with the greatest good-will from practically all who in one way or other could show it favour.

His Majesty King Frederik VIII and the members of the Royal Family supported and encouraged Mylius-Erichsen right from the very first. On June 9th his Majesty accompanied by Their Royal Highnesses, Crown Prince Christian and Prince Valdemar paid a visit onboard the "Danmark" and on this occasion Mylius-Erichsen had his long-cherished wish fulfilled, the King on Mylius-Erichsen's request assuming the protectorate of the Expedition.

Among the many others, who supported the Expedition in various ways, in addition to those mentioned earlier, the following may be named.

The Home Secretary of that time, Sigurd Berg, the Director of the royal dockyard, Rear-Admiral Zachariae, the University Professor N. V. Ussing, the Director of the Royal Greenland Trading Company C. Ryberg, Docent at the University Martin Knudsen, the Secretary of the Royal Geographical Society Captain O. Irminger R. D. N. and many more.

Members of the Expedition.

The different members were engaged during the progress of the preparations. The composition of the Expedition was as follows.

1. The author, Cand. phil. Ludvig Mylius-Erichsen, born on January 15th 1872 in Viborg; Chief of the Expedition and leader of the ethnographic investigations. In 1902—1904 Mylius-Erichsen had been the leader of a 2½ years' expedition to West Greenland, the "Literary Greenland Expedition[1]".

2. First-lieutenant in the Navy Alf Erik Martin Jens Carl Trolle born October 4th 1879 in Copenhagen; in command of the ship and second in command of the Expedition. Director of the marine surveying and of the hydrographical observations. After the death of Mylius-Erichsen in charge of the Expedition.

For the purpose of gaining experience Trolle in the spring of

[1] See p. 37.

1906 made a journey to Ivigtut in West Greenland with the Polar vessel "Fox II" of the Cryolite Company.

3. The artist painter AAGE BERTELSEN, born September 28th 1873 in Næstved.

4. The artist painter ACHTON FRIIS, born September 5th 1871 in Trustrup in Djursland.

5. First-lieutenant in the Infantry, NIELS PETER HØEG-HAGEN, born October 15th 1877 in Gunderstedgaard by Nibe. Cartographer.

6. Stud. polyt. HAKON HØEG JARNER, born January 26th 1882 at Bogense. Geologist.

7. Stud. mag. FRITZ JOHANSEN, born July 17th 1882 in Copenhagen. Zoologist (investigations on the lower land and freshwater fauna and zoological marine investigations).

In the summer of 1905 FRITZ JOHANSEN had carried out zoological investigations round about Iceland onboard the Navy inspection ship "Beskytteren".

8. Cand. med. et chir. JENS PETER JOHANNES LINDHARD, born April 25th 1870 in Dalby near Thureby (Sjælland). Doctor.

In 1899—1900 LINDHARD had been the doctor at Ivigtut and at the outpost Arsuk in South Greenland.

9. Cand. phil. ANDREAS LUNDAGER, born July 6th 1869 in Omvraa near Vejle. Botanist.

LUNDAGER had been two years as private tutor in West Greenland from 1903—1904 in Umanak and from 1904—1905 in Egedesminde.

10. First-lieutenant[1] JOHAN PETER KOCH, of the General Staff, born January 15th 1870 in Vestenskov near Naksov. Director of the land surveying.

In 1900 KOCH had taken part in AMDRUP's expedition to East Greenland, where he had done excellent service and from which he brought home valuable cartographic material[2]. Further, in 1902, 1903 and 1904 KOCH had directed in a most successful manner 3 expeditions sent out by the topographical division of the General Staff to southern Iceland, where the almost inaccessible Skejdararsandur and the southern part of Vatnajókull were topographically surveyed and investigated. KOCH had also had no little experience of seamanship and, among other things, had qualified as master of small ships.

11. Head teacher ARNER LUDVIG VALDEMAR MANNICHE, born February 19th 1867 in Gundsømagle at Roskilde. Zoologist (was really engaged as ornithologist, but at MYLIUS-ERICHSEN's request also took over the study of the land mammals).

12. Dr. phil. ALFRED LOTHAR WEGENER, Assistant at the Royal Aeronautical Observatory in Lindenberg, born November 1880 in Berlin. Meteorologist and physicist.

[1] During the Expedition KOCH was promoted to Captain.

[2] Meddelelser om Grønland. Bd. XXVII, p. 273.

13. First-lieutenant in the Navy Henning August Osterberg Bistrup, born May 15th 1879 in Godthaab in West Greenland. 1st mate.

Bistrup had lived in Greenland until his 9th year. As special preparation for the Expedition Bistrup undertook a journey to West Greenland in the spring of 1906 with the "Hans Egede" belonging to the Royal Greenland Trading Co.

14. Mate Gustav Gustavesen Thostrup, born October 30th 1877 in Viborg. 2nd mate.

15. Christian Bendix Thostrup, Petty officer, born April 14th 1876 in Viborg. 3rd mate and secretary. In charge of the ethnographical investigations after Mylius-Erichsen's death.

16. Engineer Ivar Kjerulff Weinschenck, born July 11th 1880 in Jutland. 1st engineer.

17. Engineer Herman Andreas Koefoed, born July 30th 1882 in Lauegaard in Aaker Sogn on Bornholm. 2nd engineer.

18. Mate Karl Johan Ring, born April 7th 1870 in Kjøbmandskjær, Nøtterø near Tønsberg in Norway. Ice pilot.

Ring had a very thorough knowledge of sailing among ice, having served as mate for 11 years in the North Polar Sea and Denmark Straits.

19. Stud. med. et chir. Peter Elfred Freuchen, born February 20th 1886 in Nykjøbing on Falster. Stoker and assistant meteorologist.

Simply for the purpose of being included in the Expedition Freuchen engaged himself as stoker and by way of preliminary training sailed to West Greenland in the spring of 1906 with the "Hans Egede" of the Royal Greenland Trading Co., serving as stoker.

20. Harald Lindemand Hagerup, born March 17th, probably 1877, in Tromsø in Norway. Like Freuchen served as stoker on the out and home voyage. Also assisted in the physical observations.

Hagerup had taken part in Professor Birkeland's expedition to Spitzbergen and overwintered there in 1902—1903.

21. Carpenter Jens Gundahl Knudsen, born January 24th 1876 in Uggerby. Like Freuchen and Hagerup served as stoker on the out and return voyage, but was also the carpenter of the ship.

22. Steward Hans Ludvig Jensen, born April 3rd 1874 in Skibshusene near Odense. Cook and steward.

Hans Jensen had previously voyaged to Greenland.

23. Seaman Peter Florian Knud Christiansen, born May 4th 1876 in Copenhagen. Seaman. Seaman in the service of the Royal Greenland Trading Co.

24. Seaman Axel Peter Hansen, born September 5th 1877 in St. Stefan Sogn. Seaman. Seaman in the service of the Royal Greenland Trading Co.

Peter Hansen had taken part as seaman in Amdrup's expedition to East Greenland in 1900 and done excellent service.

25. Seaman Charles Sophus Poulsen, born September 26th 1888 in Copenhagen. Seaman. Seaman in the service of the Royal Greenland Trading Co.

26. The Greenlander Nikolaj Isak Jørgen Brønlund, formerly curate in Greenland, born December 14th 1877 in Jacobshavn. Sledge driver.

Brønlund had taken part in Mylius-Erichsen's expedition to West Greenland in 1902—1904.

27. The Greenland hunter Tobias Otto Mikael Gabrielsen, born January 21st 1878 in Nugssuak, district of Ritenbænk, West Greenland. Sledge driver.

28. The Greenlander, Kivfak, Hendrik Ole Jacob Olsen, born December 11th 1884 in Ritenbænk, West Greenland. Sledge driver.

In the above list of the members composing the Expedition only the special field of work of each member has been noted. But within each division the expert concerned was obliged to have some assistance, to be able to fulfil the heavy tasks devolving upon him. In the special papers on the scientific results, therefore, the expert concerned has mentioned all those who have assisted him in his work to any noteworthy extent.

By the direction of the Committee a contract was signed between Mylius-Erichsen and each of the members, reading as follows:

The undersigned author, Cand. phil. L. Mylius-Erichsen, as leader of the "Danmark Expedition to the north-east coast of Greenland" and the undersigned ..., on this date ..., make the following:

Agreement.

§ 1.

I ..., engaged as ... with the ship "Danmark" of the Expedition, my work, place and duties onboard being determined by the engagement contract signed by the ship's Captain and myself so far as the sea voyage and the work connected with it is concerned, hereby bind myself to take part in all other operations or work connected with the service of the Expedition to the best of my ability and as far as my strength permits in precise accordance with what the leader of the Expedition may determine, and also in every way to follow the injunctions given by the leader of the Expedition in the strictest possible manner.

§ 2.

(Contained regulation of the payment and a statement as to when the Expedition was expected to return home).

§ 3.

In addition to the salary mentioned, I have also claim upon full maintenance, naturally, however, only in accordance with what the circumstances of the journey permit and so long as I am actually part of the Expedition. It is specially emphasized, that the food is one and the same for all the members of the Expedition.

I am to be equipped, lastly, at the cost of the Expedition with everything, not only for the voyage but also for my participation generally in the Expedition, so that clothes and weapons, but not my other equipment, will belong to me after the return home.

§ 4.

Whatever the Expedition may collect or obtain in any way of scientific interest, whether from hunting or fishing, as skins, blubber or living animals, minerals or discoveries of any kind, are to be placed by the Committee of the Danmark Expedition at the disposal of the public Danish collections, in agreement with the promise given by the Committee to the Ministry of Marine, and what remains over will be divided equally among all the members of the Expedition, and if several wish to retain the same object, the decision will be made by lot [1].

Original works of art made by members of the Expedition, whether paintings, drawings or the like, belong to the artist, but all members of the Expedition shall have free permission to reproduce the works in the first 2 years after the return for the purpose of illustrating the scientific papers, which they may publish, and the leader of the Expedition shall have the same right in drawing up any general account of the journey. On the other hand, all other rights of reproduction — even on the part of the artist himself — are excluded, until the period mentioned has expired.

§ 5.

Until the return of the Expedition — cf. § 2 — only the leader has the right to send telegrams to the press regarding the progress and results of the Expedition; on the other hand, correspondence in the shape of letters is also permitted to the other members, though they are bound in duty to show such correspondence to the leader of the Expedition and make the omissions, which he may consider right.

The right to give written reports on the Expedition in the form of general accounts is reserved to the leader of the Expedition until one year after the return. Reports of a purely scientific or special kind may, on the other hand, be published at any time, except that the mode of publication must be beforehand agreed to by the Com-

[1] This paragraph should have stated more precisely, that scientific records belonged to the Expedition.

mittee for the Danmark Expedition and that it must be expressly stated, that the results obtained are due to the Danmark Expedition.

The right to give public, popular lectures on the Expedition is reserved to the leader for the first 6 months after the return. Purely scientific or special lectures and lectures of quite a private character may, however, be given at any time with the consent of the Committee; but no lecture of any kind whatsoever may be held until after the lecture of the leader of the Expedition before the Royal Danish Geographical Society.

§ 6.

Should the leader be prevented from acting as such, the Second-in-command of the Expedition and the Captain of the vessel, First-lieutenant TROLLE, will become the leader of the Expedition. Otherwise the leader is free to settle who shall take his place in case of accident. Should the Expedition, however, come to be without a leader, the members will choose one for themselves. The decision will be arrived at by all the members by simple vote and the one chosen will occupy in every respect the same position as that held by the leader of the Expedition according to the present contract.

§ 7.

In the event that I ... fail to be present on the departure of the Expedition or do anything in any way in contravention of this agreement, the leader of the Expedition is entitled to take such measures as may seem to him most suited to the occasion.

On the other hand, if I should feel myself in any way injured by the leader of the Expedition, I am entitled to make a complaint in writing and the complaint will be entered in the archives of the Expedition. On returning home both parties may lay all subjects of dispute before the Committee of the Danmark Expedition, who will make the final decision, in so far as the Committee may not deem it advisable to have legal judgment on the matter.

All disputes arising between members of the Expedition, in which the leader himself is not concerned, are to be settled definitely by him, whether alone or — if he should think it right — in conjunction with one or several of the other members of the Expedition. In questions concerning the captain of the ship, however, the ordinary maritime rules and regulations apply.

§ 8.

Should there be any disagreement on any point between the above terms and the engagement contract entered into by me ... the present agreement holds good.

All questions of doubt regarding the interpretation of this contract are to be decided in the end by the Committee of the Danmark

Expedition, who shall be entitled further to make exemptions from the terms in § 4, part 2, last point of the part and also § 5, parts 2 and 3.

With respect to the stamped document it may be noted, that the total amount that can be earned on this agreement cannot be considered to exceed 6000 Kr.

The present contract is drawn up in 3 copies, of which the stamped copy remains with the Committee of the Danmark Expedition, whilst each of the parties receives an unstamped copy.

Copenhagen, May 31st 1906.

In the case of Trolle and Koch special provisions were added to the above contract, which defined more clearly their respective positions as captain onboard and leader of the land survey.

Altogether it was a company of capable men, several of whom had already won a respected name as investigator, which Mylius-Erichsen gathered round himself and which under his leadership was to solve the principal portion of the great and splendid task he had set himself, and for which he himself had prepared the plan.

As mentioned above, Mylius-Erichsen had already drawn up the plan for the Expedition in May 1905. The plan, which Mylius-Erichsen handed over to the Committee on the departure of the Expedition from Copenhagen, was in the main the same as that of 1905 and read as follows:

Plan of the Expedition.

When the Expedition onboard the screw barque "Danmark" leaves Copenhagen (probably on June 24th this year), the course will be set for Trangisvaag in the Færoes, where the three Greenland hunters with about 70 North Greenland dogs and a number of skins, brought by the S./S. Hans Egede, will be taken onboard. Thereafter Eske Fjord on East Iceland will be called at and 6 Icelandic horses and 50 tons of coal will be taken onboard. Between the 5th and 10th of July, probably, the course will be set from East Iceland along the shortest route possible passed Jan Mayen up to the ice boundary in the so-called North Bay[1], wherever it may lie this summer, apparently about 75° N. lat. Here we enter the ice, unless it should be considered advisable to try an even higher latitude, before we go inside the ice boundary. From the Færoes and from Iceland I shall send reports to the Committee and also with a whaler, if any are met with at or inside the ice boundary.

It is now the aim of the Expedition to reach in with the ship to

[1] Each summer at ca. 75° N. lat. the pack-ice belt forms a bay with scattered ice, the so-called North Bay. Note by Editor.

the east coast of Greenland as far north as possible, at the least to Shannon Island, where winter quarters may be found. If the conditions are favourable the ship will go from a spot where the land or fast land ice has been reached, along the land or fast ice northwards, as far as may be considered advisable. At the northernmost point reached the attempt will be made to land the winter house and provisions for 4 men, as also the sledge materials for the sledge journeys to the north in the coming winter. As the most northern point thought of for this landing and station (the so-called St. A) I have imagined Isle de Philippe[1] at 77°36′ N. lat., Cape Bismarck or the Koldewey Islands between 76°—77° N. lat. The wintering party at this station, from which cartographical and physical investigations will be carried on as long as the season will permit along with continuous meteorological observations, will be composed provisionally of: First-lieutenant Bistrup as leader, Stud. med. Freuchen, the Norwegian Harald Hagerup and a Greenlander or a seaman. If the attempt to land a party with winter house and stores is not successful, an endeavour will in any case be made to build a cairn at the northernmost land reached and place a report in it.

From the northernmost point reached the ship will withdraw along the coast and go into winter-quarters on the south side of Shannon Island, which until we know better may be considered as the best possible harbour. On the way, if the conditions permit, the ship will try to make short cruises out into the ice for the purpose of making soundings and also into the mouths of possible fjords, but the vessel will at no time be exposed to the danger of coming fast, the intention being to use the motor-boats, ice boat or women's boat for the investigations from the ship, where it cannot well leave the straight course southwards.

Should another harbour than Shannon Island be chosen as winter quarters, I shall arrange for a cairn with report being built at the bay on the south side of Shannon Island.

Before the new ice stops sailing, surveying and other investigations will be carried on between the northernmost point reached and the harbour, partly from St. A, partly from the ship, by means of boats, kaiaks, sledges over the land-fast ice or horses as pack-animals over the snow-free land. Further, depots will be laid out along the route between St. A and the harbour and at the entrances to arms of fjords and bays or on the hilly plateaus, which are to be more closely surveyed on the sledge journeys of the coming winter.

Winter 1906—07.

In the autumn of 1906, so long as the ice and light permit, short journeys with the sledge will be made from St. A and the harbour

[1] Ile de France. Note by Editor.

for the purpose of carrying out supplementary investigations and laying depots. At the harbour an observatory and house will at once be built on land for the physicist and his two assistants, the two engineers. A sledge expedition from the harbour will extend its journey right up to St. A, to inform the party there of the position of the harbour.

The darkest time of the year will be used in working up the scientific material collected and in preparation for the sledge journey.

About the beginning of February 11 members including the leader will set out for St. A in several small groups under the direction of the leader. There they will be divided into the following groups.

1. A meteorologist with two men remain at the station.

2. A cartographer with two men will drive out over the sea ice (to make soundings and investigate whether there may be new islands between North-East Greenland and Spitzbergen).

3. 9 men in 3 groups will journey northwards along the coast; of these:

3 a. Two men will go from Independence Bay to the most easterly point reached by Peary, Wyckoff Island [1] at 83° N. lat., and if possible further north over the ice, whilst

3 b. The leader and 3 men will pass up the Peary Channel partly through the de Long Fjord, partly round Nares Land. On the coasts of Independence Bay,

3 c. The 3 men of the third group will make investigations and prepare meat depots by hunting against the return of the two other groups. On April 15th at the latest the groups will meet in Independence Bay and work together round Academy Land, whereupon they will divide into groups and complete the investigation of the coast and fjords down to St. A.

Before the end of May 1907 all must have left St. A and returned to the ship.

Between February and June those left at the ship will undertake supplementary investigations to the west of the harbour and up towards St. A.

Summer 1907.

When the ice breaks up in June 1907 the ship will sail along the coast to the south and the outer coast and fjords will be investigated if possible right into the head of Kejser Franz Josephs Fjord. Here a winter house will be built for a meteorologist and two men with a depot, St. B, for the sledge journeys of the coming winter, which will be made mostly on the inland ice. Before the new ice forms, the vessel will seek winter quarters near the mouth of the fjord, for example, at Mackenzie Bay.

[1] Cape Clarence Wyckoff. Note by Editor.

Winter 1907—08.

An observatory and house for the physicist with two men will be built on land at the harbour and as soon as the ice and as long as the light will permit, the coast down to Davy Sound will be investigated on sledge journeys from the ship and depots laid.

At the end of the dark period supplementary investigations will be continued from the ship along the outer coast, in the arms of the fjords and over small areas of the inland ice.

Before the end of March the leader with 11 men will make for the station and depot, St. B, at the head of Kejser Franz Josephs Fjord and endeavour to find a way up onto the high plateau of the inland ice through the most practicable glacier valley; here if possible a depot will already have been made in the preceding summer and from here the easiest way will be sought for over the marginal zone of the inland ice, for the purpose of making extensive investigations of the latter. If the attempt to reach in onto the inland ice at 40° W. long. is successful and some three or four men are still suitably equipped and in good condition, these may possibly attempt to cross over to the west coast and down to Svartenhuk or Nugsuak, most probably the latter, where in the year previous a small store of food will be laid in depot, and from there connection may easily be made with neighbouring Greenland settlements.

Summer 1908.

From a Danish colony in the neighbourhood the Danish members of the sledge party will be brought down along the west coast in the course of the summer by one of the Royal Greenland Trading Co's vessels and further at the end of the August in the same year to the mission station of Angmagsalik on the east coast of Greenland. Here the arrival of the ship of the Expedition in the beginning of September will be awaited. The intention is, namely, that after completing the investigations in and near Kejser Franz Josephs Fjord and along the coast down to Scoresby Sound the vessel should steer out of the pack-ice and round this to Angmagsalik. If the vessel should not come into Angmagsalik within the short period it can expect to meet the members of the cross-journey party, it will make for Reykjavik, and from there an endeavour will be made to induce the S./S. Godthaab of the Royal Greenland Trading Co., which sails to Angmagsalik, to bring the members of the cross-journey party to Reykjavik. And if they do not meet with the vessel of the Expedition there either, they can proceed to Copenhagen with the S./S. Godthaab and the vessel of the Expedition will also proceed there.

In addition to the cairns on the northernmost land reached by the vessel and on Shannon Island, others will be raised on Bass Rock at the Americans' depot, on the Hvalros Isl. at the depot for SVERDRUP,

at the northern opening of Kejser Franz Josephs Fjord and at RYDER's depot at the northern opening of Scoresby Sound, lastly also at AMDRUP's depot on Cape Dalton.

If the vessel should be crushed in the ice on the voyage in to Greenland, we shall make either for West Iceland, West Spitzbergen or the east coast of Greenland in the life-boats or motor-boats, and in the last case seek along the east coast over the depots there down to Angmagsalik either the same summer or next summer by boat, or by sledge in the intervening winter. In such an event, cairns with reports inside will be raised at the existing depot places mentioned.

If the vessel should become frozen-in in the harbour chosen or elsewhere at East Greenland and not be able to free itself in the summer of 1908, the Expedition will remain by the vessel one year longer, thus till the summer of 1909, and if no relief vessel arrives in the course of the summer, another winter will be passed at the same place and the vessel will be left with the collections in the best possible condition, whilst the members will make for Angmagsalik with sledges (if provisions and dogs are available) on the winter ice of 1910.

Care will be taken, that the necessary equipment for such a sledge journey is always ready as far as possible.

Thus, if the Expedition does not return to Denmark in the autumn of 1908 or has not sent information by homegoing whalers, that it has been obliged to remain a third winter, I hope, that in the following summer at the end of July or beginning of August either a whaler will be engaged or a special ship sent out to Shannon Island (the bay on the south side), where we should be found or a report on where we are in a conveniently placed cairn and from there a further search can be made for our relief.

Lastly, I wish to note, that I consider the Expedition well provided with stores for 3¼ years, when we take into account the depots on Bass Rock, Shannon Island and Hvalros Island as also what we may gain by hunting. And I am convinced, further, that in case of necessity, if we include the depots at Scoresby Sound and Cape Dalton and the hunting wherever possible, we can carry on for 4¼ years.

In addition to the reports mentioned, whenever the occasion appears, I shall send home detailed accounts to the Committee on the progress and results of the Expedition, for example in the autumn of 1907, if we should meet with a whaler when on our way from the first to the second winter quarters, as also from West Greenland, Angmagsalik or Iceland in the summer of 1908, when the cross-journey party are on their way home.

The present report to the Committee I would request to be considered as my last word for the present regarding the plan of the Ex

pedition and the routes by which a search expedition might possibly come to our assistance.

Copenhagen, June 21st 1906.

L. Mylius-Erichsen.

Statement of expenditure.

	Kr.
Cost of the vessel	39,250.00
Expenses connected with the purchase	1,264.24
Bringing home the vessel, customs, docking and reparation	16,699.56
Inventory of the ship	12,244.94
Motor-boats with belongings	4,528.09
Coal, petroleum, spirit and candles	8,839.04
Provisions, beer and liquors	41,963.74
Instruments and scientific equipment	33,244.15
Painting requisites for the two artists	2,724.05
Paper, note-books, drawing and writing materials	1,585.27
Clothes, wind clothes and boots	10,310.16
Skins, skin-clothing and dried grass (Sennegræs)	6,286.13
Houses, observatories, beams and cement	2,589.84
Tents	1,214.10
Weapons, ammunition and hunting requisites	4,940.70
Motor carriage and belongings	4,089.00
Sledges, skis, snow-shoes and kaiaks	3,185.03
Dogs and food for the dogs	8,637.52
Objects of amusement	357.65
Transport of goods, expedition etc.	2,363.64
Wages and support of families for 2¼ years	59,045.00
Insurance of crew	2,016.00
Insurance of vessel and cargo. Copenhagen—Iceland	1,324.20
Towing of ship from Bergen to Copenhagen etc.	3,216.93
Mylius-Erichsen's preparatory expenses for the Expedition	13,440.00
Printed matter, outlay for postage, telegrams etc.	1,189.09
Diverse expenses	13,017.46
	299,565.53

Balance.

		Kr.
Income.	State grants and private contributions[1]	283,502.83
	Interest-free loan against insurance of vessel	15,000.00
	Interest	1,160.00
		299,662.83
Expenditure as above		299,565.53
	Balance	97.30

[1] See pp. 41—43.

III. Narrative of the Danmark Expedition.

See Pl. II and the collection of charts in Meddelelser om Grønland, Bd. XLVI[1].

(The present report does not give a topographical account of the land visited; this will be given by Captain J. P. Koch in Bd. XLVI).

A. Outward voyage[2].

At last the day had come, towards which Mylius-Erichsen had looked forward and laboured for many years, when at the head of a great expedition he should sail away under the flag of the red-white cross to reap honour for our old, beloved fatherland. In one of his diaries he has given expression to the feelings, which animated him on that warm, sunny day of summer, an expression of deep feeling towards those nearest his heart, of gratitude to all who had helped him and his fixed, unbending resolve, to do his utmost to solve the great and splendid problem, which had been entrusted to him. Mylius-Erichsen writes:

"At last!

We rise on the last morning, the day of departure, June 24th. Full of the joyful consciousness that now the exacting days of preparation were over, a deep perspective opens out into the future of deeds and research, of great adventure. Manhood's work to be done!

How Danish and summer-like the sun shone! One seemed never to have seen the roofs of the city so homely red or to have felt his country so near and dear. And yet, departure was to be a relief; for those who stood nearest, each day's struggle towards the goal had simply been an unspoken farewell. Outward bound and with a free charter to make dreams a reality, one goes onboard the ship "Danmark" to sail out and win a new piece of Denmark. At last!

Farewell, then, to town and land, to friends and family; farewell to those who steadfastly believed in the plan and willingly aided us over all the difficulties which separate dream and deed! You have given us trust, good counsel, the great indispensable means; we others have given our young desires, all our powers, life even should it be necessary. Farewell and thanks from the heart. May we prove ourselves worthy of the trust and sacrifice!"

[1] Pl. II is only a sketch drawn from the large original charts given in Medd. om Grønl. XLVI No. 2.

[2] All directions refer to the true course.

Such were the feelings of MYLIUS-ERICHSEN, when at 11 in the forenoon of St. John's day, Sunday *June 24th* 1906, the "Danmark" cast off from Nordre Toldbod, where numerous friends and acquaintances had gathered together to wave the last farewell to the members of the Expedition. On the bridge stood MYLIUS-ERICHSEN and waved his hat, whilst the heavily-loaded ship, surrounded by motor boats and pleasure cutters slowly glided out of the harbour and out into the Sound, where it swung to have the compasses set.

On the way north in the Sound the Danmark met the warship "Olfert Fischer", whose crew with their Commander, the Arctic explorer HOVGAARD, at the head gave three ringing cheers for the seafarers.

Thereafter, exchanging a salute with Kronborg the Danmark stood out of the Sound into the Kattegat and in the two following days the portion of the crew not accustomed to the sea had the opportunity of learning their respective duties on the ship. As the aim had been to take as many scientifically trained men as possible, in addition to the two artists, the number of seamen was consequently reduced to a minimum and all the others had bound themselves to do ship's service on the voyage out and home.

As will be seen from the list of the members there were only 11 men onboard, who were connected with the sea by calling, namely the master, the 3 mates, ice-pilot, the 2 engineers, steward and the 3 sailors. Among the 11 naturalists (including the artists), however, there were several who were used to the sea and a few, for example KOCH, were more or less seamen. But the three who acted as stokers had had no training in the work, one of them, as mentioned, was in fact a student of medicine. But it is the will that does the work, and as the will was not wanting, all went well on the whole.

On Tuesday *June 26th* at 11.30 p. m. the Danmark moored in Frederikshavn harbour. In the fresh wind of the Kattegat the foretopgallantyard and fore boom had been cracked and a few other, smaller damages had occurred.

In the days following the damages were repaired and most of the cargo was restowed, a work that was carried out exclusively by the members of the Expedition. In his report on the matter to the Committee MYLIUS-ERICHSEN writes:

"I cannot finish my report without mentioning, that all the members with great diligence and interest and with great good-will have carried out the considerable work onboard in these days without outside help. All has gone well and quickly. The work has been a good training for the voyage in front of us".

On Monday *July 2nd* all was clear for the departure and at 1.30 p. m. the Danmark cast loose and stood out of the harbour.

On *July 5th* almost at midday the Naze was passed and on Monday

July 9th at 3 a. m. Muckle Flugga. On Wednesday *July 11th* in the forenoon the Færoes were sighted and on Thursday *the 12th* at 7.30 a. m. the anchor was dropped off Tveraa in Trangisvaag on Suderø.

In Tveraa the Greenlanders, Jørgen Brønlund, Tobias Gabrielsen and Hendrik Olsen joined the Expedition and here most of the members of the Expedition saw for the first time these three men, who were to be of so great service to the Expedition and one of whom in his death was to contribute so essentially to the fruits of success which the Expedition brought home.

They had arrived at the Færoes about 8 days previously with the Royal Greenland Trading Co.'s steamer "Hans Egede" and brought with them 65 full-grown Greenland dogs with 5 puppies and also a large number of skins and goods from Greenland. Along with the dogs already onboard on leaving Copenhagen, there were now altogether about 100 dogs onboard.

In Tveraa 10 tons of coal were taken in as also a quantity of whale flesh as food for the dogs.

On the following day, *July 13th* 6 a. m., the Expedition again left the Færoes and the course was set towards the east coast of Iceland. Both on this day and the following the progress of the Danmark was but slow owing to the high sea and swell, which caused the vessel to roll badly. This was a hard time for the dogs. The deck was the only place where they could be and in the heavy sea, when the waves washed over the ship, there was not a dry spot anywhere where they could lie down. Dripping wet they had to stand up and sleep standing. Some help was given when G. Thostrup rigged up a platform on the deck on the starboard side, so that most of them could lie down and rest. In the heaving rolling two of the dogs fell overboard and only one of them was saved. On Sunday *the 15th* the weather improved and the ship now had a good passage until the anchor was dropped in Eske Fjord on the east coast of Iceland, Wednesday *July 18th* 5.30 a. m.

Here more coal was taken onboard, in all 45 tons. Further, a quantity of goods, which had been sent up by steamer to Iceland beforehand. For a quantity of compressed hay as horses' food and 6 Icelandic horses, however, which Mylius-Erichsen had intended to use in Greenland, no place could be found. As Eske Fjord was the last harbour to be touched at before the course was set towards the ice boundary, the ship and engines were thoroughly overhauled and all made clear for the difficult passage in through the ice-belt.

All these preparations took 4 days and it was not until Sunday *July 22nd*, that all was ready for departure. At 6 a. m. the anchor was raised. Among those who stood on the beach and waved adieu was Mylius-Erichsen's wife, who had journeyed up to Iceland to bid him a last good-bye.

"Still, wordless parting with MARIE in Eske Fjord. Farewell, live well and happy return", writes MYLIUS-ERICHSEN in his diary on that day, little thinking that it was the last farewell in this life.

From Eske Fjord the course was set eastwards round Jan Mayen, which the Expedition sighted on *the 27th* at 3.15 p. m.

The scientific investigations, which had already made a small beginning after leaving the Færoes, were now carried on with great energy after Iceland was left behind, to the extent the conditions permitted.

On *July 23rd* the dogs were counted and it was found, that 101 to 102 full-grown dogs were onboard with 12 puppies. Up till that time the Expedition had only lost 4 dogs; one overboard and drowned, 2 bitten to death by the other dogs, one of these, however, before coming onboard the Danmark, and one shot as useless.

After passing round Jan Mayen, the whole crew were divided among the boats before entering the ice. A complete equipment with all belongings and stores was made ready for each boat. Further, each man was told what he should take and do in the cases that might arise. The Expedition was thus prepared for the worst eventuality, fortunately also but little probable, namely, that the vessel might practically without warning and almost instantaneously be crushed in the ice.

It appears from MYLIUS-ERICHSEN's diary, that it was his intention to penetrate into the ice about the 74th degree of latitude and from there, if possible, set the course for Cape Bismarck. He writes, namely, in his diary for July 27th. "In 3 or 4 days we shall enter the ice, perhaps earlier — as it may possibly be of advantage to enter at 74° instead of at 76°, where perhaps the way is blocked and we may miss a chance. From 74° we may then endeavour to penetrate as far north as possible in the direction — conditions permitting — of Cape Bismarck, where we must look for good winter quarters, as the year is so far advanced. Have discussed the matter with RING, KOCH and TROLLE. — We are all agreed".

From Jan Mayen the course was therefore set N. E. by N. until *the 29th* and then due N. and N.N.W. until *July 30th*, 3 p. m., when the ship stood into the ice. The estimated position of the ship was then 74°30′ N. lat. and 3°10′ W. long., but in all probability it was somewhat more to the south, as the sky had been overcast right from Jan Mayen with haze or fog and no astronomical observations could be taken. It was not until August 1st that an observation was made of the latitude and then the position was 20 minutes south of the estimated.

The ice, which at the beginning had only consisted of small ice, gradually changed to large ice-floes, which in the end completely hemmed in the ship.

On *July 31st* just after midnight the ship again came free and the course was now set N.W. in among very scattered ice but in quite smooth water, which indicated, that the ship was either inside the ice-edge or inside a long outrunner from this.

At 9.30 a. m. the ship met with densely packed ice and stood therefore N.N.W. along the edge of the pack-ice belt; some time after noon it succeeded in forcing the dense ice belt and courses were again steered between N.W. and W.N.W. During the day 2 crested seal were shot, an extremely welcome food for the dogs. The weather was hazy and foggy that day, but there was good humour onboard. The ship had succeeded in getting into smooth water inside the ice-edge before the end of July.

From 8 a. m. of *the 31st* until 4 p. m. on *August 1st* the ship made good progress in a W.N.W. direction. The ice was very scattered the whole day, at times even the water was practically free of ice. At 4 p. m. the ice became denser and as a thick fog came on at the same time, the ship was moored to an ice-floe. No fewer than 4 seals were shot that day, so that the dogs could be fed with fresh seal-meat. Towards the evening an endeavour was made to advance, but the progress was very slight in the dense fog.

On *August 2nd* clear weather and bright sunshine were at last obtained. Since the departure from Iceland, the sky had been constantly overcast, hazy or foggy. But at the same time the ice had become denser and formed a belt of impenetrable pack-ice, which forced the ship to take a course about north and progress was exceedingly slight. At 7.15 p. m. a boiler tube burst and the ship was moored to an ice-floe. The fires had to be drawn and the water blown out of the boiler, in order to plug the tube, an extremely unpleasant situation, especially for the captain of the vessel. A fresh south-westerly wind was blowing, which drove the ship towards the N.E.

On *August 3rd* ,10.30 a. m., the engines were again ready for use. The ship was let loose from the ice-floe and manœuvred further into the ice in a north-west direction; but at 6 p. m. it was again moored to an ice-floe owing to dense fog.

The ship now lay moored until 2.30 p. m. on *August 4th*, when the fog lifted somewhat. But two hours later it thickened again and the ship had again to be moored. At 6 p. m., however, the weather became quite clear and further advance could be made.

Good progress was now made in a W.S.W. and W. direction until noon of *August 5th*, when the fog again fell over the ice and the ship had to be moored. Just after noon a bear was shot, which again provided fresh meat for the dogs. Two hours later the fog lifted, but the ice was packed close round the ship, quite enclosing it.

Shortly after midnight of *August 6th*, the ice slackened a little and the vessel succeeded in boring a way through a difficult and nar-

row passage into a clearing of open water, from which all exits were closed by dense pack-ice. The ice consisted of fields several miles long and 5 to 6 meters thick with heavy screw-ice along the borders. It was not until 8 in the evening, that the ice began to slacken and advance could again be made in a north-westerly direction.

From midnight until noon of *August 7th* the advance was exceedingly slow, often through narrow channels between ice-fields several miles in length. Sometimes the channels were just broad enough to let the ship pass through. At noon the ice became denser and all advance was stopped; but at 7.30 p. m. the ship could again move on. At 11.30 p. m. the east coast of Greenland came in sight, to the great joy of every one onboard. Now they saw stretched out in front of them the land, which was the goal of the most ardent wishes of all onboard. The flag had been flying at the top all day in honour of Mrs. MARIE MYLIUS-ERICHSEN, whose birthday it was. "Thus, we were fated to see the promised land on MARIE's birthday", writes Mylius-Erichsen in his diary.

On *August 8th* good progress was made until 2 p. m., when the ship had to be moored owing to the impassable ice.

The ship now lay fast in the ice practically the whole time until 2 a. m. on *August 10th*, partly owing to the impenetrable ice, partly to dense fog. At this time the fog lifted and advance could again be made, with a few stoppages, until 7 p. m., when impenetrable ice was again met with. A bear was shot in the course of the day.

The ship was fast in the ice again until *August the 12th* at 7.15 a. m. These were days of anxiety and uncertainty. Would the Expedition ever reach the coast or not ? On the 11th MYLIUS-ERICHSEN writes in his diary:

"A veritable TYCHO BRAHE day ! The whole day we lay enclosed between two large fields with floes and small hummocks in between, which, though they swirled round and round constantly with the current, had not enough room to drift away. Had we been able to slip out—move only 500 meters; had there been but 12 miles advance towards the north-west ! From the look-out station in the crow's nest we saw slack ice and clearings as far as the eye could reach in the north-west .... Only 30 miles from the south point of the Koldewey Island — and yet so far ! One day, a half day only or perhaps 8 — or perhaps never ! Capricious, fateful ice !".

Fortunately, however, the vessel came free on *the 12th* at 7.15 a. m. and the anxiety which all onboard had felt was forgotten in joyful expectation. MYLIUS-ERICHSEN writes:

"A happy day. Was roused at 6.30 with the news, that an attempt could now be made to break out. Came up into the look-out at 7. RING was working the ship out along the large ice-field between the small floes, which filled the channel and swirled round in a most

irritating manner every time we ran against them, returning into the way again. The weather cleared up and at 9 we were out of the pinch. Land began to show itself. We continued in slack ice at 3 miles speed until 12 along the south side of the same large ice-field. Friis came up and took an excellent sketch of the land ahead, which Trolle and I, who had been up in the crow's nest the whole forenoon, were convinced was the same as we had seen on August 7th—8th ....

Great excitement and good spirits! All up — none thought of sleeping. Maintop and cross-trees and crow's nest all full. Bertelsen made a sketch, when the land at 3 p. m. again appeared clearly and again nearer. More of the coast now showed behind Koldewey Islands and to the south. High, snow-covered hills, whilst the Koldewey Islands were nearly bare of snow. At 5 p. m. the fog descended again and lasted till 7.30. Then it again cleared off and at 8 p. m. we were about 4 miles from land, when the way was blocked by a continuous field with large screw-hummocks, which seemed to stretch right into land, though possibly there was a passage along the land for a boat. The choice lay between Shannon Island, whose 3 tops were seen in the south, and Cape Bismarck, which appeared running out low in a northerly direction to the east of the northernmost Koldewey Island, now in line with the southernmost and Maroussia Island. As there was always the possibility of finding a way southward, even if two or three days were spent in the north without any harbour being found there — which we could not know — and as the south point of Koldewey Island did not seem to offer any harbour (long and low as it is, distinctly a lowland), I made up my mind to go northward. Trolle expressed his willingness (and agreement) and Ring also. At 8 p. m., therefore, we turned northwards but were first obliged to go northeast to avoid a couple of long, intervening floes in west to east right across our course. Our hull has had some powerful blows to-day — for we now have speed on — but has come off excellently. Some of the men would like to have made a landing over the ice but I was against it. First northwards. Had a report drawn up for the first cairn at the first landing, if the land there could not be used as harbour. — Truly a happy day, our best in the ice. No ice-free coastal water, but scattered ice, thus passable. A beautiful land. The Greenlanders think it very beautiful ...".

On *August 13th* the voyage was continued northwards along the east side of Koldewy Island until 7 a. m., when the vessel had to be moored to the land-ice owing to fog. At noon it cleared up and the ice in towards land was now so scattered, that a course could be steered due west until the lead showed 4 fathoms of water at a distance of only some few hundred meters from land. Here the ship was brought to at 3.15 p. m., whilst Mylius-Erichsen and the naturalists rowed

into the coast in perfectly open water and made a landing on Koldewey Island at 76°20′ N. lat.

At length the Expedition had reached right into the coast and for the first time set foot on the promised land, which now for over two years was to witness their successful advance through the wide-stretched and completely unknown regions.

A cairn was built at the landing place, the Danish flag unfurled above and a report on the voyage and the visit of the Expedition to the island placed underneath.

After the landing party had returned onboard, the voyage was continued at 6.15 p. m. northwards towards Cape Bismarck until 10 p. m. Here Mylius-Erichsen and Trolle went ashore to survey the land. As it seemed to show favourable possibilities of winter quarters, the investigation and survey was continued until 2 p. m. of *August 14th*, with the most fortunate and extremely favourable result, that a small bay was found on the south side of Germania Land, which seemed excellently suited to serve as winter harbour.

At 2 p. m. the voyage was continued northwards along the coast at a distance of ca. 6 miles, past Cape Bismarck and on towards Cape Philippe in very scattered ice and open coastal water.

On *August 15th* at 6 a. m., when the ship was close to the south of Ile de France at 77°30′ N. lat. and 18°30′ W. long., all advance was stopped by dense, impenetrable pack-ice. It was then resolved to turn back to winter quarters at Cape Bismarck. After the flag was hoisted at the northernmost latitude reached by the Expedition this year, the course was again set southwards at 9 a. m. At 5.30 p. m. the vessel was moored to the ice off Cape Marie Valdemar. Here at Cape Marie Valdemar instead of at the planned Station A (see p. 53), which had become superfluous with such a northerly harbour, a large depot of provisions for the sledge journeys was landed over a mile of unbroken ice.

Further, a motor-boat expedition set out from the ship, with the object mainly of charting the district between Ile de France and Cape Bismarck. The party consisted of Bertelsen, artist; Brønlund, kaiakman and hunter; Hagen, assistant for survey work; Hagerup, engineer in motor-boat; Koch, cartographer and leader of the expedition; Lindhard, botanist.

The motor-boat carried a kaiak and sledge and had a whale-boat in tow. The expedition was to meet the ship in the winter quarters in the course of 14 days (see p. 77).

On *August 16th* at 3 a. m. the depot was landed, but meanwhile the ice had set in close round the ship and some large floes threatened to press it up against the fast land-ice. The situation was far from pleasant. For 3 hard hours there was continuous manœuvring to get clear of the ice-edge. By 6.30 a. m. success was attained, fortunately,

and a course could again be set south along the land and into the sound between Cape Bismarck and North Koldewey Island. At 10 p. m. the engines were stopped and all the dogs landed.

On *August 17th*, 5.15 a. m., the vessel steamed into the bay inside Cape Bismarck and moored to an ice-floe. As the bay was closed except towards S.—S.S.E., where the islands outside partially covered the entrance, through which it was not believed that drift-ice of any importance could penetrate, and as soundings showed that the depth was suitable with excellent holding ground, it was resolved to choose the bay as winter station. But as the bay was open towards the S.—S.S.E., half a day was taken to examine the conditions more closely. The wait only proved, however, that an excellent harbour had been found and at 9 p. m. the vessel steered into the head of the bay and anchored in 7 fathoms of water. Thus, the first condition was fulfilled for the successful carrying out of the main object of the Expedition, the investigation of the east coast of Greenland. The harbour was called "Danmarks Havn" and lay at 76°46′17″ N. lat. and 18°37′ W. long.

It may be of interest here to compare the ice-conditions off the east coast of Greenland in this year with those of other years. For this purpose we have excellent material in the report[1], which is published yearly by the Danish Meteorological Institute on the ice-conditions in the arctic seas and which is based on the information collected, on the Institute's initiative, by all the vessels sailing in these waters, chiefly the whaling and fishing vessels.

In the "General survey for 1906", we find p. XII:

"In the Greenland Sea the ice belt was broader than usual and along the northern and eastern coasts of Greenland the winter ice was very thick and extended much further out to sea than usual".

And in the detailed reports for 1906, p. XVII:

"*July.* In the Greenland Sea unbroken polar ice was met with between 77° and 81° N. lat. within a border of scattered ice.

At 75° the sealing steamer "Laura" entered the ice on July 16th in an attempt to reach the east coast of Greenland. After working through a broad belt of drifting ice, its way was blocked at 15°—17° W. long. by an apparently land-fast field of ice 60 miles broad, which consisted of polar ice and winter ice frozen together. Several futile attempts were made to reach land between 73° and 75° N. lat.

August. In the Greenland Sea the "Laura" continued its attempts to reach the east coast of Greenland. They were just as futile, however, as in July, and on August 15th it sought out through the ice at ca. 73° N. lat."

[1] V. Garde. The state of the ice in the arctic seas 1906. Published by the Danish Meteorological Institute on invitation of the VII International Geographical Congress. To be found in the Nautical-Meteorological-Annual 1906 published by the Danish Meteorological Institute.

It can be understood, that this report, which appeared at a time when nothing was known as to the fate of the Danmark Expedition, roused a considerable amount of anxiety in expert circles in Denmark. For all indicated, that the year 1906 was a difficult ice year, which indeed has been fully confirmed by the above report on the voyage through the ice.

The honour was so much the greater, that the Expedition had successfully reached into the coast. But not only that. It reached as far to the north as had been hoped for on the whole under the most favourable conditions [1] and went into winter quarters further north than any other ship had earlier succeeded in doing on the east coast of Greenland.

And this was not merely a chance. As will be seen from the above, it was the result of work planned by MYLIUS-ERICHSEN and carried out with a definite aim, whilst the captain of the ship, TROLLE, and the ice-pilot, RING, assisted by all onboard, succeeded in accomplishing MYLIUS-ERICHSEN's plans and hopes.

Another very important result for the Expedition should be mentioned. It succeeded in bringing all the dogs up to the Greenland coast in good condition, which naturally was of the greatest importance for the successful outcome of the Expedition. This was due, without doubt, in addition to the expert care devoted to them all the time by MYLIUS-ERICHSEN and the three Greenlanders, in great measure to the fact, that whale meat had been obtained at the Færoes and fresh seal and bear among the ice.

It was thus under the most favourable auspices, that the work on land could be started.

Extracts from the log.

for the voyage from Jan Mayen and into the east coast of Greenland.

Month and date	Time	Wind	Weather	Temperature		Position estimated		Position observed	
				air	sea	N. lat.	W. long.	N. lat.	W. long.
Saturday 28. July	4 a. m.	S.E.2	overcast	3.9	3.0	—	—	—	—
	8 —	E.S.E.2	overcast	4.2	2.5	—	—	—	—
	12 Noon	E.S.E.2	overcast	3.3	2.3	71° 28′	5° 08′	—	—
	4 p. m.	E.S.E.2	overcast	3.8	2.3	71° 37′	4° 50′	—	—
	8 —	E.S.E.2	overcast	3.6	2.3	71° 53′	4° 35′	—	—
	12 Mn.	E.S.E.2	fog	3.6	2.1	72° 10′	4° 17′	—	—

[1] See p. 39.

Month and date	Time	Wind	Weather	Temperature air	Temperature sea	Position estimated N. lat.	Position estimated W. long.	Position observed N. lat.	Position observed W. long.
	4 a. m.	E.S.E.1	fog	3.5	1.6	72° 26′	3° 49′	—	—
	8 —	S.E.2	fog	4.0	2.3	72° 41′	3° 21′	—	—
Sunday	12 Noon	S.E.1	fog	3.6	1.6	72° 56′	2° 56′	—	—
29. July	4 p. m.	S.E.2	fog	2.8	1.8	73° 09′	2° 34′	—	—
	8 —	E.S.E.2	fog	2.2	1.0	73° 25′	2° 24′	—	—
	12 Mn.	E.S.E.2	overcast	2.5	0.7	73° 42′	2° 24′	—	—
	4 a. m.	S.S.W.1	fog	3.6	1.4	73° 57′	2° 24′	—	—
	8 —	S.S.W.1	fog	3.1	1.7	74° 07′	2° 24′	—	—
Monday	12 Noon	W.S.W.2	haze	2.3	0.8	74° 18′	2° 46′	—	—
30. July	4 p. m.	S.W.1	fog	1.7	0.5	74° 36′	3° 10′	—	—
	8 —	S.W.1	fog	1.4	0.4	74° 45′	3° 23′	—	—
	12 Mn.	S.W.2	fog	1.5	0.7	74° 45′	3° 23′	—	—
	4 a. m.	S.W.2	fog	0.6	0.1	74° 50′	3° 42′	—	—
	8 —	S.W.2	fog	0.7	— 0.4	75° 01′	4° 27	—	—
Tuesday	12 Noon	W.S.W.2	overcast	1.1	0.0	75° 14′	4° 34′	—	—
31. July	4 p. m.	W.3	haze	0.5	0.6	75° 19′	4° 42′	—	—
	8 —	W.N.W.2	overcast	— 0.3	1.0	75° 25′	6° 03′	—	—
	12 Mn.	N.N.W.3	overcast	— 0.5	1.3	75° 30′	6° 38′	—	—
	4 a. m.	N.2	overcast	0.5	1.3	75° 34′	7° 06′	—	—
	8 —	N.W.1	fog	4.5	0.5	75° 35′	7° 46′	—	—
Wednesday	12 Noon	N.1	haze	2.5	0.0	75° 34′	7° 37′	75° 14′	8° 40′
1. Aug.	4 p. m.	calm	fog	0.7	0.0	75° 17	9° 23′	—	—
	8 —	S.W.1	fog	— 1.0	— 0.4	75° 17′	9° 23′	—	—
	12 Mn.	S.W.1	haze	0.5	— 1.2	75° 17′	9° 31′	—	—
	4 a. m.	S.W.1	clear	3.5	— 0.5	75° 22′	9° 47′	—	—
	8 —	S.W 1	clear	4.3	— 0.3	75° 27′	9° 52′	—	—
Thursday	12 Noon	W.S.W.1	clear	3.5	— 0.1	75° 33′	9° 48′	75° 36′	10° 40′
2. Aug.	4 p. m.	W.S.W.2	clear	1.3	— 0.6	75° 42′	10° 35′	—	—
	8 —	S.W.2	clear	1.4	— 0.6	75° 44′	10° 35′	—	—
	12 Mn.	S.W.3	clear	1.5	— 0.5	75° 44′	11° 06′	—	—
	4 a. m.	S.W.3	clear	0.8	— 0.5	75° 46′	10° 32′	—	—
	8 —	S.W.2	clear	0.9	— 0.3	75° 48′	10° 24′	—	—
Friday	12 Noon	W.3	overcast	— 0.6	— 0.7	75° 51′	10° 28′	75° 56′	10° 10′
3. Aug.	4 p. m.	W.S.W.1	fog	— 0.8	— 0.5	76° 03′	10° 40′	—	—
	8 —	W.N.W.1	fog	— 1.0	— 0.8	76° 05′	10° 49′	—	—
	12 Mn.	W.S.W.1	fog	— 0.5	— 0.5	76° 05′	10° 49′	—	—
	4 a. m.	calm	fog	0.3	— 0.9	76° 05′	10° 49′	—	—
	8 —	calm	fog	3.0	— 0.8	76° 05′	10° 49′	—	—
Saturday	12 Noon	W.S.W.1	fog	0.5	— 0.6	76° 08′	10° 39′	76° 07′	—
4. Aug.	4 p. m.	S.W.1	clear	1.2	— 0.1	76° 08′	10° 46′	—	—
	8 —	W.1	clear	— 0.8	— 1.2	76° 05′	10° 49′	—	—
	12 Mn.	S.W.1	clear	— 0.8	— 1.2	76° 00′	11° 29′	—	—

Month and date	Time	Wind	Weather	Temperature air	Temperature sea	Position estimated N. lat.	Position estimated W. long.	Position observed N. lat.	Position observed W. long.
	4 a. m.	S.W.1	clear	—	— 1.5	76° 01′	11° 53′	—	—
	8 —	S.W.1	fog	1.5	— 0.9	76° 00′	12° 39′	—	—
Sunday	12 Noon	calm	fog	—	—	76° 01′	13° 02′	—	12° 27′
5. Aug.	4 p. m.	calm	clear	—	—	76° 01′	12° 27′	—	—
	8 —	calm	clear	— 1.9	— 1.0	76° 01′	12° 27′	—	—
	12 Mn.	S.W.1	clear	— 0.7	— 1.5	76° 01′	12° 27′	—	—
	4 a. m.	calm	clear	7.4	— 0.1	76° 01′	12° 27′	—	—
	8 —	calm	clear	6.4	— 0.4	76° 01′	12° 27′	—	—
Monday	12 Noon	calm	clear	7.0	— 0.4	76° 01′	12° 27′	75° 42′	12° 35′
6. Aug.	4 p. m.	—	—	—	—	75° 42′	12° 35′	—	—
	8 —	calm	clear	— 2.7	— 0.6	75° 42′	12° 35′	—	—
	12 Mn.	calm	clear	4.0	— 1.0	75° 48′	12° 57′	—	—
	4 a. m.	calm	clear	—	— 0.2	75° 56′	13° 01′	—	—
	8 —	calm	clear	2.9	— 0.2	76° 04′	13° 18′	—	—
Tuesday	12 Noon	—	—	—	—	76° 08′	13° 35′	75° 56′	14° 05′
7. Aug.	4 p. m	calm	clear	4.5	— 0.9	75° 56′	14° 05′	—	—
	8 —	calm	clear	2.0	— 1.1	75° 56′	14° 05′	—	—
	12 Mn.	calm	clear	—	— 1.6	75° 59′	14° 26′	—	—
	4 a. m.	calm	clear	7.5	— 1.2	76° 04′	14° 44′	—	—
	8 —	S.S.E.1	clear	5.0	0.6	76° 07′	15° 14′	—	—
Wednesday	12 Noon	S.S.E 1	clear	2.6	— 1.2	75° 59′	15° 09′	76° 01′	14° 30′
8. Aug.	4 p. m.	S.S.E.1	—	1.0	— 1.0	75° 58′	14° 21′	—	—
	8 —	S.S.E.1	—	— 0.2	— 1.1	75° 58′	14° 21′	—	—
	12 Mn.	S.S.E.1	fog	0	— 0.3	75° 58′	14° 21′	—	—
	4 a. m.	calm	fog	0.2	— 2.2	76° 03′	14° 30′	—	—
	8 —	E.N.E.1	fog	— 1.2	— 1.0	76° 03′	14° 30′	—	—
Thursday	12 Noon	calm	fog	— 1.6	+ 0.5	76° 03′	14° 30′	—	14° 44′
9. Aug.	4 p. m.	calm	fog	— 2.0	— 0.3	76° 03′	14° 44′	—	—
	8 —	calm	fog	— 4.5	— 1.0	76° 03′	14° 44′	—	—
	12 Mn.	calm	fog	— 3.2	— 1.4	76° 03′	14° 44′	—	—
	4 a. m.	calm	snow	— 1.6	— 0.3	76° 07′	14° 57′	—	—
	8 —	—	—	—	—	76° 08′	15° 30′	—	—
Friday	12 Noon	E.N.E.1	overcast	— 1.2	— 1.0	76° 07′	15° 46′	76° 06′	—
10. Aug.	4 p. m.	N.N.E.1	overcast	— 2.5	— 0.8	76° 08′	15° 49′	—	—
	8 —	N.N.E.1	overcast	— 3.2	— 0.8	76° 08′	15° 49′	—	—
	12 Mn.	N.N.E.1	cloudy	— 2.3	— 1.8	76° 08′	15° 49′	—	—
	4 a. m.	N.N.E 1	overcast	— 1.5	— 0.5	76° 08′	15° 49′	—	—
	8 —	E.N.E.1	overcast	0.0	0.9	76° 08′	15° 49′	—	—
Saturday	12 Noon	N.N.E.1	overcast	0.0	0.0	76° 08′	15° 49′	76° 02′	16° 14
11. Aug.	4 p. m.	N.N.E.1	snow	— 0.8	— 0.3	76° 02′	16° 14′	—	—
	8 —	calm	snow	— 1.2	— 0.9	76° 02′	16° 14′	—	—
	12 Mn.	calm	overcast	— 0.5	— 0.8	76° 02′	16° 14′	—	—

Month and date	Time	Wind	Weather	Temperature		Position estimated		Position observed	
				air	sea	N. lat.	W. long.	N. lat.	W. long.
Sunday 12. Aug.	4 a. m.	N.N.E.1	cloudy	1.2	— 1.7	76° 02′	16° 14′	—	—
	8 —	—	haze	— 1.5	— 0.5	76° 01	16° 14′	—	—
	12 Noon	calm	clear	3.8	0.0	76° 03′	16° 55′	76° 11′	17° 05′
	4 p. m.	—	—	—	—	—	—	—	
	8 —	—	—	—	—	—	—	—	
	12 Mn.	—	—		—	—	—		

Note. In the above extract from the ship's journal the direction of the wind is given by compass and the strength on the scale 0—12. The air and sea temperatures are indicated on the Centigrade scale.

B. The period between the arrival at Danmarks Havn until the great sledge-journey northwards in the spring of 1907.

The winter quarters of the "Danmark".

See Plan III.

On August 17th at 9 p. m. the "Danmark", as mentioned above, anchored in Danmarks Havn only about 100 meters from land in 7 fm. water. Both bower anchors were set out and a chain mooring was led from aft to land and shackled to the ship's heavy kedge, which had been buried first of all and supported by planks and stones. The ship thus lay with the stem almost due south. The distance from the stern to land was only about 60 meters. The ship lay off a small point between two rivers, one of which especially appeared to have plenty of water in the early summer. This justified the assumption, that the ice early in spring would break up round the vessel and leave the harbour free. The low land between the two rivers was excellently suited for the houses, sheds, observatories etc., and for storing all the goods to be landed —work which occupied most of the attention of those onboard in the time that followed.

Mylius-Erichsen thus saw clearly, that if he could only get most of the goods on land and all the dogs remained in good condition, he would be able to achieve the end aimed at, even though the ship, against expectation, should be lost in the course of the winter.

On August 17th Mylius-Erichsen wrote as follows to Trolle.

"The first and most important aim of the Expedition — to bring our vessel and stores to the northernmost base mentioned in the plans — has been achieved. The second, most important aim is to ensure the safety of both, at the same time that the cartographers and naturalists are making the best use, by work away from the ship, of the few summer days still left after our late arrival. With the stores landed in good time, all the aims of the Expedition can be achieved, even if the ship is lost now or later. Without the ship we can move from here, when our work is done, by journeying south with sledges and boats via the depots to Angmagsalik; if the stores are not landed, we can do nothing if the ship should be lost. But to keep the dogs alive, is just as important as bringing the stores in safety on land.

If we cannot obtain fresh meat for the dogs, about half of our ca. 100 dogs must be killed in the course of the dark period, as I cannot venture to use much more of the already greatly reduced quantity of dog food except on the sledge journeys. And from what I have seen to-day, partly the situation of the ice, partly the land — the extent not investigated behind the ice — I know, that our only chance

of achieving an essential part of the programme planned necessitates our having all the dogs in good condition ...".

To obtain food for the dogs by hunting and at the same time carry on scientific investigations, Mylius-Erichsen resolved to make an excursion at once by boat into Dove Bay along with 8 others — Tobias Gabrielsen, Peter Hansen, Jarner, Fritz Johansen, Gundahl Knudsen, Lundager, Manniche and Chr. Bendix Thostrup, whilst Trolle at the same time with other 12 members of the Expedition — Bistrup, Knud Christiansen, Freuchen, Achton Friis [1], Hans Jensen, Koefoed, Hendrik Olsen, Charles Poulsen, Ring, Gustav Thostrup, Wegener and Weinschenck — should carry on all the work onboard and at the winter quarters. If any large animals appeared, Trolle was also to arrange for hunting them, and Friis and Wegener were to be given as much opportunity as possible to carry on their own special investigations, whilst the care of the dogs was entrusted to the Greenlander Hendrik Olsen.

In carrying out this scheme, those onboard began at once on all the many tasks to be done in the winter quarters, both onboard and on land. All the woodwork, planks and boarding for building the houses, observatories, sheds etc., provisions, coal, materials for the kites and balloons, hydrogen holders and many other things had to be unloaded and brought on land, whilst at the same time all things onboard had to be cleared up and arranged in view of the approaching winter.

When the ship's carpenter, Gundahl Knudsen, returned on August 29th from the boating expedition to Dove Bay, the work of setting up the buildings on land was begun along with the upper structure of the ship — work that was only completed on October 24th.

The position of the vessel in the harbour as well as all the installations on land will be seen from Plan III.

Description of the station in Danmarks Havn.

Mylius-Erichsen was fortunate in the selection of the Expedition's winter quarters. The vessel lay very securely according to the conditions and with a very good chance of escaping enclosure by the ice. The station lay centrally in a perfectly new region with equally good access to the outer coast as to the large fjords and lakes to the west. Low, undulating gneiss hills to the north and west protected the station to some extent from the prevailing north-west winds; to the east, south and south-west it was open out over the low land and out over the fjord as far as Lille- and Store-Koldewey Islands. The landscape was gray and sombre, but it might well be

[1] Achton Friis only took part in this work for a few days, however, joining Mylius-Erichsen thereafter and participating in the expedition into Dove Bay until $^5/_9$.

thought, that the work would be so engrossing, that this fact would only be of any practical importance to the artists.

The small plot of land, where the station was set up on shore, might itself be regarded as an island, being surrounded by the two small rivers (Øster-Elven and Vester-Elven) and the harbour. The ground here consisted of a low gravel plain, through which rock projected here and there. The vegetation was rich considering the conditions; immediately north and east of the dwelling-house (Villaen) extended continuous carpets of Cassiope and further north in the swampy bog (Basiskæret) there was a sparse growth of Cyperaceae. The two rivers were just so wide, that one could in general jump over them; but especially the Vester Elv in the early summer could bring down considerable quantities of water and a gangway (Spang) had to be thrown over it.

According to the original arrangement the Expedition was to carry 2 houses to Greenland, a larger to be set up at the winter quarters, and a smaller intended as a dwelling house at a depot, which might be formed away from the ship as far north as possible. In both cases the walls, gable, floor, loft and roofing had been constructed at home, so that only a few hours' work was required to set up the houses in Greenland. The largest of the houses, which was sent to Iceland by mail-steamer, had to be left behind owing to lack of space in the vessel and only the smaller was taken to Greenland. The unwieldy large pieces of which it was composed, had to be lashed over the main-hatch and here they were so damaged and warped to such an extent, that it became necessary in great part to separate the planks and set them together again before the house could be built.

The house, which was almost 5 meters square internally, had only one room. In the one gable was a window, in the opposite gable the door and above a trap-door; there was no porch. As the window of necessity had to face southward, the door and trap-door faced northward. With the prevailing north-west winds this was an extremely unfortunate arrangement; a small porch was therefore built on the north side of the house with entrance from the east. As the porch could not be raised higher than the trap-door for certain practical reasons, this was directly exposed to snow-drifts and the consequence was, that the loft became absolutely full of snow during every snow-storm.

A heavy wall of earth and stone was raised with great labour round the house almost to the eaves; in the autumn of 1907, when the wall had crumbled partially, it was repaired with provision boxes.

The interior furnishing of the house was quite spartan-like. On each side and nearest the door there were 2 broad berths one above the other. Against the south gable wall stood a long table, with sitting room for 4, one at each end and two at the long side in towards the

room. In the middle of the room stood a small cooking stove with the chimney running straight up through the loft and roof. Just inside the door was a sink, round which a dark room was constructed later.

The house was built with great care by Gundahl Knudsen in the beginning of September 1906. During the first winter it was tight and good; but already in the second winter the snow began to force its way in through holes in the corners. The plentiful circulation of air necessitated having the stove greatly heated, but also resulted in the warmth being very unevenly distributed in the small room. On one occasion — certainly out of the common — there was a difference in temperature of 45° C. between air and floor.

The loft of the house was used for storing the tent and sledge materials etc., clothes, boots and such like.

Two smaller sheds (Depotskure) were raised close to the villa for storing instruments, plant collections, paintings, tools, clothes etc. These sheds were also, like the astronomical observatory, partly constructed at home, but here the principle was good, as the walls and floor had a comparatively small area.

So long as the Expedition stayed at Danmarks Havn, the villa was occupied by Bertelsen, Koch, Lundager and Wegener. This arrangement was made chiefly out of regard for the astronomical, magnetic and meteorological observations, which compelled Koch and Wegener especially to be constantly near the instruments. It was always possible, namely, that the connection between ship and land might be broken or made difficult. Further, the villa stood in telephonic communication with the ship (Telefon-Ledn.).

The instruments in the villa consisted of a normal barometer, normal clock, barograph and instrument for measuring the electricity of the air. A brass rod, led up through the gable from the loft into the open and provided at the end with a radio-tellurium point, served as collector for the registering instrument in the room.

Round the villa were grouped observatories and other arrangements for the magnetic, astronomical, meteorological and air electricity observations, in the following manner.

The magnetic observatory (Magn. Obs.) contained a small declination measuring instrument. The observatory had single walls with no porch and was too lightly built at home. In spite of mats at the door and other lining of the observatory and in spite of a copper stove skilfully constructed by Hagerup, it was found impossible during the second winter to keep up a sufficiently high temperature and the clockwork stopped.

Stand for the magnetic theodolite (Magn. St.). Here absolute determinations were made of the declination, inclination and horizontal intensity.

In the astronomical observatory (Astr. Obs.) stood the large theodolite of the Expedition on a heavy granite support, which was cemented fast to the rock. Electric wires (Lys-Ledn.) were set up by Chr. Bendix Thostrup from some dry cells in the villa to the observatory, so that both observer and writer could have electric light. The large theodolite was used to determine the daily time, for the determination of the longitude and latitude, investigation of sidereal and terrestrial light refraction and some special observations.

The meteorological work was served by quite a number of installations.

The thermometer box (Thermometerskab), which stood about 2 ½ meters above the ground, contained the thermograph, maximum and minimum thermometers, dry and moist thermometers, aspirator and often a hair hygrometer.

Halfway between the thermometer box and wind-vane (Vindfløj) a pole was fixed in the ground (Anemometer); on this a small hand anemometer, which was kept in the villa, was placed daily. The force of the wind was also measured on the vane which had a special arrangement for this purpose.

The rain and snow fall was collected each morning at 8 a. m. from the rain-guage (Regnmaaler).

For the investigation of the temperature, moisture, direction and force of the wind in the high atmosphere, kites and — in calm weather — balloons were used. The kites were kept, when folded up, in a couple of large boxes (Dragekasser) and, naturally, had to be fitted together each day before use. During the winter this work was very troublesome and gave rise to considerable risk of frost-bites; in the autumn of 1907, therefore, a large shed (Drageskur) was built which could hold 3 kites all ready for ascent.

The two balloons[1] were kept in a wooden box (Ballon). They were filled with hydrogen, which in greatly compressed condition had been carried up in 100 large steel holders (Brintflasker).

Both kites and balloons were provided before ascending with thermograph, barograph and hydrograph, all in one instrument. They were connected with the ground by means of piano wire 12 kilometers long, which was rolled on a drum with a hand-winch (Dragespil).

A special use was made of the crow's nest (Udkigstønden) on the maintop. In each month a series of continuous meteorological observations were taken every other hour during a diurnal period at the thermometer box, 10 cm. above the ice and in the crow's nest. The aim with these series was a special study of a low-lying temperature inversion, which had been determined from the kite ascents.

In connection with the meteorological installations at the winter quarters, there was also a field station erected on the adjacent 132-

[1] A 3rd balloon had been lost from the breaking of the connecting wire.

meter high Thermometerfjæld. The field station, however, was already completely destroyed during a snowstorm in the first winter and was not erected again.

The air electricity station (Luftelekt. St.) indicates the spot, where regular, simultaneous determinations were made of the potential difference of the air per meter and the conductivity of the air. When not in use the instruments were stored in the villa.

For the measurement of the water-level a wire with a heavy weight at the end (Vandstandsmaaler) was let down through a hole in the ice at the stem of the ship.

The other scientific investigations at the station itself did not affect its outer appearance, but were carried on in part on the ship in a working laboratory (Laboratorium), where the hydrographer, the two zoologists and the geologist had their several places. A dark room was fitted up in this laboratory.

Among the objects which made up the appearance of the station, apart from the ship, the boats (Baade) have still to be mentioned. In winter they were drawn up on land close by the buried kedge, depots of boat and sledge provisions (Prov. Depot) and of benzine for the motor and coal (Kul & Benzin). Further, there was a fire-hole (Brandvaage) and a washing place (Vaskested). The first was a hole in the ice forward on the starboard side of the ship. In winter it was cut through once or twice each day, so that water might easily be got at any time in the event of fire. The washing place was a small islet in the Vester Elv, where the greater part of the Expedition's washing was carried out in the summer.

On the ship itself a roofing of planks was laid over the whole of the deck from the upper structure aft to the front of the laboratory, a completely enclosed space, which formed an excellent working room for the preparation of all the many things to be made during the winter. Thus, Gundahl Knudsen worked here for a long time on the sledges for the sledging expeditions; here stood the forge where Koefoed and Weinschenck often had something or other to do and so on. For the sake of warmth a thick snow wall was raised round the whole of the ship right from the sea-ice and as high up as possible along the side. Lastly, all square-sails were taken down and stored in the hold out of the way.

The station in Danmarks Havn just described was to be the base for the numerous excursions which were carried out with exemplary energy and magnificent hardihood during the ensuing period of nearly two years.

It would be beyond the scope of this report to give a detailed account of all the excursions. Only the most important need be referred to here in some detail.

To give some notion, however, of the enormous amount of work

done in this way a summary is added in tabular form at the end of this report, showing all the excursions made of about 1 day's duration and more, whether by boat, motor carriage, sledge or other way.

The tables give, further, the names of those who took part in the different excursions, the object of these and their duration etc.

Boat journey to Cape Marie Valdemar, $^{15}/_{8}$ to $^{27}/_{8}$, 1906.

As mentioned on p. 65, an expedition left the ship when it lay moored to the ice off Cape Marie Valdemar on *August 15th.*

The main object of this expedition was to carry out cartographic work in the district between Ile de France and Cape Bismarck. Further, the stores landed the same day on Cape Marie Valdemar were to be transported if possible to Ile de France, thus carrying the depot about 40 kilometers more to the north. Lastly, hunting especially for large game was to be carried on to the greatest possible extent, to provide a large quantity of food for the dogs.

The members of the expedition were: Bertelsen, artist; Brønlund, kaiakman and hunter; Hagen, assistant for the survey work; Hagerup, engineer in motor boat; Koch, cartographer and leader of the expedition; Lindhard, botanist.

The expedition was to join the ship again at Danmarks Havn in the course of 14 days and in any case not later than August 31st.

In a motor-boat with a whale-boat in tow the expedition left the ship on *the 15th* at 10 in the evening. It also carried a kaiak and sledge.

Shortly after, it landed on a small ledge of rock close to the east of Cape Marie Valdemar. The boats were now hauled up on land and the tent raised. From this time onwards the ice conditions were constantly so bad, that the boats could not be used. It was thus impossible to carry the depot of stores up to Ile de France. But excursions were made with the sledge in the district round about Cape Marie Valdemar and Koch managed to carry out a considerable amount of cartographic work. Of large game, 2 bears were obtained.

One of these was shot by Koch with a 6 mm. revolver. When observed, the bear fled into a small lake on land and stayed there treading water with only its head above. From a thin ice-floe, which extended from the bank almost to the bear, Koch killed it with a single shot in the neck. It was a daring and dangerous manœuvre. What would have happened, had the ice given way under Koch? — but fortune favours the brave!

On *the 23rd*, when the expedition returned to the tent on the ledge, the ice was still so bad, that the boats could not be used. As the time was now so far advanced, however, that the journey southwards to Danmarks Havn had to be thought of, the boats were care-

fully laid up on the skerry [1]. The expedition then retired southward over the sea ice along the land, dragging with it the laden sledge. On *the 25th*, however, open water was encountered. The sledge and practically all the stores had to be left here [2], and whilst Brønlund went on in the kaiak, the others sought their way overland and on foot to the station. On *August 27th* the whole party was again onboard.

It had been a tiring excursion. But the members of the party had earned good experience. They were at once initiated into the trials and changing fortunes of the arctic life and the scientific results had been satisfactory.

Boat journey to Dove Bay,

$^{18}/_{8}$ to $^{14}/_{9}$, 1906.

With the object of obtaining food for the dogs by hunting and at the same time of carrying out scientific investigations (see p. 72), Mylius-Erichsen immediately on arriving at Danmarks Havn resolved to make an excursion into Dove Bay.

In this the following took part, in addition to Mylius-Erichsen, Tobias Gabrielsen, kaiakman; Peter Hansen, coxswain; Jarner, geologist; Fritz Johansen, biologist; Gundahl Knudsen, engineer; Lundager, botanist; Manniche, ornithologist; Chr. Bendix Thostrup, coxswain. Some days later, Achton Friis also joined the expedition and took part in it until September 5th.

On *August 18th* the expedition set out shortly before midnight in a motor-boat, towing Amdrup's ice-boat [3]; in almost ice-free water the boats stood along land in towards Stormnæs, where the tents were pitched. On *the 19th* scientific investigations were made in the neighbourhood of Stormnæs, whilst Peter Hansen and Gundahl Knudsen were sent to the ship to fetch a quantity of sledge provisions, which Mylius-Erichsen intended to place in a depot on Orienterings Island. With heavily loaded boats the expedition proceeded on *the 20th* further west along the mainland, still in practically ice-free water. On the way a couple of walrus were shot and on Hvalrosodden in the inner part of Dove Bay the expedition succeeded in shooting 11 to 12 walrus.

Again the goddess of fortune had smiled on Mylius-Erichsen. Here was food for the dogs for a long time (a walrus may weigh up

[1] From the $^{7}/_{9}$ to $^{10}/_{9}$ Hagen, Lindhard, Trolle and Weinschenck made an excursion on foot to the skerry, to bring back the boats if possible. The ice conditions were unchanged, however, and the party were obliged to return without the boats.

[2] The stores left behind were fetched by motor-boat on $^{27}/_{8}$—$^{28}/_{8}$ by Brønlund, Gundahl Knudsen, Gustav Thostrup and Weinschenck.

[3] The members of the Expedition called this boat the "Amdrup-boat". See p. 43 note.

to 1,500 kg.) and further, meat of the best kind one can give to a Greenland dog. If the unexpected did not happen, the dogs could now be kept in good condition until the great, important sledge journey northwards was undertaken.

Tents were pitched on Hvalrosodden and with this tenting place as base a number of excursions were made to survey the country.

Several interesting geographical discoveries were made (Sælsø, Lakselv and Mørke Fjord) and all the naturalists had good results to show. On the excursion to the peculiar Mørke Fjord, a long but very narrow fjord surrounded by almost vertical sides, the boat was suddenly surprised by such a hurricane-like fjord wind, that the boatswain, Chr. Bendix Thostrup, only just prevented the boat from capsizing by keeping it going right up into the wind.

The land hunting also gave good results. During an excursion to the north-east of the tenting-ground Peter Hansen discovered a herd of about 20 musk-oxen, 7 of which were shot, and Manniche also managed to shoot a polar wolf, an animal, as known, very difficult to get near.

It should be mentioned lastly, that Eskimo winter houses, tent rings and other signs of earlier Eskimo settlement were found on Hvalrosodden, which led to a series of excavations and investigations there.

The motor-boat and the Amdrup-boat made several journeys to the ship with meat and collections, Stormnæs being utilised as intermediate station. In the beginning only the Amdrup-boat was used in the transporting work, the motor-boat being away on an excursion to the Koldewey Islands. To hasten on the work, several parties were sent out to Stormnæs from the ship and assisted in the transport of all the things to the station at Danmarks Havn[1]. A great part of the walrus meat, however, was only brought to the ship in the course of the winter. For the time being it was deposited in depots on Hvalrosodden and at Stormnæs. On *September 14th* all the members of the boat expedition had again returned to the station.

The whole excursion had been most successful and the boats and equipment had come out well from the trial. The main object, to procure food for the dogs, exceeded all expectations. All the members had been initiated into the difficulties of travelling and exploring, the scientists had had excellent opportunities of cultivating their special branches and, lastly, a thorough knowledge of the geographical conditions in the interior of Dove Bay had been obtained.

Boat journey to Cape Bismarck and Koldewey Islands, $^1/_9$ to $^4/_9$, 1906.

The whole of the land survey work, according to the arrangement, was placed in the hands of Koch and directed by him. He gradually

[1] See list of the journeys made from the station in Danmarks Havn.

trained a staff of capable assistants, who helped him in carrying out the extensive cartographical work accomplished by the Expedition.

In addition to the triangulation of the land, Koch and his assistants gradually succeeded in building a number of cairns round about on the tops of the hills, from which the best view could be obtained and which were most easily recognisable from a long distance.

To build the cairns, carry on the cartographical work and, if possible, obtain coloured plates, were the main objects of the boat journey to Cape Bismarck and the Koldewey Islands. The members of the party were: Hagen, Hagerup, Koch and Wegener with Koch as leader.

Early on the morning of *September 1st* the party set out in the motor-boat. Cape Bismarck was soon reached. It is a small, fairly isolated, rocky prominence, off which lie a number of skerries and islands. After carrying out measurements the party sailed further to Lille Koldewey Island, which rises as a single, enormous, reddish, smooth rock out of the sea. Here a cairn was built and measurements were made, then the party went on again to the eastern side of Store Koldewey Island, where the boat was hauled up and the tent raised at 9 a. m.

September 2nd. Early in the morning Hagen, Hagerup and Wegener mounted to the highest point of the island. This was reached after an almost continuous climb of 5 hours. Here a magnificent view was obtained over the extensive fjord landscape lying to the west. Hardly a plant and not a single animal could be seen, nothing but stones. Here Hagen made a survey and a cairn was raised.

On *September 3rd* the intention was to go over to the west side of Store Koldewey Island. The ice prevented this, however, and one of the blades of the propeller was broken off by the ice. A landing was effected on the northern part of the island and another measurement made from a high hill and a cairn built. At 9 p. m. the voyage was continued with the course set homewards. In an attempt to force the boat at full speed through a narrow channel between two ice-floes, a hole was made in the starboard side, through which the water poured in. The hole was quickly stopped with waste, however, and at 3 a. m. on *September 4th* the party reached the ship.

Boat journey to Cape Bismarck and the Koldewey Islands, $^{15}/_{9}$ to $^{19}/_{9}$, 1906.

As with the foregoing, the main object of the expedition was to build cairns and take measurements on Cape Bismarck and the Koldewey Islands.

The expedition, which was led by KOCH, consisted of BERTELSEN, HAGEN, JARNER, KOCH, LINDHARD and G. THOSTRUP.

On *September 15th* early in the morning the expedition set out in one of the ship's whale-boats. After taking measurements and building a cairn on Cape Bismarck the course was set right over to Røseløbet, which however was filled with ice and the passage found impracticable. The boat was then hauled up on the spit and next day set in the water on the other side of the island.

On *September 16th* there was a strong wind with snow and no further advance could be made.

September 17th. With the tent left standing on the spit of land, the party at 6 a. m. rowed over to Store Koldewey Island, where some triangulations and measurements were made as also some detailed measurements in the neighbourhood of the head station. At the same time JARNER carried out geological investigations, whilst BERTELSEN painted. At 7 p. m. the party returned to the spit, where the boat was again hauled up on land.

On *September 18th* the boat was again hauled over the spit and set in the water on the eastern side of the island. The tent was again left standing, whilst the boat was rowed up on the eastern side of the island, where a number of triangulations were made as well as detailed measurements. At 7 p. m. the party were again back at the tent.

September 19th. After making some triangulations and detailed measurements in the morning on the western side of the island, the party began the homeward journey. It was also high time. It was freezing 10°, the new ice had already begun to form at many places and there was the risk of not being able to force a way through. The homeward voyage was very tiring and exciting; in Danmarks Havn especially the new ice was so thick, that the boat could hardly get through. The party did not reach the ship until 10 p. m.

This was the last of the boat journeys for that year. On September 19th, when KOCH's party returned from the Koldewey Islands, the difficulties were so great, as described above, that the boat could hardly force its way through the new ice in Danmarks Havn, and on the 21st already the new ice was bearing.

There was enough to do at the station however. KOCH and his assistants set up a base out on Basiskæret and built cairns in view of the triangulation work to be done. The naturalists worked steadily within their own departments, whilst all the other hands were busily engaged in getting the station into order. The dogs were gradually arranged into teams and divided among those who were especially to take part in the sledge journeys. Many of the members of the

Expedition must indeed, owing to their position, remain as a rule at the station, however much they might wish to take part in the sledge excursions. After the dogs had been distributed, it was the duty from that time of the owner of the team, as far as possible to look after them himself and feed them, so that they might learn to look upon him as their own special lord and master. The dogs were all well nourished and in excellent condition after the large quantity of walrus meat had been obtained; but there had also been a considerable shrinkage in the stock of meat.

Sledging was carried on with great energy under the direction of the Greenlanders, so as to train for the position of sledge driver, whilst skating was indulged in more as a pleasure.

The machinery of the motor-carriage was tested, but proved to require overhauling.

Indoors there was a great press of work to get all ready for the sledge journeys, which were now soon to be undertaken; the preparation of the sledges and harness for all the many dogs, about 100, occupied attention especially.

And already on October 1st the first sledge journey was undertaken.

1st sledge journey northwards to lay out depots, $^{1}/_{10}$ to $^{19}/_{10}$, 1906.

The main object of this expedition was to lay out various depots along the coast north of Danmarks Havn. The depots were to serve as supports for the great, projected sledge journey northwards in the spring of 1907. Along with laying out the depots, the unknown land, which was now to be travelled over, had to be investigated and surveyed in the greatest possible extent.

In the expedition, which was led by Mylius-Erichsen, the following members took part: Bistrup, Brønlund, Tobias Gabrielsen, Hagen, Peter Hansen, Jarner, Koch, Mylius-Erichsen, Ring, G. Thostrup and Trolle.

On *October 1st* at 3 p. m. the party set out, with 10 sledges and about 90 dogs.

The course was laid over the sea ice along the land and towards the depot on Cape Marie Valdemar, which was not reached until *October 3rd* at 4 p. m. The bear shot by Koch in the autumn and which had been deposited here, was now put to good use as food for the dogs.

On *October 4th*, 11½ a. m., the journey northwards was continued and at 7 p. m. of the same day the tents were pitched at Cape Amélie, where also a depot was made.

Whilst Jarner and Trolle remained here to carry on geological and geographical investigations round about Cape Amélie and in

the Skærfjord, the others pushed on northwards. On the 6th, however, Bistrup had to return with Peter Hansen, who had fallen sick.

North of Cape Louise the character of the land completely changed. The coast retreated in a long and flat bay, off which innumerable skerries and small islands extended from Cape Louise due northward.

A depot was again made on the land in from the southernmost of these skerries, called Bjørneskjærene, because the expedition shot a couple of bears here.

In the bay mentioned the expedition drove over glacier ice, a discovery of great interest in scientific regards but extremely unpleasant for advance with the sledges, as the glacier ice was full of round hummocks and deep fissures, which often compelled the expedition to make considerable detours.

Later investigations proved, that most of the glaciers on the mainland at the head of the bay did not calve, but were prolonged out into the water right over to the outlying row of islands and skerries.

The bay was given the name "Jøkelbugt".

Here in Jøkelbugt two more depots were built, one on Hagens Island (77°58′ N. lat.)[1] and one on Nordre Depot Isl. (78°14′ N. lat.), which the expedition reached in the evening of *October 7th*. On *the 8th* the return journey was begun.

In the southern part of Jøkelbugt, Hagen and Ring separated from the others to carry out survey work there and when Cape Amélie was passed, Brønlund and Mylius-Erichsen drove into the Skærfjord to join Jarner and Trolle, whilst Tobias Gabrielsen, Koch and G. Thostrup continued direct to the ship, which they reached on *October 11th*.

Hagen and Ring remained 4 days in the southern part of Jøkelbugt, which was not covered with glacier ice but with old, unbroken sea-ice, filled with frozen-in, scattered icebergs. The glacier in here must therefore calve. On *October 13th* the return journey was begun and Cape Amélie was reached in the evening of *October 14th*.

Here they met Bistrup, Tobias Gabrielsen, Peter Hansen and Hendrik Olsen. After Bistrup with the invalid Peter Hansen had arrived at the ship, the latter had to lie up in bed for a day, but then felt himself so well, that on the 12th he accompanied Bistrup and the two Greenlanders northwards to lay out a depot of dogs' food at Cape Amélie. On the 15th all six began the return journey and reached the ship on the evening of the 16th.

From *the 6th* till *the 9th* of October Jarner and Trolle carried on investigations and survey work in the neighbourhood of Cape Amélie. After Mylius-Erichsen and Brønlund joined them on the 9th, all 4 proceeded further into Skærfjord on the 10th and in-

[1] The depot on Hagen Island was used up by Hagen and Ring, however, during their stay in the southern part of Jøkelbugt to carry on survey work there.

vestigated it geologically and geographically from the 10th to the 17th. On *the 18th* the return journey was begun and the sledge party arrived at the ship on *the 19th.*

The first sledge journey was thus completed and was in every respect satisfactory. Depots had been laid out at Cape Amélie, on Bjørneskærene, Hagens Isl. and Nordre Depot Isl., and the unknown land right up to ca. 78¼° had been partially charted and surveyed.

But the principal thing was, that the sledge equipment had been tested and experience gained for the coming, important sledge journeys. Mylius-Erichsen and all the members were agreed, that the best method of travelling was by means of the Eskimo dog sledges, an experience which Mylius-Erichsen had gained on his expedition to Cape York and which had been fully confirmed on the sledge journey just ended. And this had by no means been carried out under specially favourable conditions. The sun was up for only a short time in the day and the temperature had often been very low. At the station in Danmarks Havn, for example, the minimum temperature during the period from the 1st to the 19th of October had reached — 22.3° C. and the mean for these 19 days of all the daily minima was — 13.5° C. The sledging had at times been exceedingly bad, especially in Jøkelbugt, so that good opportunities had been obtained of seeing, how the sledges behaved under different conditions.

During the sledge journey northwards and after this the work at the station, to bring it into complete order, was being steadily pushed on. On the ice forward on the starboard side a snow house for ice was built and on the port side a snow house for the motor carriage. A number of snow houses were built for the dogs. The construction was the same for all the houses. Snow-blocks of about one foot in diameter were cut from very hard, frozen snow and the walls built up by building the blocks one above the other. The roof was formed of some planks with snow above. It was not until October 24th, when the superstructure on the ship was finished, that the station assumed its final appearance.

After Lindhard and Weinschenck had overhauled and cleaned the motor-carriage, this was again tested. With two men on it over fairly heavy snow the motor overtook Jørgen Brønlund's sledge, which with Freuchen and 9 dogs had been given a start of about 30 meters. There is thus scarcely any doubt, that on many occasions motor-carriages would be found very useful on arctic expeditions.

The naturalists were constantly busy, each in his own field, but gradually as the cold increased in intensity and everything became covered with ice and snow, the out-door work was more and more restricted. But there was also more than enough to do indoors, in working up the material already collected.

The daily meteorological observations, which had started already on August 17th, were continued uninterruptedly and the magnetic and astronomical observations were carried on along with them. Balloon and kite ascents were often made and the northern lights studied.

WEGENER's constant assistants in carrying on the meteorological and magnetic work were: BISTRUP (absolute magnetic measurements), FREUCHEN (meteorological observations), HAGERUP (magnetic registering observations), LINDHARD (air electricity observations) and KOEFOED and WEINSCHENCK (kite ascents).

KOCH continued with his survey work and astronomical observations. Tidal observations were begun under BISTRUP's direction and TROLLE began his sledging excursions for the purpose of making hydrographical observations.

In spite of the increasing cold the artists continued taking studies. It may be of interest to future expeditions to know how the colours held and how they were dealt with in the cold. On this BERTELSEN has reported as follows:

"It proved, that the oil colours first froze at — 20° C. and that the colours did not suffer much, even when frozen for a long time and repeatedly thawed. It was quite possible, however, to paint outside in harder frost than — 20°. The first year BERTELSEN tried to have a Primus or lamp with him, but it was always difficult to get the palette thawed and the light was blown out by the least wind. Next year he mixed the colours with benzine before setting out and thinned them constantly while painting. In this way it was possible to paint outside even in the severest cold the Expedition encountered. Thus, BERTELSEN has been painting outside at a temperature between — 30° and — 40° C. Turpentine can also be used to thin the colours; it did not freeze either, but as a lot has to be used, BERTELSEN believes, that it is not so good, making the colours unclean. The tubes have to be carried in the pocket, otherwise they freeze and the colours cannot be got out.

BERTELSEN had also taken many pastille colours. These did not freeze but they are difficult to work with in severe cold, as it is necessary to have bare hands for this material".

But in addition to the scientific investigations, there was also a great deal of other, practical work carried out at this time. New sledges were made and fitted together and the old inspected and repaired. Round about in the rooms and berths there were busy hands sewing kamik stockings, patching boots, refooting stockings, making mittens and improving the skin furs, making sleeping bags, dog harness, whips, lashings for skis and many other things. For new sledge journeys would soon be undertaken.

After returning from the sledge journey northward to lay out

the depots, it would not have been surprising in itself, if the sledging expeditions had been postponed until the days became longer in the spring and when the cold was decreasing, instead of increasing as at this time of year. This would have been in keeping with the practice on earlier arctic expeditions. But it would not have been in agreement with the magnificent energy which marked the Danmark Expedition from first to last. Thus, the sledging expeditions were continued without break throughout the winter and the Danmark Expedition has proved, that in arctic regions it is quite possible to carry out sledging expeditions in midwinter and during the darkest period of the year, if only the Expedition has strong, willing and courageous men. The Danmark Expedition here opened up new paths, a result of the energy of its leader, Mylius-Erichsen, and the inherent power in him to get his capable and energetic companions to understand his plans and enter whole-heartedly into their accomplishment.

Of the numerous sledging excursions made in the course of the winter, before the depot-laying journeys northwards for the great sledge journey to the north in the spring of 1907, the journeys to the Pendulum Islands and the excursions connected with them may be specially mentioned, as also the surveying journeys to Mørke Fjord and round about Store Koldewey Island, whilst for the numerous other expeditions reference may be made to the table showing the "Journeys with dog sledges".

The sledge journey to the Pendulum Islands deserves mention in detail as this 3 weeks' journey was carried out at a time of year, when arctic sledging expeditions had not hitherto been made.

Reconnoitring sledge journey along west side of Store Koldewey Island, $^{26}/_{10}$—$^{31}/_{10}$ 1906.

The main object of the expedition was to investigate the ice conditions along the west side of Store Koldewey Island and to lay out here a small depot, in view of a projected sledge expedition to the Pendulum Islands.

The members of the expedition were Brønlund, Achton Friis, Jarner, Fritz Johansen and Lundager.

On *October 26th* at 10 a. m. the party set out with 4 sledges and 32 dogs. Of the sledges 3 were of the Eskimo type, whilst the 4th was one of the so-called "Nansen" sledges.

The weather was fine and the sledging to begin with good. But towards evening the going became worse and worse, until finally they were driving between icebergs in screw-ice and loose snow. In the screw ice the narrow Nansen sledge was being constantly upset,

whereas the broad Eskimo sledges got on well. At 3 p. m. the tent was raised.

October 27th. There was a heavy snowstorm during the night. The bad going of the previous evening was now very much worse, the ice being everywhere much screwed and the new-fallen snow very loose and lying in drifts. Progress was therefore extremely slight this day, not more than some few miles.

October 28th. It was now evident to the party, that the ice conditions along the west side of Koldewey Island were of such a nature, that the sledge journey to the Pendulum Islands ought not to be undertaken along this route. The members of the party agreed, therefore, that JARNER and LUNDAGER should go southward with two sledges and lay the depot as far south as they could reach, if they were to be back the same evening, whilst BRØNLUND drove out westwards on the sea-ice, to see if the sledging was better out there. ACHTON FRIIS and FRITZ JOHANSEN were to remain at the tent to make sketches and prepare the food. The depot was formed at about 76°10′ N. lat.

October 29th. During the night the tent was visited by a bear, which BRØNLUND and ACHTON FRIIS succeeded in shooting. The bear was skinned and a part of the meat stored on the sledges.

On *October 30th* the return journey was begun and BRØNLUND again succeeded in shooting a bear. The first shot at 30 meters only wounded the bear, which came on to attack BRØNLUND who was in front of the others and alone. And when BRØNLUND tried to reload, the empty cartridge stuck and would not come out. It was a critical moment, even for a man like BRØNLUND, whose natural courage and coolness had often surprised the Expedition. But at the last moment he got the cartridge out, reloaded and shot the bear.

Towards the evening a severe snowstorm arose, which forced the party to pitch their tent. And here in the middle of the snowstorm at a temperature of ca. — 20° C. one of BRØNLUND's dogs whelped, in a hole which it had dug in the snow. The hardiness of these dogs is almost incredible, but that of their master, JØRGEN BRØNLUND, was no less. In his thoughtful care for the dog, he dragged his sleeping bag out of the tent and laid it by the side of the dog; and here he passed the night.

On *October 31st* the party again reached the ship.

Reconnoitring sledge journey to Cape Peschel, $^{28}/_{10}$ to $^{3}{}_{11}$, 1906.

The main object of the expedition was to examine the ice conditions in the interior of Dove Bay and down along the mainland to Cape Peschel, as also to lay out a small depot there, in view of the projected sledge expedition to the Pendulum Islands. Further, sur-

vey work was to be carried on in the western part of Dove Bay as well as round Teufel Cape and Cape Peschel.

The expedition, which took two sledges, consisted of Hendrik Olsen, Charles Poulsen and G. Thostrup, with the last as leader.

On *October 28th* at 10 a. m. the party set out along with Bertelsen and Bistrup, who intended to do survey work in Mørke Fjord, and Mylius-Erichsen and Wegener, who were going to Hvalrosodden for the purpose of hunting. All 3 parties reached Hvalrosodden in the afternoon.

On *the 29th* the parties separated, Hendrik Olsen, Charles Poulsen and G. Thostrup stood into the head of Dove Bay and down along the mainland. For two days the expedition had to work its way through deep and loose snow. In the ice here, round about some rocks, a number of seal breathing holes were seen.

Several interesting geographical discoveries were also made. It proved that Teufel Cape did not lie on the mainland, as supposed by the Germans, but on an island. Several islands with intervening water were discovered and it became clear, that a rich field lay here for the cartographers, as the German chart, though good when the circumstances under which it was drawn up are considered, required to be amended in many respects.

At Cape Peschel 1 sledge provision box and 1 roll of dried fish were placed in a depot.

On *November 3rd* about 11 p. m. the party returned to the ship. It had driven in a straight line from Cape Peschel over towards the north point of Store Koldewey Island and on this stretch the sledging was good the whole way. G. Thostrup had thus become convinced, that this was the route which should be followed in future excursions to Cape Peschel instead of along the mainland.

Sledge journey to Mørke Fjord,

$^{28}/_{10}$ to $^{5}/_{11}$, 1906.

The main object of the expedition was the surveying of Mørke Fjord which had been discovered on the boat journey to Dove Bay.

The expedition, which had two sledges, consisted of Bertelsen and Bistrup, the latter as leader.

On *October 28th*, 10 a. m., the party set out along with Mylius-Erichsen and Wegener, who intended to hunt in the district round Hvalrosodden, and also with Hendrik Olsen, Charles Poulsen and G. Thostrup, who were to survey the western part of Dove Bay and lay out a depot at Cape Peschel. All 3 parties kept together as far as Hvalrosodden, where the tents were raised on the evening of the same day.

On *October 29th* Bertelsen and Bistrup continued further to Mørke Fjord, to make sketches of the neighbouring land from a height

at the head of the fjord. The weather was beautiful and the sledging excellent; the travellers soon reached the head of the bay and then drove some distance up the river, which was covered with hard, glassy ice. They only stopped when a large fall in the river prevented further progress. Here the tent was raised.

On *October 30th* an attempt was made to climb the hill at the head of the fjord. But the hill became steeper and steeper, the higher they climbed and the attempt had to be given up before reaching the top. In their endeavours to climb the steep sides, it was necessary to remove their mittens to get a good hold, and the result in the low temperature — 21° C. was, that BERTELSEN had his fingers very severely frozen. In the course of the night the wind rose to a raging storm. The original intention had been, to make another attempt next day to reach the top; but it was now given up and as soon as there was enough light, the party began the homeward journey.

October 31st. This was a heavy day for the travellers. BISTRUP writes:

"Such a journey as that of October 31st, in a piping storm down a river over glassy ice, I have never experienced. It was simply a marvel, that we got through at all. We took a whole day to transport our two sledges and dogs about 2 miles from the tenting place to the mouth of the river. BERTELSEN, whose fingers had been frostbitten in climbing the hill, now got his one foot slightly crushed between the sledge and stones, on using it as a fender when the wind took command and drove him and the sledge right across the river. We were obliged to unspan the dogs and crawl over the ice, dragging them after us until they could get foothold on stones or snow; as soon as they came on the glassy ice, they lay down flat and refused to move. — It was a tough day. When we were raising the tent, it blew so hard we could hardly stand and it was not easy, for example, to get our sleeping bags up to the tent. This was also blown down on the top of us when we at last got it up, but we had no energy left to raise it again and as there was just room as it was, we let it stay".

On *November 1st* the weather improved a little and the journey was continued. The wind was so powerful whilst the travellers were west of Monumentfjæld, that they were practically blown out of the fjord; as soon as they got round Monumentfjæld, the wind completely dropped and as the going was excellent they soon reached Hvalrosodden.

On *November 2nd* the party drove some distance up Sælsø and tented on the northern side of the lake by the large river which flows out there.

November 3rd. After taking some measurements they drove back to Hvalrosodden. Here they met BRØNLUND and FRITZ JOHANSEN, who had come to Hvalrosodden to hunt. BERTELSEN, who had

kept company with Bistrup in spite of his frozen fingers and crushed foot, now drove home with Brønlund whilst Johansen remained with Bistrup.

On *November 4th* Bistrup and Johansen drove further to the northern Orienterings Island, where survey work was also carried out and on *November 5th* they arrived back at the ship.

The results of this journey were small in cartographic regards. But there can scarcely be any doubt, that this journey, along with the many others made in the course of the winter of 1906—1907, trained and hardened the members of the Expedition and thus in their way contributed to the result, that the main purpose of the Expedition, the investigation of the north-east coast, was carried out in the unique and wonderful manner to be described later.

Sledge journey round Store Koldewey Island, $^{8}/_{11}$ to $^{18}/_{11}$, 1906.

The main object of this expedition was a geological and cartographic survey of Store Koldewey Island; if possible, also, the depot placed on the south-west side of the island in support of the sledge parties to Pendulum Islands was to be supplemented [1].

The expedition, which had 3 sledges with 23 dogs and was under the command of Trolle, consisted of Jarner, Hendrik Olsen, Trolle and Weinschenck.

The departure took place on *November 8th.* In the evening the tent was raised by the shore inside Trip-trap-træsko Skerries. Owing to a snowstorm *the 9th* was a blank day, but the journey was continued on *the 10th*, down along the west side of Koldewey Island.

November 11th. By noon the party had reached the depot laid out on October 28th and added to it a sledge provision box and a quantity of food for the dogs. In the evening, 7 p. m., the tent was raised not far from the south point of the island.

November 12th. After Trolle had taken a moon observation the journey was continued at 12 noon. The south point of the island, which ends in a long, low tongue, was rounded and the party drove up along the east side of the island. But here they encountered greatly screwed sea-ice. Along the snow of the land good advance was made; at 5 p. m. the tent was raised.

November 13th. It was no longer possible to drive on the land this day and the party had again to go out on the screw-ice, which made progress extremely difficult. At 6 p. m. the tent was raised about 30 kilometers north of the south point of the island.

On *November 14th* the party set out at 8.30 a. m. The ice was now good and excellent progress was made. But at 2 p. m. a severe

[1] The depot had been made on October 28th, see p. 87.

snowstorm suddenly sprung up from the north-west, which stopped all advance and forced them to pitch the tent.

The storm raged without break on *November 15th*, *16th* and *17th*; and meantime all the dogs' food had been used up.

On *November 18th* the weather at last cleared and the homeward journey was begun immediately at daybreak. The party reached the ship the same day, a good deal exhausted after the extremely hard journey along the east side of the island.

In addition to the geological and geographical observations the result of this sledge journey, as of the previous, was the training obtained by the party and the experience gained in the difficult work of sledging.

Sledge journey to Pendulum Islands, $^{13}/_{11}$ to $^{4}/_{12}$, 1906[1].

In the autumn of 1906 Mylius-Erichsen desired to make a sledge journey to the depots of the Baldwin-Ziegler Expedition at Cape Philip Broke (Shannon Isl.) and on Bass Rock, in order to ascertain what these depots could offer in case of necessity. At the same time, as agreed upon before leaving Copenhagen, he wished to deposit a post with report from the Expedition in the depot at Cape Philip Broke.

Koch, the astronomer of the Expedition, and Wegener, who was responsible for the magnetic observations, also desired to make the journey, the former to try and determine by pocket chronometers the difference of longitude between the observatory of the Germania Expedition and Danmarks Havn, the latter in order to determine the secular variation[2] in the magnetic elements.

Not without reason Mylius-Erichsen had grave doubts as to the advisability of attempting such a great sledge journey with untrained personnel at such an advanced time of year; but yielded to Koch and Wegener's desire to take part. To help somewhat over the difficult conditions, he arranged for the first part of the route to be reconnoitred, both along the west coast of Store Kodewey Island and over towards Cape Peschel (see pp. 86—87). At both places, along with the work of inspection, small depots were formed to support the expedition. The result of the preliminary journeys was, that Mylius-Erichsen selected the route along the mainland and at the same time gave orders, that Hagen after the departure of the sledge expedition was to bring fresh stores to the depot made by G. Thostrup at Cape Peschel.

According to the original intention, the expedition was to start

[1] The report on this sledge journey, which has been kindly given me by Captain Koch, is reproduced here almost as written by him.

[2] The variation in declination, inclination and horizontal intensity.

in the beginning of November (full moon on 31/X), but continuous snowstorms led to the one postponement after the other, and it was not until November 13th, that a start was made, thus at the most unfavourable time (new moon on 15/XI).

The members of the expedition were: 1st party, Brønlund, Mylius-Erichsen and Ring; 2nd party, Koch, G. Thostrup and Wegener; altogether 6 men with 6 sledges and about 50 dogs. The leader of the expedition was naturally Mylius-Erichsen.

November 13th. Start at ca. 10 a. m.; temperature — 26° C.; calm; good, firm snow for sledging. In the afternoon the tents were pitched about 20 kilometers north-east of Teufel Cape.

November 14th. Starry clear; calm; temperature — 26° C. Drove to Cape Peschel and took the provisions from the depot, then continued southwards along the coast. The first party, which in the dark had driven far in advance of the second, pitched their tent on land, having met with screw-ice between Cape Seebach and Haystack. By means of a "flare" from the Primus, the second party was guided into the tenting ground.

November 15th. The screw-ice round Haystack was easy enough to get over but presented great difficulties to those unpractised in managing dogs and sledges. South of Haystack Brønlund shot a bear. The tents were raised on land just under the highest point of Haystack.

November 16th. Cloudy with snow-drift beginning. Brønlund advised against continuing, but as Koch suggested, that they might perhaps reach some distance before the snow came, Mylius-Erichsen gave orders for departure.

Shortly after the start the storm began with heavy drifts of snow from the land. The sledges worked along a narrow ice-foot in the innermost part of Roseneath Bay. At one place it became necessary to leave the land and go out on the snow-free and smooth ice, and here the sledges were at the mercy of the wind with no semblance of control. When Mylius-Erichsen, after a drive or slide of several hundred meters, reached the screw-ice, he found that only G. Thostrup and Wegener had followed him. After making a futile attempt to find the 3 missing sledges, he resolved to follow the screw-ice, with the intention of making for land and tenting on the first opportunity. Fortunately, the 3 sledges were just able to make up a tenting party (1 tent sledge, 1 sledge with cooking apparatus, each man with sleeping bag). After a great deal of hard work they at last succeeded in reaching land and raising the tent and now they hoped, that the other 3 had kept together and might also be able to reach the tent.

Brønlund, Koch and Ring had also found each other on the edge of the screw-ice at a spot where it seemed easy to pass; they worked their way, therefore, among the hummocks and ridges of the

screw-ice, which under such conditions was always to be preferred to the glassy ice. Here BRØNLUND's sledge broke down; but with almost incredible hardiness he unloaded his sledge with bare hands, loosened the straps of the sledge, lashed it together again and loaded it — a work that took over an hour. KOCH and RING, who helped him naturally as well as they could, were obliged every minute to stick their hands into their mittens and beat their arms, to avoid being frozen. On continuing through the screw-ice to reach the land, KOCH was so unfortunate as to fall down from the top of a hummock over his own sledge. One of the sledge uprights struck him in the breast just at the spot where he was carrying 2 chronometers in a skin-bag against the bare chest. The glass of one of them was broken with the blow and the chronometer at once stopped.

When the 3 sledges reached the edge of the screw-ice at a spot where even, snow-covered ice led into land, BRØNLUND stopped and explained, that now he believed he could find the others again; his team of dogs, he said, had winded something or other, and it would almost certainly prove to be the track of the others' sledges; in any case it could not be bear, of that he was quite certain! KOCH and RING, who had only been able with the greatest difficulty to follow BRØNLUND through the screw-ice and whose eyes were so glued together by the snow, that they could hardly see the sledge, though holding on to the uprights, half thought that BRØNLUND's suggestion was ill-timed boasting. But when BRØNLUND left his sledge and disappeared in the driving snow, to return after a quarter of an hour with the information, that he had really found the tracks, all doubt vanished. The sledges were set in motion again and before very long they reached MYLIUS-ERICHSEN's tent.

November 17th. Snowstorm. No advance owing to the weather.

November 18th. Towards evening the weather cleared. Sledges repaired.

November 19th. Calm. Temperature — 22° to — 28° C. Sought for the dogs with lanterns for two hours. Two of the dogs, Kunuk and Lady, could not be found and had consequently to be left behind. A third dog had run away at Haystack[1]. In the evening, after a long day's march under the most favourable ice conditions, they reached the south-west corner of Shannon Island, close to the north of Cape Tramnitz.

November 20th. Whilst KOCH, G. THOSTRUP and WEGENER continued south towards Pendulum Straits, MYLIUS-ERICHSEN with BRØNLUND and RING drove east along the south coast of Shannon

[1] The third dog fell in with the party again at Haystack on the return journey. Kunuk and Lady arrived at the ship in the end of January 1907. One of the places visited by them was Store Koldewey Island, where in the manner of foxes they had dug their way down to a deposited bear.

Island. Almost off Cape David Gray, Mylius-Erichsen met with open water, and as there was no snow lying on land, he had to give up the idea of reaching Cape Philip Broke for the time being; instead, he drove south over towards Bass Rock, which he reached the same evening.

Koch, G. Thostrup and Wegener reached Pendulum Straits late in the evening. In the southern half of this they found new ice, and as an attempt at driving on land was unsuccessful, Koch ventured rashly out on the new ice in the belief, that they might well manage along the land for the last 5—6 kilometers to Germania Harbour. The strong, northerly wind, however, rendered the steering of the sledges very difficult, as they were driven before the wind over the smooth ice. In the intense darkness (it was just about midnight on November 21st), they could only see some few meters in front and Koch all too late discovered an open channel right in his way. The dogs swerved round on the edge of the opening, but Koch could not stop the sledge. He had just time to jump clear when it toppled over into the water. Koch ran back immediately and stopped G. Thostrup and Wegener. All three now turned to the very risky work of salving Koch's sledge. G. Thostrup's practical sense, however, soon got them out of the difficulty and the sledge was got out without further mishap. It is hardly necessary to add, that the party did not continue their journey after this accident. The tent was pitched on Sabine Island and each man crept into his sleeping bag to await daylight. Reconnoitring at midday they found, that it was impossible to reach Germania Harbour from the east and there was nothing else for it, therefore, but to try the route through the Clavering Strait.

November 22nd. In the northern part of Clavering Strait already the party met with new ice, which was covered by such a thick layer of dust, that advance was difficult. South of Sabine Island the new ice was very thin, long streaks of phosphorescence shone under the paws of the dogs and it was again so dark, that it was not without great misgivings, that the party continued their way. By driving quite close to land and trying the ice from time to time with a heavy knife, they succeeded about 11 p. m. in reaching Germania Harbour; here in the following days Koch and Wegener carried out their observations.

November 24th. Late in the evening Brønlund arrived at Germania Harbour with food for the dogs from Bass Rock, where Mylius-Erichsen and Ring were inspecting the depot made there. Brønlund, who knew nothing of the conditions in the Pendulum Strait, had been stopped there by unsafe ice; but instead of venturing on it he at once called a halt, loosened his "bas" [1] and allowed it to act

[1] When a dog team is formed, there is always a tremendous fight between the dogs as to which will be the leader. The final victor is called the "bas".

as guide. The "bas" ran towards land and soon found KOCH's tenting place and on investigating this BRØNLUND quickly arrived at the conclusion, that KOCH had gone north and west round Sabine Island. It was too late, however, for BRØNLUND to continue that day and he passed the night among his dogs under the open sky in the shelter of some rocks; next day he continued his journey.

November 25th. Brønlund left with G. THOSTRUP for Bass Rock, the latter to fetch some food for the dogs.

November 28th. G. THOSTRUP returned from Bass Rock and reported, that MYLIUS-ERICHSEN had now finished his inspection of the depot. On the 27th, MYLIUS-ERICHSEN had left Bass Rock and driven to the north point of Sabine Island, where he deposited a number of things to be collected later by KOCH, G. THOSTRUP and WEGENER. Next day with BRØNLUND and RING he drove over towards Ardencaple Inlet, the interior of which he wished to reconnoitre. Unfavourable weather and high snow in the outer part of Ardencaple Inlet compelled him, however, to give up this plan and go north to the Haystack. Here the party again shot a bear, which was specially welcome, not only because the dogs were not contented with the American dog-cakes from Bass Rock, but MYLIUS-ERICHSEN also desired to wait a day for the party from Germania Harbour.

November 29th. Owing to storm the departure from Germania Harbour had to be postponed.

November 30th. Left Germania Harbour. The things on the north side of Sabine Island taken up. In the evening the tent pitched almost halfway between Cape Rink and Cape Tramnitz.

December 1st. Calm. Temperature — 32° C. The tent pitched in the evening close to Cape Oswald Heer.

December 2nd. Calm. Temperature — 32° C. After a short drive fell in with MYLIUS-ERICHSEN's party south of the Haystack. Rested the remainder of the day.

December 3rd. The whole sledge party now turned homewards. Cape Peschel was reached in the evening. Here, since MYLIUS-ERICHSEN's departure, HAGEN had brought a depot of sledge provisions and dried fish. Bears, however, had broken up the depot, broken the pole which served as mark and eaten the dried fish. But, fortunately, the sledge provisions were all right.

December 4th. Cloudy and windy. Temperature — 30° C. Towards midnight the party arrived at the ship [1].

[1] All had been reduced by the journey. KOCH had lost 1 kg., MYLIUS-ERICHSEN 1.5 kg., G. THOSTRUP and WEGENER 2.5 kg., JØRGEN BRØNLUND and RING 3 kg. The dogs had also lost in weight, but not to any extent.

The journey had been successfully accomplished. Mylius-Erichsen had deposited a post-bag on Bass Rock and had inspected the depot there. Wegener's observations had been successful, but Koch had been unfortunate. Two of the watches, which were carried on the sledge, had not been able to stand the low temperature; they had become uncertain and at last stopped, because they could not be wound up in good time on the night, Koch's sledge had fallen into the water.

The journey had quite a special and fateful importance owing to the exceptional achievements on the homeward journey. In 5 days Koch, G. Thostrup and Wegener had travelled over 315 kilometers from Germania Harbour to Danmarks Havn in the darkest month of the year at a temperature of about — 30° C. and with full loads on the sledges[1]. This means an average speed per day of 63 kilometers; in one day they had travelled about 83 kilometers.

Mylius-Erichsen, who had been accustomed at Cape York to regard a day's journey of half a hundred kilometers as of little account and who had expressed the opinion at home, that it would not matter whether the ship was stationed at Shannon Island or at Cape Bismarck, as he would be able with his Greenlanders to travel this distance in a couple of days, was now more than ever convinced by these achievements of untrained men, that his journey to Peary Channel would go easily and smoothly. And even if the coming spring journey should offer unexpected difficulties and delays, and result in an enforced stay far north during the summer, yet he would be able to reach the ship in the course of a few weeks over the ice of the following autumn.

The following winter, when another sledge expedition was made to Shannon Island and Bass Rock, and this time with experienced and trained sledge drivers, was to bring the truth home to overflowing, that the conditions in the one year formed no safe basis for conclusions as to the conditions in the next.

Sledge journey to Cape Peschel to lay out depots, $^{23}/_{11}$ to $^{25}/_{11}$, 1906.

The main object of the expedition was to deposit a quantity of dried fish and sledge provisions in a depot at Cape Peschel, at the same point where a depot had been made about the 1st of November. The depot was to support the sledge party to the Pendulum Islands on its return journey.

The expedition, which had 3 sledges, consisted of Hagen, leader, Peter Hansen and Charles Poulsen.

On *November 23rd* at 8½ a. m. the journey began in clear, calm weather. In accordance with the experience gained on the previous

[1] Probably about 300 kg. per sledge including sledge.

sledge tour to Cape Peschel, after passing the north-west point of Store Koldewey a course was made for a point on the mainland between Teufel Cape and Cape Peschel. At 11.30 p. m. the skerries just east of Cape Peschel were reached, where the depot was to be made. On the last part of the journey the weather had become dull and a strong north wind got up. In the dark the party went astray on the screw ice between the skerry and the land, where the sledges were often upset.

November 24th. The wind rose in the night to a storm, which continued to late in the afternoon.

November 25th. At daybreak the depot was made and the home journey begun in perfectly calm weather. The sky was clear and the moon lit up the way most beautifully for the travellers from 4 p. m. until they again reached the ship at $9^1/_2$ p. m., CHARLES POULSEN with the soles of his feet so frostbitten, that he was obliged to lie up for some time. On that day they had travelled about 83 kilometers; a fine achievement.

On November 2nd the sun showed itself for the last time and the darkness of the winter night settled down over the little colony of brave men, who were working so far north to bring new laurels to Denmark. Only the moon and the northern lights shone over the way of the courageous travellers, who in spite of darkness and cold still carried on their sledging excursions, as described in the foregoing.

The sledge party from the Pendulum Islands did not return until December 4th and from that time onwards until a few days after Christmas all the members of the Expedition were together at the station, where all the scientific and practical work constantly engaged the attention of those onboard.

To give a little change and raise the spirits of the party in their monotonous daily life, various lectures and entertainments were begun. Thus, BISTRUP gave lectures in navigation, ACHTON FRIIS in drawing, singing and, with BISTRUP as assistant, in piano playing, MANNICHE in Danish etc. A singing club was formed and gymnastics, boxing and fencing were carried on under the energetic lead of HAGEN; further, in accordance with the tradition of all arctic expeditions the publication of a paper was started, with FREUCHEN as editor. Later, various expert and scientific lectures were given. Thus, TROLLE gave a lecture on "The currents in the northern seas", FRITZ JOHANSEN continued with one on "The animal life on the sea-bottom". Lastly, BISTRUP, ACHTON FRIIS and TROLLE often gave small entertainments with piano and mandoline.

To get some exercise, the men went out on skis and small sledges on calm days or took walks in the neighbourhood. A special pleasure

was taken in attending to the fox-traps, which had been built round about and which in the course of the autumn and winter gave a rich booty of foxes.

As Christmas approached, the activity onboard increased. A Christmas committee was formed to make all the preparations, draw up the programme for the festivities, arrange for the decoration of the mess and cabins and make up the Christmas boxes etc. In the cabins the men were busy arranging Christmas presents for each other, whilst those literary inclined wrote æsthetic contributions to the ship's "Christmas Roses", edited by Mylius-Erichsen, for which Bertelsen and Achton Friis supplied the drawings. The Christmas boxes were brought up from the hold and inspected, whilst the steward, Hans Jensen, assisted by Hendrik Olsen, had enough to do in preparing the Christmas fare.

Christmas eve came with beautiful, calm weather, a landscape clothed in snow and ice, with a temperature of about — 25° C. All the 28 members assembled to the Christmas feast in the gaily decorated mess. Coffee was served in the villa, where two dainty, small Christmas trees decorated with the Dannebrog flag stood on the table. Then they returned to the ship, where the presents were distributed and an exceedingly fine Christmas song, written by Mylius-Erichsen and set to music by Achton Friis, was sung. Many thoughts assuredly turned that evening to the circles at home, where Christmas was usually spent, and where the mothers, wives and sisters created surroundings which can never be felt when 28 men hold Christmas.

On the 27th already the sledge excursions began again, Jørgen Brønlund and Hagerup proceeding to Hvalrosodden to carry on hunting.

On the 28th Hagerup returned to the ship with a bear shot on the way and the same day Hagen and Koefoed also drove to Hvalrosodden to make observations on the northern lights, whilst Wegener undertook observations at Danmarks Havn[1]. Further, Knud Christiansen and the brothers Thostrup went off to fetch walrus meat home from the depot on Hvalrosodden. These three returned on the following day. From the 30th to the 31st Hvalrosodden was visited by Bistrup, Achton Friis and Peter Hansen for hunting purposes. On the 31st Jørgen Brønlund also returned to the ship, leaving Hagen and Koefoed to pass New Year's eve together on Hvalrosodden. In his diary Hagen writes.

"It was a strange New Year's eve; far, far away from what we were accustomed to; for the first time away from home and under such conditions. Thousands of thoughts also wandered homewards,

[1] In this way the height of the northern lights above the earth was determined.

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often we looked at the watch and spoke and thought of what our dear ones were now doing. I pictured my mother's New Year's table, the New Year's games and the solemn moment, when father would rise and with the punch in his hand express his good wishes for the New Year; then the tears filled my eyes. At a little over 10 p. m. we knew that it was midnight at home; we went out to the end of the Naze and each fired 2 shots with the revolver, one for our dear home and one for the ship. The bullets were to take our heartfelt wishes for the New Year".

It was HAGEN's last New Year's eve. Ere the year was out, his body lay in everlasting sleep under the white, snow cover of the polar regions. The warm, affectionate heart, whose deep feeling for his parents and family appears on every page of his diary, had then ceased to beat.

As the time wore on, HAGEN succeeded in obtaining a sufficient number of observations. On the 4th the return journey was begun along with HENDRIK OLSEN and LUNDAGER, who had come that day to Hvalrosodden. On the 5th at 3 a. m. they reached the ship.

In the ship all were now busy with the preparations for the great sledge journey northwards, the plan for which had been shown by MYLIUS-ERICHSEN two days after Christmas. It was now a matter of having all in the best condition for this sledge journey, which was so important for the whole success of the Expedition; all the preparations had to be made in exact agreement with the experience gained on the earlier sledge journeys. The sledges were inspected and a few small changes made, whilst new sledges were built. The carpentry work for this purpose was mainly done by GUNDAHL KNUDSEN, whilst the 3 Greenlanders fixed up the sledges. The iron runners of the sledges were made by KOEFOED. A quantity of new skin furs had to be sewn under the direction of G. THOSTRUP and all the clothing to be used had to be most carefully overhauled. FREUCHEN got the sewing machine up from the hold and from now onwards it proved very useful. On a ropery constructed by G. THOSTRUP traces and straps were made for packing the sledges, and the dogs' food was prepared in the form of cakes[1] by RING and packed in tin boxes, which were then soldered by WEINSCHENCK or sealed in some other way. HAGERUP was busy making skis; all the dogs' harness was examined and towing harness made for the members of the Expedition, who were to drag their own sledges in laying out depots northwards, when all the dogs were away on the great sledge journey to the north. New mess-cases, medicine chests, whip stocks etc. were made by GUNDAHL KNUDSEN. LINDHARD arranged a medicine chest for each party and wrote instructions. CHR. BENDIX THOSTRUP made a weight list of

[1] The cakes were a compound of grease, beef fat and whale meat, and weighed about 0.75 kg., enough for a day's rations for a dog.

the different parts of the equipment and marked the boxes etc. with the number of the sledge party. Hagen looked after the ammunition and the naturalists gave advice to those, who were to form the north-bound party regarding collections and observations; in short there was activity in all directions.

The dogs' rations were increased and they were used as little as possible to bring them into the best condition before the journeys northward began.

On one of the few excursions at this time, the three Greenlanders Jørgen Brønlund, Tobias Gabrielsen and Hendrik Olsen, came near to losing their lives under circumstances that may be related.

On January 21st they drove away from the ship at 11 a. m. Their object was to reach the open water, which had been seen on the previous day east of Cape Bismarck. Where there was open water, there was a possibility of finding bears and seals. They came fairly soon to the open water, where they saw fresh tracks of bear. They followed these some distance along the edge of old ice and then further out over some few days' old ice, which extended outwards. They left the dogs behind on the edge of the new ice and took only their guns and "Tokejærn"[1]. The bear tracks were soon lost, however, and when they turned to go back, they found, that the floe of new ice had loosened and drifted some distance away from the old ice.

It was a terrible discovery to make. The temperature was about — 30°, of food they had none and they were all thinly clad under such circumstances. They had only imagined they would be away about 3 to 4 hours. It was Tobias' birthday and the occasion was to be celebrated onboard at dinner.

But they did not long remain in perplexity. With the picks they cut an ice-floe of about 60 feet square from the large floe. On this they set out and using picks, guns, hands and feet as oars they succeeded after 6 hours' incessant work in reaching the old ice. And now they set out for the ship at full speed, reaching it at midnight, all much overcome with cold, water and excitement.

There was great anxiety onboard about the 3 Greenlanders and the pleasure was all the greater, therefore, when they returned. It seemed terrible to imagine, that these capable, kindly souls, who were so indispensable to the Expedition, might have been lost in this tragic manner.

On January 26th Hagen and Mylius-Erichsen made a sledge tour out to the sea ice along the outer coast, Mylius-Erichsen wishing to examine the ice there with a view to the sledge journey northward. The same large opening, which had nearly been the grave of the Green-

[1] The Greenlanders use the "Tokejærn" (a bar with iron point) to ascertain the bearing power of the ice, testing whether the pick will penetrate the ice on the first, strong blow — or not.

landers, was still found, extending far to the south. The sea-ice proved to be quite good and MYLIUS-ERICHSEN resolved, therefore, that the sledge journeys to lay out depots should begin as soon as possible.

2nd sledge journey northwards to lay out depots, $^{29}/_{1}$ to $^{4}/_{2}$, 1907.

The main object of the expedition was to increase the stores of the depots at Cape Marie Valdemar or Cape Amélie.

The following took part in the expedition, which was under the leadership of MYLIUS-ERICHSEN; BERTELSEN, JØRGEN BRØNLUND, FREUCHEN, TOBIAS GABRIELSEN, HAGEN, HAGERUP, PETER HANSEN, KOCH and MYLIUS-ERICHSEN.

On *the 28th* all the provisions and dogs' food, which had to be transported further north, was carried out on to the sea-ice at Syttenkilometernæsset on 3 sledges drawn by men instead of dogs. Each sledge bore a weight of ca. 275 kg., a weight which the experience of this journey proved, was too great for 3 men to pull.

On *January 29th* the expedition set out with 9 sledges, each with a team of 7 dogs. It was fine, calm weather, but the cold was intense (minimum temperature for the 24 hours — 36°, maximum temperature — 25.9° C.). After driving over the spit of land the way led northward along the land on the sea-ice. On that day the progress was satisfactory, even though the sledge drivers had to run beside the sledges most of the day owing to the heavy going. After travelling ca. 37 kilometers (judging from the odometer), the tents were raised on one of the low points running out from this coast.

On *January 30th* at 7 a. m. all was made ready for the start. The sky was threatening even at daybreak and at 3.30 p. m., after a distance of about 23 kilometers by the odometer had been travelled, the tents had to be raised owing to the breaking of the snow-storm. It had been an even more tiring journey than that of the previous day.

The storm lasted for 3 days. On the fourth the party were obliged to return home, to avoid making too big a hole in the provisions of the depot. The depot was made, therefore, a little south of Cape Marie Valdemar and on the evening of the same day they were back again at the ship.

The days had now begun to lengthen and on February 12th a hunting party again saw the glowing disc of the sun from a little hill at the head of Stormbugt. After the long winter night, no wonder it was greeted with a ringing cheer! It had become necessary to obtain more food for the dogs and hunting excursions were now often made to different places in the neighbourhood. On one of these, on the 13th, HAGEN and TOBIAS GABRIELSEN succeeded in shooting a

bear and on the 16th Tobias shot a second. Both were exceedingly welcome, for the walrus meat had long since given out and the dogs had consequently, in the later period, to eat the food brought from home, which can never come up to fresh game. No wonder that there was joy onboard. It was of great importance, to keep the dogs in full vigour until the great sledge journey northwards in the spring of 1907. Before this was begun, two more journeys had to be made to lay out depots.

3rd sledge journey northwards to lay out depots, $^{20}/_{2}$ to $^{28}/_{2}$, 1907.

The main object of the expedition was to add to the stores of the depots northwards, especially that on Nordre Depot Island.

The expedition, which was under the leadership of Mylius-Erichsen, consisted of Bertelsen, Jørgen Brønlund, Tobias Gabrielsen, Hagen, Hagerup, Peter Hansen, Koch, Mylius-Erichsen, Hendrik Olsen and Ring.

On February 9th, as on the previous occasion, the stores for the depot had been transported out on to the sea-ice at Syttenkilometernæsset with the drag-sledges, each sledge drawn by 3 men. The journey out had been quite easy, but on returning there was a strong and troublesome wind against them and 5 of the 9 men suffered more or less from frostbites on the face. Seizing the opportunity the doctor gave a lecture on frostbites and at the same time gave instructions in binding and in the use of the medicines contained in the sledge medicine chests.

On the morning of *February 20th* the expedition started off with 10 sledges, each with a span of 8 dogs, except Hagen, who had only 7. It was fine and calm, but cold weather (minimum temperature for the 24 hours — 30°, maximum temperature — 24.4°).

After loading the sledges with the stores deposited out on the sea-ice, the party drove on at 10 a. m. with ca. 250 kg. on each sledge. The sledging was good and rapid, so that excellent progress was made. After travelling about 60 kilometers, the tents were pitched at 6 p. m.

On *February 21st* the weather was again fine. The sun was now above the horizon for several hours. The going was good and Cape Marie Valdemar was soon reached. Here the sledges were unloaded and a return journey made to the depot formed on the previous sledge journey, which was also transported to Cape Marie Valdemar, where the tents were pitched at 5 p. m.

On *February 22nd* the journey was continued with fully loaded sledges. The going was not so good that day, yet Cape Amélie was reached. In the autumn 2 bundles of dried fish had been deposited here and covered well with stones. But the protection had not been sufficient, for a bear had eaten all the dried fish.

February 23rd. This proved to be of little importance, however, for the next day, just as the travellers were about to set out, HAGEN detected a bear — perhaps the sinner. JØRGEN BRØNLUND and TOBIAS at once tumbled the loads off their sledges and drove after the bear and shortly after it fell to a well-directed shot from TOBIAS. The journey was now continued northwards. The first, ca. 10 kilometers provided excellent sledging, but thereafter the ice became worse and worse. The tents were raised 7 to 8 kilometers north of Bjørneskær depot. The 2 sledge cases of tin which had been deposited here in the autumn, were found all right, though bears had disturbed them.

On *February 24th* the travellers again advanced about 45 kilometers. The weather, which had been good the whole time, changed its character in the afternoon and a storm of wind and snow came on shortly after the tents were raised. The tenting ground was made on the ice some distance north of Hagens Island.

On *February 25th* the weather was unchanged. To make the depot out in the middle of the ice could not be done, to drive back to the nearest land would have been very annoying. To lie and wait for better weather was not possible, as there only remained provisions and dogs' food for 3 days, unless they attacked the depot stores. As the weather was still unchanged at 12 midday, MYLIUS-ERICHSEN resolved that they should try to reach Nordre Depot Island with only sleeping bags and depot stores on the sledges. The tents could remain standing with all the other equipment, provisions etc. It was a risky proceeding, to drive off in a dense snowstorm which might continue indefinitely. The tracks, the only certain guide on the return journey, might easily be wiped out and they would be obliged to sleep out in the sleeping bags on the bare open ice, for an attempt to find the tents would be useless.

But in spite of the risk, they drove off with the snow right in their faces. It was difficult to get the dogs to advance, but they nevertheless reached land, which was taken to be the island about a mile south of Nordre Depot Island [1]. Here the depot was made and with practically empty sledges the party now hastened back, whilst there was still hope of finding the tracks. The air became darker, however, every minute and at last they could not see from the one sledge to the other in the driving snow. HAGEN and PETER HANSEN got lost from the others, but fortunately found them again. The sledges now kept close together; but the tracks became gradually more and more indistinct and at last entirely disappeared. JØRGEN BRØNLUND believed, however, that he could find the tents all the same and with the Greenlander's almost incredible "track-sense" he actually succeeded in finding them — it cannot be denied, to the great joy and relief of the whole party.

[1] It proved later, that the depot had been deposited on Box Islands.

On *February 26th* the weather cleared up. With light sledges the party travelled rapidly southwards. Towards the evening the tents were raised about 20 kilometers north of Cape Amélie.

On *February 27th* Cape Marie Valdemar was reached and on *February 28th* they were back at the ship after travelling the ca. 60 kilometers from 8.15 a. m. to 6 p. m. at a temperature of — 32° C.

Whilst the depots were being formed northwards, those on the ship endeavoured to obtain food for the dogs by hunting. Thus, Fritz Johansen, Koefoed and Manniche went out with a drag-sledge to Cape Bismarck and remained in camp there right to the 28th, without getting anything however. The opinion had gradually grown, in fact, that the bears as a rule followed the outer coast and only rarely penetrated into Danmarks Havn.

The hunting excursions were continued after the return of the sledge expedition. Trolle made excursions for hydrographical purposes and, naturally, at the same time carried on hunting when the opportunity presented itself. From the 5th to the 9th of March he lay out on the fjord making hydrographical observations with Peter Hansen, Hendrik Olsen and Charles Poulsen. They saw no sign of game on this occasion.

On March 6th a small conflagration occurred onboard. It was fortunately observed in good time and quickly extinguished. This was the second time a fire had occurred and served as a serious warning. If the ship were burnt, it would mean giving up the northern journey and thus the failure of the Expedition.

On the day that Trolle returned, Achton Friis, Lindhard, Manniche, Mylius-Erichsen and Ring set out for Hvalrosodden. Manniche and Lindhard were passengers and thus only 3 sledges were taken. Fortune did not favour them either. On March 12th they returned without any booty. On March 11th the temperature observed at the station was — 40.9° C. and as it was rather lower at Hvalrosodden, the party must have had a fairly cold experience.

On March 16th another hunting party, consisting of Jørgen Brønlund, Hans Jensen and Manniche, set off for Hvalrosodden, again without finding the large game. It returned on the 19th.

Whilst the fortune of the hunting parties who went to some distance was not good, the luck of those who remained onboard was much better.

On March 10th Peter Hansen and Hendrik Olsen shot a bear and another was shot on the 11th by Charles Poulsen and Peter Hansen. Both were shot in the neighbourhood of the ship.

This day a very serious case of poisoning occurred, after most of those onboard had partaken of the liver of the bear first shot. Bear

liver is poisonous, a fact well-known to the Greenlanders, who live in regions where many bears are killed, for example, at Angmagsalik. Most of those onboard had also heard of this probably, but did not believe it until they now suffered. Fortunately all recovered but the case was very serious.

Four more bears were shot before the start of the great northern journey. One was shot by JØRGEN BRØNLUND when he on the 21st was out with MYLIUS-ERICHSEN on a hunting excursion to Sonja Havn and Store Koldewey Island, and the three others, a female with two cubs of the year, were shot by TOBIAS GABRIELSEN with 4 bullets; 3 bears in 4 shots, a fine achievement.

In addition to the large animals, ptarmigan and hares were also shot occasionally and these were very welcome in the mess.

The time for the great northern journey was now approaching nearer and nearer. Ere this, however, MYLIUS-ERICHSEN resolved to send out still another sledge party to lay out depots.

4th sledge journey northwards to lay out depots, $^{15-16}/_{3}$ to $^{21}/_{3}$, 1907.

The main object of the expedition was to supplement the depot at Bjørneskærene. The expedition consisted of 2 parties:

1st party	2nd party
PETER HANSEN	BISTRUP
HENDRIK OLSEN	TOBIAS GABRIELSEN
CHARLES POULSEN	GUNDAHL KNUDSEN
G. THOSTRUP, leader	TROLLE, leader

The 1st party set out on *the 15th*, the 2nd on *the 16th*, but they met on the 16th in the evening at Cape Marie Valdemar, where the tents were pitched.

On *March 17th* both sledge parties continued over towards the depot at Cape Amélie. Here the going was heavy, over uneven ice and loose snow.

On *March 18th* the party journeyed on northward. In the beginning the way was good, but later the snow lay deep and loose, so that the dogs had great difficulty in pulling the heavily loaded sledges forward. The drivers were obliged as a rule to help by pushing the sledges, so that it was a tiring march that day.

In the afternoon the Bjørneskær depot was reached and the stores and petroleum deposited there.

The return journey was begun the same evening and on *March 21st* at 2 p. m. the ship was reached.

During the absence of the 4th depot-laying party northwards, a sledge party of 12 men carried about 500 kg. of dogs' food out to

the outer coast. The party consisted of Freuchen, Achton Friis, Hagerup, Peter Hansen, Jarner, Fritz Johansen, Hans Jensen, Koefoed, Lindhard, Lundager, Manniche and Chr. Bendix Thostrup: the object of this arrangement was to facilitate the passage of the great sledge party to Cape Marie Valdemar. The food was carried out on March 22nd by means of drag-sledges. A watch party with tent remained by the stores, whilst the others returned the same day.

When the two parties, which had gone to the depot at Bjørneskær, returned on March 21st, all preparations were now made to begin the great sledge journey northward, on which the principal object of the whole Expedition was to be accomplished. A week later, on March 28th, the departure took place.

C. The great sledge journey northwards in the spring of 1907.

1. Review of the preparations for the sledge journey.

The preparations for the journey had meant a considerable amount of work. As mentioned above, they embraced in the main the following:

Mylius-Erichsen: preparation of the general plan of the journey.
Mylius-Erichsen and Koch: selection of the men for the sledge parties.
Mylius-Erichsen: preparation of lists of the provisions and stores for the sledges.
Gundahl Knudsen and the Greenlanders: construction of the woodwork and fitting up of the sledges.
Ring: preparation and packing of the dogs' food.
Ropery under the direction of G. Thostrup: making of traces and straps.

And, lastly, common to all: sewing of sleeping bags, furs, kamikker (skin-boots), canvas boots, fur caps, dogs' harness and much more; fitting skis to the sledge runners, training and feeding of the different dog teams.

Further, the following depots had been prepared:

1) on Nordre Depot Island in Jøkelbugt at 78°14′.

2) on Box Islands (37 boxes of pemmican for the dogs, each 25 kg.). According to the plan this food for the dogs was to have been deposited on Nordre Depot Island in February 1907. As mentioned above (see p. 103), however, Mylius-Erichsen had made the depot in a snowstorm on some islands, which were assumed to lie south of Nordre Depot Island. As the sledges had been obliged to return during the same storm, it was not known with certainty, on setting out in March, where this depot lay.

3) on the land inside Bjørneskærene (Bear Skerries).

4) on the mainland east of Cape Amélie.

5) at Cape Marie Valdemar.

6) on the outer coast about 8 kilometers east of Danmarks Havn.

2. Main object of the sledge journey, composition and plan.

The main object of the expedition was an investigation of the perfectly unknown north-east coast right up to the points reached from the west by Peary, namely, Navy Cliff (81°37′ N. lat. and 34°05′

W. long.) at Independence Bay and Cape Clarence Wyckoff (82°57'.7 N. lat. and 23°09' W. long.) on the north-east coast of Peary Land. The aim was first of all to get the whole of this extensive stretch surveyed; but along with this, an endeavour was to be made to carry out a scientific investigation of the land as extensive as time and conditions would permit.

The members of the expedition were:

1st party: Jørgen Brønlund, Hagen, cartographer, Mylius-Erichsen, leader of the whole expedition and leader of the 1st party.
2nd party: Bertelsen, Tobias Gabrielsen, Koch, cartographer and leader of the 2nd party.
3rd party: Bistrup[1], cartographer, Wegener, meteorologist and geologist.
4th party: G. Thostrup, cartographer, Ring.
Altogether 10 men, 10 sledges 86 dogs and 4 tents.

A very detailed plan of the expedition had been worked out by Mylius-Erichsen. To understand this, however, it will be sufficient to give the following brief account of how Mylius-Erichsen conceived the carrying out of the plan, after all the depots had been laid out. This was written down by Mylius-Erichsen, when the sledge party sent out to make the 4th and last depot had not yet returned, and is reproduced here as written by him.

"The load of the 10 north-going sledges will be:

from the ship; sleeping bag, private baggage, instruments, photographic apparatus each sledge	75 kg.
weight of sledge	37.5 -
tent and poles 25 kg., extra provisions ca. 44 kg., mess case 25 kg: for 4 parties 376 kg. and for each sledge ca.	37.5 -
from Syttenkilometernæsset food for the dogs in sacks	50 -
from Cape Marie Valdemar 1 sledge case	42.5 -
extra weight	7.5 -
altogether	250 kg.

If the two sledge parties (8 sledges), which are at present in the north, have managed to take the dog's food and petroleum to Cape Amélie or in the most favourable case to the depot at Bjørneskærene, each of the 4 sledge parties from Cape Amélie and Bjørneskærene will have an increased weight of from 42.5 to 62.5 kg. (1 sledge case and possibly 1 box of grease). With a total weight of ca. 300 kg. per sledge

[1] Owing to circumstances to be mentioned later, a change occurred on the journey, Ring and Wegener changing places, so that Ring came into the 3rd party and Wegener into the 4th party.

the northernmost depot on the island at 78°14′ N. lat. should be reached in 4 days from the ship.

According to the quantity of dogs' food boxes remaining, a certain number of sledges (probably 7) must then at once return to Bjørneskærene or Cape Amélie and bring on the boxes, petroleum etc. to the northernmost Depot Island. This journey should not take more than 4 days. The other 3 sledges (Koch's party) may utilise the time, when their survey work is finished, in bringing up about half of the 37 boxes of pemmican for the dogs, which was deposited in a depot in February, and also, if possible, in taking forward 3 loads of sledge cases a day's march further north from the northernmost Depot Island. Eight days after the departure from the ship all the 10 members should be together at Nordre Depot Island, in order to move the rest of the loads northwards to the point reached by Koch.

A rest of a day will then be necessary — or perhaps, before, on the northernmost Depot Island.

Our supply of provisions at this spot or time will be: *in use*; the remainder of the 4 sledge cases brought from Cape Marie Valdemar (partly used during the halt):

brought from Cape Amélie and the Bjørneskær depot	4 cases
on the northernmost Depot Island	11 —
	15 cases

Of these will be deposited at the halting place, at most	3 cases
taken into use	4 —
carried further north	8 —
	15 cases

Thus, the 10 sledges will drive north from the halting place with 12 sledge cases and 4 extra boxes[1], which will mean altogether	685 kg.
Further, dogs' food: 54 boxes of pemmican of 26 kg. ...	1404 -
16 boxes of grease of 36 kg	288 -
tents and mess boxes for 4 parties	187.5 -
private baggage of 10 men, at most	750 -
weight of sledges	375 -
altogether...	3689.5 kg.
or in round numbers (including petroleum among other things)	4000 kg.

which gives a maximum weight of 400 kg. per sledge, each sledge being drawn by 8 to 9 dogs.

[1] The sledge cases contained all the different sorts of provisions corresponding to a definite number of days. In the extra boxes, on the other hand, were the more select provisions, which were intend to be used only on special occasions.

This is the greatest weight we can think of burdening our teams with, and so long as the sledges are so heavily loaded, we cannot sit on the sledges ourselves. Under such conditions we may take 37 kilometers (20 miles) as a good day's journey.

If we obtain nothing from hunting, our supplies will last for 6 weeks after the halt, at most 2 months for 10 men, and 3 weeks for the dogs, at most 1 month.

From the northernmost Depot Island we must line the coast northwards to Independence Bay, a distance probably of 370—445 kilometers (200—240 miles), with depots of cases and boxes for our return journey (to be increased or replaced if possible by game). Taking 4 sledge cases as used up on the journey and 3 placed in depots, we should thus reach Independence Bay (north side of this) with 5 sledge cases and most of the 4 extra boxes.

G. Thostrup and Ring, it is hoped, will reach as far north as this and from there return along the row of islands on 1 sledge case and the rest of 1 extra box. If we arrange for Wegener and Bistrup's return 1 week later, they should manage on their extra box as supplement to 1 or at most 2 of the depot cases further south. For the further advance of 6 men from Independence Bay and the return, there would be at least 4 sledge cases and the rest of 2 extra boxes.

On the way between northernmost Depot Island and Independence Bay there would be in depots about 20 boxes of dogs' food and at least the same amount used up. Without game we thus arrive at Independence Bay with possibly only 25—30 boxes of dogs' food remaining — but with the return assured to northernmost Depot Island. For both of the advance parties (6 men) we can thus only arrange for 18 boxes in all (2 weeks' food at most for 6 teams), whilst the rest will be for the 2 teams with 2 men each.

This will be the condition with the heaviest loads, the most rapid day's journeys, favourable weather and not too heavy going, without finding game. Thus, if the hunting is good, we may make more out of our journey than simply reaching the northernmost goal with safe return.

Depots of sledge cases and dogs' food for the return will be deposited between Cape Marie Valdemar and northernmost Depot Island by the drag-sledge party in April".

So far Mylius-Erichsen. It need only be added, that Mylius-Erichsen with the 1st party intended to investigate Independence Bay and try to reach Navy Cliff or Cape Glacier, whilst Koch with the 2nd party were to try and reach Peary's cairn on Cape Clarence Wyckoff. The 3rd and 4th parties were to supplement the survey measurements made by Koch on the outward journey, the 3rd party taking especially the coast-line, the 4th party the fringe of islands off the coast.

3. Narrative of the journey.

According to the course taken by the sledge journey, the narrative falls naturally into the following divisions:

3 a. Outward journey until the 1st and 2nd party separated.
3 b. Journey of the 2nd party to Peary Land.
3 c. Return journey of the 2nd party.
3 d. Return journey of Bistrup and Ring.
3 e. Return journey of G. Thostrup and Wegener.
3 f. The journeys made from the ship to lay out depots in support of the sledge parties returning from the north.
3 g. The last journey of Mylius-Erichsen, Høeg Hagen and Jørgen Brønlund, which, however, will be described later.

3a. Outward journey until the 1st and 2nd parties separated[1].

In the morning of *March 28th* a start was made with about 150 kg. on each sledge, a load that was increased however to about 200 kg. from the depot on the outer coast. Some days previously Hagerup and Peter Hansen had been sent out to Syttenkilometernæsset to shoot bear. They saw none of these, but when the sledge expedition reached their tent, they had warm coffee ready. Mylius-Erichsen stopped a little while to enjoy the offered refreshment, and then Trolle and Koefoed arrived from the ship to wish the travellers once more "bon voyage". When the sledges went on, the 4 left behind waved a salute from Syttenkilometernæsset.

The first day was very tiring. As the weather was good, Mylius-Erichsen would not halt until Cape Marie Valdemar was reached. About 70 kilometers over heavy going was, however, rather much the first day, even with half loads. The lack of training soon revealed itself in some cases in swollen and tender joints and knees.

March 29th. Set out in the morning from the depot at Cape Marie Valdemar with ca. 250 kg. on each sledge.

Fog and loose snow; later, strong northerly wind with a good deal of snowdrift.

Most placed skis under the sledges, but Bistrup was unfortunate, his skis soon breaking.

In the fog and snowdrift it was very difficult for the column to keep together, and Mylius-Erichsen was afraid, that the tracks would be covered by the drifting snow and the connections lost. After a march of 25 kilometers he gave orders to halt.

March 30th. Set out in the morning for the depot at Cape Amélie, where smooth, glassy ice was met with. The dogs found it very dif-

[1] Of this journey Captain Koch has kindly given me an account, which is reproduced here almost in its entirety.

ficult to stand in the strong, opposing wind and one of Mylius-Erichsen's dogs especially was quite useless.

After a march of 20 kilometers the tents were raised about 5 kilometers north of the depot.

Tobias utilised the long halt at the tenting place to make a short hunting tour, but only got 2 ptarmigan. When he returned he showed the poor result to Brønlund and remarked dolefully, "I must shoot a lot to get enough to eat". He referred here to the fact, that Koch had already placed his party on rations from the first day, and these were thus somewhat restricted.

On this day again almost all were driving with skis under the sledges. The Greenlanders found this advantageous naturally, but for the others it was probably not such a good plan, as they were still far from possessing the control over their teams and sledges, which is required to prevent the skis getting damaged. The Greenlanders made a layer of ice on their sledge skis in the well-known manner, by means of urine. The ice-layer thus formed on the skis helped them to a very great extent.

It was a long and tiring march of about 50 kilometers. Mylius-Erichsen, whose load was always greater than any other's, seemed untiring. He ran extremely well, kilometer after kilometer. Now and then he took a rest on his sledge for a couple of minutes and then he was on his legs again. He had a bad foot, which certainly bothered him a good deal; the others could see, that his one foot dragged. He also had a couple of difficult dogs, which caused him no little trouble.

The tents were raised at Hagens Island. Koch, who desired to make a time determination before the sun disappeared behind a hill, was obliged to hasten. His fingers were so frozen (temp. — 32° C.), however, he could not set up the instrument. He gulped down a glass of cognac. This helped at once and the observation was successful.

April 1st. Early in the morning Bertelsen stuck his head into Mylius-Erichsen's tent with the surprising news, that sledges were arriving from the north. Mylius-Erichsen rushed out of his tent and Brønlund, who was still in his sleeping bag, jumped quickly into his kamikker. April fool!

This was also a bad day; the screw-ice in Jøkelbugt especially made the travelling very difficult. Several men had to work at the sledges as well as the dogs to get them through.

In the evening the tents were raised at Nordre Depot Island. Bertelsen and Koch went up onto the island to take an observation. Just as they were ready, Brønlund came up and reported, that half of Bertelsen's sleeping bag had been eaten by the dogs. Bertelsen was greatly put out and hastened down to the tent to investigate the extent of his misfortune. Again April fool!

April 2nd. Mylius-Erichsen now divided the 10 sledges into two divisions A and B.

Division A — Bertelsen, Brønlund, Mylius-Erichsen, G. Thostrup and Ring — returned with empty sledges to the depot at Bjørneskærene to bring up provisions and dogs' food. They passed the night at the depot and reached Nordre Depot on the following day — a journey of 120 kilometers in 2 days.

April 4th. Just as division A were starting off northwards, the other division returned. Koch reported, that on 2/IV he had found and taken on the 37 boxes of dogs' pemmican, which had been deposited in Jøkelbugt (at Box Islands) in February during a snowstorm. On 3/IV he had driven northwards with 400 kg. on each sledge. Owing to very bad ice he had not succeeded in reaching the land, as Mylius-Erichsen had desired, for the sake of hunting. He had, therefore, unloaded his sledges on the ice about 30 kilometers north of Nordre Depot and had now returned to fetch a new load. He strongly advised against making for the land at Pic de Gerlache and recommended a route just on the east point of Lamberts Land.

As the division B had already driven 30 kilometers that day, the dogs had to have a breathing space. Division A, who were ready to start, at once drove off and allowed the other party to follow on later.

When the A party reached the place, where Koch had set down his first load, they could see nothing of the difficulties Koch had warned them against, probably owing to the peculiar light. Mylius-Erichsen, who rightly laid great weight on hunting as soon as possible, resolved to go on at once towards Pic de Gerlache. He was soon forced to admit, however, that Koch was right.

The A party thus went on, but after 11 kilometers of very bad ice, were forced to stop owing to damages.

Late in the evening the B party reached the depot on the ice. As the party had travelled 60 kilometers that day, Koch resolved to halt and tent at the depot.

April 5th. Early in the morning Koch continued the journey and in the course of the forenoon reached Mylius-Erichsen's tenting place with all 5 sledges damaged; one sledge had even been left behind for the time being, as it had broken right across; it was fetched later in the day.

A rest was then taken. Mylius-Erichsen and the two Greenlanders drove in towards land with empty sledges for the purpose of hunting. It proved impossible, however, to make any advance with the sledges and they had to be left on the ice. After a long and extremely tiring tour the hunters returned. The booty was only 7 hares.

Bertelsen utilised the halt to paint a sketch of Pic de Gerlache. The colours froze and he was obliged to use the knife instead of brush.

April 6th. After a depot had been made on the ice and the sledges repaired, the journey was continued towards the east point of Lamberts Land. Now and then they met with large screw-ridges and cracks in the ice. For a couple of hours, for example, they drove along a glacier fissure, which was 50 meters broad.

The tents were raised after 35 kilometers had been traversed according to the odometer.

April 7th. The tidal screwings in the floating inland ice were found extremely troublesome. Koch's team of dogs had earlier fallen into a fissure, but remained hanging in the traces. Not to lose the dogs the harness was bound together over their backs, so that they could not slip out. This arrangement proved successful. The dogs often fell into holes, but none were lost.

This combination of ice ridges and snow-covered fissures gave plenty of variety but caused no end of trouble. After travelling 14 kilometers the tents were raised.

Ring held a gathering that day on the occasion of his birthday. We were all 10 together in G. Thostrup's tent, where coffee and cognac were served. The strange conditions, both inside the tent and outside, the strong comradeship which bound the men to one another, made the festivities something quite unique. The elated and homelike feeling culminated, when the quartette sang: "Jyden han er stærk og sej" and Franzén's masterly drinking song: "Når skämtet tar ordet vid vänskapens bord". Its refrain: "En blomma är gladjen, i dag slår hon ut, i morgen da vissner hon redan; just nu, når du kan, haf et glädligt minut og tänk på det kommande sedan", suited all too well the uncertainties of the sledge journey.

On *April 8th* Mylius-Erichsen returned with 6 sledges to the tenting place, whilst Koch with 4 sledges drove northward.

April 10th. When Mylius-Erichsen on 10/IV at noon again reached the tenting place of 8/IV, he found a letter from Koch, reporting that he had reached the east point of Lamberts Land on 8/IV after 40 kilometers' travelling; on 9/IV he had returned to the tenting place of 8/IV and on 10/IV again drove on to Lamberts Land with full load. Mylius-Erichsen at once went on and reached the east point of Lamberts Land almost at midnight, a couple of hours after Koch.

On *April 11th* a rest was taken. Brønlund and Tobias went hunting after musk-ox, followed by Bertelsen. They journeyed in over the land to the westernmost of the two small fjords which cut into Lamberts Land from the north. Here Bertelsen turned back, whilst the two Greenlanders continued over the fjord to the land west of this. In the evening they returned; they had only shot a couple of hares.

A depot was made on the east point of Lamberts Land (Brøn-

LUND's grave); here they left a quantity of clothing, reserve parts for the sledges, petroleum and all the provisions that could not be transported with them. This depot was fully sufficient to ensure the safe retreat of the party from Lamberts Land on returning.

April 12th. The dogs had gradually become rather exhausted; it was a great misfortune, that no musk-ox had been found on Lamberts Land. It was hard work to drag the heavily loaded sledges when the journey was continued northwards from there. Some distance out from Nioghalvfjerds Fjord the party came upon fresh tracks of bear. MYLIUS-ERICHSEN at once gave orders to the Greenlanders to follow and shoot the bear, even if the hunting lasted the whole day. He himself continued with the 8 sledges and tented after 18 kilometers in all had been traversed.

TOBIAS soon returned with the news, that the bear with two cubs had been shot. It was brought in and skinned at the tenting place. The dogs were exceedingly uproarious; it was necessary to place 6 men on the watch to keep them away, whilst 4 men cut up the bear. The dogs however showed great determination to get at the bear before it could be divided among the sledge teams. A few of them attacked the watchers without paying any attention to the blows and lashes that rained on them. This was the signal for the other 70 to 80 dogs to rush in on the bear all in a heap. The 10 men were obliged to beat a hasty retreat and in less than a quarter of an hour the bear was demolished. Fortunately, when the attack came, the cutting up was so far advanced, that even the weaker dogs managed to get a good piece of the bear in the general scrimmage.

During the night WEGENER was wakened by his dogs barking. He got up to ascertain the cause of the alarm and saw a bear coming towards the tent. He shot it at once. As the dogs were now satiated the men succeeded in skinning and cutting up this bear without difficulty.

On *April 13th* the party reached 32 kilometers further north and tented in the northern part of Nioghalvfjerds Fjord (79-Fjord).

On *April 14th*, after a journey of 30 kilometers they reached the east side of Hovgaards Island, where the tents were raised. On the last part of the march, the screw-ice had been somewhat troublesome.

April 15th. The dogs had gradually acquired a taste for the sledge lashings and several sledges in consequence had been bound together with hemp, which naturally was not good. BISTRUP's and KOCH's sledges completely broke in two in the difficult screw-ice and KOCH split his one runner. The repairs took a long time and as a bear was shot after a march of 8 kilometers, MYLIUS-ERICHSEN gave orders to raise the tents.

Taught by experience they determined this time to leave the dogs spanned to the sledges, whilst the bear was being cut up. The

sledges were turned crossways, so that the dogs could not easily set them in motion towards the bear. The result was as bad as could be imagined. One team succeeded in setting their sledge in motion and this stimulated the other teams to such an extent, that soon all the sledges bore down on the bear at full speed, where the feast and fighting at once began. As the dogs were still harnessed to the sledges, there arose an indescribable confusion; traces and harness were terribly mixed up and a quantity of the harness was dyed with blood and dirt. G. Thostrup's team nearly missed sharing the booty, as the sledge on the way to the bear stuck fast in a fissure. Afraid that his dogs would get nothing to eat, Thostrup ran up and slipped off all the harness; he was probably the one that came off best and cheapest from the general scrimmage and confusion.

April 16th. After a journey of 20 kilometers the party fell in with a bear which was shot. As the dogs were not very hungry, it was thought that quite a small watch would be sufficient to keep them off during the cutting up process. At this moment, however, another bear appeared and whilst attention was directed to the newcomer for a short time, the dogs at once rushed down on the dead bear and ate it up.

The second bear, which was shot soon after, could be cut up in peace.

April 17th. As the party approached the east side of Hovgaards Island, the screw-ice became exceedingly difficult to pass; lashings and bindings burst, cross-trees and uprights broke in two, a sledge runner split and the odometer was broken. At last there seemed to be no progress. Mylius-Erichsen then called the sledge-drivers together, divided them into groups of 2 and 2 and sent them out to reconnoitre. Tobias, who had previously been some distance behind in the column, understood the reconnoitring in a peculiar, but for him extremely characteristic manner. Whilst the others left their sledges, he drove on at full speed, forced his way through a cleft in a screw-ridge, traversed a couple of longitudinal and transverse hollows and was soon out on good ice. When the others returned to report, Tobias came and briefly said, that he had left his sledge on the other side of the screw-hummocks. This put an end to discussion; all simply followed in the tracks of Tobias.

April 18th. In spite of the good sledging they now had, it proved impossible to reach the land under Mallemukfjæld on this day. Most of the sledge drivers had suffered greatly in the joints of the feet and knees, and the sledges were badly damaged; one of them had to be left behind for a time. After 30 hours' marching Mylius-Erichsen was obliged to tent on the ice a couple of kilometers from land under the western end of Mallemukfjæld.

April 19th. There was a strong snowdrift this day, which was

in consequence utilised to repair the sledges. Large openings of water stretched right out from close under the coast. To all appearance it would be very difficult to get past Mallemukfjæld.

April 20th. Brønlund and Mylius-Erichsen with empty sledges reconnoitred along the coast towards the north-east. They were stopped by the southernmost of the two glaciers, which project out into the sea from Mallemukfjæld. In an attempt to get over this glacier, Mylius-Erichsen fell into a glacier ravine, but got out again with Brønlund's help. They returned in the afternoon with greatly damaged sledges and 2 broken gun-butts. The result of the reconnoitre was, that the party could make no progress that way.

Koch and Wegener made geological investigations at Mallemukfjæld and collected specimens of the carbon formation there. Bertelsen painted.

When Mylius-Erichsen returned from the reconnoitring tour he sent G. Thostrup and Tobias into Djimphna Sound to determine, whether Holms Land might not be an island.

April 21st. After 18 hours march G. Thostrup and Tobias returned with the information, that advance northward that way was also impossible, unless they drove up over the land. Whether it was possible to drive over the land, they naturally did not know.

During the past few days the temperature had varied between — 20° and — 30° C.; the open channels were covered with new ice. The only practicable way seemingly was to go out over the screw-ice to the openings and in a wide bend along and over these to try and reach the land on the other side of Mallemukfjæld. Mylius-Erichsen resolved to make this venture with 8 half-loaded sledges. Hagen, who was suffering from a slight indisposition, and Ring were to remain behind to cut up a bear, which had been shot at the tents.

The way over the heavily screwed ice was very laborious and the new ice was so thin, that it was far from bearing everywhere; yet as a rule it was fairly solid along the margins of the openings.

Whilst driving along the margin of an opening Mylius-Erichsen's dogs suddenly swerved and bolted out over the opening, he himself remaining standing on the old ice. Koch's dogs at once followed Mylius-Erichsen's and when Koch tried to prevent this, the dogs pulled him over. He got entangled in the traces and sledge-runners and in this position was dragged with the sledge out over the opening. For a time it looked very serious, as the new ice swayed a good deal; but Koch escaped with a fright, a torn anorak (wind-coat) and wet trousers.

April 22nd. By midnight the party had passed Mallemukfjæld.

The sledges were unloaded some kilometers north of the cliff and at once returned to the tenting place. When they arrived there,

the party learnt that the dogs of Hagen and Ring had eaten the whole of the bear.

A depot for the return journey was made south of Mallemukfjæld.

According to the original plan Ring and G. Thostrup were to form the first returning party. Mylius-Erichsen had met with a number of much greater difficulties however than he had anticipated after his experience on the depot journeys and especially on the autumn journey southward in 1906. The screw-ice especially had been very troublesome, causing a number of break-downs and thus great delays, for only Mylius-Erichsen, Ring, G. Thostrup and the two Greenlanders were able to repair the damages in the most practical way. For the purpose of making the best arrangement possible under the circumstances Mylius-Erichsen resolved upon a change in the members of the 3rd and 4th parties, so that Ring and G. Thostrup were not to be in the same party. As geologist Wegener could not return home, now that the boundary between the primitive rock in the south and the sedimentary deposits in the north had just been reached; the one to return was therefore Bistrup. As the latter, like G. Thostrup, was a cartographer, Ring and Wegener had consequently to change places, so that a cartographer and one who was able to undertake the repairing of the sledges came to be in each party.

Bistrup and Ring thus remained behind, retaining the two worst sledges. Further, Bistrup exchanged 7 of his good dogs for 7 of Wegener's, which were not so good.

In the evening the 1st and 2nd parties along with G. Thostrup and Wegener again drove out over the new ice of the openings and tented early in the morning north of Mallmukfjæld.

April 23rd. During the previous days the dogs had eaten far too many of the sledge and ski lashings and it was now resolved to keep a watch henceforth at the tenting place. Bertelsen, who desired to paint, and the two Greenlanders, who were to repair the sledges, volunteered to keep watch between them.

It was the only time a watch was kept, for Brønlund hit upon a method of building up the sledges one on the top of the other on 4 of the dogs' food boxes, so that the dogs could not reach them.

The screw-ice lay close to land along the outer coast of Holms Land. It was possible, however, to travel on the narrow and fairly high ice-foot, where the advance was more or less easy in spite of the very undulating surface. An opposing wind with snowdrift was somewhat troublesome.

April 24th. Between Cape Amélie (at 77°30′) and Mallemukfjæld (at 80°09′) Mylius-Erichsen had found no trace of earlier Eskimo settlements. It was a great surprise to him, therefore, to discover a tent-ring and a well-preserved trap north of Mallemukfjæld. At

Eskimo Naze, moreover, they came upon distinct traces of a whole Eskimo settlement and it was consequently necessary to pitch the tents there. Almost all went to work to collect either Eskimo relicts, such as darts, snow-knives, fragments of sledges and kaiaks etc. or fossils, of which many occurred here even in the sandstone used by the Eskimo as building material. The collections were deposited in a depot at the spot, to be fetched on the return journey.

In the evening, when all was ready to continue the journey, a bear arrived. The hunt was very difficult in the screw-ice and lasted a long time. Several dogs were wounded by the bear and one of Koch's dogs was shot by the same bullet that killed the bear.

April 25th. It was not until 3 a. m., that a start could be made; the dead bear was carried on Brønlund's sledge. At midday a halt was made on the ice south of Amdrups Land about 15 kilometers west of Henrik Krøyers Islet. The distance traversed was 43 kilometers.

The bear was dropped behind a hummock half a kilometer before the halt, and here it was cut up without trouble from the dogs.

April 26th. Mylius-Erichsen now resolved, that G. Thostrup and Wegener should not continue further than to the coast, where they were to make a depot (80°43′) and then return home. On the return journey G. Thostrup — like Bistrup earlier — was to utilise the opportunity to complete the chart, as Koch had only been able naturally to survey the outer coast during the forced march.

At 10 in the evening the 1st and 2nd parties said good-bye to G. Thostrup and Wegener. Previously Wegener had exchanged his good sledge with the inferior one of Bertelsen and given a good dog to Hagen in exchange for one of his worst. G. Thostrup had also given a dog to Koch.

The screw-ice, which lay close to land from Sophus Müllers Naze, forced the sledges up on to a rough and unpleasant ice-foot. This led to Brønlund discovering distinct traces of earlier Eskimo settlement however; tent-rings, meat-depots, remains of sledges and implements etc. Mylius-Erichsen was even of the opinion, that one of the ruins had been an Eskimo winter-house. At this settlement also the sandstone was full of fossils, especially bivalves and corals. In the course of half an hour a very considerable collection had been made and deposited at the place to await their return. Mylius-Erichsen, however, specially requested Koch not to take the Eskimo objects, if he should arrive first at the tenting place.

Shortly after the settlement had been passed, the two parties drove out over Antarctic Bay and pitched their tents on the north side. This was on *the 27th.*

April 28th. At 3 in the morning the journey was continued eastward along a high ice-wall. Some kilometers further on, the edge of

the inland ice fell away to the north, and then to the north north-west. Again they had to drive some distance eastward, again they turned "the last point before Independence Bay" and again land appeared far away, running out to the north north-east.

On this day the journey had a pleasant termination. Brønlund's dogs suddenly put on full speed — they had detected a bear — and soon all the other 5 teams were in wild pursuit. The bear saved itself, however, by climbing a small iceberg and at the foot of this all the 6 sledges now tumbled together in the most tremendous confusion, which soon developed into a general scrimmage. The dogs were left to fight, however, and the bear was shot. Fortunately, it fell up on the iceberg and was there dissected in peace.

The day's journey had been neither long — about 30 kilometers — nor of long duration; but as it was convenient to get done with the bear on the spot, Mylius-Erichsen gave orders for the tents to be raised (81°07').

April 29th. At 4.30 a. m. the journey was continued, at first over firm snow and then on new ice along a large ice-barrier. Though it was sufficiently clear, that open water must occur here in the summer, it came as a great surprise to find a large piece of timber frozen into the old ice just north of the barrier at 81°22' about 500 meters from land. The discovery greatly interested Mylius-Erichsen; the drift-wood was measured both longways and crossways and finally photographed by Hagen.

On this day they had at last reached the easternmost point of Greenland. After a march of 40 kilometers they rounded a broad, flat naze, which appeared to run out into the sea without sharp boundary, and when Mylius-Erichsen gave orders to tent at the end of 57 kilometers, he felt convinced, that the course would no longer be eastward.

April 30th. Before leaving the tenting place, the following stores were deposited in a small gravel bank:

2 small boxes of pemmican	provisions
1 tin of farce with cabbage	
2 tins of pease meal with pork	
2 liters of petroleum	
1 box of dogs' pemmican	

The intention was, that each party on returning should have the right to take up to one-half of the depot.

It is obvious, that the depot was not very safely provided. It contained scarcely one day's rations for 6 sledges, whereas the journey southward to the depot on Amdrups Land had to be reckoned at 3 days at least. In addition, this last depot could not be said either to be very safely provided.

To understand why MYLIUS-ERICHSEN broke through the perhaps too solid principle, which he himself had expressly laid down in his plan for the sledge journey, that they were not to venture further than regard for a safe retreat permitted, the following considerations may be given here; they are in the main a repetition of the statements made by MYLIUS-ERICHSEN to KOCH on the journey between April 26th and 30th.

The difficulties of the journey had been underestimated. A sledge party of 10 sledges, which had only 3 fully experienced drivers, must always travel more slowly than a smaller, more select party, and this becomes more and more evident as the difficulties on the way increase.

In the autumn of 1906 MYLIUS-ERICHSEN with untrained men and fully loaded sledges had achieved an average day's journey of over 60 kilometers on the return from the Pendulum Islands; it might seem justifiable, therefore, to take 35 kilometers as the average day's march for the spring journey.

The distance from Danmarks Havn to Independence Bay had been estimated at about 400 kilometers, an estimate based partly on GERLACHE's statement of the lie of the coast up to 79° and partly on the fact, that PEARY had given the direction of the coast line from Academy Glacier to be south-east.

Had these, seemingly correct suppositions held good, MYLIUS-ERICHSEN would have been able to reach Independence Bay without in any way depending on what he got from hunting. On the other hand, it was reasonable to hope for game. It had proved certainly, that the musk-ox was much rarer in North-East Greenland than we at home had expected, nor had the bear hunting been very promising; but again the goal itself was a district, which was known from PEARY's journeys to contain musk-ox and that, in all probability, in considerable abundance.

The estimate of the distance was erroneous. The land projected much further to the east than expected and the length of the journey was thus increased by about 300 kilometers. Worse still, the estimate of the day's march was also erroneous. Even fjord ice and firm snow, such as had been met with on the journey to the Pendulum Islands in 1906, were only exceptionally encountered during the spring journey of 1907; instead, the travellers met with screw-ice of the worst kind, in which sledges were damaged daily, or deep snow, where the dogs could not pull the sledges, or lastly, a rough and sloping ice-foot, where progress was very slow and laborious. The disadvantage of having only 3 fully experienced sledge drivers among 10 was very marked under such conditions. The drivers had in fact to learn during the journey itself and probably most of them never learnt how to repair a sledge.

Naturally, MYLIUS-ERICHSEN had already seen, that the suppo-

sitions in the plan had failed; but he was at the same time of the belief, that even so he should not at once give up all idea of making the journey. A reasonable amount of risk had to be taken, especially here where it was a question of investigating the last, unknown stretch of an extensive land. The risk, however, should not fall on the sledge parties, whose main task was to support those going furthest north. For those who had to return, the journey could not have the same attraction as for the 1st and 2nd parties, who steadily pushed forward into the outermost, unknown land.

The returning parties had sacrificed time and energy for the others and if Mylius-Erichsen had asked them, in fact, if he had not prevented them, they would have shared the full risk with him. This Mylius-Erichsen could not agree to. When the supporting parties turned back, sledges and dogs were exchanged, so that the 1st and 2nd parties always had the least damaged sledges and the strongest dogs; on the other hand, Mylius-Erichsen took care, that the returning parties were so well provided with provisions and dogs' food, that they not only could reach the ship but also, if the hunting gave them a chance, could carry out their cartographic investigations successfully.

From 81°30′ the coast line bent evenly more and more to the west; it seemed as if Independence Bay now lay straight in front without too many windings and turnings. It was now simply a question of having good hunting; with this it could be taken as fairly certain, that they would reach the goal aimed at for the time being. Unfortunately, the chances of hunting were not good. The land was covered with ice everywhere and the sea-ice was old and far too solid to encourage any hope of meeting with seals or bears. When the gneiss hills in Erik S. Henius Land began to appear, the hope of game again arose; but when Mylius-Erichsen tented under Nakkehoved in the evening, the hope had vanished. The land was obviously only a small, isolated group of hills; a few kilometers further west the inland ice again projected right out over the coast.

May 1st. The journey was continued in the afternoon at 3.30. The coast now tended due west and some few hours later west by south. No land whatsoever was seen to the west. Hitherto the screw-ice had lain close to land; now its margins extended out over the sea towards the north-west, whilst at the same time the inland ice jutted out over the sea-ice and made advance difficult owing to the presence of fissures and loose snow.

It was originally Mylius-Erichsen's intention, that the 1st and 2nd parties should keep together as far as Independence Bay and in company try the fortunes of hunting either on Academy Land or right over on Peary Land. If they were fortunate, Mylius-Erich-

SEN would continue north-west through the Peary Channel, whilst KOCH was to follow the coast of Peary Land to the north-east and try to reach PEARY's cairn on Cape Clarence Wyckoff (82°57′.7).

The difficulties of the journey had already for some time raised doubts in KOCH's mind as to the accomplishment of the programme. At the depot at 81°30′ he had, for this reason, suggested to MYLIUS-ERICHSEN, that the 2nd party should give over to the 1st party all the provisions and all the food they could do without and then turn back. MYLIUS-ERICHSEN however would not hear of this.

The inauspicious outlook during the march on May 1st again caused KOCH, after consultation with BERTELSEN, to bring forward the proposal, that the 2nd party should return, but again MYLIUS-ERICHSEN rejected it; he still hoped and expected, that they would find game in a few days; he knew that KOCH was more than willing to go on and only made his proposal with great self-sacrifice. Finally, he said that he thought it of special importance for the Expedition, if KOCH could succeed in reaching PEARY's cairn at ca. 83° and thus link up with the American survey. KOCH replied, that in that case he would propose, that the 1st and 2nd parties should at once separate. The nearest route to Peary Land would now be along a course towards the north-west, whereas the coast tended west by south; the advance along this was difficult and the outlook with regard to game was for the time the least possible. The boundary of the screw-ice ran out towards the north-west; by following this KOCH hoped to meet with bears. But KOCH also calculated, that even without hunting he would be able to reach Peary Land and return to the depot at 81°30′ without too much risk. MYLIUS-ERICHSEN hesitated somewhat in accepting this proposal. PEARY's experience did not indicate, that big game could be got on the east coast of Peary Land and he did not believe in bear hunting in the screw-ice. On the other hand, the outlook westward was not good at that moment and he would not oppose KOCH's attempt, therefore, to go directly to Peary Land.

When the parties separated, the stores were in the main as follows:

	1st party	2nd party
provisions for.....	ca. 15 days	ca. 15 days
dogs' food for.....	- 15 —	- 14 —
petroleum for.....	- 25 —	- 25 —

By a mistake the 2nd party carried off the common jar of spirits, the 1st party having only the spirits contained in a small spirit can belonging to the cooking apparatus. The mistake proved, however, to be of no practical importance.

At 8.15 in the evening the two parties drew away from each other. The small silk flags were fastened on the sledges; each wished the other good luck on the journey, swung their caps and soon MYLIUS-

Erichsen disappeared in the uneven screw-ice to the west, whilst Koch drove out over the sea.

3b. Journey of the 2nd party to Peary Land[1].

May 1st. Tents were raised on the screw-ice at 11.30 in the evening.

May 2nd. On making an observation at 5 a. m. Koch saw land to the north by east and took a bearing of it. At the same time he saw the vapour of open water almost in the same direction. It was resolved to try and advance in the direction of the land and the open water, where they might expect to find game.

Departure at 3 p. m. The screw-ice soon proved to be so difficult, that Koch on the advice of Tobias gave up further advance in the direction north by east. The sledges could not stand the blows and thumps in the quite fresh and sharp screw-ice, and the land had disappeared; it was not seen at all beyond that once and has probably been "cape-fly-away" (in the observation journal is added: "wind — 0; refraction anomalies — 2; horizon — in all directions"). The course was then set along the border of the screw-ice in the direction west by north. The way ran along narrow snow-bridges over several broad gaps with open water; one of Bertelsen's dogs fell in but was saved. The tent was raised at 11.30 p. m.

May 3rd. Departure at 3.45 p. m. The dogs were very tired; it was hardly possible to get them forward through the loose snow or over the hummocks of screw-ice.

May 4th. Raised the tent at 1.15 a. m. Departure at 6 p. m. The screw-ice was specially unpleasant this day. As all directions seemed equally broken, the course was set north-west. At the end of the march, however, the ice became good; but the dogs had quite lost their strength and could get up no speed. During a strong mirage land appeared in the south-west, apparently not far away. Possibly it was Princess Thyra Island or an island north-east of this; but Koch could not venture on a closer investigation, as it would obviously prove a very difficult matter to reach Peary Land.

May 5th. Pitched the tent at 3.30 a. m.

At the tenting place one of Tobias' dogs was worried and partly eaten by the other dogs.

Departure at 9.15 p. m. The march began with an hour-long passage over an unpleasant screw-ridge. Two sledges were damaged and the fork of the odometer was broken. Later, the going improved and on the last half of the march it was good. Fresh dogs could here have travelled 10 kilometers per hour with the light sledges. Now

[1] Captain Koch has kindly given me an account of his journey and I reproduce it here practically as written by him.

the speed was scarcely 4 kilometers per hour and the drivers had to walk by the side of the sledge or even push from behind.

May 6th. Pitched the tent at 7 a. m., 10 to 20 kilometers from the south-east coast of Peary Land.

May 7th. Departure at 4 a. m. Good snow under foot, but slow marching. Reached Peary Land at 9 a. m. Deposited most of the stores at 82°30′ on the south side of Herlufholms Strand west of Cape Ejler Rasmussen and set a course northwards to seek for PEARY's cairn.

Even if no game appeared, this goal might still be reached, if each man placed himself on half rations for 15 to 20 days and some of the dogs were used as dog food — presupposing constant good weather however. To have a chance of game, the party held on over the flat, partly snow-covered Herlufsholm Strand. About 15 kilometers from the coast TOBIAS discovered musk-ox. A herd of 4 cows and 2 calves were shot. After skinning these the tent was raised there at 1 a. m. on the 8th.

May 8th. A rest was taken and a hunt made after game; 6 oxen, 2 young cows and 3 young calves were shot. Snowstorm. BERTELSEN snow-blind.

May 9th and *10th.* The snowstorm continued. On the 10th the weather calmed down somewhat. With the help of the dogs the 11 musk-oxen were towed to the tent, skinned and the meat deposited in a depot. BERTELSEN well again.

May 11th. Departure at 11.45 a. m. Heavy going both on land and later on the sea-ice. Dense fog; in the fog the party drove up into the screw-ice. Pitched the tent after travelling 30 kilometers.

May 12th. Set out at 10.45 a. m. Pitched the tent at 10 p. m. at PEARY's cairn, 82°57′.7, after travelling 38 kilometers. KOCH removed PEARY's report[1], which ran as follows:

"Record deposited May 22nd 1900 by R. E. Peary, U. S. N.

May 22nd 1900.

Arrived here 10.30 p. m. May 20th from Etah, via Ft. Conger & north end of Greenland. Left Etah Mar. 4th. Left Conger Apr. 15th. Arrived north end of Greenland May 13th. Reached point of sea ice Lat. 83°50′ N. May 16th.

On arrival here had rations for one more march southward. Two days of dense fog have held me here. Am now starting back.

With me are my man, Mathew Hanson; an Eskimo Ahngmalokto; 16 dogs & 3 sledges.

[1] This original document was sent through the Committee by Captain KOCH on his return home to "The Peary Arctic Club of New York City". Comparing this with the copy published in the Bulletin of the Geographical Society of Philadelphia, January 1904, it will be seen, that there are various, though minor differences.

This journey has been made under the auspices of and with funds furnished by the Peary Arctic Club of New York City.

The membership of this Club includes Morris K. Jesup, Chas. A. Moore, Henry W. Cannon, Herbert L. Bridgman, John H. Flagler, E. C. Benedict, Jas. W. Hill, H. H. Benedict, Chas. P. Daly, Alfred Harmsworth of London, Dr. Hyde, E. L. Bliss, Sands, Constable, Parrish, Raven and others.

R. E. Peary,
Civil Engineer, U. S. N."

Instead of Peary's report Koch deposited the following:

"A sledge party of the Mylius-Erichsen's Danmarks Expedition — lieutenant Koch, artist Bertelsen and the Eskimo Tobias Gabrielsen — arrived here May 12th 1907, 10 p. m. on journey northward.

I have taken R. E. Peary's record, which was deposited here in this cairn.

J. P. Koch".

May 13th. Set out at 6.30 p. m. and on

May 14th, 3.15 a. m., halted at Cape John Flagler; odometer distance 50 kilometers. Koch's intention to penetrate into Frederick E. Hyde Fjord had to be given up, the fjord being full of fog. Instead, he set a course north round Peary Land towards Cape Bridgman. Departure at 9.50 p. m.

May 15th. Pitched the tent at 6 a. m. on the sea ice south-east of Cape Bridgman: odometer distance 44 kilometers. It was Koch's intention to travel a further 10 to 20 kilometers towards the west to measure the heights etc. there and to give Bertelsen an opportunity to paint. Continuous fog prevented this however. A couple of sketches were made nevertheless as also some measurements from the tenting place.

May 16th. Fog. Koch gave up his plan of travelling westwards and resolved to go into Frederick E. Hyde Fjord. Set out at 2.30 a. m., drove in towards land, built a cairn and deposited there the following report [1].

[1] The report translated reads as follows.

"J. P. Koch, leader of 2nd sledge party. Danmark Expedition to the north-east coast of Greenland 1906—1908.

Cape Bridgman, 15/V 1907.

The Danmark Expedition reached Cape Marie Valdemar by ship in August 1906 and went into winter quarters at Cape Bismarck in September same year.

On 28/III 1907 a sledge expedition of 10 men, 10 sledges and ca. 85 dogs set out northwards. The whole sledge expedition was led by Mylius-Erichsen. At 80°09′ 2 men and 2 sledges returned, at 80°44′ other 2 men and 2 sledges. The journey went well but was prolonged more than expected, because the coast of Greenland proved to lie much more to the east than believed. According to a pro-

"J. P. Koch, Fører af II Slædehold. Danmark Ekspeditionen til Grønland Nordøstkyst 1906—1908.

C. Bridgman den 15/V 1907.

Danmark-Ekspeditionen naaede pr. Skib K. Marie Valdemar i Aug. 1906 og gik i Vinterkvarter ved Kap Bismarck i Sept. s. A.

Den 28/III 1907 drog en Slædeekspedition paa 10 Mand, 10 Slæder og ca. 85 Hunde nordover. Den samlede Slædeekspedition førtes af Mylius-Erichsen. Paa 80°09′ vendte 2 Mand og 2 Slæder om, paa 80°44′ atter 2 Mand og 2 Slæder. Rejsen gik godt men forlængedes ud over det ventede, fordi Kysten af Grønland viste sig at ligge langt østligere end antaget. Efter et foreløbigt Skøn ligger det østligste Punkt paa 81°24′ N. Br. og ca. 12° v. f. Grw.

Den 1. Maj, paa 81°43′ og ca. 18° v. f. Grw., skilte II Slædehold — Koch, Bertelsen og Tobias Gabrielsen — sig ud fra I Hold. Dette sidste — Mylius-Erichsen, Hagen og Brønlund — drog mod Vest ind mod Independence Bay og Peary Channel, medens II Hold drog mod Nordvest ud over Havet mod Peary Land.

II Hold naaede Peary Land den 7/V Fm. paa ca. 82°30′. Samme Dag skød vi 4 Moskusokser og 2 Kalve, næste Dag 8 Moskusokser og 3 Kalve. Vi opholdtes af Snestorm i 3 Dage og drog derefter nordover. Pearys Varde fandt vi den 12/V Kl. 10 Em. paa ca. 82°59′. Den 15/V Kl. 5 Fm. kom vi hertil i tæt Taage — 3 Mand, 3 Slæder og 25 Hunde — med Forsyninger for 5 Dage og iøvrigt Hjemrejsen sikkert ved Depoter. Vi vende nu om, rejser ind i Fr. Hyde Fjord og vil derefter søge langs Peary Lands Østkyst og Sydøstkyst ned til Academy Gletscheren for derfra at returnere til Ekspeditionsskibet ved Kap Bismarck.

Da vi forlod Skibet den 28/III var alt vel.

J. P. Koch".

visional estimate, the easternmost point lies at 81°24′ N. lat. and ca. 12° W. of Greenwich.

On May 1st, at 81°43′ and ca. 18° W. from Greenwich, the 2nd party — Koch, Bertelsen and Tobias Gabrielsen — separated from the 1st party. The latter — Mylius-Erichsen, Hagen and Brønlund — proceeded west towards Independence Bay and the Peary Channel, whilst the 2nd party went northwest out over the sea towards Peary Land.

The 2nd party reached Peary Land on 7/V in the forenoon at ca. 82°30′. That same day we shot 4 musk-oxen and 2 calves, the next day 8 musk-oxen and 3 calves. We were delayed by snowstorm for 3 days and thereafter proceeded northwards. We found Peary's cairn on 12/V, 10 p. m., at ca. 82°59′. On 15/V, 5 a. m., we arrived here in a dense fog — 3 men, 3 sledges and 25 dogs — with provisions for 5 days and the homeward journey also assured by depots. We are now returning, intending to go into Fr. Hyde Fjord and will thereafter journey along the east and south-east coast of Peary Land down to the Academy Glacier, from which we will journey on to the ship of the Expedition at Cape Bismarck.

All well, when we left the ship on 28/III.

J. P. Koch".

Tented in the evening on the north side of Fr. Hyde Fjord, about 30 kilometers up the fjord; odometer distance 48 kilometers.

May 17th. Departure at 8 a. m. Drove across the fjord to the south side and tented here at 10.30 a. m. — Bertelsen and Koch sick (tiredness, repulsion to food, pains, giddiness, sore gums, general loss of energy). Tobias went hunting, but was not fortunate. Provisions and dogs' food for 2 to 2½ days. Petroleum almost used up; for several days the party had practically been living on raw meat, as they had only enough to thaw and warm the meat, but not to cook it. — Unfortunately, the dogs had gnawed all the fat from the meat; fat stuffs were greatly needed and this was probably the cause of the sickness. There were no means available to put an end to the costiveness; salt water could not be got, as all the ice was fresh.

May 18th. Bertelsen and Koch climbed a hill, 550 m. When about to set out again, Bertelsen's team found to have only 3 dogs. Tobias went out to search for the dogs.

May 19th. Tobias returned some hours afterwards with the news, that the dogs had been hunting musk-ox and had pursued an ox over a steep precipice by the fjord 500 m. high. They were probably all dead. Koch at once started off — 3.30 a. m. — and drove along below the precipice, where he found the dead musk-ox and 1 living, unhurt dog. Koch resolved to wait one more day for the 5 missing dogs. Tented under the precipice at 4.30 a. m.

In the evening Tobias drove back to the former tenting place to look for the dogs; they were not to be found. The precipice could not be investigated; it was inaccessible. Probably the 5 dogs were killed, like the musk-ox, but remained hanging on the cliff.

May 20th. At 12.15 a. m. the party set out with 20 dogs. Strong wind from N. W. with snowdrift. Tented 9 a. m. on the north side of Schley Fjord; odometer distance 54 kilometers.

May 21st. Fog. Passed Peary's cairn and added the following note to the earlier report.

"May 21st 1907, a. m.

Reached Cape Bridgmann; stayed 3 days in the Hyde Fj.; lost here 5 dogs going down over a precipice in pursuit of a musk-ox. We are now going southward to Academy Land, 3 men, 3 sledges and 20 dogs. Bertelsen and I suffer from not being able to digest the musk-oxen meat; for several days we have had almost no other food. I think we shall be allright again, when we 23rd shall reach our depot at 82°30′.

J. P. Koch".

Pitched the tent on the northern side of Herlufsholm Strand at 1.50 p. m. In spite of extreme economy Koch's petroleum ran short here.

May 22nd. Departure at 7.30 a. m. Drove across Herlufsholm Strand towards the depot with petroleum and sledge provisions west of Cape Ejler Rasmussen. TOBIAS shot a musk-ox and brought it in on the sledge. Strong wind from the W.S.W. with snow-drift, later dense driving snow. Heavy sledging. After covering 40 kilometers in 13½ hours it was evident that they had missed the depot. Raised the tent at 9 p. m. Picked out the marrow from the bones of the killed musk-ox and ate it raw with snow. They tried to drink the blood not yet clotted but found it nauseating.

May 23rd. In the course of the afternoon the weather became better and they succeeded in ascertaining where they were by means of KOCH's own chart. At 4 p. m. TOBIAS drove away to fetch the sledge provisions, petroleum and spirit of the depot. He returned later with these. They now had oatmeal porridge and prunes and BERTELSEN and KOCH each drank half a liter of boiled water hoping that it would be good for the constipation.

May 24th. The meal on the preceding day did not help BERTELSEN, whereas KOCH was more fortunate. KOCH decided as the last resource to give BERTELSEN an injection by means of a petroleum funnel. The experiment succeeded better than expected and was repeated during the next 8 to 14 days every second day.

Started at 8.30 a. m. for the meat depot up under the hills at Herlufsholm Strand. Returned the same day to the tent with the meat.

May 25th. Departure towards the S.E. at 11.15 a. m. Reached the coast after having driven 6½ kilometers. From there TOBIAS drove back to the provision depot to fetch the remainder of the goods, while BERTELSEN and KOCH drove towards the S.W. along the coast. Heavy sledging with loose snow. Were obliged to stop at 5 p. m. because KOCH was feverish. (Fever was fairly common at this time whenever the conditions required continuous physical exertion). Odometer distance 22 kilometers. TOBIAS returned to the tent place at 5.30 p. m.

May 26th. The apparently favourable conditions for hunting at Herlufsholm Strand had given KOCH the idea to proceed to the Academy Glacier. It was quite uncertain whether MYLIUS-ERICHSEN had really succeeded in reaching so far, still more dubious if he had penetrated through the Peary Channel. For the 2nd party, however, a journey to the Academy Glacier and — if they found no trace of the 1st party — still further towards the north-west through the Peary Channel would in all probability force them to remain in the north the whole summer with return to the ship across the autumn ice. KOCH thoroughly discussed the plan with BERTELSEN and TOBIAS. In order to carry out the plan without too great a risk, it was necessary to shoot so much game on Herlufsholm Strand that they had enough

provisions and food till the middle of September. This might be possible. Not only had they had good hunting immediately they arrived on the 7th and 8th of May, but on the 22nd of May they had also come across quite fresh tracks of game in the snow, and had even sometimes driven into herds of musk-oxen. It was also very probable that they would get good hunting on the southern part of Peary Land, which in the main has the same character as Herlufsholm Strand. It was however already so late in the year, that it was doubtful if they could afford to spend 8 to 14 days; if the hunting failed it was very improbable, that they could still get home. Koch's and Bertelsen's illness was moreover much more serious than at first believed; they were both quite weak and could stand no exertion; the fact that they could now get water and that their digestion was again in order had naturally raised their spirits but made no very great change [1]. Thus, it was their illness together with the near approach of summer which decided the matter and from Cape Kjøbenhavn Koch determined to steer due south.

Departure at 1.30 p. m. Very heavy sledging. Koch and Tobias, as often before, used their skis with success. Bertelsen's skis were unfortunately quite destroyed by the screw-ice in Wandels Sea. Pitched the tent at 11 p. m. Tobias snow-blind.

May 27th. Made an observation at noon and sighted a cape probably Cape Knud Rasmussen, very far off towards the west.

Started at 5.30 p. m. towards Cape Rigsdagen. After covering 12 kilometers they reached the land, which here tended south to southeast and shortly after they met, quite unawares, Mylius-Erichsen's party heading for the north.

There was mutual surprise at this play of fate which led the two sledge parties together just at the point where, according to the original plan, they should have separated. As they naturally had much to tell each other from the preceding month Mylius-Erichsen and Koch immediately agreed to drive to the land and raise the tent in company.

The meeting had of course to be celebrated and as the 2nd party, owing to an involuntery fast at Peary Land, were comparatively well provided with European provisions, the feast was held in Koch's tent. The meal consisted of black coffee and biscuits with butter. After the coffee Tobias provided tobacco, Brønlund cigarettes.

Mylius-Erichsen then told them the following [2].

After Koch had driven out over the sea-ice on the 1st of May, the 1st party had proceeded westwards along a coast where the in-

[1] It was not until July—August about one month after the return, that they were again quite well.

[2] Of Mylius-Erichsen's account Koch has here only noted certain parts, not stated in Brønlund's diary.

land ice graded evenly into the sea ice, so that it was impossible to say where the inland ice stopped and the sea ice begun. The inland ice and the loose snow soon placed such great hindrances in their way, that MYLIUS-ERICHSEN already on May 2nd turned towards the north in order to reach the sea ice. Here he crossed KOCH's track but soon after again steered westwards. After a few days he passed north of Prinsesse Dagmar's Peninsula. The dogs were by that time very exhausted. MYLIUS-ERICHSEN therefore tried to lighten the sledges by depositing a box of dog pemmican on the north side of Prinsesse Dagmar's Peninsula and parting with everything that was not absolutely necessary, e. g. the case which contained kitchen utensils.

As some time passed ere the 1st party met with musk-oxen, it had been necessary to kill 2 of the dogs and use them as food for the others; 1 dog had run away and altogether they had killed or in other ways lost 4 dogs.

All told the 1st party had shot 21 musk-oxen. Most of them were shot a long way from the tent place high up in the rocks, probably more than 300 meters above the sea. It had been hard work to skin all the animals and carry the meat for miles down to the tent. The hunting under these unfavourable conditions had taken a long time. The dogs had of course been driven up to the hunting place to feed there, but nevertheless it was not such profitable hunting as if the animals had been shot down at the shore.

HAGEN showed KOCH his observation-journal containing sketches from the inner part of Danmarks Fjord. They were made with the greatest care and gave a distinct picture of a large Greenland alpine fjord. Questioned expressly by KOCH, HAGEN stated that the distance from the interior of Danmarks Fjord to the inland ice could be estimated at 30 kilometers. The margin of the inland ice was some 500—1000 meters high and it was impossible to mount it from the interior of the Fjord.

It was MYLIUS-ERICHSEN's intention to try and penetrate westwards from Cape Rigsdagen for a couple of days. He had therefore deposited some of his load — including provisions for 4 days and dog food (musk-ox meat) for 2 days — 32 kilometers south of Cape Rigsdagen. On the sledges he had now provisions and dog food for 3 days and petroleum for a few meals. The little spirit which the 1st party had was of course soon used up, but it had caused no difficulty to heat the cooking-apparatus with petroleum.

When MYLIUS-ERICHSEN heard that KOCH was sure, that he had seen the Academy Glacier and the inner part of Independence Sound and had carried out a number of preliminary surveys for the determination of the course of the coast line, he stated that he would give up the planned 2 day's journey towards the west and instead return home with the 2nd party.

Mylius-Erichsen and Koch further agreed that during the return journey on the way from Antarctic Bay to Mallemukfjæld they would try to get so much game, that they could lay out depots for a journey which Koch might possibly carry out next spring through the Peary Channel to Cape York.

May 28th. In the morning Mylius-Erichsen and Hagen climbed the fells, partly to make a survey, partly to build a cairn at the place where their journey had ended and also to get a view of the conditions in Independence Sound. When they returned at noon, Mylius-Erichsen declared that he had altered his decision to return home with the 2nd party; he would now as originally intended continue his course westward for 2 or 3 days before returning and therefore asked Koch to give him 1 box of dog pemmican, 2 liters of petroleum and a little spirit.

They now agreed as to how they should divide the common depots between the 2 sledge parties.

The depots were:

	Provisions for 3 men	Food for 20 to 25 dogs	Petroleum for 3 men	Remarks
81°30′	2 days	2 days	3 days	
80°43′	2 —	3 —	0 —	
Mallemukfjæld	0 —	4 —	20 —	Personal clothing of 2nd party, skis, etc.
Lamberts Land	8 —	3 —	20 —	Personal clothing of 1st party. Reserve parts for sledges etc.
Nordre Depot	10 —	5 —	15 —	Reserve parts for sledges.
Hagens Island	10 —	5 —	0 —	Personal clothing, skis etc.
Björneskærene	10 —	5 —	0 —	
Cape Amélie	20 —	6 —	0 —	
Cape Marie Valdemar	50 —	6 —	Unknown but practically in great quantities.	

Regarding the 4 northern depots the contents could be considered as correct. The 5 southern depots were to be laid out from the ship after Mylius-Erichsen's departure. Even if it could be taken for granted that this had been done, they could not know how much had been taken from the depots by the 3rd and 4th parties. As to the 4 northern depots the table states what was left after the parties already returned had taken what they wanted.

The parties made the following agreement:

The 1st party should proceed westwards for 2 or 3 days and then return.

The 2nd party should return immediately, leaving the depot at 81°30′ untouched and only take what was absolutely necessary

from the depot at 80°43′ (Amdrups Land). From Lamberts Land the 2nd party should drive due south along the group of islands. If necessary KOCH might visit the Nordre Depot, but if possible he should avoid doing so as MYLIUS-ERICHSEN desired to remain in this part of the Jøkelbugt for some days. Of all the other depots KOCH could take half. During the return journey the 2nd party should take with them as much as they could of the stone samples and fossils collected on the journey northward, whereas KOCH should leave all the Eskimo things for the 1st party.

During the northward journey MYLIUS-ERICHSEN had constantly been writing letters for TROLLE, containing an account of the journey and of the discoveries made. Altogether there are 6 of these letters. The last was brought home by KOCH and has been written at Cape Rigsdagen on the day when the 1st party drove westward and the 2nd eastward on the return journey. As this is the last communication from MYLIUS-ERICHSEN, the portions refering to the journey may be quoted here.

North Cape of N.E. Greenland. ca. 82°03′ N. lat. 28th May 1907. 2 months after the departure from the ship.

Dear TROLLE.

With KOCH and his comrades, whom we left on May 1st and met last night at midnight quite by chance, I send you these lines in haste in order personally to tell you the good news, of which KOCH's party will be able to give a more detailed report, that everything has gone well with us all. In spite of illness, owing to an exclusive meat diet for a long time, KOCH's party succeeded in reaching Cape Bridgman, and, what I consider a great triumph, in finding and bringing away PEARY's record.

My party acting in the belief that we found ourselves in Peary Channel has discovered and penetrated into the head of one of East Greenland's largest fjords, which runs in south of the land where we are at present and reaches the inland ice, for which the glacier behind Academy Land forms the northern outlet. In here we shot 22 hares, 4 ptarmigan and 21 musk-oxen, found drift timber in the inner fjord (at ca. 81° N. lat. and ca. 29° W. long.) and Eskimo ruins! Shot at a wolf at too long range, saw 2 snow-owls etc. and collected a considerable number of samples from the sedimentary-like, imposing rocks along the coast.

Unfortunately we had to drive about 80 miles [2] to get out of the fjord again and north round this land, on the northern point of which

[1] The letters have been lent by Lieutenant TROLLE to the Editor.

[2] 148 kilometers. Measured from Cape Rigsdagen, however, the fjord is over 200 kilometers long.

we drove right against our 3 returning comrades. They were suffering from constipation, Tobias also from snow-blindness, but in good spirits and full of energy; and now to-day they start off for the ship which they will probably reach in about 3 or 4 weeks. A week later or at the utmost a fortnight you may expect to see us. We now seek to end the journey of our party by a 40 miles tour towards Cape Glacier. We will then have established a connection with Peary's point and will return with satisfactory results. When we separated from Koch's party on the 1st of May, we had only one sledge-case left and have now for about 3 weeks been living exclusively on hare and musk-ox meat, of which we boil a pot-full twice during the 24 hours, the one time mixed with a packet of knorrsk[1] which makes the soup saltish and a little more substantial. We have all 3 been in good health and have not suffered from constipation, rather the reverse, though not troubled thereby in any way.

Unfortunately, your dog-team has by mishap been considerably reduced. But we shall make up for it later! Hagen has lost 2 dogs and Jørgen and I have each shot one for dog-food. Our travelling is still fairly good. With another fortnight at our disposal (now it is too late in the year) and 10 quarts of petroleum besides the 5 still left, we should willingly have made more journeys in these attractive regions ...

Hard days we have had, that cannot be denied, days full of hope and bitter with deceptions, and the month we have still left will not be the easiest — but we are all grateful for our work, the life and comradeship during the 3 months we have spent up here. We should like to travel with Koch's party towards the south, but duty calls us 2 or 3 days to the west, so we must separate again after 24 hours never to be forgotten.

Good-bye to you, dear Trolle, and to every one onboard, with greetings and all good wishes, once more good-bye with the last sledge post we can send — and then in a month we shall certainly meet.

Yours sincerely
L. Mylius-Erichsen.

On the *28th of May* at 7 p. m. Mylius-Erichsen, Hagen and Brønlund drove west into Independence Sound with 3 sledges and 23 dogs and at the same time Koch, Bertelsen and Tobias left the tent place and drove east.

The provisions of the 2 parties, until Amdrups Land was reached, were as follows:

[1] Meat-extract. Note by Editor.

1st party

	On the sledge	Depot in Danmarks Fjord	Depot on Princess Dagmars Peninsula	Depot at 81°30′	In all	Rema
Provisions	5 days	2 days	0 days	1—2 days	8—9 days	The disproportion between the provisions and the dog food is only apparent, because a great deal of the dog food consisted of musk-ox meat.
Dog food..	5 —	2 —	2 —	2 —	11 —	
Petroleum.	6 meals	9 meals	0 meals	6 meals	21 meals	

	2nd party (all on the sledges)
Provisions	10 days
Dog food	11 days
Petroleum	30 meals

It was estimated, that these stores would last till they reached the depot at 80°43′ (Amdrups Land) and the petroleum till they came to Mallemukfjæld. In addition to the ca. 320 kilometers to Amdrups Land, the 1st party had to make a two days' journey towards the west and again two days back to Danmarks Fjord.

The estimated supplies, which however are not quite reliable as to the 1st party but must nevertheless be considered as fairly correct, give at once the impression, that the 2nd party were the more favourably placed. It must be remembered, however, that of the 2nd party two were ill, as also that all the provisions etc. had to be carried on the sledges and they had only 20 dogs (the 1st party had 23).

3c. The return journey of the 2nd party[1].

As already mentioned the 1st and 2nd party separated on May 28th at 7 p. m.

On the *29th of May* the 2nd party stopped close to the south of Princess Thyra Island, where the tent was pitched. Odometer distance 50 kilometers. Departure at 6.30 p. m. Heavy sledging, snow and drift.

May 30th. Raised the tent at 3.30 p. m. Odometer distance 35 kilometers.

On *May 31st* they were held up by a snow-storm. To make some change in the food, they tried to eat dog pemmican; but the taste was too much for them. They had more success with the grease, of which they gradually consumed about 5 kg. The dogs were given musk-ox meat instead.

On *June 1st* the weather improved. Departure at 6 p. m. Thick haze, new snow and heavy sledging.

[1] In the following, the short, concise style of Koch and Bertelsen in their official report has been used to the greatest possible extent.

June 2nd. Stopped at 4.30 a. m. Odometer distance 41 kilometers. Departure at 8 p. m. Drifting and falling snow.

June 3rd. Raised the tent at 6.30 a. m. Odometer distance 52 kilometers. Departure at 9 p. m.

June 4th. At noon they passed the depot at 81°30′, which of course was left untouched. South of Nordost Runding they had some very heavy sledging; Koch, therefore, drove up on the inland ice where the sledging was good and firm. Raised the tent on the inland ice at 7 a. m. Odometer distance 64 kilometers. Departure at 9.15 p. m.

June 5th. Hoping to meet some game, Koch again drove out on the sea-ice; here there was a lot of water but good sledging. Pitched the tent at 7 a. m. Odometer distance 48 kilometers. Tobias went hunting and shot 3 seals, and thus only had 1½ hours' sleep at this place. Departure at 9.15 p. m. During the drive 1 seal, 1 bear and 1 walrus were shot. Took the bear and the first 3 seals along with them and left behind them the walrus and the other seal.

June 6th. Raised the tent at 5.30 a. m. near the depot at 80°43′ (Amdrups Land). Odometer distance 29 kilometers. Repaired the sledges; skinned the bear. Departure at 11.20 p. m.

June 7th. Drove back to the walrus and seal left behind. The walrus was skinned and the hide and bones heaped up on the ice, so that they could be seen at a long distance, and in a letter left by Koch for Mylius-Erichsen he wrote, that half a walrus would be deposited near the Eskimo ruins at Sophus Müllers Naze.

They now drove to the Eskimo ruins with about 600 kg. of walrus meat and about 250 kg. were deposited in an old Eskimo meat-pit. Here Koch wrote a letter to Mylius-Erichsen, part of which may be quoted.

7th June. 9.15 a. m.

Dear Mylius-Erichsen.

The depot here is at your disposal. There is walrus meat for about 8 days. Further, we deposit at the Thostrup-Wegener depot[1] 1 box of dog pemmican, 1 box of grease and probably some bear meat (perhaps 2 meals for 3 teams). In view of the planned journey to Cape York it would perhaps be best to leave all the box dog-food at the Thostrup-Wegener depot untouched now and as far as possible avoid using the dog-food depots at 80°09′ and 79°08′, because it is much more probable that next spring you can be sure of finding the box food than e. g. walrus meat or bear meat. Further information at the Thostrup-Wegener depot ...

At 11.45 a. m. they reached the depot at 80°43′ on Amdrups Land. Odometer distance 48 kilometers.

[1] The depot at 80°43′ on Amdrups Land.

The sledges had gradually become very damaged, especially the sledge-straps. (The dogs had eaten almost all the skin-straps; even the lashings of spun-yarn and marling had not been spared). The sledges were therefore very limp and often collapsed.

June 8th. At the 80°43′ depot KOCH deposited 5 days rations of bear and walrus-meat for 3 teams and 1 box of dog pemmican [1] (3 teams for 2 days) and one box of grease (3 teams for 1 day).

Here KOCH again left a letter for MYLIUS-ERICHSEN.

BERTELSEN and TOBIAS had now again become snowblind, TOBIAS however only slightly.

Departure at 5.40 a. m. Fog. From 11 a. m. drifting snow. Pitched the tent on the ice at 11.30 a. m. Odometer distance 30 kilometers. Departure at 11.45 p. m.

June 9th. From Eskimo Naze they took with them a number of fossils deposited there by WEGENER. Stopped at 8.45 a. m. Odometer distance 40 kilometers. Departure at 11.10 p. m.

June 10th. From Nordost Runding to Mallemukfjæld the 2nd party had proceeded along open water of indeterminable extent, which now reached close to the land. The passage round Mallemukfjæld was difficult and scarcely free of danger. The ice foot had been washed away and they were therefore obliged to proceed on a sloping snow-field ending in a ca. 30 m. high, snow declivity down to the sea. Here TOBIAS drove all 3 sledges.

The ice in the bay south of Mallemukfjæld had broken up at many places and KOCH might have gone adrift had he followed the same route as on the outward journey. He kept close to the land therefore, driving through some very troublesome screw-ice, where KOCH's sledge collapsed and the odometer broke.

At 9.30 the tent was raised at the depot ,where they found the meat of 3 bears (besides a ham of a fourth) which G. THOSTRUP and WEGENER had shot. The provisions at the depot were left untouched.

June 11th. BERTELSEN and TOBIAS were now better from the snow blindness. After depositing a letter for MYLIUS-ERICHSEN, the 2nd party started at 5.15 a. m. with provisions and dog food for 5 or 6 days. Loose newly fallen snow, heavy sledging. Pitched the tent at 1.30 p. m. Odometer distance 31 kilometers.

June 12th. Departure at 1.30 a. m. Fog, loose and thick snow which protected the sledges in the screw-ice, so that they suffered no damage. Raised the tent at 10.30 a. m. Odometer distance 35 kilometers.

June 13th. Departure at 12.40 a. m. Easy sledging during the first 50 kilometers, later on bad sledging. KOCH's sledge collapsed. Pitched the tent at 3 p. m. at the depot on Lamberts Land. Odometer distance 71 kilometers.

[1] 1 box of dog pemmican = ca. 26 kg. 1 box of grease = ca. 18 kg.

June 14th. A rest was taken. All 3 sledges were repaired. Koch examined and put in order the depot, which had been scattered and partly destroyed by bears, and wrote to Mylius-Erishcen.

"Besides our part of the sledge-case we have taken about 2 quarts of petroleum [1] from the depot.

At 8 p. m. we go southwards along the group of islands, heading for Bjørneskærene, but as we have provisions and dog food for 3 or 4 days only we may be obliged to resort to Nordre Depot or Hagens Island ...

If we need not visit Nordre Depot we take from the next depot on our way — probably Bjørneskærene — 1 sledge-case less 2 day's provisions for 3 men ...".

Departure at 7.30 p. m. Fog.

June 15th. Were forced westwards owing to impassable ice. Stopped at 6.30 a. m. Odometer distance 48 kilometers. Departure at 8.40 p. m.

June 16th. Light fog, glacier ice with deep fissures forcing the party further westwards. Stopped at 7 a. m. Odometer distance 45 kilometers. Departure at 7.50 p. m. Clear weather, easy sledging with some difficult passages through the screwed glacier ice. Passed Nordre Depot. Koch rebuilt the depot which had been scattered by bears and wrote to Mylius-Erichsen. Drove on again and raised the tent on June 17th at 6.50 a. m. Odometer distance 46 kilometers.

June 17th. Departure at 10.40 p. m. Loose snow about a meter deep and brash.

June 18th. After midnight the snow could bear the dogs and a few hours later also the sledges. Difficult passage across some screw-ice with a large water-filled fissure. From this place to the ship the odometer was used no more. Pitched the tent at 5 a. m. at the depot on Hagens Island.

Departure at 9.30 p. m. Fog and brash so that they could only advance very slowly.

June 19th. At 7.30 a. m. the tent was raised at Bjørneskærene. Departure at 9.50 p. m. Fog.

June 20th. Passed the depot at Cape Amélie and raised the tent at 9 a. m. some ten kilometers south of this foreland. Departure at 10.10 p. m. To begin with the sledging was bad, later on it improved and on

June 21st at 9 a. m. the tent was pitched near the depot at Cape Marie Valdemar. Departure at 10.00 p. m.

[1] It appeared later, that there were scarcely 2 quarts of petroleum in the depot. As Koch had taken no petroleum from the previous depot, where there were about 10 quarts and as it could hardly be supposed, therefore, that the 1st party would be in want of petroleum on Lamberts Land, Koch took it all. A remark to that effect was added in the letter.

June 22nd. After covering ca. 40 kilometers southwards along the coast a halt was made. At 8 p. m. they started again.

June 23rd. At 2 a. m. the 2nd party reached the ship after 88 day's absence.

The return of the 2nd party concluded one of the finest sledge expeditions ever made by arctic explorers.

In extent of the journey as well as cartographical results and physical investigations it comes up on a level with the best and greatest sledge journeys yet made on sea-ice in arctic regions [1].

With undaunted courage, hardihood and energy the 2nd party under KOCH's guidance had brought the journey to an end. Many dangers had been encountered. It was only with the greatest difficulty that they succeeded in getting past the open water near Mallemukfjæld. What would have become of the 2nd party if they had been forced to wait the summer or return home by way of the inland ice, is difficult to say, but the prospect of getting home alive would have been small, especially as KOCH and BERTELSEN were not in the best of health at the time.

This danger was not unknown to the travellers. On the journey north, when they had met with broad openings off Mallemukfjæld in spite of a temperature of — 20° to 30° C. and found numerous traces of Eskimo settlements on Eskimo Naze and frozen-in drift timber at 81°22′, it must have been clear to MYLIUS-ERICHSEN and his comrades that from Mallemukfjæld and further northwards past the Nordost Runding they would often during the summer be stopped by open water.

Nevertheless they started northwards with a comparatively small store of provisions and dog food and therewith, so to speak, burnt the bridges behind them.

The connection between PEARY's journey from the west and KOLDEWEY's and PAYER's journey from the south had now been established. A splendid cartographic work had been carried out by KOCH on the journey, while BERTELSEN, the first painter who had been on a sledge expedition of this kind, brought back with him sketches from the whole journey even from above 83° N. lat. What TOBIAS GABRIELSEN was to the 2nd party is best seen from BERTELSEN's and KOCH's words about him in their official report sent in to the "Danmark Expedition", quoted literally in the following:

"We find it natural here to call attention to the special importance which TOBIAS has had for the 2nd sledge party.

It was first and foremost TOBIAS who procured the game which made it possible to bring this long journey to a happy ending: on his

[1] The distance covered was more than 2000 kilometers.

shoulders rested all the hard work during a great part of the journey; his certain judgment of the difficulties of the journey, his hardihood and dexterity as driver several times saved us from long detours and considerable delays, and perhaps even on a certain occasion averted a catastrophe. To all of is he was a good comrade, always amiable and helpful".

Denmark may be proud of the share taken by Koch, Bertelsen and Tobias in arctic exploration and as long as the interest for geographical science persists, the names of these 3 men will not be forgotten.

3d. Return journey of Bistrup and Ring.

On the 18th of April the whole of the great sledge party, consisting of 10 sledges, had reached Mallemukfjæld, south of which a depot was laid out. Owing to the difficulty in getting round this foreland Mylius-Erichsen decided that Bistrup and Ring should proceed no further northwards but, in accordance with the plan of the great sledge journey, should be the party to return home first (see pp. 116—118).

On the return journey Bistrup was to supplement the survey measurements made on the journey north by Koch and he should especially direct his attention to the charting of the group of islands lying off the coast.

In the evening of April 22nd, therefore, the 1st and 2nd parties with G. Thostrup and Wegener started northwards while Bistrup and Ring were left behind. Two of the poorest sledges were given over to them and Bistrup had changed 7 of his good dogs for 7 of Wegener's which were less good.

April 23rd. Owing to a strong wind Bistrup and Ring did not begin the return journey till 11.30 p. m., when they drove out on the screw-ice following the old sledge tracks. With the small load on the sledges (the greater part had been left at the depot) they made good progress.

April 24th. At 1 p. m. the tent was raised on the northernmost rock south of Cape Anna Bistrup.

April 25th was spent in making observations and surveying. At 7.15 p. m. the journey was continued towards the head of the Nioghalvfjerdsfjord; the sledging was smooth but somewhat heavy with loose snow.

April 26th. At 1 a. m. they arrived at a small island south of Cape Adolf Jensen. From the island, which made a good station for survey work, they saw towards the west the inland ice flowing out into the head of the fjord between two high hills. As they had only provisions left for 2 days more Bistrup decided to steer straight

for the depot on Lamberts Land instead of proceeding further into the head of the fjord, which naturally would have been of interest.

At 7 p. m. BISTRUP and RING started again, driving southwards over ice with deep and steep cracks and very deep fissures which often forced them to make great detours. The ice had the same character as in Jøkelbugt, i. e. moving glacier ice and the sledges suffered much damage there.

April 27th. At 2.15 a. m. they tented on a small island off the north-east point of Lamberts Land and surveyed the land round about and repaired the sledges.

April 28th. At 10 a. m. they left the island. To begin with, the ice was very rough so that BISTRUP's sledge collapsed. At 4 p. m. they reached the depot. By this time all the provisions for the men had been used up.

April 29th. RING repaired and strengthened BISTRUP's sledge.

April 30th. BISTRUP did not feel quite well and they did not start again till 5 p. m., after providing themselves with all that was necessary from the depot.

As BISTRUP had been charged with charting the group of islands lying off the coast, they steered out towards the northern end of the northernmost of the Norske Islands, which was reached at midnight in a dense fog. Here the tent was pitched.

May 1st was foggy all day long. A cairn was built and a report placed therein.

May 2nd. The journey was continued along the eastern side of the island where there was sometimes good ice, sometimes large screwings. Along the first half the island presents a steep front towards the sea at a height of 200 to 300 meters, south of this the slope is more gradual. They drove over a smooth ice-foot about 15 to 20 meters broad. At 9.30 p. m. the tent was pitched at the southern end of the island. RING had in the course of the day become a little snowblind.

May 3rd. At 6.45 p. m. they started once more but were forced to raise the tent again on one of the northernmost Franske Islands owing to dense fog.

May 4th. After making a survey and some observations the journey was continued at 8.30 p. m.

May 5th. At 2.45 a. m. the tent was raised on the southernmost of the Franske Islands and after the usual surveys and observations had been carried out the journey was continued southwards at 11.15 p. m. They were now steering down along the eastern side of the numerous islands extending from the Franske Islands southwards to the mainland.

May 6th. The tent was raised at 5.30 a. m. on an island near the foot of Cape Mérite, which at a height of ca. 250 meters falls off

steeply towards the sea. From the top of the island Bistrup had an excellent station for surveying with a good view towards the south.

May 7th. The day was spent in repairing the sledges, the dogs in the course of the night having eaten most of the sledge straps. Departure at 9.30 p. m.

May 8th. The men were forced by fog to pitch the tent at 3.30 a. m. near a small island at ca. 78° N. lat.

May 9th. From 2 a. m. till 8 a. m. they covered the distance from the island to the northern end of Ile de France, the steep slopes of which fall down to the sea from a height of ca. 75 meters. The island has a flat and snow-covered top; here surveying and observations were made. Towards the east, as far as the eye reached, they saw nothing but ice, far away screw-ice but close under land large fields of new ice.

May 10th. At 6 a. m. the journey was continued along the western side of the island. The influence of the sun was gradually more and more felt; the sledging became heavier, the higher the sun rose in the sky. On the whole both Bistrup and Ring found it very hot that day (the temperature at the station in Danmark Havn was on 10th May at 8 a. m. — 7.9° and at 2 p. m. — 4.3°). At 1.30 p. m. they reached the S.W. point, where a drag-sledge party from the ship had laid out a depot for them. They took what they needed from the depot and made a survey.

May 11th. Bistrup climbed the southern point of the island and found the cairn built by the Duke of Orleans' expedition. It had, however, already been visited by the above-mentioned drag-sledge party. They made a survey and observations near the cairn and in the evening began the return journey.

May 12th. At noon they reached the depot near Cape Marie Valdemar where everything they could spare of provisions and dog food was deposited.

May 13th. At 1 p. m. Bistrup and Ring returned to the ship after 47 days' absence.

Taken as a whole the journey had been as successful as could be expected. The weather had been very favourable, as a rule clear and only a little wind. A few times they had fog. Bistrup had therefore been able to work out the task entrusted to him and had supplemented Koch's surveys during the journey north by charting and examining the long row of islands lying off the coast. During the whole journey he had had first-rate assistance from his excellent companion, the clever and willing Ring.

As to the ice conditions on the stretch covered Bistrup made the following observations.

In the bay between 79° and 80° the inland ice ran far out, merg-

ing evenly into the fast land ice, in which the distinct influence of tidal motion could be seen. The land-ice lay unbroken between the islands from the largest of the Norske Islands to the Franske Islands and from here out to the north end of Ile de France, down along the west side of this island to its S.W. point. From this place the fast land-ice turned to the west, then to the south along the land south of Cape Marie Valdemar.

Along the eastern side of Ile de France there were many new-ice formations bounded in the far distance by a broad belt of screw-ice. On the southern side of the island there was new ice and open water.

In spite of repeated observations BISTRUP found no trace of any movement in the sea-ice.

3e. Return journey of G. Thostrup and Wegener.

In the evening of April 22nd the 1st and 2nd parties with G. THOSTRUP and WEGENER started for the north while BISTRUP and RING remained at Mallemukfjæld, being the first party to return home according to MYLIUS-ERICHSEN's plan for the great sledge journey.

The next party to turn back, in accordance with the plan, was G. THOSTRUP and WEGENER (see p. 119).

During the return journey G. THOSTRUP was to supplement KOCH's surveys made on the journey up with others, especially from the coast of the mainland, while WEGENER should continue his physical investigations.

On *April 26th* the depot at 80°43′ (Amdrups Land) was laid out and on the same day at 10 p. m. the 1st and 2nd parties separated from G. THOSTRUP and WEGENER and proceeded further northwards.

WEGENER had given his good sledge in exchange for BERTELSEN's bad one and a good dog to HAGEN instead of one of his poorest ones. G. THOSTRUP had besides given a dog to KOCH.

April 27th. After making some survey observations at the tent-place G. THOSTRUP and WEGENER at 10.30 a. m. drove out to Henrik Kröyers Islets in order to investigate these skerries, which are only 20 meters high. The ice between the land and the rocks was quite smooth as far as 2 kilometers from the skerries, where it was screwed. East of the rocks there was a belt of screw-ice about 1 kilometer broad, outside this a belt of open water extending north and south and widening out in a northerly direction. Outside the open water they saw screw-ice as far as the eye could reach.

On the islands as well as on the land itself they found numerous fossils.

On *April 28th* they began the return journey, driving S.W. along Amdrups Land, afterwards advancing into the Ingolfs Fjord.

On *April 29th* the tent was pitched on the northern side of the

fjord and here they were obliged to wait until the 3rd of May, before they had clear enough weather to make the necessary surveys and observations.

During this delay, however, Wegener had the opportunity of thoroughly examining the surrounding landscape and on one of his excursions he had the good luck to meet a small herd of musk-oxen, 3 adults and 1 calf, of which he and Thostrup succeeded in killing 2 of the full-grown and the calf. It was a most welcome booty, for at this time they had only dog food for 2 days, whereas they now got enough for 7 days more. It was of special importance to Wegener, because he could now give more time to his physical observations, where otherwise he would have been obliged to hasten the return journey as much as possible.

The dogs also profited greatly from these days of rest with plenty of food and they now had quite a well-fed appearance.

On *May 3rd* they drove over with nearly empty sledges to a small island S.W. of the tent-place and made some survey observations from its top. In the evening they returned to the tent-place on the northern side of the fjord.

On *May 4th* they continued the return journey. They followed the same route out of the fjord as on entering it. They now steered right across the mouth of the fjord and in the evening the tent was pitched on the Eskimo Naze.

On *May 5th* the journey was continued down along Holms Land. Bertelsen's shaky sledge caused Wegener a good deal of trouble, for in spite of the comparatively good sledging one of the crossbars and several of the straps broke. Fortunately G. Thostrup was equal to making repairs. In the evening the tent was raised at the old tent-place north of Mallemukfjæld. Numerous tracks of bears were seen this day.

On *May 6th* they passed Mallemukfjæld following the old track through the screw-ice and across the thin ice of openings. The tracks seemed, however, to have shifted a little at places. The tent was pitched off the depot.

From the *7th* to the *11th May* G. Thostrup and Wegener stayed here. The 7th and 8th were spent in making survey and physical observations and in repairing the sledges, which had suffered much damage in the screw-ice.

On the *9th* they started off, but barely 4 kilometers from the tent-place they met 3 bears which, after half an hour's fatiguing hunt, were all shot. While they were loading the bears on the sledges, they discovered another bear which they also succeeded in killing after a short struggle. 4 bears in one afternoon was exceptionally good fortune. Several seals which had crawled up on the ice through their breathing holes were seen that day.

They drove back to the tent-place near the depot with the dead bears, which were skinned, cut up and the greater part of the meat placed in the depot. While piling up the depot G. THOSTRUP had the bad luck to get one of his fingers severely crushed by a stone tumbling on it.

All these doings took another few days.

On *May 11th* they drove into the district south of Holms Land. It proved to be a sound, the two branches of which, Hekla Sound and Dijmphna Sound, encircled Lynn Island and afterwards ran between the mainland and Hovgaards Island down to the Nioghalvfjerdsfjord.

During the days from the *11th* to the *18th* of *May* Hekla and Dijmphna Sound were examined and surveyed, though the weather was often hazy and the sledging very bad owing to exceptionally large quantities of deep and soft snow in the Sounds here. A lot of fossils were found here. On the 18th the journey was continued down through the Sound between the mainland and Hovgaards Island, G. THOSTRUP and WEGENER hoping to get confirmation of their supposition that this Sound would lead them to Nioghalvfjerdsfjorden. If this was not the case, they would be obliged to return by the same way and would then be in want of provisions. They drove in the middle of the Sound but gradually the ice became quite impassable. There could be no doubt that they were on the boundary between the outflowing glacier-ice and the sea ice. The tidal water had also caused some large screwings here. They therefore drove in to land and raised the tent.

On *May 19th* they succeeded in finding a passage through the screwings and across the slopes and cracks behind them. The journey was now continued on the inland ice across the ice-stream between the mainland and Lamberts Land. On the whole they made good progress this day. The tent was raised near Lamberts Land.

May 20th. The journey was continued down along Lamberts Land. To begin with they made good progress but later their way was barred by cracks and screwings, forcing them to make great detours. One of the cracks was almost 20 meters broad and filled with brackish water, though however with a distinctly saltish taste. Later the ice was very uneven and rough but towards the end of the day's journey it became rather good. They raised the tent off a headland on the southern side of the fjord after having crossed the sledge-tracks of BISTRUP and RING (who had been here on the 27th of April, i. e. 24 days earlier, so that the tracks may last a long time if conditions are favourable).

On *May 21st* they reached the depot on Lamberts Land without difficulty. It had been an interesting but very fatiguing journey over the magnificent and picturesque Nioghalvfjerdsfjord. The travellers were also very exhausted when they reached the depot, not only on account of the exertions but also owing to insufficient

nourishment and lack of sleep. To this was added that Wegener's one eye had been very much inflamed by the strong sun and reflexion from the inland ice.

On *May 22nd* they drove southwards to Cape Drygalski and from there down along the western side of the island, off which the tent was pitched. Already on this day they felt that they had come out on the flowing glacier-ice in the Jøkelbugt, as they had to drive round a fairly broad and deep crack with new ice in the bottom. In the evening the journey was continued southwards along Schnauder Island which appeared to be separated from the island further north by a narrow sound.

May 23rd. This day also they passed several cracks in the ice. In the evening the tent was raised a few kilometers west of the south point of Schnauder Island.

On *May 24th* they reached Pariser Islands, west of which the tent was raised at midday.

May 25th. Dense fog. As they had no more dog food left they could not remain at this place. It was of importance to reach the Nordre Depot as soon as possible. In spite of the fog they succeeded in finding the depot after covering 46 kilometers in 12 hours. The dogs were also very much exhausted and one of them died here. G. Thostrup and Wegener were also worn out. In the last two nights they had only got 3 and 5 hours sleep respectively. But the cartographic work had been carried out carefully and Wegener with his usual energy had made physical observations and taken photographs, many of them coloured.

From the depot they took the necessary provisions both for the men and the dogs. The measurements and observations were made and all other necessary work executed, which forced them to remain at the depot till the evening of the next day.

On *May 27th* they reached Hagens Island after having covered 39 kilometers. Here they found plenty of provisions laid out under great difficulties by the drag-sledge parties sent out from the ship. Now they could at last get enough sleep. For in spite of the fairly long halt at Nordre Depot they had only had a few hour's sleep there with all the different work they had to do. Owing to a strong wind they did not continue the journey till the evening of the 28th.

On *May 29th* they reached Cape Amélie, the *30th* Cape Marie Valdemar and on the 31st G. Thostrup and Wegener returned to the ship after 65 days' absence.

The journey had in every respect been very satisfactory, even though it had at times been extremely fatiguing and dangerous. The weather had on the whole been good and G. Thostrup had succeeded in the task given him and had supplemented the measurements of Koch made on the journey with other surveys, especially of the outer

coast of the mainland. At the same time WEGENER had carried out some very valuable investigations and had taken numerous photographs several of which were coloured and both of these excellent men had again proved, how remarkably well they were suited for the laborious and dangerous work of arctic exploration.

3f. The journeys made from the ship to lay out depots in support of the sledge parties returning from the north.

1. Drag-sledge journeys.

As support for the various sledge-parties gradually returning from the great sledge expedition towards the north, MYLIUS-ERICHSEN had decided that those left in the ship should lay out depots on Hagens Island and near Cape Philippe on Ile de France.

Immediately after MYLIUS-ERICHSEN and his companions with 10 sledges had started northwards, the preparations for these journeys were begun. Apart from a very poor dog team of full-grown animals only puppies were left on the ship, and the sledges had to be drawn by the men themselves during the journey.

The expedition consisted of 3 parties, 4 men and 1 sledge in each party. The members of the different parties were:

I party	II party	III party
HAGERUP	FREUCHEN	FRITZ JOHANSEN
PETER HANSEN	ACHTON FRIIS	GUNDAHL KNUDSEN
HENDRIK OLSEN	KOEFOED	CHARLES POULSEN
TROLLE	LUNDAGER	CHR. BENDIX THOSTRUP

The leaders of the 3 parties were TROLLE, LUNDAGER and CHR. BENDIX THOSTRUP.

The detailed plan for the sledge journey had been drawn up by TROLLE. The equipment of the sledges was as follows:

3 tents with poles, each 22.5 kg.	67.5 kg.
3 bags with tools and cooking-utensils, each 8.33 kg.	25.0 -
12 sleeping bags, each 9 kg.	108.0 -
12 bags with personal baggage, each 5 kg.	60.0 -
Weapons and ammunition (2 guns per sledge), each 10 kg.	30.0 -
Petroleum	18.0 -
Spirit	2.0 -
Deer-skins, 3 per sledge	15.0 -
Lashings	3.0 -
Spades	5.0 -
A medicine chest	2.0 -
Provisions for their own consumption (in 3 sacks)	80.0 -
Sails, camera, sextant, artificial horizon etc. etc.	5.0 -
Provisions for the depots in 12 boxes, each 27.5 kg.	330.0 -
In all...	750.5 kg.

Each of the sledges thus had a load of ca. 250 kg. If the weight of the sledge is taken at ca. 35 kg., each man consequently had to drag ca. 71 kg.

In order to make it easier for the drag-sledge parties during the first part of the way, Hendrik Olsen on the 5th and 6th of April drove out to Syttenkilometernæsset with the rest of the dogs and the puppies and deposited there 12 boxes of dog pemmican, about 300 kg.

On the *8th* of *April* in the morning all 3 sledge parties set off, while Knud Christiansen, Jarner, Hans Jensen, Lindhard, Manniche and Weinschenck, 6 men altogether, were left to look after the ship and the station and to make all the regular observations.

The parties followed the tracks of the great expedition northward, but though the way had been marked out for them on the ice, which at places had screwed towards the coast, it took them about 3 days to reach Cape Marie Valdemar, a distance of about 70 kilometers. The same distance had been covered in a little more than half a day by the 10 north-going dog-sledges. But it must be remembered, that the dog sledge plus its load had only weighed 200 kg. against the 285 kg. of the drag-sledge. Nevertheless, this example furnishes a good proof of the enormous superiority of the dog sledge compared with the drag-sledge on expeditions in arctic regions.

On *April 11th* in the morning all 3 sledge-parties, as already mentioned, arrived at Cape Marie Valdemar. The men were all very exhausted, and it was decided to have a rest here for some days, at the same time to dry all the wet skin-clothes. The laborious work of drawing the sledges made them all sweat very much in spite of the great cold and both clothes and boots became wet. But the sun now, especially in the middle of the day, exerted a strong influence and helped to dry the clothes when hung up for that purpose, even if the temperature was far below the freezing-point.

On *April 13th* in the evening the journey was continued towards Cape Amélie. It became a very hard piece of work. The ice in the bay was smooth but it was extremely fatiguing to walk in the deep loose snow and the sledges cut deep down, so that progress was very slight. In spite of the low temperature — some — 30° — they did not feel the cold so long as they toiled onwards through the snow, on the contrary they perspired. But when they rested for a breathing space, they soon felt the piercing cold.

On *April 14th* towards the morning they raised the tent almost in the middle of the bay and towards the evening they continued the journey, heading for the depot on Cape Amélie. Chr. Bendix Thostrup started a few hours before the others. He did not take the tent with him, intending to return as soon as he had unloaded some provisions at Cape Amélie. The sledging was still unusually

heavy with loose dry snow, in which the wood runners slipped almost as if in sand. All 4 men had to use all their strength the whole time.

April 15th. A little way from the Cape Amélie depot the 1st and 2nd parties met CHR. BENDIX THOSTRUP's party on the way back to their tent, from which they intended driving to the depot at Cape Marie Valdemar.

At the Cape Amélie depot the 1st and 2nd parties separated. In the same evening the 1st party started again towards the north, while the 2nd party stayed one more day, LUNDAGER wishing to make botanical investigations and ACHTON FRIIS to paint some sketches.

April 16th. Shortly after midnight the 1st party started northwards alone, while the 2nd party remained at Cape Amélie. On this day the sledging was good, but unfortunately HAGERUP had some pain in his knee which troubled him greatly. Towards the evening the tent was pitched near one of the skerries off Cape Louise.

April 17th. At 2 a. m. LUNDAGER's party passed the tent-place and at 6 a. m. TROLLE started again. Off Orleans Sound and along the rocks further north the sledging was again mostly heavy. When they drove close in under the land, however, it became somewhat better. Here the snow had drifted together. About 9 a. m. LUNDAGER's tent was passed and in the afternoon the Bjørneskær depot was reached; here a box of dog pemmican was deposited. The tent was raised off the point north of Bjørneskærene.

April 18th. At 6 a. m. LUNDAGER's party passed the tent-place and at ca. 8 a. m. the 1st party started again. TROLLE let the tent stand, intending to return directly to this place as soon as the provisions for the depots had been unloaded on Hagens Island. They had not proceeded very far, however, before HAGERUP was obliged to return to the tent on account of his bad leg. TROLLE, PETER HANSEN and HENDRIK OLSEN now dragged the sledge further in spite of very heavy sledging with loose and deep snow. At noon they passed LUNDAGER's tent and continued the journey, following the still visible tracks of the northbound party, partly covered by newly fallen snow. The sledging was extremely heavy, their feet constantly sank deep down into the snow and it was a most tiring and laborious march. Moreover, TROLLE also had a sore knee. But he mastered the pain and continued the journey.

At last they reached the depot on Hagens Island. The provisions were deposited and after a short rest they began the return journey with the empty sledge. At ca. 6.30 p. m. they reached the 2nd party's tent where the tired travellers were revived by a plateful of warm pemmican.

Extremely tired and exhausted they finally reached their own tent at midnight.

April 19th. A fairly stiff wind was blowing, so TROLLE did not

begin the return journey till a little after midnight of *April 20th*. On the same day the 2nd party also started on the return journey, after depositing their provisions at the depot on Hagens Island.

With the empty sledges the return journey became comparatively easy. On *the 26th of April* the 1st party and on *the 27th* the 2nd party returned to the ship.

After supplementing their load from the depot near Cape Marie Valdemar, the 3rd party drove northwards towards Ile de France. During the journey north they came out on drifting sea-ice and did not discover the danger before a stiff western wind began to drive all the masses of ice out to sea. After about 10 hours' forced march, partly over yielding thin ice, Chr. Bendix Thostrup succeeded however in leading the party in again on the fast land-ice off Cape St. Jacques and on *April 20th* this foreland was reached.

As they found open water off Cape Philippe, they had to make the main depot near Cape St. Jacques while a smaller one was transported across the land to Cape Philippe. The Duke of Orleans' cairn was found. The report was taken away and another placed therein. Further, they found a number of old Eskimo tent-rings, meat-pits etc.

On *April 24th* they started on the return journey and reached the ship on *the 1st of May*[1].

The drag-sledge journeys had been carried out in exact conformity with the plans and all the men by their energetic and very laborious work had done all that was in their power to secure the retreat of those travelling further north and had thereby contributed to the solution of the great, main object of the whole expedition.

2. Journey with dog-sledge.

As a link in the endeavours to ensure the retreat of Mylius-Erichsen and Koch's sledge parties, it must also be mentioned that Hendrik Olsen drove quite alone to Hagens Island with a sledge drawn by 8 dogs during the days from the 3rd to the 9th May, where he deposited 2 tin boxes for each of the above-mentioned parties and some pairs of skis. The boxes contained under-clothing, boots, mittens etc.[2].

Hendrik Olsen's journey was very successful. The journey north took him 3 days, he then had a rest near Hagens Island and returned 3 days later. The last night his tent was pitched some miles

[1] With the exception of Hagerup and Hendrik Olsen all the members of the drag-sledge expedition had lost in weight during the journey; Chr. Bendix Thostrup most ca. 7 kg. and Peter Hansen least ca. 1 kg.

[2] In a letter written by Mylius-Erichsen to Trolle deposited during the journey north near Bjørneskærene, the first-named had asked the latter to see that these things were transported to the depot on Hagens Island.

south of Cape Marie Valdemar. In the night he was roused by the furious barking of the dogs and when he peeped out from the sleeping-bag he found himself face to face with a large bear which had its head right in the tent. No wonder HENDRIK got a fright; but seizing the gun by his side he gave the bear a charge of hail right in the muzzle. The bear tumbled back in a hurry and HENDRIK succeeded in killing it. Some of the meat he took with him to the ship, the rest was deposited at the tent-place.

D. Work at and from the station in Danmarks Havn during "the great sledge journey northwards in the spring of 1907".

After the great sledge party had started northwards on the 28th of March, Trolle took over the leadership of all the operations carried out at and from the station in Danmarks Havn, Mylius-Erichsen before his departure having transferred to Trolle the conduct of the expedition.

He had done this by letter, which also contained some detailed plans for the work of the Expedition during the spring and summer time. To the plans Mylius-Erichsen added various remarks and closed the letter with the following words:

"In laying down the detailed plan I have not taken into consideration the possibility, that I might be prevented from returning to the ship. Should I fail to come back I have in any case only one single feeling, only one desire: Go through with all the later work in the best possible agreement with the brief remarks added to the detailed plan, which show what I myself would have endeavoured to do if I had been alive.

And with these words I say good-bye, bringing you my best thanks for all you have hitherto done for the Expedition, and whilst I look forward to our happy meeting I give over to you the leadership of the Expedition during my absence, with full right to choose a substitute whenever you may be away from the ship for more than a day and night.

Yours sincerely.
L. Mylius-Erichsen".

In agreement with the orders of Mylius-Erichsen, they were now from 28th March to the 8th April very busy with preparations for the drag-sledge journeys that had to be made for the purpose of laying out depots in support of the sledge-parties coming from the north. These journeys made from April 8th till May 1st have been mentioned in the foregoing (see p. 147).

For the same purpose another depot was laid out by dog-sledge in the days from the 3rd to the 9th of May (see p. 150).

While the drag-sledges were away, only 6 men were left at the ship, i. e. Knud Christiansen, Jarner, Hans Jensen, Lindhard, Manniche and Weinschenck. Besides looking after the ship these men had to do the tedious work of carrying out all the regular observations.

Apart from laying out the above-mentioned depots, another difficult task rested on all the men that did not partake in the great

journey, namely, to provide by hunting as much dog food as possible, in order that they might be able to keep the large stock of dogs alive, when the great sledge party returned from the north and they were all again together at the ship. There were many other tasks they wanted to perform with the help of the dogs as soon as the main object of the expedition, the survey and investigation of the unknown N.E. coast, had been carried out. They therefore made many excursions, partly for game exclusively, partly for scientific purposes, but they often carried on both together.

It would lead too far to give a detailed description of all these excursions. Many of them are not mentioned except in the "List of the journeys made from the station in Danmarks Havn" at the end of this report and only some of them need be referred to in detail, among these the drag-sledge journey to the eastern side of St. Koldewey Island.

Drag-sledge journey to Store Koldewey Island, $^{28}/_{4}$ to $^{4}/_{5}$, 1907.

The main object of the excursion was to make geological investigations on the eastern side of Store Koldewey Island and to hunt, especially for big game.

The members of this excursion were: JARNER, HANS JENSEN, LINDHARD and WEINSCHENCK.

On *April 28th* at 11 a. m. the departure took place with a sledge carrying a load of ca. 250 kg.

On *April 29th* the expedition reached the place where MYLIUS-ERICHSEN and the naturalists had landed on the 13th of August 1906 and where for the first time they set foot on Greenland's east coast. The tent was pitched near the cairn and this was used as a starting point for a number of excursions made during the following days.

JARNER had the good luck to find some fossils and from a geological point of view the result was good, but apart from 4 hares shot by HANS JENSEN the proceeds of the hunt were nil.

On *May 2nd* HANS JENSEN and LINDHARD went across Koldewey Isl. through a pass running between the rocks. In the pass were two lakes lying on terraces, one above the other and the whole of the surrounding, rocky landscape was of an unusual, gorgeous nature.

On *May 3rd* they began the return journey and on *May 4th* at 4.45 p. m. they again came back to the ship.

The strong sunlight, which here on clear days shines all day and night at this time of the year, was the cause of a slight attack of snow-blindness from which HANS JENSEN, LINDHARD and WEINSCHENCK suffered.

On May 6th two parties started again, the one to try and find the cairn raised by the Germans at Cape Bismarck on April 15th 1870, the other for hydrographical purposes.

The first party, consisting of Lindhard, Chr. Bendix Thostrup and Weinschenck, drove down into the head of Stormbugt with a drag-sledge and pitched the tent there. On the 7th of May they all went northwards up into the mountains. It became a long and fatiguing march, because they had taken it for granted, that the cairn had been raised on the highest and most conspicuous knoll and therefore went too far north. It was only after a long search that they found the cairn, a small heap of stones some few feet high, lying at one of the least conspicuous places in the whole neighbourhood.

The document was lying in an open crockery jar, the stopper of which had probably mouldered away. It was completely illegible, destroyed by wind and weather.

An empty cartridge with a W stamped on the end was lying near the cairn.

This was all that remained to indicate the German visit here 37 years previously.

Regarding the building of this cairn Koldewey writes [1].

"Wir errichteten einen Cairn (Steinpyramide), der wol unverrückt und nie wieder gesehen bis ans Ende der Zeiten stehen wird". (We raised here a cairn (stone pyramid), which will probably remain untouched and unseen till the end of time).

And now, only 37 years later, the cairn was opened by other explorers, who had wintered close by and who had sent out a sledge party that reached $6^1/_2$ degrees of latitude further north than the place where the Germans had built their cairn, in the belief that no other expedition would ever reach further north.

We can however quite well understand Koldewey's remark. With his knowledge of the ice conditions along Greenland's east coast he most probably believed, that no one could ever penetrate further north with ship than he had done with the "Germania", and considering the sledge equipment at that time he was also quite sure, that it would be impossible to carry out sledge expeditions of much longer duration than the one made by him from Germania Harbour to Cape Bismarck.

The sledge equipment, however, has greatly improved during the past 37 years. We need only refer to the immense progress made in the manufacture of preserves, food etc. within these years. Further, the construction of the excellent cooking apparatus, such as "Primus" and "Lux", have made it possible to carry fuel on the sledge which weighs very little and lasts for a comparatively long time. Sledges,

[1] Die Deutsche zweite Nordpolarfahrt in den Jahren 1869 und 1870 unter Führung des Kapitän Karl Koldewey. p. 492. Leipzig 1873.

tents, sleeping-bags, weapons and ammunition, in short all things for arctic equipment, have become lighter and simpler and we have learnt from the Eskimo to let dogs drag the sledge instead of doing so ourselves. Finally, experience has taught us, that during a sledge journey alcohol used daily is very injurious, to say nothing of the weight, whereas it may be used exceptionally with advantage as a stimulus.

Thanks to all these improvements and changes the polar explorer has proceeded on his victorious career through arctic and antarctic regions.

When we consider the difficulties under which they had to work, the chart drawn up by the Germans was very creditable, but it needed of course much correction and improvement. The best idea of the immense work carried out by the Danmark Expedition in these regions, is obtained by comparison of the Danmark Expedition's chart of this region with that of the Germans [1].

On May 8th LINDHARD, CHR. B. THOSTRUP and WEINSCHENCK returned to the ship.

The second party starting on the 6th of May consisted of PETER HANSEN, CHARLES POULSEN and TROLLE. With a drag-sledge they proceeded to the small island Maroussia, where the tent was raised. From this place they made excursions for hydrographical purposes and carried on hunting. On the top of the island they had an excellent view over the sea-ice and TROLLE therefore had a constant watch up there on the look out for bears.

Their watchfulness was rewarded; PETER HANSEN during his watch caught sight of a bear and he and MANNICHE succeeded in shooting it. The latter had joined the party at Maroussia in order to make ornithological observations. The bear was brought to the ship and skinned.

It was on the same day, May 9th, that HENDRIK OLSEN returned from his sledge journey northwards to lay out depots (see p. 150), also with a bear, so now again they had some dog food.

On May 13th TROLLE returned to the ship with good hydrographical results, He left the tent out at Maroussia, because he intended as often as possible to have a party out there to hunt game and look out for bears. From the 13th to the 21st of May the tent, which on the 18th had been moved to Rendyrskæret, was used in turn by HANS JENSEN, JARNER, KOEFOED, HENDRIK OLSEN and WEINSCHENCK and on the 22nd HANS JENSEN and KOEFOED had the good fortune to shoot another bear. It was skinned and transported to the ship.

[1] See Meddelelser om Grønland, Bd. XLVI, No. 2, Plates II, III and V and Die zweite Deutsche Nordpolarfahrt in den Jahren 1869 und 1870 unter Führung des Kapitän KARL KOLDEWEY. p. 469. Leipzig 1873.

On the 13th of May, the same day that Trolle returned from Maroussia, Bistrup and Ring also came back to the ship (see p. 140). They brought the first news to those onboard regarding the journey north, which had in many ways been much more difficult than expected. And they had found open water near Mallemukfjæld in spite of a temperature of between — 20° and — 30° C. The terrible overhanging danger of this open water to those who had past it and must return, was clear to all and added to the tension felt by everybody during this period.

While Trolle stayed at Maroussia, another party had started on a longer expedition, this time for scientific purposes only.

Drag-sledge journey to Dove Bay, Cape Peschel and Koldewey Islands,

$^{10}/_{5}$ to $^{20}/_{6}$, 1907.

The main object of this journey was a geological investigation of the above-mentioned regions.

The members of the expedition were: Freuchen, Jarner and Gundahl Knudsen, with Jarner as leader.

In order to secure Jarner's retreat along the eastern side of St. Koldewey Island, Trolle arranged with him that a depot should be laid out at a certain place. This task was executed by Hendrik Olsen during the days from the 17th to the 20th of May.

Moreover, as it was now so far on in early summer that Jarner might probably meet with open water along the Koldewey Islands, he and Trolle decided that in the above-mentioned case he should pull down a certain cairn built on the island, which could be seen from the ship by means of a telescope.

Broadly outlined the course of the journey was as follows.

On *May 10th* the departure took place with a sledge. The tent was raised at the northernmost Orienterings Island.

On *May 12th* they reached Hvalrosodden where they took provisions from the depot. The tent was pitched near Rypefjældet.

On *May 14th* they reached the rock off Spydodden and passed on the way a hitherto unknown fjord Helle Fjord, off which the sledging was very bad. The weight of the sledge plus load was now about 300 kg. When Jarner had investigated Helle Fjord the journey was continued on May 17th.

From *May 17th* to the *26th* they investigated the islands, sounds and a large fjord, on the southern side of which was a large calving glacier, all lying in the western part of Dove Bay. The fjord as well as a part of the sounds was completely filled up by icebergs. Everywhere between these were enormous drifts of snow and even on foot it was at places impossible to make their way. Several seal

breathing holes and a number of bear-tracks were seen and on one of the islands they observed quite fresh tracks of musk-oxen.

On *May 26th* the tent was pitched on the western side of Teufelcape Island.

On *May 28th* in the evening they reached the depot on the island off Cape Peschel. But the depot had been broken up by bears and everything was consumed and destroyed. Even the jar with petroleum had been so battered that it was leaky and all the oil had run out.

On *May 29th* in the morning they steered over towards the depot on the western side of Store Koldewey Island.

On *May 30th* in the morning, aften dragging the sledge continuously for about 20 hours, they reached the west side of the island, but the travellers were now so exhausted that they slept some 20 hours on end before they began to look for the depot. A bear had also been here, but had only succeeded in getting one of its fangs through the tin box.

JARNER found an excellent passage (Trækpasset) across the island; they had only to carry the sledge load for a short distance and then drove across a long lake and through a small river-bed which led them out on to the sea-ice on the eastern side of the island.

On *June 2nd* the tent was raised on the eastern side of Store Koldewey Island. The same day at noon the brooks began to flow. Here a bear was shot and deposited on the shore.

On *June 6th* they started on the return journey. The melted ice water began to flow out over the ice. They often had fog, which was at times so dense that they had to lie still. On June 10th they had to ride out a snow-storm. With the advance of the month the progress became more difficult. Near Lille Koldewey Island the sledging was sometimes so bad, that the men sank waistdeep in the loose snow under which was water nearly up to the knees.

On *June 20th* they reached the ship after a successful journey from a geological point of view.

Those onboard had begun to be uneasy about JARNER's party and on June 18th HENDRIK OLSEN and G. THOSTRUP started along the eastern side of the Koldewey Islands in order to meet and if possible help them. However, the parties did not meet. On June 22nd HENDRIK OLSEN and G. THOSTRUP returned.

On May 31st G. THOSTRUP and WEGENER returned from the journey north (see p. 143). The news they brought was not encouraging. The coast continued tending N.E. instead of N.W. as had been expected. When G. THOSTRUP and WEGENER left them, the 1st and 2nd party had only provisions left for 3 weeks. It looked as if the glorious aim of the expedition was not going to be fulfilled.

Meanwhile, the work at the station went on steadily and quietly. Trolle continued his hydrographical investigations and Achton Friis painted. The naturalists constantly made excursions and one hunting expedition after another started from the ship; but generally the result was very poor. From the 24th May to the 6th June Trolle arranged for an attempt to be made to bring back the motor-boat and whale-boat, laid up near Cape Marie Valdemar in the autumn of 1906. With great difficulties they succeeded in getting the boats transported across the ice down to Syttenkilometernæsset. Here they were left till later in the summer when G. Thostrup sailed the whale-boat home, taking the motor-boat in tow.

About the 1st of June the snow began to melt. The melting water flowed out on the ice and where this was snow-free large lakes were formed. Where the snow covered the ice, the water sank down below the snow, thus forming quite an impassable slush. The time was near when neither sledge nor boat could be used on the ice.

In order to facilitate the work of the naturalists under these conditions and to make it possible for them to extend their investigations in all directions, Trolle gradually had tents raised at various places in the neigbourhood. The tents were permanent and contained depots of provisions etc. etc.

This work was carried out by Peter Hansen and Hendrik Olsen who at the same time were hunting seals, now appearing on the ice.

Thus, tents were raised at Syttenkilometernæsset, at the outermost point of Cape Bismarck, Maroussia, Storm Cape and at Hvalrosodden.

Meanwhile the days passed and neither the 1st nor the 2nd party returned. The melting of the snow increased and the passage across the ice became more and more difficult. On June 20th Jarner's party returned from the journey to Dove Bay and Koldewey Islands and reported the bad sledging they had had towards the end of their journey.

No wonder that the tension onboard increased. At last Koch, Bertelsen and Tobias Gabrielsen returned on the 23rd of June (see p. 135). They were exhausted and the dogs extremely emaciated, but they were in good spirits. They had reached their goal and planted the Dannebrog on the point aimed at.

But the best thing was that they brought news of Mylius-Erichsen's party. They had been met on the journey home and according to the arrangements made they would come back to the ship in a few days or at the utmost a few weeks later than Koch's party.

But days passed and weeks passed and weeks became months and still Mylius-Erichsen and his companions did not return. Meanwhile, the influence of the arctic summer with its constant sunlight

became so great, that all sledge-driving on the ice had gradually to be given up. Onboard they were now convinced that MYLIUS-ERICHSEN's party could not return for the present. They would be obliged to wait over the summer, coming south as soon as the ice formed again: and then those onboard would go out to meet them.

Would they be able to get through the summer? Would they find game to keep not only themselves but also the dogs alive? For without the dogs there was no hope of getting back to the ship. These were the questions felt by everyone onboard.

E. From the return of the 2nd party until Koch finds Jørgen Brønlund.

On June 28th Trolle returned from Maroussia, where he and Charles Poulsen had remained 20 days for hydrographical purposes, and on the 29th, Fritz Johansen and Manniche returned from Storm Cape where they had spend 21 days in zoological investigations. Both parties were satisfied with the results.

It was always a difficult matter, however, to get sufficient food for the dogs, even though by this time some seals had been captured. On the 25th of June therefore a sledging party was sent to Hvalrosodden, as a quantity of walrus meat, which had frozen in the autumn of 1906, was known to lie there and might now have thawed. The party consisted of Knud Christiansen, Freuchen, Tobias Gabrielsen, Hagerup, Peter Hansen, Hendrik Olsen and Ring.

On the 29th the party returned with a quantity of walrus meat and 4 seals shot on the way. It appeared besides that about one and a half walrus still remained at the place, so that the dogs had now food again.

It had been a very fatiguing expedition, because the melting snow water now completely covered the ice at many places, so that almost everything on the sledges became wet. Especially the return journey was difficult. The following amusing extract from Freuchen's diary gives some idea of the difficulties to be overcome.

"That was the worst job I have had to face for a long time. Every 20th step the dogs were obliged to swim across the melting snow-water fissures, while the men pushed the sledges behind; in this way they could keep themselves dry from the waist upwards. Being the tallest of all, however, I was used as a measuring rod and had to go on in front and down into the fissures, to ascertain whether they went right through the ice or were only melting snow-water fissures. I succeeded in keeping my cap dry, which I was rather proud of!"

None the less Bistrup and Hendrik Olsen undertook another sledging expedition with dogs from the 4th to the 7th July, to build a cairn on Orienterings Isl.; but this was the last of the longer sledging expeditions with dogs that summer: on this excursion Bistrup and Hendrik Olsen shot 3 bears, a female with two large cubs.

In addition to these adventures, all were very busy onboard with different kinds of ship's work. Engines and boilers, motor-boats and motor-carriage were thoroughly inspected and the pumps repaired; the boats were caulked and several of them provided with new sails. The cargo was trimmed, sorted and cleaned, sails and skin clothes etc. were aired and much more.

Further, as the belief grew that MYLIUS-ERICHSEN would not be able to return that summer but would be forced to remain in the north, all were much occupied with the preparations for a relief expedition to be sent out to meet him as soon as conditions permitted. New sledges were taken in hand, new harness and whips etc. for the dogs and all the other things required for the equipment of the sledges were examined and repaired.

On the 6th of July the land could no longer be reached from the ship over the ice, the outflowing water having gradually formed a lake round the ship, while the other part of the harbour was still ice-bound. After the ship became free of ice, it made some water, as most wooden ships do after wintering in polar regions, the seams being forced open by the freezing of the water in them.

The awakening summer life gave the naturalists plenty to do, while WEGENER with undaunted energy continued his laborious work of flying kites and balloons and KOCH and his assistants continued the detailed survey of the station and its neighbourhood. At the same time hunting was carried on to the greatest possible extent.

For the numerous excursions made during this time, reference may be made to "List of the journeys made from the station in Danmarks Havn".

After the ice round the ship had broken up, the dogs which now lived on land had a peaceful time and all gradually assumed a well-nourished condition, thanks to many seals caught by TOBIAS GABRIELSEN and HENDRIK OLSEN.

On the 17th of July TROLLE returned from Maroussia, wherefrom he had made an excursion to Sonja Harbour. The ice was still solid and thick out there. Some miles out at sea a few streaks of open water were however to be seen. The terns and eider ducks, which in the previous year had bred in quantities, had arrived but were not breeding, an indication of an inclement summer.

On the 18th of July TOBIAS GABRIELSEN and HENDRIK OLSEN returned from one of their numerous hunting expeditions carrying with them 1 walrus and 6 seals. It was a good stroke of luck, doubly welcome at this time because it was now clear that enough food must be got to keep the dogs in good condition for the relief expedition in search of MYLIUS-ERICHSEN's party. On another excursion at the end of the month HENDRIK OLSEN again shot a walrus.

To obtain still more walrus meat it was decided that a hunting party under the direction of RING should start for Hvalrosodden, and camp there in order to hunt walrus and musk-oxen. It was expected that walrus and seal would seek the open water formed by the out-flowing water from Laxeelv off Hvalrosodden and that the walrus would collect at the point as in 1906.

On the 29th of June BISTRUP, TOBIAS GABRIELSEN, HAGERUP,

Peter Hansen and Ring started therefore with the Amdrup boat and a drag sledge. Bistrup took part in the expedition in his capacity as cartographer and Manniche who joined the party at Storm Cape as zoologist.

It took the party six days to reach Hvalrosodden. It was a very fatiguing tour and the boat had to be dragged across the ice over long stretches. The drag sledge was left behind near Havnenæs, as it proved inadequate for the transport of the boat.

Until the 31st of August the hunting party stayed at Hvalrosodden but in spite of the most strenuous endeavours they only obtained 2 walrus, 1 bear, 1 musk-ox and ca. 200 kg. of salmon, which was air-dried in order to serve as dog food.

On the 31st of July a strong breeze sprung up with heavy squalls from the N. and N.E. A strong gust of wind broke the stern mooring chains and the warp dragged the anchor up, so that the ship broke adrift and swung round alongside the fjord-ice. It lay here safely with a fender out during the rest of the storm. When the wind abated, the ship was again moored with the stern towards land.

On the 2nd of August Trolle climbed the hill. About 1 miles from land he saw open water with drifting floes, but under land the frozen pack-ice was still thick and firm. In Dove Bay the ice seemed to be on the point of breaking up, as a few openings in the ice could be seen.

On the 7th of August all the fjord-ice seemed to break up and on the point of going adrift, leading to the sudden formation of a broad channel across the mouth of the harbour, and on the 13th of August with a stiff breeze from the south all the ice in the harbour broke up. On the 15th there was so much open water in the fjord that the motorboat could go into Storm Bay, but from Storm Cape and further westwards the winter ice still lay unbroken, thus barring the passage.

The ice conditions were on the whole less favourable this year than in 1906, when just at this time, the 17th of August, the ship had sailed into Danmarks Havn in almost open water and anchored there. And in Dove Bay there had been almost ice-free water, so that boats could get about till the middle of September.

But in 1907 at the same time of year the pack-ice was lying along the land in an immovable belt several kilometers broad, which would have barred the way completely, had the "Danmark" tried to leave the harbour, while the winter ice was unbroken over the greater part of Dove Bay.

The latter condition was the worst, because the ice forced the walrus away or at any rate made the hunting of them rather difficult, and an ample supply of walrus was the only means of obtaining sufficient food for the dogs.

All long excursions by boat were also rendered impossible and

no wood, provisions etc. could be transported into the head of Mørke Fjord, where it was decided to build a meteorological station and for which a small house for two men was required.

On the 21st of August KNUD CHRISTIANSEN, FREUCHEN and KOEFOED tried by means of the motor-boat to tow boat No. 1, loaded with wood and other material for the projected station, westwards across Dove Bay. Owing to the ice they reached no further than the skerries west of Storm Cape, where all the stores had to be unloaded.

From the 2nd to the 5th of September another attempt was made to bring the stores still further westwards by means of motor-boat, boat No. 1 and a hand-cart. In spite of great efforts they only succeeded in getting it about 5 or 6 kilometers further west to Snenæs. Here the ice again stopped all further advance.

Meantime the night frost had begun to increase. Already on the 1st of September the new ice as far out as the ship was so strong, that it could safely bear. Further out to sea the pack-ice lay close in to the coast. There were channels and openings in the ice and these were already covered by new ice. It would hardly have been possible for the "Danmark" to get away this year, had that been the intention.

It would not be long ere the new ice covered every drop of open water and put an end to all hunting of walrus. But before this happened, fortune smiled once more upon the untiring hunters, inasmuch as BERTELSEN and ACHTON FRIIS had the good luck to wound a walrus off Cape Bismarck, where they had been camping from the 27th August to the 9th September, in order to hunt and make sketches. Next day the walrus was killed from the motor-boat, onboard which HENDRIK OLSEN, KOEFOED, CHR. BENDIX THOSTRUP and WEINSCHENCK were out on a hunting expedition.

The last walrus was shot on the 9th of September. A hunting party consisting of HAGERUP, PETER HANSEN, HENDRIK OLSEN, CHARLES POULSEN and WEINSCHENCK killed it after a hard struggle in Storm Bay. This hunting is by no means without danger, because a wounded walrus often takes the offensive. On this occasion, for example, the walrus managed to drive its tusks right through the motor-boat.

All told the summer hunting had yielded 6 walrus, 1 musk-ox, 8 bears, about 16 seals and about 200 kg. of salmon. Besides, 1 walrus was still left from 1906, in which year almost three times as many walrus had been shot. The supply was by no means sufficient.

The cold was increasing and the time was near, when the sea-ice would again become passable for dog-sledges. As soon as this happened, the relief expedition would set out, and the sooner the better. Onboard, therefore, all were working with feverish haste to get everything ready for the expedition and on September 22nd

the ice conditions were so favourable, that the departure could take place.

Relief sledge journey northwards from September 22nd to November 2nd 1907.

The plan for the journey was drawn up by Trolle after consultation with Koch and those most experienced in such expeditions. Broadly outlined it was as follows. 2 sledge parties, each consisting of 3 men, should proceed together to Mallemukfjæld. Here the one party, the supporting party, would return while the main party continued its way, possibly even as far as the Academy Glacier. All the depots on the way were to be visited, to see whether they might not contain letters from Mylius-Erichsen.

It was taken for granted, namely, that Mylius-Erichsen, after the enforced wait over the summer, would try to get southwards along the line of depots, partly to have these to fall back upon and partly because on this route he was sure to meet the relief expedition, whose coming, as soon as conditions allowed, he was certainly entitled to rely upon, also because Mylius-Erichsen before his departure had actually discussed this eventuality with Koch.

Some of the best sledge drivers and the doctor, whose assistance might be required, were chosen for this expedition. They were:

main party (1st party)	supporting party (2nd party)
Tobias Gabrielsen	Peter Hansen
Lindhard	Hendrik Olsen
G. Thostrup, leader	Ring, leader.

On a seventh sledge Hagerup was to accompany them to Cape Marie Valdemar with dog-food for all 7 teams for 2 days, besides what was required for his own return journey.

On *September 22nd* at 10.30 a. m. the departure took place. The full load was stored on the sledge out on the outer coast to which the sledge cases and dog-food had been previously forwarded. The weight of each sledge plus load was then about 190 kg. Due north of Øksebladet they drove out on the sea-ice, which they found very densely packed especially round the points. Several of the sledges suffered severe damage. Tents were raised for the night near Fyrretyvekilometernæsset.

On *September 23rd* they had fairly good sledging. A couple of sledges cut through the thin ice which covered the cracks but none suffered damage. Tents were raised at Cape Marie Valdemar.

September 24th. Abouth 9 a. m. Hagerup turned back, after exchanging his good sledge for Hendrik's damaged one. At 9.45 they continued the journey, after supplementing the sledge load from the depot. At 4 p. m. the Cape Amélie depot was reached, where

provisions were again taken on, so that each sledge plus load reached a weight of about 285 kg.

September 25th. At 10 a. m. the journey was continued. Fairly good sledging. About 12 kilometers from the tent place a bear was shot; tents were therefore raised, the bear skinned and the dogs fed. During the hunt several of the dogs were wounded by the bear.

On *September 26th* at 9.30 a. m. they drove further northwards; the depot on Bjørneskær was reached at 11.30 a. m. and the depot on Hagens Island at 4 p. m. Both depots were in good condition.

On *September 27th* at 9.30 a. m. they started from the tent-place. The ice was hard with very little snow on it and full of cracks and knolls, so that it was hard work for the sledges. In the afternoon it began to grow hazy and soon after to snow. At 4 p. m. they reached Nordre Depot which also appeared to be in order.

On *September 28th* it was blowing hard with a heavy snowfall completely burying tents and dogs.

The *29th of September* was passed in digging out the tents, repairing the sledges, dog harness, tents and tent-poles, which had suffered various damage of minor importance during the storm.

On *September 30th* it was nice, calm weather. At 9.30 a. m. the journey was continued. But the heavy snowfall had made the route almost impassable. The snow lay so loose that the dogs and men sank deep in it, while it was almost impossible to move the sledges. At 4 p. m. the party had only advanced 9 kilometers. By this time the dogs as well as the men were so exhausted, that tents had to be raised.

October 1st. It now became clear to G. Thostrup that it was impossible to drive any further with full-packed sledges, owing to the snow. One third of each load therefore was deposited on the ice and at 10 a. m. they advanced further northwards. It was still very difficult to draw the sledges, but it was a little better now that the load had been reduced. At 5 p. m. tents were pitched after 22 kilometers had been covered.

October 2nd. While Ring's party drove back in order to fetch the goods left behind, G. Thostrup drove on and raised his tent about 23 kilometers further northwards and deposited the loads. At 7.30 Ring reached the old tent-place.

On *October 3rd* G. Thostrup's party drove back to Ring's tent-place and about 3 in the afternoon both parties again started northwards with the remainder of the load. At 8.30 p. m. they reached the tent-place where the first load had been deposited. They had the same bad sledging, which was very hard on the dogs and several of them cut their paws on the sharp-edged ice projecting through the snow from the rough and uneven glacier-ice underneath.

On *October 4th* at 12.30 p. m. the journey was continued northwards with full load. It was again very heavy sledging with much loose snow and it was often difficult to find a way across the deep cracks in the glacier-ice. These varied much in breadth, from 1 meter to several hundred meters. At several places there were snowbridges, across which the parties could drive, but it was often necessary to go a long time along the border of the glacier-ice in order to find a passage.

The dogs lost greatly during these days, which were also extremely fatiguing for the men. The latter were generally obliged to help in pushing the sledges forward and in spite of the severe cold their clothing became quite moist with perspiration. Consequently, the sleeping-bags also became wet and a thick layer of hoarfrost formed between the reindeer skin and the cover. At 4.30 p. m. tents were pitched after about 11 kilometers had been covered.

October 5th. At 9.30 a. m. the parties left the tent-place. On this day the sledging was even worse than on the preceding day and more cracks were met with. At 4 p. m. tents were raised almost off the western point of Schnauders Island. The dogs were now so tired, that it was almost impossible to force them onward. For the men the journey had been no less laborious. They often sank waistdeep in the soft snow and the sledges sank to the cross-bars and stuck fast in the snow, so that it often took 2 or 3 men to get a single sledge free again.

Tobias had this day the bad luck to lose one of his dogs. Owing to a wound it was unable to pull and was therefore running alongside the sledge. On its way across a 15 meter deep crack covered with snow it most unfortunately tumbled in. The crack was too narrow for anyone to be let down and it was impossible to see the animal. An attempt was made to shoot it from the sound of the yells but without success, and when the party drove on they heard the pitiful howls of the poor animal.

October 6th. Owing to the bad sledging the advance had not been so great as was expected and the dog food had therefore been reduced considerably. G. Thostrup now decided that the supporting party should only accompany his party as far as the depot on Lamberts Land, not to the Mallemukfjæld as had been the original intention.

5 sledge cases which afterwards were to be deposited by Ring on Schnauders Island were left behind at the tent-place and at 10 a. m. both parties started with the remainder of the load. They had, especially in the beginning, some very bad sledging and after 7 hours' march, during which about 22 kilometers had been covered the men and dogs were so exhausted that tents had to be raised.

On *October 7th* at 10.30 a. m. they started again. The sled-

ging was still bad and the dogs very slack. At 4.30 p. m. the depot was reached and fortunately appeared to be in good order, but it did not contain any news of MYLIUS-ERICHSEN. It was here that the parties were to separate. G. THOSTRUP therefore wrote the following letter for TROLLE which he delivered to RING.

"Reached Lamberts Land after 8 days' hard journey from the depot 78°13' [1]. Have been forced to leave behind 5 sledge cases 44 kilometers from here. Deposit here 1 sledge case and 10 quarts [2] of petroleum. RING returns and we continue with 4 sledge cases and 1 in use, 50 quarts of petroleum and about 7—8 days' dog food, taking also one of the boxes deposited here. The dogs are very exhausted, especially TOBIAS' team".

2nd party's return.

On *October 8th* at 12 a. m. the 2nd party began the return journey, while the 1st party went further northwards. With the lightened sledges they now proceeded fairly quickly in spite of much snow and covered in 8—9 hours the 44 kilometers southwards to the sledge cases left behind.

On *October 9th* all the sledge cases were driven to Schnauders Island and deposited there, the party covered besides about 16 kilometers southwards.

October 10th. In spite of snowy weather they started again at 10 a. m. At 5.30 p. m., however, the air was so thick with snow that they could drive no further and therefore raised the tents. The distance covered was about 40 kilometers; but in the end the dogs were also so exhausted, that they could barely be driven onward, which may also be ascribed to the very reduced allowance they had been given during the last days.

On *October 11th* the air was thick with snow till noon. At 1 p. m. they started in spite of very heavy sledging. During the night more than a foot of loose snow had fallen and the dogs became more and more exhausted. It was now quite impossible to sit on the sledge, the sledge-drivers generally had to walk beside it. After covering a distance of 15 kilometers the tents were raised at 6 p. m. and the dogs got the rest of their food.

On *October 12th* at 10 a. m. the return journey was continued. Hitherto the same route as on the outward journey had been followed, but they now steered right towards Hagens Island — east of the old route by Nordre Depot. There were large fissures in the ice and sometimes they had to go a long way round to find a passage, often the dogs tumbled into the fissures; but Hagens Island had to be reached the same evening, as all the dog food had been used up.

[1] Nordre Depot.

[2] 1 quart = 1.136 liters.

At 10 o'clock in the evening the travellers at last reached Hagens Island, quite wet with perspiration and both tired and hungry; they had had no food for 15 hours whilst working very hard all the time.

On *October 13th* they called a halt, which the men as well as the dogs were badly in need of. During a fortnight they had not rested a day.

October 14th. In spite of a snow-storm from the north they started at 11 a. m. There was still much deep and loose snow. At 5 p. m. they raised the tents at Bjørneskærene.

On *October 15th* the sledging conditions at last began to improve. From 10 a. m. to 5 p. m. they covered the way to the Cape Amélie depot.

On the *16th*, *17th* and *18th of October* the sledging was fairly good, but the dogs were very exhausted and during the last days two of them had to be carried on the sledges. On the 18th inst. at 2 p. m. the party reached the ship after 27 days' absence.

1st party's journey northwards and return.

On *October 8th* the 1st party started further northwards, while the 2nd party began the return journey. To begin with they had bad sledging and only advanced slowly. The ice was full of hard knolls, the sharp edges of which cut the paws of the dogs, and between the knolls the snow had drifted together so that the men sank waist-deep in it and the dogs could not draw the sledges. The party only advanced 10 kilometers. At every halting place and on the tent-place the snow became stained with blood from the cut paws of the dogs. It was very depressing day after day to have the same bad sledging conditions. Even the untiring Tobias was affected.

October 9th. This day they followed the tidal screwings which ran N.N.E.; here the sledging was better. Fresh tracks of bear were found but unfortunately no bear appeared. It would have been of the greatest use to get one, for the dogs were badly in want of a good feed on fresh meat. In 6 hours the party covered 20 kilometers.

On *October 10th* at 10 a. m. they started again. It was blowing hard from the N.W. with mist and snow now and then. After covering about 21 kilometers tents were pitched at 4 p. m., the mist and commencing darkness making it hardly possible to distinguish some 30 meters ahead.

On *October 11th* they remained in tent owing to a hard northern breeze with mist and snow. This halt was very good for the dogs which were badly in need of rest. There was not a single one without bad paws and all were very slack, especially Tobias' team.

On *October 12th* at 10 a. m. they started again. The air was thick and the snow was falling, so that they were obliged to use

the compass. They had to work their way through the newly fallen soft snow, about a foot deep over the level ground, still deeper in the slopes. After 7 hours' hard march they reached Bagatellerne on the northern side of the Nioghalvfjerdsfjord.

Here G. Thostrup decided to deposit 2 sledge-cases, 1 box of dog-pemmican and 10 quarts of petroleum, as the miserable sledging conditions prevented them from advancing quickly enough with the heavy loads.

On *October 13th* they advanced further north along Hovgaards Island. In the spring there had been screwed pack-ice here, but now they found large and level ice-fields covered with deep snow. It looked as if there had been open water along the coast in the course of the summer. After 7 hours' march they had only covered 18 kilometers.

On *October 14th* they continued the journey northwards following the coast and at some places the sledging was fairly good. They passed a long fissure which ran along the coast. After covering about 24 kilometers they were stopped by open water off a glacier, the open water reaching close to the coast. G. Thostrup therefore drove up on the glacier and here the tent was raised after 7½ hours' march.

October 15th. Fortunately the open water was only of small extent. After covering 4 kilometers northwards on the glacier they could again drive out on the sea-ice and were now heading for the depot. They were however forced into the bay by the long fissure observed the day before, which suddenly bent westwards forming a large clearing with open water.

After 6 hours' march the party reached the depot at 4 p. m. It was untouched with unfortunately no news of Mylius-Erichsen.

On *October 16th* they had a rest, which the dogs were badly in want of. Much of the deposited bear meat had been consumed by foxes but there was still a good deal left.

On *October 17th* they drove on again following the coast. The ice was newly frozen and often moved up and down when they drove across it. Near the Mallemukfjæld the party were stopped by open water which reached as far southwards as they could see. They mounted the glacier in order to get a view of the situation and saw now, that the open water reached close to the coast north of the Mallemukfjæld. The only way in which to proceed was therefore by land, but this was impossible under the prevailing conditions; on this both Lindhard and G. Thostrup were agreed.

The party therefore returned to the depot, where they left everything they could dispense with, among other things 1 sledge-case, 20 quarts of petroleum and 2 boxes of dog-pemmican. A report containing all the necessary information for Mylius-Erichsen was written by G. Thostrup and placed in the depot.

On *October 18th* the return journey was commenced. It became a repetition of the trials on the journey out and the return journey of the 2nd party, for which reason it need only be given here in broad lines. Drove 34 kilometers and raised the tent.

On *October 19th* Bagatellerne reached. Distance covered 34 kilometers.

On *October 22nd* they arrived at the depot on Lamberts Land after having covered during the preceding days 16 and 27 kilometers respectively. The dogs were exhausted and two of them had to be carried on the sledges, if they did not want to loose them. They were all now so emaciated, that they ate their own excrement in order to get something in the stomach.

On *October 27th* the party reached Nordre Depot where they found it necessary to make a halt, in order to get some dog food, of which they had none left. The dogs became more and more exhausted and were now only moving at a walking pace. On the 26th one of them broke down, it was placed on the sledge but died two hours later; the wonderful endurance of the Greenland dogs is shown by this example. They had to shoot another on the same day; it was quite worn out. The distances covered during the past days were, on the 23rd 28, the 24th 20 and on the 25th 24 kilometers. After taking 1 box of dog-pemmican, some provisions and petroleum from the depot the party drove on in the direction of Hagens Island.

On *October 28th* they reached Hagens Island after having covered 30 kilometers in 8 hours.

On *October 29th* 35 kilometers were covered in 8 hours.

On *October 30th* they went southwards along Amélie Land and drove out over the bay, heading for Cape Marie Valdemar. Also on this day a dog broke down.

On *October 31st* they passed Cape Marie Valdemar.

On *November 2nd* at 4 p. m. the ship was reached after 42 days' absence. Off Syttenkilometernæsset a bear was shot.

From the foregoing, detailed report it will be seen that the relief expedition had been carried out with the same undaunted energy that characterized all the operations of the Danmark Expedition. That it did not reach so far as desired was only due to the bad sledging during the greater part of the journey.

In spite of the fact that all the six men were practised sledge-drivers, that the land was now better known and more experience had been gained in every direction and that during the journey out they had practically no resting day, the journey occupied much more time than the great sledge-journey towards the north in the spring of 1907. On the arrival at Mallemukfjæld the party had con-

sumed much more of the provisions and dog-food than calculated, and the men as well as the dogs were very exhausted.

It was owing to these causes, that G. THOSTRUP and LINDHARD found it too dangerous to travel further north across the land in order this way to try and get round the open water off Mallemukfjæld.

They were undoubtedly right. From the condition of the dogs after the return to the ship it was evident that the limits to their power of endurance had been reached. Besides those which died on the way, there were several others which died shortly after the return journey. They were all very emaciated and exhausted and many of them never reached their former state of health.

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While the relief expedition was on its way, those behind on the ship had not been idle. Among the works that were carried out may be mentioned:

Setting up the meteorological station in Pustervig, $^{25}/_{9}$ to $^{18}/_{10}$, 1907.

As already mentioned, WEGENER desired to raise a meteorological station at the head of Mørke Fjord as near as possible to the inland ice, because he considered it of interest to make comparative observations at this place and out at Cape Bismarck. The material required for the station had previously been transported out to Snenæs (see p. 163).

On *September 25th* FREUCHEN, JARNER and WEINSCHENCK started with a sledge drawn by the motor-car for the purpose of bringing the goods from Snenæs out to Hvalrosodden and from there into the Mørke Fjord. It appeared, however, that Mørke Fjord was still open and they therefore had to unload the stores at the Monumentfjæld [1].

From *September 26th* to the *29th* KNUD CHRISTIANSEN and HAGERUP each drove a dog sledge with stores down to the station.

On *September 27th* it was blowing hard from the north with a heavy fall of snow. This morning WEINSCHENCK began the return journey with the motor-car from Hvalrosodden, without provisions but with tent and sleeping bag. Off Snenæs he stuck fast in the snow and had to raise his tent.

On *September 28th* the weather was the same. During a short lull he took the tent and sleeping bag on his back and went down to Stormnæs where he knew he would find half a tin of pemmican. Here he was again obliged to raise his tent and only on the 29th did he reach the ship on foot.

[1] On the chart in Medd. om Grønl., XLVI, No. 2, Pl. III, this hill is called Danmarks Monument.

In the end of November the motor-car was found near the shore off Snenæs. Owing to its weight it had sunk through the ice down to the bottom, where it froze fast and could not be saved.

On *October 1st* Knud Christiansen, Hagerup and Gundahl Knudsen started for Mørke Fjord. A small tent with provisions was raised at Snenæs and another of the same kind at Hvalrosodden, in order to be able to keep up the communication on foot with Mørke Fjord. At Hvalrosodden they met Freuchen and Jarner. Owing to various things to be done and a snow-storm they did not start for Mørke Fjord till the 5th, on which day Jarner returned to the ship.

From the "Monument" and further in there was still open water. Gundahl Knudsen therefore decided to built the house at the head of Pustervig.

The house that was raised had the following dimensions: 3.1 meters in length, 2 meters in breath and 1.9 meters in height. In one end of the house and raised 0.6 meters above the floor they built a sleeping platform for 3 men, which occupied half the space of the house and would just accomodate 3 men in sleeping-bags. In the one gable there was a small window and in the corner of the same gable a door opening on the house-passage. The door was 1.2 meters high and 0.8 meters broad, the house-passage 1.5 meters long closed by a door ca. 1 meter high. The flat roof was built of boards upon which was placed a layer of birch-bark and thereover a layer of tarred felt, kept together by a layer of flat stones. The whole house was surrounded by a stone-wall.

From *October 7th* to the *11th* Hagerup and from the *8th* to the *11th* Knud Christiansen had to drive back to the ship in order to fetch more timber.

On *October 11th* Bistrup and Weinschenck arrived in order to help with the building of the stone-wall.

On *October 14th* Bistrup and Hagerup returned, on *the 15th* the house was finished and on *the 18th* Knud Christiansen, Freuchen, Gundahl Knudsen and Weinschenck returned to the ship.

At the station in Danmarks Havn all the various scientific investigations etc. had been continued.

From the 24th to the 30th of September Koefoed and Chr. Bendix Thostrup made minute surveys in the neighbourhood of Syttenkilometernæsset and from the 5th to the 17th October on the Koldewey Islands, while Koch from morning till night was busy with calculations regarding the enormous survey work of the Expedition.

Further, Koch sometimes made astronomical observations in the observatory built for this purpose.

WEGENER was busy with his meteorological, physical and magnetic investigations, while the other naturalists pursued their studies as far as conditions permitted.

The hunting was constantly bad, but one day in the end of September FRITZ JOHANSEN succeeded in shooting a bear out at Renskæret. Walrus and seals were sometimes observed in an opening in the ice, which reached from the Baadskær over to Lille Koldewey Island right to the end of September, but none were shot.

From the 3rd to the 16th of October FRITZ JOHANSEN and TROLLE made hydrographical and zoological investigations and soundings in the waters between the lines Cape Bismarck, Maroussia, Cape Christian and Stormnæs, the Trip-Trap-Træsko skerries.

For the many smaller expeditions carried out, reference should be made to the "List of the journeys made from the station in Danmarks Havn"; of these besides the above, the following may be mentioned.

Surveying sledge journey to Helle Fjord and Teufel Cape, $^{17}/_{10}$ to $^{28}/_{10}$, 1907.

The party consisted of BISTRUP and HAGERUP with the first-mentioned as leader.

On *October 17th* they started from the ship with two dog-sledges and arrived the same evening at Hvalrosodden. Here they deposited three sledge-cases for the station in Pustervig; on the way they had deposited one at Snenæs.

October 18th. After taking provisions for the dogs from the walrus-meat depot, they drove on and raised their tent a little way into the Helle Fjord.

On *October 19th* they made a survey of the fjord. In the evening their cooking apparatus "Lux" broke down [1].

On *October 20th* they drove back to the ship with empti sledges in order to get the cooking apparatus repaired.

On *October 21st* they returned to the skerries off the Spydodde, where all the goods had been deposited.

On *October 22nd* they reached the S.E. point of Edwards Island. The ice was not many weeks old. On approaching the island they met for the first time the large stream of enormous icebergs projecting from the "Brede Bræ" (Broad Glacier).

On *October 23rd* they drove along the southern border of Edwards Island and tried to get further west and northwards. But the many icebergs made the progress so difficult, that they had to drive back and raise the tent on Edwards Island.

[1] It seems as if the "Lux" apparatus was not always quite reliable. On the other hand, the "Primus" apparatus used on the expedition of the Carlsbergfond in 1898—1900 never broke down.

October 24th. From a hill top on the island Bistrup thought he could see a fairly passable way between the icebergs across the sound. It took, however, no less than 5 hours to pass the ca. 8 kilometers broad sound, a proof of the number of icebergs that had to be passed. In the evening they raised the tent on Carl Hegers Island.

On *October 25th* the journey was continued towards A. Stellings Sound and the tent raised on the western end of Teufel Cape Island. Off the southern point of the biggest island they found open water, which however was passed by driving on a border of ice running along the land and just thick enough to bear. At several places between the islands there was newly formed ice.

On *October 26th* the tent was raised off the western end of Lichts Island where a bear and its cub were shot.

On *October 27th* they began the return journey and reached the ship on *the 28th.*

Regarding the journey Bistrup states, that though the weather was good and the temperature not very low, the conditions were unfavourable owing to the feeble light. In spite of the unclouded air they could not see very far or rather they could not clearly distinguish the projecting points, cairns and the like. Owing to the early darkness each travelling day was besides shorter, and this was especially inconvenient here where unknown ground of difficult nature had to be surveyed.

Hagerup lent good assistance to Bistrup throughout the work.

On the 18th of October the 2nd party of the relief expedition, consisting of Peter Hansen, Hendrik Olsen and Ring returned (see p. 168). They only brought bad news about the conditions further north, which added to the pessimistic feeling that increased every day as nothing was heard of Mylius-Erichsen and his comrades.

But the hope was not dead, for they all knew the sterling qualities of these three men. If they could not find their way out nobody could.

About these days the so-called "ice-cave" up in the hills near the station was surveyed by Bertelsen, Koch and Wegener. It was formed by a deep crevice in which the snow had accumulated during centuries and become ice. Every summer the water from the melting snow forced its way through the bottom of the crevice, in this way forming a most splendid vault in the ice. When the water in late summer began to fall in the river, it was possible to penetrate into the ice-grotto, which was more than 2 kilometers long and ca. 20 meters high.

In order to try and get fresh meat for the very exhausted dogs which had come home from the north, Bertelsen and Manniche

raised a tent out at Maroussia from the 20th to the 27th of October and LUNDAGER and KOEFOED another at Snenæs from the 20th to the 26th in order to hunt. Neither of the parties obtained any game.

On the 25th of October FREUCHEN, JARNER and WEINSCHENCK started for the station in Pustervig in order to set up the instruments and begin the observations on the 1st of November.

On the 28th BISTRUP returned from the survey expedition, fortunately with a bear and its cub, which were shot on the way.

In the days that now followed one journey after another was made to the meteorological station with provisions and material (see list of the journeys made from the station in Danmarks Havn).

On the 2nd of November, when the dark period had just set in, the 1st party of the relief expedition TOBIAS GABRIELSEN, LINDHARD and G. THOSTRUP returned (see p. 170). An oppressive feeling of hopelessness seized all onboard. The open water which had barred the way for the relief expedition and prevented it from advancing further northwards had perhaps also stopped MYLIUS-ERICHSEN and his comrades on their way southwards, if on the whole they were still alive, which most doubted as time went on.

On account of the small supply of dog-food it became necessary, now that all the dogs were again together at the station, to kill some of them. In the following days 9 dogs were shot.

The same day that the relief party returned, BERTELSEN, KOCH, CHR. BENDIX THOSTRUP and WEGENER started for Pustervig in order to make a survey of the creek and to carry out meteorological investigations. They returned on the 10th of November with good results.

During the return journey the 1st party of the relief expedition had been forced to use much of the dog-food placed in the depots. In a letter left by G. THOSTRUP in the depot on Lamberts Land for MYLIUS-ERICHSEN, he had written that immediately after his return he would ask TROLLE to see that new supplies of dog food were transported to the depots in the north.

For this purpose TROLLE sent out another expedition, which was naturally at the same time to serve as relief expedition.

Sledge journey northwards to lay out depots, $^{13}/_{11}$ to $^{23}/_{11}$, 1907.

The members of this expedition were HAGERUP, KOEFOED and HENDRIK OLSEN. KOEFOED was the leader and the plan was to deposit 1 box of dog pemmican at Cape Marie Valdemar, 1 box at Hagens Island and 2 boxes and one sledge-case at Nordre Depot.

On *November 13th* at 10 a. m. the party started with 3 sledges.

On *November 14th* at 3.30 p. m. they arrived at Cape Marie Valdemar. Temperature — 26° C.

On *November 15th* and *16th* a gale from the N.W. with snow forced them to remain there. Temperature — 14° and — 18° C.

On *November 17th* at 10 a. m. the journey was continued and at 3.30 p. m. Cape Amélie was reached. Good sledging. Temperature — 16° C.

On *November 18th* in the morning it was again blowing hard from the north. As the wind abated in the course of the evening and the moon rose they started northwards again at 8 p. m. Temperature — 19° C. They had some very heavy sledging and the sledge-drivers were obliged to run behind the sledges during the greater part of the way and often sank down in the deep snow to over their knees.

On *November 19th* the Bjørneskær were reached at 1.30 a. m. Temperature — 28° C. At 6.30 p. m. the journey was continued, Temperature — 28° C., and Hagens Island reached at 11.30 p. m. They had a strong head wind and heavy sledging, and often sank waist-deep in the soft snow. A few hours after the tent had been raised, there rose a heavy snow-storm from the N.W. which only abated during the forenoon of Thursday the 21st. In the 4 days they were forced to lie still so much dog-food was consumed, that they were obliged to return. The provisions and the dog-food were therefore deposited on Hagens Island and at 1.30 p. m. they started on the return journey; the air was thick with snow but they had the wind on their backs.

On *November 23rd* at 8 p. m. they arrived at the station.

If any had cherished a faint hope that this sledging expedition might possibly bring news of Mylius-Erichsen's party, the result was a grievous disappointment.

Besides the fate of this party, there was another danger which that summer had revealed and which gave sufficient cause for anxiety as to the future. It had been seen, namely, that the "Danmark" could not possibly have got out of the harbour through the solid, immovable belt of pack-ice, which constantly barred the passage. If the same was the case next year, it might be necessary to leave the ship and seek southwards, hoping to be taken onboard by some chance sealing-vessel approaching the coast.

Under these difficult circumstances Trolle, who had taken over the leadership of the Expedition [1] during the absence of Mylius-Erichsen, desired to consult with the members of the expedition, especially on all matters regarding a possible retreat and the search in the north.

[1] As already mentioned on p. 152, Mylius-Erichsen in a letter to Trolle before his departure had given over to him the leadership of the Expedition during his absence.

Trolle proposed, as the best mode of cooperating, that all the members of the Expedition should select among themselves 4 men, who together with Trolle should discuss all the questions he had to lay before them.

The members of the expedition agreed to this proposal and selected Achton Friis, Gundahl Knudsen, Koch and Chr. Bendix Thostrup as members of the so-called "Council".

It was agreed by Trolle and this council, that it would be best to send a sledge-party to the American depots on Bass Rock and Shannon Island, partly to fetch some dog-food which they knew had been deposited there and partly to ascertain how much exactly was in the depots. In view of a possible retreat along the coast, it was of great importance to have exact information on this point.

It was specially necessary to get more dog-food, if the dogs were to be kept alive for the relief sledge expedition in the coming spring.

Sledge journey to Shannon Island and Bass Rock, $^{25}/_{11}$, 1907 to $^{23}/_{1}$, 1908.

The members of this sledge expedition were: Tobias Gabrielsen, Hendrik Olsen, Charles Poulsen, G. Thostrup and Weinschenck. G. Thostrup was the leader and the plan was, as already mentioned, to fetch some dog food from Bass Rock and Shannon Island and to make a thorough survey of everything contained in the depots there [1].

On the *25th of November* at 10 a. m. the departure took place. At noon Cape Helgoland was passed and they now headed for Cape Peschel. Out on the bay the sledging was not so good because of the soft snow lying there. Half-way between the two Capes the tent was raised.

November 26th. In order to get close under land where the sledging was supposed to be better, they steered down on Teufel Cape and from there across Roon Bay. On the bay, which was partly covered by new ice, they drove among many icebergs. In the evening the tent was raised a little north of Cape Peschel.

On the *27th of November* the journey was continued along the land where the ice was smooth and level. From Cape Ritter they made for the mouth of Bessel Fjord. Towards night the tent was raised a little north of the Haystack.

November 28th. At noon they reached Haystack. Here G. Thostrup deposited two sledge-cases and the journey was continued along Hochstetters Foreland. The tent was raised ca. 24 kilometers north of Cape Rink.

[1] When Mylius-Erichsen made the sledge-expedition to the Pendulum Islands during the autumn of 1906, he did not succeed in reaching the depot at Cape Philip Broke, because he found open water on the southern coast of Shannon Island. See p. 94.

On *November 29th* the journey was continued southwards along the land. At noon two more sledge-cases were deposited on shore, and the party now steered for Shannon Island. In the afternoon the tent was pitched a little north of the S.W. point of the island. In the evening it began to blow and

On *November 30th* a furious gale was raging which forced the party to remain in camp.

On *December 1st* the wind abated, so that they were able to continue the journey southwards to Cape Tramnitz and from there they followed the land towards the south-east and east, thus reaching a point which G. Thostrup in the darkness took for Cape Philip Broke, where the depot was to be found.

The *2nd of December* was hazy with a strong wind. The day was spent in looking for the depot, of which however no trace could be found. On the other hand, they discovered out at the naze the remains of a Greenland hut and a meat-pit.

As the supply of provisions and dog-food had run short, however, G. Thostrup considered it advisable to drive on to the depot on Bass Rock the next day and to try again on the return journey to find the depot at Cape Philip Broke.

On the *3rd of December* the weather was clear. When the party now heading for Bass Rock had gone a short distance on the ice, they observed low land to the east. It now dawned on G. Thostrup, that his former tent-place had been Cape David Gray and that the land seen towards the east was probably Cape Philip Broke. The journey was continued however in the direction of Bass Rock; the sledging was fairly good until they approached the island where they met with screw-ice. In the course of the afternoon the depot was reached. Several of the sledges had suffered damage and Weinschenck had had the bad luck to wound his knee severely by a fall on the ice, while Thostrup during the last days had a swollen leg without being able to find any cause for it. It was a good thing, therefore, that they reached the depot, where they could rest under comparatively good conditions in one of the depot sheds.

From the *4th* to the *26th of December* they stayed at the depot which was thoroughly examined and everything counted. It was difficult work, for the snow had drifted into the sheds, at some places forming a frozen mass of snow, in which many of the cases were frozen solid. By means of their comparatively primitive tools the cases were one by one freed from the snow and drawn out. Some of the cases had been piled up outside the sheds and sacks with coal placed on them. It was still more difficult to move these cases. The weather was generally stormy, often snowy and constantly hazy. At last on the 10th of December the weather became clear and G. Thostrup now found much open water about 1 kilometer towards the east.

From the *12th* to the *13th of December* Tobias Gabrielsen and Weinschenck made an excursion to Cape Philip Broke for the purpose of finding and examining the depot there. They succeeded in finding the depot which appeared to be in good order.

The *15th of December* had been fixed for the departure but it was blowing and snowing so much that the journey had to be postponed. During the following days the departure was constantly postponed owing to wind, snow or mist. Christmas eve was spent at the depot and not until

December 26th at midnight did they start on the return journey. Owing to the heavy loads and the bad sledging it was decided to take the goods in two separate portions.

Consequently, each sledge was loaded with 6 cases of dog biscuit and the northward journey begun. The sledging was very bad, deep, soft snow into which the dogs and men often sank. After a few hours' extremely fatiguing drive a thick fog from the south came on. As the tents had been left behind, the sledges were unloaded and they drove back to fetch these and the remainder of the stores.

The return journey seemed to G. Thostrup one of the coldest he had ever taken part in, and he was indeed one of the veterans of the expedition in regard to sledge expeditions.

It must have been very cold[1] indeed, for when they returned to the depot it appeared that they were all more or less frost-bitten. Of Tobias Gabrielsen, Charles Poulsen and Weinschenck it was especially the nose and fingers that had suffered, while the feet of Hendrik Olsen and G. Thostrup were so badly injured, that at any rate the latter could not continue the return journey in such a condition.

To make the return journey as easy as possible (when once they would be able to start), they determined to gradually forward all the dog biscuit to Shannon Island, so as to be able, as soon as G. Thostrup was well again, to drive homewards all together whenever the weather allowed.

On the *27th of December* early in the morning, therefore, Tobias Gabrielsen, Hendrik Olsen and Weinschenck made an attempt to take the dog biscuit over to Shannon Island. But the snow was so deep and soft that it was hardly possible to get on, even after they had lightened the sledges of some of the cases and had proceeded with the rest. In the evening they returned frightfully exhausted and without having accomplished their object. There was nothing to be done but wait for better sledging.

[1] In Danmarks Havn the minimum temperature during that day and night was — 34° C.

The following days the weather was changeable and blowy, on the 30th they even had a gale.

New year's eve like Christmas eve was spent at the depot and was dreary and monotonous like the other days.

On *January 2nd* the weather was good. The storm of the preceding days had formed a crust on the snow which enabled Hendrik Olsen and Weinschenck to get all the cases transported to a spot on the route for Shannon Island.

On *January 3rd* in the morning they returned. G. Thostrup now decided to make use of the good sledging and

On *January 4th* the party started on the return journey in spite of the fact that Thostrup had not nearly recovered from his frost bites. They drove northwards at an excellent pace until they reached the cases with the dog biscuit deposited on the ice, which were now placed on the sledges. Owing to this heavy load the sledges sank to the cross-bars, so that the dogs could not draw them, and it soon became evident to G. Thostrup, that under such conditions it was necessary to forward the loads in two different portions if they wanted to get on at all. The sledges were therefore again freed of some of their load and the party proceeded on their journey. In the evening the tent was pitched on the sea-ice south of Shannon Island.

On *January 5th* they had a fresh wind with snow in the air. Later in the day it began to snow. Nevertheless, they set out to bring in the loads left behind to the tent-place.

On *January 6th* the sledging was a little better. They had however an extremely fatiguing tour before they reached the south-west point of Shannon Island in the afternoon.

On *January 7th* they drove towards the N.W. in the direction of Hochstetters Foreland. The sledging was fairly good but they did not reach land till late in the evening, when the tent was pitched.

On *January 8th* the sledging was bad again. After an exceedingly laborious day's journey they at last reached under the land, where the tent was raised in the afternoon.

On *January 9th* the journey was continued northwards towards Haystack which was faintly visible in the distance. "It was one of the most tiring day's journey I have ever had", G. Thostrup wrote in his diary. "It was very hard for the dogs to work their way through the heavy snow and many of them had their paws cut by the snow-crust, which every few minutes gave way underneath them". On the southward journey they had here been driving on snow-free smooth ice, but had now to work their way through soft snow several feet deep.

On *January 10th* after one more very fatiguing day with

heavy and bad sledging they reached a little south of Haystack. For G. THOSTRUP with his bad feet these days were specially fatiguing and painful. With empty sledges the two Greenlanders now drove to Haystack and fetched one of the two sledge-cases deposited there, for the provisions were on the point of running short.

On *January 11th* they had a rest, of which men as well as dogs were badly in need.

On *January 12th* they only drove to the depot at Haystack, as a heavy gale and thickening air threatened bad weather which soon afterwards set in.

From the *12th* to the *16th of January* it was almost constantly blowing hard often with a heavy fall of snow, so that it was quite impossible to proceed. One of the dogs froze to death during these days.

On *January 16th* the weather at last began to improve and at noon they started northwards.

January 17th. In the beginning the sledging was good and they proceeded quickly, but a little north of Haystack they again met with quantities of soft snow which forced them to proceed slowly. After 15 hours' drive, during which they only covered about 30 kilometers, the tent was pitched in the lea of an ice-hummock on the northern side of Bessel Fjord. On the way they had been obliged to shoot a dog, which was quite worn out. This was the 3rd dog they lost during this journey.

On *January 18th* they had some fairly good sledging, but in the neighbourhood of Cape Peschel they were obliged to stop and raise the tent, the wind having risen and the air so full of snow that they could not see their hand before them.

On *January 19th* the journey was continued across Roon Bay where the air was thick with snow. They sighted Teufel Cape however and steered right down on Cape Helgoland. Some 15 kilometers from Teufel Cape the tent was raised. They now had provisions and dog-food for 4 days only.

January 20th. In the course of the night quantities of snow fell and all day long it was blowing hard and snowing, so that the party were obliged to stay where they were.

On *January 21st* the snow ceased but as the air was still hazy, they were forced to lie still this day also.

On *January 22nd* they were again able to proceed and

On *January 23rd* at 10 p. m. they at last reached the ship after 60 days' absence. All the provisions and dog-food had been used up, so that it was high time they returned. Between Cape Helgoland and Baadskær there had been at some places much water on the ice, the result of which was that HENDRIK OLSEN got some slight frost-bites on his feet, but now he as well as G. THOSTRUP could come

under good medical treatment. This day they lost the 4th dog; it was left behind and probably eaten by the wolves.

The return journey had taken 20 days, though all the men were skilled sledge-drivers. The preceding year — also in the heart of the winter — the same journey had been made in 5 days by fairly unpractized sledge-drivers and with almost the same load on the sledges[1].

It is evident from this, that in arctic regions the conditions are very variable from one year to another and further that the arctic explorer must be favoured by fortune; otherwise even the most skilled may fail.

The journey had however not been in vain. The stores in the depots had been counted and they now knew what they could rely upon, if they were forced to winter once more or had to go southwards. Furthermore, the dogs had been kept alive during the two months without reducing the provisions of food onboard the ship and a number of things that were wanted had been transported from the depots to the ship.

While the sledge excursion to Shannon Island and Bass Rock took place, the work at the station in Danmarks Havn went on constantly and steadily.

Onboard ship much had been done. All the cargo was trimmed and coal transported from the lower hold to the coal bunkers and a systematic war of extermination against the rats was now begun. These animals had multiplied to such an extent, that they had become a real plague. Provisions, dog-food, skins etc. had therefore to be stored in such a way, that the rats could not gnaw their way through. By means of traps, poisoned cakes etc. they now made war against them with good results.

The bad weather and the miserable sledging, which the travellers to Shannon Island and Bass Rock had experienced on the way, also prevailed in and around Danmarks Havn. It was only with the greatest difficulty that the necessary provisions could be transported to the station in Pustervig and it often happened that the coal ran short there before a new supply arrived. They were often forced by the weather or the bad sledging to postpone some planned journey for several days, even for a week, and frequently they had to return home for the same reason.

This year it became clear to them how great may be the difference in the weather and sledging conditions from one year to another. Trolle writes in his diary: "Last year the sledging conditions were excellent and favourable all through the winter and the same journey

[1] See p. 96.

which is now carried out with difficulty in 8 days only took 2 or 3 days without the least trouble the winter before". Onboard ship they thus gained the same experience as the party to Shannon Island.

On the 20th of December TROLLE climbed the hill and observed open water out to sea and a very distinct "water sky" both in the north and south. On the 10th of December G. THOSTRUP had seen open water off Bass Rock, so that there seems to have been much open water off the coast during this time. The weather was now comparatively mild and the ice was this year very much thinner than the preceding year. In a crack between Baadskær and Lille Koldewey Island the thickness of the ice was on the 3rd of January 62 cm. The average thickness was 70 cm. as compared with 100 cm. the foregoing year.

Christmas was spent very quietly. Of the 28 members of the Expedition, who had all been together the previous Christmas eve, 10 were wanting; 5 of them were on Shannon Island, 2 were at the station in Pustervig and 3 were in the north and their unknown fate gave room for many depressing and anxious thoughts.

At 1 p. m. a short service was held. TROLLE read the Christmas service and some Christmas hymns were sung.

At 4 p. m. they partook of Christmas dinner, but the humour was not as the year before, owing to the anxiety and uneasiness regarding the fate of MYLIUS-ERICHSEN, HAGEN and JØRGEN BRØNLUND, though everybody tried to keep up hope and only consider them as absent.

In January wolves visited Danmarks Havn. They had followed the sledges of PETER HANSEN and GUNDAHL KNUDSEN, when they drove from Pustervig back to the ship and were now staying in the neighbourhood. The men gradually succeeded in killing all 3 of them, a most welcome booty to the zoologist.

On the 23rd of January the party from Shannon Island at last returned. As the hunting near the station during the winter had yielded practically nothing and the Shannon party brought no supply of dog food, it was found necessary to kill some 20 dogs. They had still 28 good dogs left and had enough food to keep them alive.

Otherwise the time was spent in doing all kinds of scientific investigations and in preparing for the projected sledge journeys in the spring, first and foremost the relief and search expedition towards the north. With a view to the sledge journeys southwards, depots were laid out at various places already in the middle of February.

Sledge journey to Teufel Cape, Roon Bay and Bessel Fjord to lay out depots, $^{15}/_{2}$—$^{23}/_{2}$, 1908.

The object of this expedition was to lay out depots at the places mentioned as a support for BISTRUP, JARNER and the artists, who

intended later to make scientific investigations and studies in those regions. At the same time ethnographical investigations were to be carried on.

The members of the sledge expedition, of which Koefoed was the leader, were Hendrik Olsen and Chr. Bendix Thostrup, the latter chiefly for the sake of the ethnographical investigations.

February 15th. At 10 a. m. in 32 degrees of cold they started with 3 sledges, each drawn by 9 dogs and with a load of about 200kg. on each (not counting the weight of the sledges). The sledging was good till they reached Cape Helgoland, but became heavy afterwards. At 5 p. m. they raised the tent about 30 kilometers from the ship.

February 16th. At 9 a. m. the journey was continued, temperature — 38° C., and they still had some very heavy sledging. At 5 p. m. they were exhausted and forced to raise the tent about 15 kilometers north of Teufel Cape, which they had in reality aimed at reaching that day.

February 17th. At 10 a. m. they set off again and reached Teufel Cape after 2 hours' drive and made there the first depot. Another depot was laid out on an island in Roon Bay about 7 kilometers south of Teufel Cape. At 6 p. m. the tent was raised near Cape Peschel.

The *18th of February* was spent in making ethnographical investigations and repairing the sledges, which had suffered damage on the way.

February 19th. At 11 a. m. they drove southwards along the coast, the air being thick with snow. At 3 p. m. the tent was raised a little way into Bessel Fjord.

On *February 20th* the weather was clear and calm with a temperature of — 34° C. With empty sledges they now made a reconnoitring expedition into the unknown part of Bessel Fjord.

At 2 p. m. they drove on with loaded sledges to the northern and outermost rocks in the Bessel Fjord (Depotskjæret). Here the last depot was laid out. The journey was now continued in the direction of Cape Arendts on Store Koldewey Island. At 6 p. m. the tent was raised about 15 kilometers from land.

On *February 21st* the weather was calm and clear but bitterly cold. The mercury froze in the thermometer.

At 9 a. m. the journey was continued. At noon they reached Cape Arendts and now followed the western side of the island some 15 kilometers towards the north, afterwards proceeding through Trækpasset to the east coast. At 5 p. m. the tent was raised; temperature — 37° C.

On *February 22nd* at 9 a. m. they drove further northwards. They had some fairly good sledging until about 10 kilometers south of the sound between the Koldewey Islands. At 6.30 p. m. the tent was raised west of Røseløbet.

On *February 23rd* at 10 a. m. the ship was reached.

The journey had been successful in every respect. Depots had been laid out and the ethnographical results were satisfactory.

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On the *15th of February*, the same day that the above sledge expedition set out, the sun shone for the first time that year on the small colony in Danmarks Havn, bearing promise of the coming summer, in the course of which the members of the expedition hoped to meet their friends at home once more.

Onboard they were all the time busy with the preparations for the sledge journeys, of which the expedition with the drag-sledges to the inland ice was already to begin in the first days of March and the relief and search expedition towards the north about the middle of March.

Drag-sledge journey over Sælsø to Dronning Louises Land and Mørke Fjord,

$^1/_3$ to $^3/_4$, 1908.

The object of this expedition was to chart Sælsø and to examine whether from this lake they could come up on the inland ice and by crossing this reach the snow-free land, which had been observed behind it and which was afterwards named "Dronning Louises Land". Further, Mørke Fjord was to be surveyed.

The members of the expedition were Bertelsen, Lindhard, Wegener and Weinschenck, the first-named as leader.

On *March 1st* the departure took place with one drag-sledge, the weight of load plus sledge being about 350 kg., i. e. every man had to drag about 88 kg. In the evening the tent was raised at Snenæs.

On *March 2nd* they reached Hvalrosodden in spite of heavy loads and bad sledging.

On *March 3rd* they continued out on Sælsø, which was covered with rough, hard snow.

On *March 4th* at noon they reached the naze where the lake bends westwards. The ice was free of snow here and from various signs it was seen that the lake had not been ice-free the previous year.

On *March 7th* the glacier at the head of the lake was reached. On the way they had come across small frozen-in blocks of calf-ice produced by the glacier.

The *8th of March* was spent in making a survey, painting and photographing and in looking for the best way to get up on the inland ice. It appeared that this fell off steeply towards the land on the 3 to 5 kilometers that could be seen, while on the glacier itself they found an apparently good ascent.

March 9th. After depositing a sledge-case at the tent-place, the ascent began. Nevertheless, the remaining load had to be taken up in two portions. After getting up on the glacier, progress was fairly good, though the ice was full of cracks and fissures covered with snow, so that the men could not see them until they fell in.

On the *10th*, *11th*, *12th* and *13th of March* the journey was continued in the direction of Dronning Louises Land. The surface of the inland ice was very rough and bore some resemblance to a suddenly frozen, undulating sea. The roughness increased from east to west. On the 13th in the evening, only about 10 kilometers from Dronning Louises Land, they came across ice-combs up to 10 meters high, whilst earlier melting-ice hummocks had only varied between ½ and 4 meters. Bertelsen resolved therefore to raise the tent here and proceed no further with the sledge.

On *March 14th* Wegener and Weinschenck went towards the land while Bertelsen and Lindhard remained near the tent, to paint and sketch and to investigate a moraine extending north and south beyond the tent-place.

It appeared that the inland ice ended in an almost vertical, ca. 25 meter high wall towards the snow-free Dronning Louises Land near Cape Bellevue, where Wegener and Weinschenck succeeded in finding a place in the ice wall to descend from the inland ice to the land. Northwest of Cape Bellevue Wegener observed an extensive lake quite filled with icebergs.

On *March 15th* they started on the return journey and on *the 17th* in the evening they were again down on Sælsø.

From the *18th* to the *22nd of March* they made their way back to Hvalrosodden by way of Sælsø.

On *March 19th* the party made no advance owing to a hurricane-like storm; though the tent had been raised on the lake several kilometers from land, quantities of pebbles were carried out and driven against the tent and at last with the tent-poles giving way, the tent was blown down on the top of them.

On *March 20th* the tent was pitched opposite the river in the valley, on the northern side of the fjord.

On *March 21st* Bertelsen and several others proceeded without sledge through the bottom of the valley and discovered that at its other end there was another large lake the extent of which they could not judge. Later on they named it Anneksø.

On *March 22nd* the party reached Pustervig, and in spite of mist and snow-storm succeeded in making a survey of Mørke Fjord. After Bertelsen had relieved Charles Poulsen at the station in Pustervig, the sledge party proceeded homewards on the 1st of April and arrived at the ship on the 3rd.

It had been a very intersting excursion. They had seen that behind the ca. 40 kilometers broad belt of inland ice, Storstrømmen, there was an extensive ice-free tract of land which would undoubtedly be a large and interesting field for further exploration, a land which they had now set foot upon. They had become acquainted with the character of the inland ice in these regions and brought home with them collections of plants, rocks and fossils.

After the departure of BERTELSEN's party the men at the station in Danmarks Havn put the final touches to the careful preparations made during the past months for the relief and search expedition towards the north.

The sledges were carefully examined and repaired and skis to put under the runners of the sledges were made. Dog traces and harness, straps, skis and ski-straps were also made ready, wind clothes and reindeer skin coats sewn and tents and sleeping-bags repaired. The provisions were packed up and put into boxes. The dog pemmican was mixed and made into cakes, cartridges were loaded and many other things.

The dogs were given plenty of food in order to get them into good condition.

To get them some fresh meat if possible, PETER HANSEN and RING camped out at Maroussia from the 29th of February till the 8th of March looking for bears. But they did not find even a trace of them.

On the same day that PETER HANSEN and RING returned empty-handed, HENDRIK OLSEN and CHARLES POULSEN on the other hand came back from Pustervig with a bear, which FREUCHEN had shot in there, so they did nevertheless get some fresh meat for the dogs before the departure of the expedition, which took place a few days later.

Relief and search journey with the sledge northwards, $^{10}/_{3}$ to $^{26}/_{3}$, 1908.

The only members of this expedition were KOCH and TOBIAS GABRIELSEN and the aim was to get information regarding the fate of MYLIUS-ERICHSEN, HØEG-HAGEN and BRØNLUND.

The plan was to proceed along the outer coast in order to examine all the depots north of Schnauders Island. It was taken for granted, namely, that if MYLIUS-ERICHSEN had turned southwards he would as long as possible follow the depots, partly to make use of them, partly because on this route he might expect to meet any possible relief expedition sent out from the ship. Had he been forced by circumstances — e. g. open water — to travel on the inland ice, KOCH

hoped that either in the depots or in cairns built near the outer coast he would find news of him.

If no information regarding MYLIUS-ERICHSEN and his comrades was found in the depots or elsewhere along the coast from Cape Bismarck to Cape Rigsdagen — where KOCH parted from MYLIUS-ERICHSEN on the 28th of May 1907 [1] — KOCH intended to penetrate through Peary Channel and then if possible go down along the N.W. coast of Greenland to Cape York.

The journey might present so many difficulties, however, that KOCH reserved to himself full right to return home either by way of Cape York or to Danmarks Havn or by any other route which he might think best suited in the given case.

After a consultation with TROLLE it was agreed further that:

1. the ship was not to leave Danmarks Havn earlier than the 1st of July 1908.

2. If KOCH did not return before the ship sailed the following things should be left for him in Danmarks Havn: provisions, coal,

	The contents of the depots before Koch started northwards.					The contents of the depots after Koch had passed them on his way towards the north. The depots were to ensure their retreat.					
	Sledge-cases	Boxes of dog pemmican	Boxes of grease	Meat kg.	Petroleum liters	Sledge-cases	Boxes of dog pemmican	Boxes of grease	Meat kg.	Petroleum liters	
Cape Marie Valdemar	2*				31	1				4	*1 sledge-case to be used for dog-food
Cape Amélie	1	2					1/2				
Björneskærene	2/5						1/2*				*To be deposited on the journey up
Hagens Island	1 1/5	2 1/2				1 1/5	2 1/2				*According to the plan they should not pass these two depots on their way northwards.
Nordre Depot	2/5				5	2/5				5	
Schnauder Island	4*					1					*3 sledge-cases to be used for dog-food
Lamberts Land	1				8	1	2*			8	*To be deposited on the journey up
Bagatellerne	1*				8						*1 sledge case to be used for dog-food
Mallemukfjæld	1	2			ca.20*	1	2			5	*uncertain, perhaps ca. 35
Sophus Müllers Naze	1/10	2	2	500		1/5*		2	250	2*	*1/10 sledge-case and 2 liters of petroleum to be deposited on the journey up
Nordost Runding	1/5	1			2	1/5	1			2	

petroleum, spirit, matches etc. for 2 men for 9 months; further a sledge, tent, tent-inventory 2 sleeping-bags, weapons, ammunition, instruments, books, paper, ink etc. and if possible 2 kaiaks.

3. The depots on Shannon Island and Bass Rock must not be emptied.

[1] See p. 134.

The depots along the coast and their contents at that time are shown in the above table, which at the same time mentions how Koch intended to make use of them during the journey up.

From the ship they took altogether 5 boxes of dog pemmican, 75 kg. of American dog-pemmican, 4 liters of spirit and 3 provision cases [1], the contents of which were as follows:

Case I and II.

Bread in linen bags	7.5	kg.
A tin of butter	2.0	-
Oatmeal	0.75	-
Mustard	0.025	-
Salt	0.30	-
Curry powder	0.025	-
2 tins of milk	0.50	-
Liver-pie	0.125	-
2 tins of potted ham	2.00	-
Sardines	0.06	-
Lime-juice lozenges	0.50	-
Meat chocolate	2.00	-
Blood pudding	2.00	-
Peasemeal with bacon	3.50	-
4 boxes of pemmican	6.00	-
Cinnamon	0.03	-
3 bundles of vegetables	0.375	-
1 parcel of patent coffee	0.50	-
Ground sugar in linen bags	1.25	-
1 packet of matches	0.06	-
	29.50	kg.

Case III.

5 kg. of pemmican, 10 kg. of peasemeal with bacon, 0.5 kg. salt, 1 kg. tea, 3 kg. tobacco, 2 packets of matches, 10 wax-candles, needles, canvas needles, thread, yarn, knives and several other small articles.

With a daily consumption of 0.75 kg. per man the above-mentioned provisions would be able to last about 50 days.

With a daily consumption of ca. 0.65 kg. per dog the dog-food would last about 16 days.

Provisions and luggage were loaded on 3 sledges, 2 of which were of Eskimo construction while the third was a small Nansen long-sledge.

[1] The contents of the cases were partly determined by what they had on-board, but the composition represents approximately what such an experienced arctic traveller as Koch considered most suitable.

The latter was dragged after one of the other sledges and they intended to use it, if Koch found it suitable or if they were forced to proceed on the inland ice.

Each of the two Eskimo sledges were drawn by 10 dogs, which were all in good condition at the time of departure.

As will be seen from the following, Koch already at Lamberts Land had ascertained the fate of Mylius-Erichsen and his comrades, so that the daring and venturesome journey north of Greenland was never carried out. But Koch started with the possibility of this venture before him and we owe it to him to give the above account of his great project.

Regarding the events of the journey itself I think it best to let Koch speak for himself.

Koch's report on the relief and search journey northwards, March 1908[1].

March 10th. Departure from the ship at 6.30 a. m. North of Syttenkilometernæsset the sledging was bad and the sledges cut through the half-frozen snow-crust. At 5 p. m. the tent was raised at Fyrretyvekilometernæsset.

March 11th. Departure at 8.00 a. m. Bad sledging. At 4 p. m. the tent was pitched at the depot Cape Marie Valdemar. In this depot there should have been 2 sledge-cases and 31 quarts of petroleum. We found one of the sledge-cases high up on one of the rocks but could not find the other. It has probably been lying in the crevice at the original place of the depot, but if so it has been covered by 3 meters of snow. The jar of petroleum has probably been leaky, it only contained 15—20 quarts.

March 12th. Departure at 8 a. m. The tent was raised at 2 p. m. at the depot Cape Amélie. The crust of snow was thicker on the bay here and the skis did not cut through.

March 13th. Departure at 7.30 a. m. The tent was pitched at 4 p. m. near a small island about 10 kilometers north of Bjørneskærene.

March 14th. Departure at 8 a. m. Fog. The tent was raised at 4.30 p. m. due east of the islands at 78°14′.

March 15th. Departure at 8 a. m. Fog and snow. The tent was raised at 3 p. m. owing to snow, at ca. 78°29′.

March 16th. Departure at 8 a. m. Fog. Drove northwards by the compass. In the afternoon advanced between high, snow-covered glacier-screwings and raised the tent at 6.30 p. m. The dogs began to lose their strength and needed a rest.

March 17th. Departure at 8 a. m. Clear weather. For a long

[1] In "Illustreret Tidende" series 1911, No. 14, Koch has previously written a very interesting report of this journey. Note by Editor.

time sought in vain for the four sledge-cases deposited on the island (Schnauder Island), which, we supposed, were covered by large quantities of snow. We found them however further north than expected and so high up on a rock that they were uncovered in spite of about 10 meters of snow, lying here from the preceding winter. Took a rest that day and used 2 sledge-cases to feed the dogs.

March 18th. Departure at 8.30 a. m. Fog. The tent was raised at 4.30 p. m. without knowing exactly where we were.

March 19th. Departure at 8.30 a. m. The weather cleared up, so that we could find our way. Shortly after, we again had fog and a head wind with a fairly strong drift of snow. With great difficulty we succeeded in reaching the depot on Lamberts Land.

The old depot was covered by snow but GABRIELSEN knew for certain, that the new depot had been laid at another place and here we only found 3 rolls of films and a tin with cartridges; the sledge cases, the petroleum jar and the clothes were gone.

On seeking in the immediate neighbourhood for the lost things, GABRIELSEN found a piece of tin projecting from the snow about 100 meters from the depot under the slope of a small hill. It appeared to be the lid of a sledge-case. We also found here the almost snow-covered entrance to a small cave in the rock and when we had removed some of the snow and light penetrated in, we could distinguish the outlines of a human being in a reindeer coat. We immediately fetched a spade and "Tokejærn" and began to shovel away the snow and remove a couple of tins and a box of dog-food.

The human being was BRØNLUND. He was lying on one side with his back towards us; the hood of the coat was drawn over the face, which was completely hidden, but we knew it was BRØNLUND from the bare left hand and the reindeer coat. Across him lay his gun with both barrels loaded; near his head stood a cooking apparatus (Lux), the feet were wrapped up in rugs and lay between two sledge-cases.

We gradually removed the snow and then saw that over the entrance there was a primitive roof made of the reserve runner and the reserve cross-bar, which had been lying in the depot. In the nearest sledge-case at his feet we found a bottle with papers, BRØNLUND's diary and almost half of the provisions. I knew the bottle, it was the same as we had used for the letters during the spring journey in 1907. The letters left by us were wanting; most likely they had been used to light the fire (there was no spirit in the depot); the papers now found in the bottle were only chart-sketches drawn by HAGEN.

The diary was written in Greenlandic but unfortunately GABRIELSEN could not read the writing. A single page however was written in Danish. The words were as follows:

"Perished in 79 Fjord after an attempt to return by way of the inland ice in the month of November. I arrive here by declining moon and can go no further owing to frost-bites on the feet and the darkness.

The bodies of the two others lie in the middle of the fjord in front of the glacier (about 10 miles).

Hagen died on the 15th of November and Mylius about 10[1] days later.

Jørgen Brønlund".

Brønlund must have been in the cave for about 5—6 days before he died. The sledge-case was scarcely half empty; of the 8 quarts petroleum there was still about half a quart left; of the tin filled with matches half a score of boxes had been used. Brønlund had thus had plenty of time and had evidently made preparations for his death.

The bottle with the chart sketches as well as the diary were placed uppermost in the sledge-case and in one pocket of the diary was found a loose sheet covered with writing, on the back of which was the word: "Will".

It was evident, that Brønlund had placed these things in such a way, that they could easily be found and it was therefore improbable that more would be discovered by ripping up his clothes, had this been possible.

We did not try to do this, however. Deeply moved as we were, it was more than painful to begin such a work, which we also had every reason to believe would give no result.

As no stones could be broken loose at the place, we covered the body with wood and cases and afterwards buried the whole under the snow.

The language which Gabrielsen and I spoke to each other did not permit of many words. I addressed a brief good-bye to Brønlund before we returned to the sledges: "Farewell, Brønlund! Kammeratsoak!"[2].

The position was now as follows. The object of our journey had been:

a. To procure so much information regarding the lost sledge party as would dissipate the tension and nervousness caused by the uncertainty of their fate and to make certain that no more relief expeditions were required.

b. To bring positive information to the public at home on these points.

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[1] As will be seen from the further description p. 220, it may be possible that "two" is written and not "ten" days as supposed by Koch.

[2] You were a good comrade to us.

JØRGEN BRØNLUND

Axel E. Aamodt. Kjøbenhavn

The first part of this task had now been accomplished but the second was still left. — The question was now: could we w i t h o u t r i s k do more to obtain fuller information regarding our lost comrades or to save the results of their work. By far the most important of these results, HAGEN's exact and detailed charts and sketches, were already in our hands and we hoped that BRØNLUND's diary might contain some statement as to how the summer had been passed, but it was nevertheless a great disappointment, that neither MYLIUS-ERICHSEN's nor HAGEN's diary or journals were found with BRØNLUND. For the public and especially for the relatives of the two men who had perished, it would furthermore be of great importance, if we could find the bodies of MYLIUS-ERICHSEN and HAGEN.

But this proved to be hopeless. I have already several times mentioned the enormous quantities of snow that had accumulated in the course of the winter. In my diary for March 12th I have written at Cape Amélie: "On the distance covered (i. e. from the ship to Cape Amélie) there has been almost twice as much snow as last year". The Rosio Island was completely covered by snow and rose as a faint cupola on the sea-ice, where the only dark point was the cairn on the top of the island. The undulating high land on the western side of Lamberts Land was completely levelled by the snow, even the ca. 400 meters high slopes towards the south were clad in white and it was only at a few places with overhanging rocks, that the ground projected out of the snow. East of Lamberts Land, where in the beginning of April in the previous year we drove on almost snow-free ice during the last 2 to 3 kilometers south of the depot, there was now a thick layer of snow. At some places in Jøkelbugt, where in the previous year we had been stopped by huge fissures and large screwings, we were this year able to proceed without difficulty across a smooth, undulating snow-flat.

And we have all seen indeed how drifting snow, at the places where it lies at all and especially in large bays, collects round the objects on the ground and gradually covers them. It may sometimes happen that a storm blows the snow away again, but unfortunately during the previous month we had had a very considerable fall of snow without storms and the surface of this snow had already become so hard, that it could almost bear the sledges; it was not to be expected, therefore, that a storm would uncover anything that had been hidden.

Even with a fairly certain statement of the exact place where we were to look for the bodies of MYLIUS-ERICHSEN and HAGEN, I doubted if we could find them, for the wavy surface of the snow made it hardly possible to distinguish small objects at any greater distance than a few kilometers and very often only within the distance of a few hundred meters. But when it dawned upon me, that I could

not understand Brønlund's statement, I considered all search quite hopeless.

In further explanation I may say, that 79-Fjord (Nioghalvfjerdsfjord) was the provisional name given to the large bay north of Lamberts Land, the mouth of which was about 32 miles broad. The inner part was filled by a glacier which gradually merges into the sea-ice; the glacier has no boundaries, there are no icebergs or calf-ice which might mark the end of the glacier and the beginning of the sea-ice. In the month of November the boundaries may possibly be sharper, but in spring when the snow has levelled everything, one may travel for miles without being able to determine whether one is on the sea-ice or on the glacier.

The middle of the fjord in front of the glacier was the place where we were to look for the bodies of our comrades. The distance from the depot to a line which would fit in with the statement "in the middle of the fjord in front of the glacier" would be 16 to 20 miles. With the 10 miles Brønlund might have meant the approximate distance from the depot, but this was not in agreement with the statement "in the middle of the fjord in front of the glacier". These words could also mean — and perhaps this was more likely — 10 miles from the glacier; but this statement was of no use, as it was impossible for me to find the boundaries of the glacier within 8 miles.

Under the prevailing conditions I felt sure that all search would be useless.

It seemed probable that Mylius-Erichsen and Hagen, before they started on the return journey had deposited collections and perhaps also journals at some place on the coast. Where these were to be looked for, I could not know, but it must at any rate be north of Mallemukfjæld — I thought especially of the depot at Amdrups Land or at the Eskimo Peninsula. As the passage round Mallemukfjæld was always rather dangerous, I considered it too hazardous to look for the things there, and thus there was nothing left but to return to the ship.

The same afternoon we drove southwards and raised the tent at 7 p. m.

March 20th. Departure at 8.30 a. m. Fog and snow. Raised the tent at 4 p. m.

March 21st. Departure at 8 a. m. Clear and calm weather. Raised the tent at 4 p. m.

March 22nd. Heavy gale with driving snow-drift in the morning. Later the wind fell. Departure at 10 a. m. Drove through the group of islands and as on the preceding day corrected some imperfections on the chart.

March 23rd. Departure at 8.30 a. m. Clear weather. Made

more corrections on the chart. Raised the tent at 4 p. m. at the depot on Hagens Island.

March 24th. As I was aware that hardly any dog-food was found at the ship and as it would be of no small importance for the work in spring if we could keep the dogs alive, I determined to take with me all the food from the depots on Hagens Island and south thereof.

Departure at 8 a. m. Passed the Bjørneskær depot and raised the tent at 4 p. m.

March 25th. Departure at 8 a. m. The air was thick with snow; later we had fog and wind with drift of snow. Raised the tent at 5 p. m. near Cape Marie Valdemar.

March 26th. Departure at 6 a. m. Fog. Reached Danmarks Havn at 6 p. m.

J. P. Koch.

Koch's return to the ship released the uncertainty and tension all had felt since Mylius-Erichsen's sledge-party failed to appear in the autumn of 1907 and gave room for deep sorrow and sadness.

Mylius-Erichsen, the energetic and untiring leader, the soul of the whole undertaking had ceased to live. And with him two of his men Høeg-Hagen and Brønlund, beloved by all onboard, had found the death of heroes.

By the discovery of Hagen's chart-sketches, however, the results of their journey had been saved and from Brønlund's diary it was hoped to get information regarding their last journey.

The translation of the diary has however only given an incomplete answer to this question. With the available data so far we are still obliged to guess at much and many things.

Before endeavouring to state how the journey was in all probability carried out, a translation of Jørgen Brønlund's diary may be given here. After the return it has been translated into Danish by Chr. Rasmussen, lecturer in Greenlandic at Copenhagen.

F. Jørgen Brønlund's diary[1].

See Pl. X.

On *March 28th 1907* we started on the journey north. That day we had splendid weather. Near the boat-harbour[2] we reached the mainland. It was a day that made one sweat, because the sun in the middle of the day began to get hot. I got frost-bitten in my cheek.

March 29th. Our journey ended in rising wind and hazy weather. We tried the sledge-skis.

March 30th. Proceeding towards Cape Amélie. As it began to blow we stopped before evening. Tobias got 2 ptarmigans, I 1.

March 31st. Easter Sunday. Beautiful calm weather. We reached Hagen's place of observations[3]. After sunset the thermometer showed — 32° C.

April 1st. Easter Monday. Proceeding to the things taken on in advance. Bistrup followed 2 hours later.

April 2nd. We returned to fetch another load, five in all; Ring took the last (note: we had come to real polar-ice).

April 3rd. On the return journey we came to the tent-place of our comrades.

April 4th. We met our comrades on the way back for new loads and proceeded. The snow was very hard. Without stopping we drove past the sledges of our comrades, trying to reach the land. As the ice began to be anything but smooth we were forced to stop.

April 5th. Mylius, Tobias and I went up on the mainland in order to get a view from one of the summits. On the mainland we had to walk all the time, it being impossible for us to proceed with sledge. Our food became quite frozen. We had to go further out to sea, the way along the land being very rough. My comrades shot 2 hares, I got 3 (2 shots).

April 6th. We steered almost right out to sea with our sledges, but were obliged to walk all day long. We covered ca. 20 miles. The ice was bad.

April 7th. Ring joined us. We drove over bad screw-ice and had to walk all the time. Off "Isblinken" many fissures.

Drove 8 miles (still very cold). Were in want of water.

April 8th. The weather splendid. Carry on some of the load and return again. 6 sledges.

[1] The diary and translation have been presented to the Royal Library of Copenhagen. All the foot-notes referring to the diary are by the editor of the report.

[2] Cape Marie Valdemar.

[3] Hagens Island.

April 9th. Returned towards the evening — tried to reach the others. Dog-food (to be remembered), ice (to be remembered).

April 10th. We got past the disgusting ice and came in on the low-water mark. Our comrades ...

April 11th. (In the night we had — 34° C.). To-day we made a halt to rest the dogs. TOBIAS, BERTELSEN and I went out; I shot a hare and 3 ptarmigans [1]. We saw the excrement of musk-oxen, most likely from the summer-time.

April 12th. We had only covered a very small distance, when we found tracks of bears, a she-bear with two cubs. We wanted them badly, so TOBIAS and I emptied our sledges, followed the tracks and shot them. The old bear crept into the breeding hole of a large seal; we waited some time for it to come out, as we were certain that it would reappear.

April 13th.

April 14th. In the afternoon we started again.

April 15th. Today (or after midnight) we came to a large foreland covered with ice [2]. We wanted to proceed a little further but came across some bad screw-ice which forced us to stop. The ice we crossed to-day was of the same character as the ice we had some days ago, i. e. hard but with soft places where there was no water under the snow. Contrary to our expectations the coastal line bends towards the east while we were of opinion that it should turn west. Since we left the ship, we have covered three degrees of latitude (i. e. a distance equal to from Jacobshavn to Upernivik). We covered (to-day) 32 kilometers. We have now been away 19 days.

April 16th. Towards the evening we started again but to our great annoyance we hardly made any progress (because we had to wait for BISTRUP whose sledge had broken down). We shot a bear and two cubs. When it had been skinned and the dogs had greedily consumed their part, there came another bear from the north, which we also got hold of. The sun sets no more in the evening.

April 17th. The mallemuks have come. Frost-fog. Driving in and out among the screw-ice, which often caused damage to the sledges, we stopped at last on the northern side of a large naze at 8 a. m.[3]. As the ice on which we were driving had not been quite still during the winter time it was full of screwings. We wanted to get up on land to investigate a sedimentary or sandstone hill seen there. Before we reached it we made a halt, two of the sledges breaking down, and it was not difficult in any case to reach the hill on foot.

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[1] They crossed the land till they reached the westernmost of the two small fjords cutting into Lamberts Land from the north, and went across the fjord to the land in the west. See p. 114.

[2] The eastern side of Hovgaards Island.

[3] Cape H. N. Andersen.

April 18th. Before breaking up we had to repair the sledges. The miserable frost-fog was again coming on and in the night it began to blow hard. The sledges in winter-time.

April 19th. Bad weather again, with driving snow. Our dogs are now constantly eating the lashings of the sledges.

April 20th. To-day I heard the chirping of birds at the foot of a hill; on journeys so far north one longs to hear that sort of thing. The weather had again become good, quite bright. The large foreland[1] we had reached was extremely beautiful, with streaks of different layers; it greatly resembles the large island north of Cape York, where we wintered. Mylius and I in our sledges tried to get round the mountain, which we took to be a large foreland, but as we could not proceed in the heavy screw-ice we tried on foot. We walked 12 miles without seeing the other end of the mountain and therefore turned round tired and discouraged by the long way we still had before us. When we came back Tobias and Thostrup penetrated into a fjord[2], which we took to be a sound, in order to investigate it.

April 21st. Tobias and his companion returned in the morning without having found any way into the fjord. Towards the evening we intended to forward only half our loads. We meant to go out to sea, as the worst screw-ice lay along the land. When we were on the point of starting (my comrades had inspanned the dogs) we saw a bear which was shot. It severely hurt two of my dogs and caused some injury to two others. On foot we reached the place desired and unloaded the sledges; we then turned round and returned towards the morning.

April 22nd. We reached the load carried on the day before and drove up on the land there.

April 23rd. We started again, proceeding almost the whole time on the ice-foot. After rounding what we considered to be a foreland, we came across some very old tent-places and found various objects, heads and bones of walrus, and also the bones of a whale.

April 24th towards the evening. The old story over again: just as we had finished securing the load on the sledges and were on the point of starting, we observed a large bear. Tobias shot one of the dogs instead of the bear. As we had taken down our tents and did not want to remain there all night, I took the bear on my sledge while my comrades took the heaviest part of my load, except my sleeping bag and my reserve clothes. It was not an easy load, especially as my dogs were very exhausted, and my "bas", the largest of my dogs, had been bitten so severely by the bear that it was unfit for use.

The ice was very easy and quite smooth for driving purposes, and running mostly in the uprights we covered 24 miles. Arrived

[1] Mallemukfjæld.

[2] The fjord leading to Hekla Sound and Dijmphna Sound.

at last at the large naze, of which we were to see the northern side the next day and made a halt there a little before noon [1]

(*April 25th*).

April 26th. After taking some food, MYLIUS and I early in the morning went up on the high land to investigate the land in front of us. Up there we could see that the coast line turned more towards the west. We could not distinguish much of the land far away, saw only a large glacier in the distance, nor were we able to see the ice a long way off, our position was too low. After coming back we had another short nap and started again in the afternoon. We parted from THOSTRUP and WEGENER, who were now going back to the ship. After proceeding a short distance on the ice-foot we reached some good, smooth ice; we drove down on it and stopped in the morning on the northern side of the glacier end [2]. On the way we drove along the border of a large opening partly covered by thin ice.

April 27th. We slept and then drove on, delayed again by lashing up the sledges. Early in the morning at 3 a. m. (April 28th) we proceeded on the thin ice round the large glacier naze and saw the land before us, nothing but glaciers. The ice was excellent and we could have driven a long distance but came across a bear (a she-bear) and therefore halted a little before noon [3].

April 29th. Shall we ever reach our goal, the large bay?

In front of us there was nothing to be seen but inland-ice. We have for a long time been expecting every day to turn westwards and we are constantly moving northwards. At last we have begun to say to each other, that PEARY may probably only have been on some nunatakker [4] and considered these to be coastal mountains. It must now soon be seen how matters stand. In the beginning of our journey we had excellent ice to drive upon, latterly it has become very bad. We proceed along a fairly low glacier and without being able to see ice-free land we pitch our tent. At 7.45 we woke up.

(We saw a piece of wood projecting from the sea-ice).

April 30th. When we broke up from the so-called nunatakker, we followed the border of the glacier for about 8 miles, then drove down on the ice, horrible old ice over which we had to make many windings and turnings, with no hard layer of snow, heavy to drive on, so that we were constantly obliged to walk behind the uprights. We sighted a naze which we considered to be ice-free land and steered

[1] This was the 25th April. The tent-place was south of Amdrups Land ca. 15 kilometers west of Henrik Krøyers Holme.

[2] It was the 27th of April. The tent was raised on the northern side of Antarctic Bay.

[3] 81°07′ N. lat.

[4] Snow-free hill-tops ranging above the inland ice.

down on it rounding the point. We then had a frost-fog and halted in the night (towards the morning).

May 1st 1907 (81°42′ N. lat.). We woke up in clear weather and started in the evening in order to round the big naze. We drove on smooth ice along the shore, made good progress and soon got round the naze. When we sighted the other side, we were longing very much to find ice-free stretches of land. And again we saw nothing but glaciers before us, which were quite low. The coast line now turned towards the west [1].

May 3rd. When one comes to a place for the first time it is not very easy to find one's way; this was clearly seen in our sledging to-day. When we started, we first followed the glacier-covered coast line, later we got further out to sea and though the weather was quite clear we went as in a fog. It was a great mirage that confused us, just as if it had been a fog.

May 4th. Beautiful weather. Our journey to-day was also very fatiguing. The ice was certainly not bad but now the dogs began to lose their strength, which is not to be wondered at considering that they had had no rest at all. Now an ice-free land where we might find game and food for the dogs would be welcome. The mainland we are seeing is one single mass of glaciers. This day we turned towards the south-west in order to reach some heights, but as we observed that they were covered by inland ice we halted. A low land north of us, which we took to be a naze, we intended to round the next day. The lands to be seen north and west of us we consider to be Melville Land, which we may probably reach in the course of 2 days; if there is only musk-oxen there—for the dogs. The ice on which we drive must be very old, it looks like a frozen swell.

May 5th. A fairly flat land lying ahead caused us some trouble; as it was naturally covered by ice we decided to go north of it. The snow was very heavy and most of the time we had to walk behind the uprights; at last we reached the land, mounted it and saw now distinctly the streches of land that lay before us; how we longed to reach them, after seeing only glaciers and ice before us for such a long time. We rounded the northern point and pitched the tent.

May 6th. In the afternoon we started again.

May 7th. In the forenoon I went off to get a view of a land 19 kilometers from the island where we had raised the tent. Arriving there I first saw the tracks of a wolf which had been following the shore northwards. After proceeding a little further I saw old excrement of musk-oxen which made me almost quite happy.

May 8th. We came to the land where I had been the day before[2].

[1] On the same day at 8.15 p. m. the two parties separated, Mylius-Erichsen in order to go westwards and Koch to proceed towards Peary Land. See p. 123.

[2] A little north of Cape Kronborg.

Towards the eveving MYLIUS and I went hare-hunting, he got 2 and I one besides 2 ptarmigans. As there was a strong wind with heavy snow-fall, we had constantly to be closing our eyes. At last mine became very painful.

May 9th. Bad weather, drifting snow and wind from the sea. As there could be no talk of hunting we had a quiet day. Our dogs were badly in want of something to eat, but in order to economize we did not feed them.

May 10th. Again wind from the sea and heavy drifting snow. HAGEN and I went hare-hunting, but it was in vain, because we could not see round about us. My comrade killed a ptarmigan (another which he shot was eaten by a dog). This day we shot two dogs, one of MYLIUS' and one of mine, in order to satisfy the hunger of the others; they greedily ate them.

To-morrow we follow the coast southwards in the hope of finding some hares and musk-oxen. Our dog-food is only sufficient for 8 days and we have begun to economize with our own provisions. This night the dogs have been doing damage to the sledges, eating the harness and HAGEN's skin-boots.

May 11th.

May 12th. In the forenoon I went away hare-hunting. As I began to climb a hill, I found tracks of hares and had no doubt about good hunting; then I saw tracks of musk-oxen only a few days old, so I thought no more about the hares. I now kept a sharp look-out and a long way towards the west I sighted some black stones which looked rather strange to me; on closer examination they proved right enough to be musk-oxen. Holding one of my dogs, which had run after me, in a leash I now approached them. As I could not hide myself I steered right down on them; however they became frightened and began to run away. Then I let the dog loose ...

When I returned late in the evening my comrades were most agreeably surprised. After eating, they got ready and went off following my tracks with their dogs after them.

May 13th. At noon they returned after cutting up (the shot animals) and depositing some of the meat, which the dogs were not allowed to eat. When I had boiled the meat and eaten, I went away in order to feed my dogs, which had not been with me the previous night.

May 14th. My comrades climbed the hills, whilst I arranged the cases with the small store of provisions yet remaining and cut up the musk-oxen I had shot. Late in the evening they returned, each with 2 hares. After having slept a little, I fetched the dogs which were up at the place where I had met the musk-oxen and came back in the forenoon (the 15th)[1].

[1] From HAGEN's drawings (Tables V and VI) it is evident that on this day they found themselves in the neighbourhood of Gundersteddal.

May 15th. We started in the evening in stormy weather; in our native land (on Greenland's west coast) it would have been from the S.E. The wind was blowing in the direction out of the fjord, so we had it against us. We made good progress, however, until we met with snow (heavy drift-snow), we then raised the tent on a small island [1] where we consumed the last small fragments of our bread. We now had to live almost exclusively on meat. When we had eaten the meat we used to take a single spoonful of blood-pudding, we kept in a tin, in order to get rid of the taste of meat. We now determined only to continue the journey forward 3 days more. We went towards the south-west. The large hills on each side gave a nice home-like impression.

May 16th. We did not start, as it was blowing harder and the weather was cloudy.

May 17th. It was still blowing but the air was clearer than yesterday. In the middle of the day I rose to feed the dogs and to fetch some ice for melting.

Being finished therewith, I gazed at the mainland round about and observed some stones on the ground looking greatly out of place there, much more resembling musk-oxen. I took out my telescope and on closer examination they seemed to be very much like musk-oxen lying down with their backs to the wind. My companions were wide awake at once and turned out on the spot.

We then proceeded towards the oxen, which lay a little up on the shore on the lee side. We climbed the shore, no wiser than before, as they did not move at all. We went on and came quite close to them, keeping on the lee side all the time; our dogs could smell them and ran forwards and we followed in the wake of the dogs. They made not the slightest sign of wanting to run away, but rose one after another, gathered quickly together in a clump with the bulls in front; there was the greatest danger for the dogs, which ran up quite close and ran the risk of being butted. We now began to fire at them at close range, taking great care not to shoot the dogs.

In less than 5 minutes we had killed them all, 14 musk-oxen. During the short time we were firing, the dogs had torn to pieces two small calves and devoured the entrails.

We were now very glad to have some proper food for the dogs and also for ourselves, and hoped to be able to reach our goal. While we were cutting up the dead animals a dog began to bark up on the hill and when I went up to it I found ...

May 18th. It was still blowing. In front of us in the direction of the fjord there were heavy clouds and it was evidently blowing even harder there, suggesting very hard weather on the west coast (of Greenland) during these days.

[1] Pinseskæret.

But thanks to good fortune, we could now remain where we were without worrying about food for the dogs.

If the wind would only abate and let us further investigate these regions; they were of a special beauty with their mighty mountains. I wanted to paint them but was prevented from doing so by the constantly drifting snow.

Towards the evening I missed a wolf; it was very shy and I could not get close to it; it was to lee of me, scented me and escaped after I had sent a few balls after it the moment it rose.

May 19th. Whitsunday. The wind was still blowing; we arranged the musk-oxen meat we were to take with us. MYLIUS and HAGEN went up in the hills and returned with 3 hares.

In the evening the wind lulled.

May 20th. When we woke we had fog and a little snow was falling. We penetrated further into the fjord (westwards); the fog gradually lifted but there was more wind. It was evident, that the dogs had gathered more strength while they were lying still with plenty to eat. The ice was very heavy and we were obliged to have skis under the sledges, but made much better progress.

As we advanced further into the fjord the ice became easier to drive on.

Late in the evening we stopped after having covered about 36 miles [1].

Was it a fjord or a sound we found ourselves in ? That was what we wanted to know and what we might expect to find out the next day. At the place where we rested we found a stone-wall and a trap, things made by human hands in times long passed. On the other hand, we did not find any site of a house or tent-ring.

May 21st. In the afternoon we started again; after having covered about 8 miles we reached the head of the fjord ...

Tracks of musk-oxen ...

We slept a little without raising the tent. Early next morning we started again in order to get out of the fjord. We found a piece of floating wood. The head of the fjord was quite low; farthest in was a small lake, connected with the fjord by a narrow tongue of clay. Not very far from the innermost part of the lake a glacier covered the land, but it had not calved. The front of the glacier to the north and south was quite low without any high hills (quite flat).

May 22nd. After proceeding a long way out of the fjord we halted at noon off a projecting point.

May 23rd. At 3 a. m. we broke up. At noon we came to the place where we had shot the musk-oxen [2]. In order to economize with our petroleum we did our cooking in the open air and used as

[1] Ca. 68 kilometers.

[2] The land inside Pinseskæret.

fuel the piece of wood found a few days ago. On the way towards the land we saw a seal on the ice.

May 24th. The weather was very beautiful. When our dogs had gorged themselves we had a long rest to let them digest their food. I caught sight of a wolf about to eat the rest of the musk-oxen meat, together with two of the dogs. It was very wild, so I could not get near it. On the way back I stood on the watch near the breathing hole of a seal but did not see it. Though neither the sea nor the land-ice had thawed, I amused myself by drinking from a puddle near the breathing hole. It tasted a little saltish.

May 27th. At noon we met our comrades (KOCH's expedition)[1].

May 28th. We proceeded into a fjord (Independence Bay). The weather was cloudy and it looked like mild weather; we only made small progress[2].

May 30th. The weather had become calm. From the other fjord there came a slight wind which we had on our backs; it had begun to be somewhat cold, about — 6° C. A little after 6 in the evening, started again in the direction of Cape Glacier. We were marching westwards in a large sound.

We wanted to sight the place reached by PEARY, but did not get so far and without having it above the horizon we had to make a halt; we drove along a hilly stretch, tending smoothly towards the west by south and stopped early in the morning of the 31st of May after having covered 36 miles.

June 1st. In the night we at last sighted the place we wanted to see[3].

June 2nd. In the evening at 6 o'clock I went out hunting musk-oxen at a place ca. 8 miles away. I found a great number of tracks in the bay but saw no animals.

On the way back I saw again a seal on the ice; when I was calling for my dogs it heard me and the moment I saw it, it dived down again. Hoping that it would reappear, I stood on the watch for it but in vain.

June 3rd. At noon I returned and found my comrades very anxious and on the point of setting out to look for me.

We now ate the last small remains of the musk-ox meat and the remainder of the soup which we made thick by all sorts of ingredients. We had only oatmeal left for one more meal.

June 4th. At noon I awoke; on going out I managed to shoot

[1] As already known, the meeting took place near Cape Rigsdagen. See p. 130.

[2] This day the two parties separated, never to meet again. See p. 134.

[3] It was the glacier in the head of Hagens Fjord which they mistook for Academy Glacier. The latter they cannot have sighted until the 7th or 8th June, if we take it for granted that they passed Cape Grundloven on June 5th (Grundlovsdag = Constitution Day).

2 ptarmigans in one shot outside our tent. I rejoiced over this booty, as we were quite destitute of provisions, having just the small quantity of meal for one more time. A little later I went out to the place where the inland ice merges out into the sea, hoping there to meet with seals, but returned soon after without seeing any. When I came back, the dogs had gone into the tent and eaten the ptarmigans.

My annoyance can be imagined!

At 6 in the evening MYLIUS and HAGEN returned, also without any game. We now consumed our last porridge. We were obliged to kill a dog and use it as food for the other dogs. From this moment we met with a number of misfortunes which we had never thought of before; we very seldom met with game and when there was any, fortune was always against us.

Every day the dogs lost more and more of their strength, getting too little food. My dogs were however a little better than the others.

On *Friday the 14th of June* we continued our journey[1] but as soon as we were a little way from the beach and had reached the snow we could not continue. With our dogs, which were now very weak, we could not proceed over such a route, so we had to return and make up our minds to stay over the summer if we could get something to live upon. This was indeed very dubious, taking into consideration how reduced our provisions were and how little food we had for the dogs.

June 15th. MYLIUS and I went up in the hills in order to get a view of the land where we had camped; we mounted the highest hill and looked around with out telescope but could not see anything of interest. It was a fairly low land which gradually increased in height and became more and more snow-covered. When we began to descend we caught sight of the tracks of a large musk-ox, evidently from the day before. I was not a little glad, for if it had not gone very far away we were sure to get hold of it. After closely examining the tracks which showed that it had gone slowly northward I returned to our tent. Directly afterwards I set out again with a sledge. After covering 4 miles I went up on the land and tried on foot to find the tracks, which I found and followed for a long time; later I lost the tracks of the animal; but suddenly it appeared right close in front of me, lying down quite motionless. I killed it with 2 shots.

I only took out the entrails, cut off one of the hind legs and returned, because I had forgotten my knife, which I used to skin with.

On the way back to my dogs I shot a hare and a goose. When I returned to my comrades they were also very glad.

[1] They have reached back to Danmarks Fjord and from the place where they were later forced to stay over the summer, they intended to drive across this fjord to Princess Dagmars Peninsula, in order to begin the return journey.

June 16th. In the morning we drove out to fetch the musk-ox I had shot; we drove with two sledges because my comrades had combined their teams so that they were only using one sledge.

We left the sledges on the shore, the dogs went with us and when we came to the musk-ox I had killed, I shot five more, one of which had a new-born calf.

At this good stroke of luck our joy from the day before certainly increased, especially as they had fat on them and our hopes for the future became still brighter. We cut up two of them together with the large one shot by me the day before. Of the others we only took out the entrails and after cutting off a piece which we wanted to cook we returned in the evening. We decided to move our tent nearer to the slaughtered animals, as it would be less troublesome to get at the meat.

During these days the weather was very beautiful, quite summer-like and there was no wind at all (sometimes when we felt a faint puff of wind it was a gust from the sea, i. e. from the ice). Though the thermometer in the middle of the day generally only showed [1] degrees of heat, we yet felt it very hot because we had no wind; and especially in our tent it was often difficult to sleep during the night with the sun high in the sky.

June 19th. We drove to the place where I had shot the musk-ox and when we pitched our tent and thought of the summer that lay before us here, we called the land where we found ourselves Sommerpladsen [2].

During the following days we had much work with the musk-oxen, of which the remainder were cut up and placed in a depot.

From this time we began to lead a very dull and monotonous life.

June 24th. To-day was the anniversary of our departure; on this day a year ago the Danmark Expedition started from Copenhagen.

And we Greenlanders started on the same day from Egedesminde. We therefore feasted on 3 geese I had shot and which we found suitable for the day; they were excellent, especially after we had tasted no wild fowl for such a long time.

We constantly see geese these days, making from the north towards the south. They probably have their eggs in some of the fjords, for they often settle near our tent-place and I am in keen pursuit of them, but as they are very timid I do not get many of them. Also arctic skuas and some wading birds are often seen.

On economical grounds we generally only boil food once a day. There is no fuel here, which is very annoying. Some willow twigs

[1] The number has been omitted.

[2] In Pl. IV the place is called Oversomrings-Teltplads.
In Pl V the place is called Oversomringslejr.

are found now and then but if fresh it is impossible to get them to burn; we therefore collect the withered ones and use them as fuel. As the number of our dogs has become reduced, MYLIUS and HAGEN intend driving on one sledge on our return journey to the ship; in this way we can use one of the sledges as fuel but we must economize very much with it, for when it has been burnt it will be very difficult to get something warm to eat. Fortunately, there is some fat on the musk-oxen I shot the other day which may also be used with success. We cook by turns, but only once a day.

And as our pot is too small now that we eat nothing but meat, we have three cookings of meat one after the other. When one is reduced to meat exclusively, one naturally eats a lot and thirsts a great deal.

July 2nd. After a fog which began to seem somewhat tedious we had at last this evening quite clear weather. During the first 8 days we had constantly had heavy fog with snow and slush.

Yesterday I examined the ice to see if the layer of snow had become reduced.

Along the shore the ice had indeed become very good, but further out it was still very bad because the snow was fairly soft with water underneath.

During these days HAGEN and I have been constantly roaming and have built cairns up in the hills as marks for the sketches and survey of the land.

Sunday night July 7th. Last night we had hail and fog all through the night. The sky is still cloudy and it is very cold.

During the days towards the middle of July the weather was still very cloudy and it was constantly snowing and raining. Not until the 12th did the weather become quite good again.

July 13th. We long for the night-frost, which against our expectations has not begun to set in yet. At midnight a thin layer of ice covers all places where the ice had melted. But as the thermometer has not once gone down one degree of cold, the freezing of the ice makes no progress.

On the *16th of July* in the evening HAGEN and I went southwards to look for musk-oxen; for we are now badly off again and our provisions are on the point of running short. When we had walked 4 miles we came to a river which we could not get across. We then followed the land, though we did not expect to meet with any game; we had not gone very far, before we saw the tracks of a large musk-ox which we followed and shot. It was very fortunate that the beast contained a little fat which we used for greasing our fuel. When we had covered up the animal and taken some of the meat we drove back and reached the tent on the 17th in the evening at 10.

On account of bad foot-gear our feet got swollen, even though we did not walk far.

July 23rd. We all 3 fetched the meat from the place where we had shot the musk-ox the other day.

Our dogs ran after us and we gave them the entrails and the skin to eat. On the return journey our boots went to pieces before we reached our tent-place.

July ended in constant thaw, rain and snow and it did not freeze in the night.

We moved our tent nearer to the shore.

July 29th. This day I had a great disappointment. I saw a small lonely seal moving northwards in the melting-ice and snow water along the beach. I followed it on land and shot it, but it sank. Though the water was not deep at the place, it was difficult for me to get to it, because I was absolutely without any means of getting out on the water. Here there was nothing but ice and we could not get anything to float on the water; and as the beach thawed more and more, the belt between land and sea became broader.

July 30th. We fetched the rest of the musk-ox meat that had been placed in depot; we started at 11 p. m. and came back on the 31st at 10 a. m. Foxes had broken up our store and taken something.

These days we can no longer get out on the ice, because there is a broad belt of melting-ice and snow water between land and the ice and on land we cannot go very far because of the rivers.

August 1st. In this month also we shall perhaps have nothing but bad weather; it began with a heavy downpour and a strong south-east wind.

August 2nd. Again cloudy weather with snow.

Hagen and I tried by means of a hook to haul up the sunken seal; I ferried out to the place and my comrade held me fast from land by means of some straps bound together.

As it unfortunately began to blow out from the place where the seal had been driven in, we again became dripping wet for no use at all.

In the course of the day it began to rain and to blow hard.

August 6th. During the following days the air was constantly thick with snow and a thick layer of snow fell on the ice. We are longing for good weather; we have again barely food enough for 3 days. And our poor dogs that hardly get anything to eat; they are very gaunt and quite worn out.

Hagen and I are very busy these days in making boots of the leather bag containing the sextant; but as our tools are bad we think it a very difficult piece of work.

At 6 in the evening Hagen and I went out to hunt musk-oxen as we had boiled our last meat. Our only provisions now consisted

of two geese, a ptarmigan and a tin of beef. We followed the coast southwards and went up on the land at the place where we shot a musk-ox the other day, in order to look for more musk-oxen, but this time we did not even find tracks of them. On our way we shot two ptarmigans and saw two hares but they were so shy, that we could not get within gun-reach. After having been away for 24 hours we returned on the 7th in the evening very tired, for we had been walking on bare stones. We have no food to give to the dogs which are very thin. We do not know what to do now, because the land where we are is completely devoid of animals.

I go about in a constant dread that we shall be without dogs when we have to start on the long return journey to the ship and we dare not think of covering the 500 miles on foot, considering the boots we have.

August 8th. Mylius decided that we should leave our present grounds and we all think it quite reasonable to try and get to a place where there are animals.

Though we did not know anything about the conditions we broke up. As the ice along the beach near us had melted, we ferried our few things out on a floe of ice, and as the floe was quite small we had to repeat the transport several times though it was not very much we had with us. At last at 10 in the evening we were all 3 together with our dogs over on the ice.

After loading our sledges we set off glad and happy to be sledging again; we now hoped to come up on land at a place that would cause us less trouble.

As the ice along the shore had thawed most we drove further out, for as far as our eyes could reach the ice looked better out at sea. And if it was so, we intended to follow the good ice southwards and seek into the large bay where we had stayed during the month of May and where we were sure to find musk-oxen.

As we had to make many detours on account of the fissures, I went first and showed the way. But after covering a little more than 4 miles we found that we could proceed no further, the fissures becoming so broad that we could not get across them.

So we again had to pitch the tent out on the ice towards the morning. As it was very cold that night a comparatively thick ice formed in the fissures and we took comfort in the thought, that in some days the thin ice would be able to bear.

But alas that was not to be. Our only provisions consisted of 3 ptarmigans and 1 goose; for the dogs we had nothing.

During the following days we tried to reach the land, but as the thaw was constantly increasing it became more difficult. And as Mylius these days suffered from severe pains in the stomach, our prospects looked still worse and our anxiety increased.

August 12th. In the morning Hagen and I plucked up our courage and tried to reach the land by pushing a sledge before us; by constantly leaping over the narrowest fissures we at last reached the land after much difficulty. Before starting on this venture we ate the last of half a goose, so this morning it was a matter of the utmost importance to get some food.

As soon as we came up on land, we shot a ptarmigan which we immediately divided between us and ate raw.

We now followed the coast southwards and waded across two large rivers; ice-cold as they were and flowing at a rapid rate, neither of us would have thought of wading across them, if we had not been forced on by dread of the future; we grasped each others hands and tried in this way to get through the current. We reached southwards to the place where on May 7th I had shot nine hares, but there was nothing now. So we had to return again without anything as a storm was coming on. A strong thaw now set in again, which made it still more difficult for us to get across the ice to the tent. Sometimes we had to turn the sledges upside down so that the points and the uprights touched the bottom of the water that stood on the ice and got over in this way.

On the *13th of August* at 6 in the morning we came back very tired and down-hearted. There was nothing left but to kill a dog and use it as food.

During the days that followed it was constantly thawing and blowing almost incessantly. Under these conditions the ice thawed still more and the thin ice covering the fissures melted. That our fourteen dogs, our sole means of conveyance for the return journey, had now to be used as food for us, was very hard. And we were longing for good weather, because it would obviously then begin to freeze. Each time the conditions forced us to kill a dog we tried to make it suffice for two days for us and for our dogs. We first took the weakest and smallest because we wanted to save a good team for a sledge. The dog meat we now had was not sufficient for us, we were half-starved; and the small number of dogs still left became more and more emaciated and weak.

August 22nd. At last the weather began to clear up and grew cold.

August 23rd. To our great joy when we awoke in the morning, it was turning cold. The thin ice now again covering the cracks in the ice grew thicker and it froze all day long. The weather was very beautiful and quite calm. This day we killed the sixth dog and now hoped to be able to reach land without sacrificing more of those that were left. We certainly longed very much to get back to the ship; nevertheless, our minds were at present mostly bent on reaching a place with hares and musk-oxen, where we as well as the dogs might regain our strength.

August 24th. We made up our minds to start in the evening to penetrate further into the fjord.

After having made ourselves ready in the course of the day we set off in the evening with a sledge; we had now only eight dogs left. Everything that we could possible do without was thrown away, and in order to make our tent lighter we took away the bottom. The other sledge we cut up, removing all the iron, and took with us to be used as fuel. Though we thus tried in every way to reduce the luggage we had however big loads. And as the dogs were so gaunt and emaciated we only made small progress.

The ice was now quite snow-free and therefore cut the paws of the dogs; it was also difficult for us with our miserable footware to walk on it. We only advanced very slowly but were quite content that we did advance at all. That we were now able to cross the thin ice covering the fissures where they were narrowest was also a good thing. After about five hours' journey we came to a place where we thought we might reach over to the land and raise the tent there. We then ate a small piece of dog meat on the ice and tried to get some rest by four hours' sleep.

August 25th. In the morning Mylius and I went towards the land, which we reached without difficulty, climbed up and roamed about for several hours without observing anything. We knew no way out, if our march that day should also be in vain; Mylius now wanted to go back and I agreed, because he had such bad soles to his boots and was almost walking in bare stockings. We were now obliged to resolve upon shooting another dog the next day. I wanted to go a little further, for I badly wanted just one single ptarmigan. I roamed about for a long time but had at last to return, seeing nothing.

On my way back I caught sight of a hare on the shore; it was as if I had met with a large reindeer. And when I had shot it I threw myself upon it, ravenous as a bloodthirsty wolf, cut it up and devoured rapidly heart, liver and kidneys.

After walking a little further I got three more. With four hares on my back I returned and it seemed to me that my feebleness grew less as I thought of the meal to come. . .

When I got back my comrades also showed their great joy; now they would have something better to eat than the poor dog meat.

As they had killed a dog, we had however nothing but dog meat that evening.

During these days the weather was very beautiful, quite clear with no wind and it was also now freezing all day long and still more in the night, though the sun did not go down below the horizon.

August 25th. In the night we broke up. Part of our luggage,

[1] Must have been Cape Kronborg or the region round there.

which we did not want for the time being, was left behind [1], to be taken with us when we pass this place on the return journey.

When we reached the beach, we followed the thin ice at the places where the ice had floated away from the land.

We had not driven very far before we saw hares a little above the beach; Hagen went up after them and got four and I three and besides we also got thirteen ptarmigans. Without reaching our goal, we stopped in the morning because we had been delayed by our hare-hunting.

August 31st. In the morning we broke up to try and reach Gunder-steddalen, but did not succeed owing to the ice; a little later we raised the tent on land.

Recollections from my stay near Cape York.

(The beginning of an essay on the songs of the Polar Eskimo, which has nothing to do with the diary).

(A small verse to his dearest friend).

October 19th. In the afternoon we came up on the inland ice. The ascent took us four days. The fifth of the remaining dogs has now also died, butted to death by a musk-ox. The sun rises no more [2].

In the one pocket of the diary lay a loose leaf filled with writing on the back of which was the word: "Will".

And finally there was a single page written in Danish, the contents of which have been given already p. 191 (see Pl. X).

[1] As mentioned above, must have been Cape Kronborg or the regions round there.

[2] The translater into Danish remarks that owing to a slip there was written in Greenlandic: "sets no more".

G. Last journey of Mylius-Erichsen, Høeg-Hagen and Jørgen Brønlund.

To reconstruct the course and events of this journey we have the following data.

1. Jørgen Brønlund's diary.
2. Høeg-Hagen's chart-sketches.
3. The communications made by Mylius-Erichsen to Koch when they met off Cape Rigsdagen on 27/V 1907 (see p. 130).
4. The opinions and views regarding a possible retreat which had been exchanged between Mylius-Erichsen and Koch during the first part of the great sledge journey north [1].

On the *1st of May* at 8.15 p. m., ca. 81°47′ N. lat., Koch's party separated from Mylius-Erichsen's (see p. 134). While Koch proceeded towards Peary Land, Mylius-Erichsen continued his journey westwards.

On *May 5th* Mylius-Erichsen and his companions reached Princess Dagmars Peninsula. The dogs were by that time very exhausted. Mylius-Erichsen therefore tried to lighten the sledges, partly by depositing a box of dog pemmican on the northern side of the peninsula, partly by parting with things that were not absolutely necessary, e. g. the case in which cooking-utensils etc. were kept.

On *May 8th* they drove across Danmarks Fjord and raised the tent on the western side of the fjord a little north of Cape Kronborg (see P. IV, V).

On *May 11th* they followed the coast southwards in the belief that they now found themselves in Independence Bay.

From the *12th* to the *15th of May* they stayed in the regions round Gundersteddal (see Pl. V, VI, VII).

On *May 15th* they reach Pinseskæret. On the land inside this they had excellent hunting.

May 20th the inward journey was continued and

On *May 21st* they reached the head of the fjord and now learned to a certainty, that it was not Independence Bay but another enormous fjord, about 200 kilometers in length.

On *May 22nd* they again proceed out of the fjord and on May 27th off Cape Rigsdagen Mylius-Erichsen's and Koch's parties meet quite unawares (see p. 130). Mylius-Erichsen tells Koch that all told they have shot 21 musk-oxen in Danmarks Fjord. The greater

[1] Told by J. P. Koch to the editor of this report.

part had been shot on the land inside Pinseskæret on the so-called Sjællands Slette.

On *May 28th* at 7 p. m. the two parties, separated never to meet again. Koch's party proceeded homewards, while Mylius-Erichsen and his companions went westwards in order to reach Cape Glacier and thus link up the connection with the points reached by Peary.

On *May 29th* they drove into Hagens Fjord[1] in the belief that this fjord was a continuation of Independence Bay (see Pl. V and VIII).

On *June 1st* they sighted the glacier in the head of Hagens Fjord and still believed that they found themselves in Independence Bay and that it was the head of this bay they saw (see Pl. IX).

They have probably not discovered their mistake till the first days of June when they rounded Cape Peter Henrik on the western side of Hagens Fjord.

To understand why Mylius-Erichsen first took Danmarks Fjord and then Hagens Fjord to be Independence Bay, it must be remembered that on all his charts[2] from these regions round here Peary states that from Academy Glacier the coast bends almost in the direction S.E., whereas according to what has been found out by the Danmark Expedition, it turns on the contrary almost in the direction N.E.

As the entrances to Danmarks Fjord and to Hagens Fjord lie further north than the Academy Glacier and as Mylius-Erichsen was entitled to suppose from Peary's chart, that he would come to Academy Glacier from a point S.E. of the glacier it was quite natural that Mylius-Erichsen steered into these fjords which, as far as he could see, first went southwards and then turned towards the S.W. Mylius-Erichsen, who was each time of opinion that he found himself in Independence Bay, thus assumed that this Bay would go further south than the Academy Glacier and that it would at the same time turn west and north-westwards up to the Glacier; in other words, that it would describe a curve between the mouth of the fjord and Academy Glacier. In this way everything would fit in with Peary's charts.

This mistake on Peary's chart thus became of extremely fateful importance to Mylius-Erichsen and his companions. For it was owing to this long journey into Danmarks Fjord and Hagens Fjord, that their retreat was begun too late and had to be given up on account of the comparatively sudden melting of the snow. And we know that their enforced summer in the north led to their death.

On *June 5th* they have undoubtedly been near Cape Grundloven[3]

[1] It should be mentioned that this report was written before Captain Einar Mikkelsen returned home from his expedition to the N. E. coast of Greenland.

[2] Robert E. Peary: "Northward over the Great Ice", Vol. I, p. 352. "Field work of the Peary Arctic club 1898—1902", Bulletin of the Geographical Society of Philadelphia, Vol. IV, No. 1, January 1904. "Nearest the Pole", The accompanying chart.

[3] June 5th is the Danish "Grundlovsdag" (Constitution-day).

and about the 7th and 8th of June they have probably sighted Academy Glacier at a distance of about 30 kilometers. Here they built a cairn and drove out of Independence Bay again.

On *June 14th* they reached back to Danmarks Fjord and from the place where they were forced to remain over the summer, they intended driving across the Fjord to Princess Dagmars Peninsula, in order to begin the return journey. But the sledging was now so bad, that it was impossible for the dogs, by that time thin and emaciated, to draw the sledges through the snow. They had to return and made up their minds to remain here over the summer.

On the summer tenting place they stayed right until August 8th, when they proceeded into Danmarks Fjord to shoot musk-oxen, the neighbourhood of the summer tent place gradually becoming quite devoid of game: the goal of their journey has probably been Sjællands Slette where they previously had excellent hunting, but from BRØNLUND's diary we only know that on August 31st they had reached the region near Gundersteddal.

Of the period from the 31st of August to the 19th of October the diary says nothing.

On *October 19th* JØRGEN BRØNLUND relates, that they came up on the inland ice; but thereafter the diary contains nothing except the single page written in Danish, where JØRGEN BRØNLUND states that in the month of November they reached Nioghalvfjerdsfjord where they all perished. (See Pl. X).

From the diary we learn all that they went through during the summer. How they were often completely destitute of provisions and how the foot-gear gradually became quite worn out and how they tried to make some other kind of boots, which were naturally extremely primitive.

To get some food for themselves and the dogs they were at last obliged to kill some of the latter. On August 24th they had only 8 dogs left and the day after they kill, as far as we can make out, another dog, so that by that time they had only 7 dogs left.

Their small supply of petroleum was soon used up. To get warm food now and then they gradually cut up two of the sledges and used them as fuel.

Each page of the diary bears evidence of the hard struggle and of their sufferings. Yet it contains no complaint. A diary written under such desperate conditions could not have been more manly.

As will be seen from the foregoing, the diary contains no statement as to the route chosen for the return journey.

In the following, an endeavour will be made to sketch the route MYLIUS-ERICHSEN and his companions in all probability chose for their return journey.

As starting point they have almost to a certainty taken Cape

Kronborg. In Jørgen Brønlund's diary from August 25th when they found themselves at Cape Kronborg he writes, namely, the following words (see p. 211):

"Part of our luggage, which we did not want for the time being, was left behind, to be taken with us when we pass this place on the return journey".

It is evident therefore, that by that time Mylius-Erichsen intended to return back by the same route as on the journey up, i. e. north of Kronprins Christians Land, afterwards following the outer coast.

Among the objects they in all probability left behind at Cape Kronborg was their petroleum cooking apparatus (Lux), as there was no sense in taking this apparatus with them into the fjord when they had no petroleum. But this apparatus was found by the side of Jørgen Brønlund's body on Lamberts Land.

It seems reasonable to conclude, therefore, that after a successful hunt in Danmarks Fjord, probably on Sjællands Slette, they returned to Cape Kronborg and took with them the baggage they thought would be useful on the return journey, including the Lux apparatus; they knew there would be petroleum in several of the depots along the outer coast.

But if this reasoning is correct, there is very little probability that they again returned into Danmarks Fjord and ascended the inland ice from the head of the fjord, as Achton Friis assumes in his book on the Expedition [1].

From Cape Kronborg to Lamberts Land, namely, there is precisely the same distance, whether the route is laid north round Kronprins Christians Land and thereafter down along the outer coast or into the head of Danmarks Fjord and from there over the ca. 30 kilometers to the margin of the inland ice and over this down to Lamberts Land.

Under these circumstances it is obviously most probable that Mylius-Erichsen and his companions would select the known route along the outer coast, where the depots had been made and where they were likely to meet the relief expeditions sent out from the ship.

It may be added here, that Hagen was of opinion that the inland ice at the head of Danmarks Fjord could not be climbed. Hagen told this to Koch, when they met at Cape Rigsdagen on May 29th (see p. 131).

On the whole, it seems little probable that they would deliberately try to ascend on the inland ice, so long as they were not absolutely forced to do so.

[1] Achton Friis: "Danmark Expeditionen til Grønlands Nordøstkyst", p. 561. In the report on the Expedition published by Trolle immediately on his return home, Trolle like Achton Friis is inclined to believe, that they have tried the nearest route over the inland ice.

We have only to think of the difficulties they might encounter there: deep ravines and fissures would make advance difficult, especially on ascending and descending.

Further, they would have no hope of hunting on the inland ice, whereas they might expect to meet with game along the outer coast; nor could they get firewood on the inland ice, whilst petroleum lay in several of the depots.

There seems therefore but little probability that they climbed on to the inland ice, for example, at some place or other on the east side of Danmarks Fjord. For all the above grounds, indicating the advantage of selecting the coastal route for the homeward journey, are so weighty, that we may reasonably conclude, that this route has been chosen, even though Mylius-Erichsen and his companions have started on their return journey from a point considerably further up Danmarks Fjord than Cape Kronborg.

We must remember also, that by following along the outer coast they would come to the first depot already at Prinsesse Dagmars Peninsula. Here Mylius-Erichsen had deposited a box of dog pemmican (ca. 26 kg.), which would have lasted several days for 3 men and at most 7 dogs. More they could not have had at this time and possibly they had only 5. And here lay the cooking case. It was as good as firewood (see p. 131).

About 110 kilometers further on they would reach the next depot (at 81°30′), which contained:

2 small tins of pemmican
1 tin of farce with cabbage
2 tins of peasemeal with pork
2 liters of petroleum [1]
26 kg. of dog pemmican

About 100 kilometers further they would come to the next depot (at 80°43′), where Mulius-Erichsen could expect to find 2 days' provisions for 3 men and 26 kg. dog pemmican, 18 kg. grease.

In this depot there was in reality much more, as Koch on his return journey had deposited about 125 kg. bear and walrus meat, 26 kg. dog pemmican and 18 kg. grease. Further, at the Eskimo ruins on Sophus Müllers Naze Koch had also deposited about 125 kg. walrus meat. Of this, however, Mylius-Erichsen knew nothing.

The contents of the 7 depots south of the depot on 80°43′ are mentioned in the list p. 132.

[1] For one meal per day for 3 men, 2 liters of petroleum would probably last about 20 days at the latitude in question and the time of year. See Meddelelser om Grønland, Bd. XXVII. p. 73.

We must assume, therefore, that Mylius-Erichsen and his companions have begun their journey along the line of these depots [1].

We have still to consider, where Mylius-Erichsen climbed up on to the inland ice and what forced them to take this course.

The latter is readily understood. From the relief expedition sent out from the ship, September 22nd to November 2nd, we know that two of that party, G. Thostrup and Lindhard, reached Mallemukfjæld on October 17th and found open water there, which extended right into the coast and so far out, that they could not get further.

And from Jørgen Brønlund's diary we know, that Mylius-Erichsen and his companions began the ascent of the inland ice on October 15th.

The same open water, which prevented G. Thostrup and Lindhard from getting north, has also presumably stopped Mylius-Erichsen's advance southwards and forced him up on to the inland ice, and the two parties have been at that time, without suspecting it, on opposite sides of the open water, north of Mallemukfjæld.

The ascent of the inland ice has probably been made from the head of Antarctic Bay. Here Mylius-Erichsen and Koch had discussed the probability of being able to get up easily on to the inland ice, if open water were met with south of this Bay.

Regarding the ascent Jørgen Brønlund writes in his diary:

"October 19th. In the afternoon we came up on the inland ice. The ascent took us four days. The fifth of our remaining dogs has now also died, butted to death by a musk-ox. The sun rises no more[2]".

Where the ascent was made, therefore, there must have been musk-oxen. But these animals occur just on Amdrups Land. In May 1907 G. Thostrup and Wegener had shot musk-oxen a little way into Ingolf Fjord on the north side of the fjord (i. e. on the south side of Amdrups Land).

The ascent took four days, which means that they had a heavy load on the sledge. In addition to guns, tent, sleeping-bags, cooking apparatus etc., they must have had no small amount of food, musk-ox meat and provisions and dog-food from the depot at 80°43′ and from the depot on Sophus Müllers Naze. For we know, that the journey to Nioghalvfjerdsfjord (79-fjord), took a month during which they were able to keep life in, though just on the verge of the grave, when they at last reached Nioghalvfjerdsfjord.

The journey home over the inland ice must have been terrible. The cold up there must have been felt intensely by the emaciated and weakened travellers, who doubtless had to use their provisions

[1] That Koch is of the same opinion, is seen from the remarks in his report on the relief and search expedition northwards in March 1908. See p. 194.

[2] See p. 212.

sparingly and who, for protection, only had a tent without bottom, poor sleeping-bags and miserable foot-gear.

The last especially has determined their fate. All have most likely been severely frostbitten and this with the general weakness from want and suffering and the sickness resulting therefrom has led to their death rather than the lack of food.

This is certainly true for JØRGEN BRØNLUND.

In the month of November they at last reached Nioghalvfjerdsfjord. Their goal was the depot on Lamberts Land. Here they knew they would find provisions, petroleum and clothing. But by this time they were completely exhausted and both MYLIUS-ERICHSEN and HAGEN died just before they could reach the depot.

Only JØRGEN BRØNLUND reached it, hardly believing however that he could save his life. All indicates, that he was fully conscious of his approaching death. But he knew that his body would be found there and with it the results of their journey northward [1].

Then with shaking hand he writes down the last account of their terrible death-march (see Pl. X), made his will and placed his diary and the bottle containing HAGEN's chart-sketches in such a position, that they were certain to be found by any relief expedition sent out from the ship.

And far from family and friends, with the eternal darkness and cold of the polar night reigning over the snow-covered hills and the ice-covered sea, JØRGEN BRØNLUND calmly awaits and faces death.

There is a touch of the old northern race of heroes in the tragedy that came to an end in those dark November nights.

JØRGEN BRØNLUND's statement, where HAGEN and MYLIUS-ERICHSEN died, is not clear.

"The bodies of the two others lie in the middle of the fjord in front of the glacier (about 10 miles)", he writes.

The westernmost of the two fjords cutting down into Lamberts Land from the north has no name. It is not impossible, that the reference is to the middle of the mouth of this fjord, which indeed they must have passed on their way down from Nioghalvfjerdsfjord to the depot on Lamberts Land. It is quite conceivable, namely, that as the fjord had no name JØRGEN BRØNLUND has called it the "fjord in front of the glacier", namely, the fjord cutting in from the side in front of the glacier at the head of Nioghalvfjerdsfjord. Further, the distance from the depot on Lamberts Land to the middle of the mouth of this fjord is just 10 miles.

A second doubtful point is, whether MYLIUS-ERICHSEN died two or ten days after HAGEN. It is difficult to say, namely, whether JØRGEN BRØNLUND's diary has two written in letters or the number 10. The

[1] See KOCH's report, p. 192.

Danish two (to), when written, and 10 may easily have a great resemblance.

If we go through the whole of Jørgen Brønlund's diary, however, and examine how he was accustomed to write the letter "t" and the number "1", we are most inclined to accept the view, that Jørgen Brønlund has written, that Mylius-Erichsen died two days after Hagen, especially when we examine these letters and signs under a lens (see Pl. X, where the signs in question have been reproduced, as seen under a lens). In addition to this, Jørgen Brønlund sometimes writes numbers with letters, sometimes as numbers, so that there is really nothing surprising in the fact, that just two lines above he has written "2½ Mil" (= 10 miles) in numbers.

Against this view, however, we have that Jørgen Brønlund writes: "I arrive here by declining moon". In November 1907, namely, full moon was on the 19th.

We know, that Hagen died on the 15th of November. Assuming that Mylius-Erichsen died almost two days later, this would be the 17th or the 18th; thus, Jørgen Brønlund would arrive at the depot on Lamberts Land just about full moon.

But from Koch's report we know, that Jørgen Brønlund must have been 5 or 6 days at the depot before he died and if we assume that he did not write the above lines until he felt death approaching, the moon would then have been on the decline.

If we assume that the diary contains "two days after", we can picture the last few days of the journey. They have reached the middle of the mouth of the westernmost fjord, which cuts into Lamberts Land from the north. Here Hagen died and Mylius-Erichsen cannot drag himself further. Only Jørgen Brønlund has still sufficient strength. He toils on to the depot, to fetch provisions and petroleum. When he returns after about two days to the spot where he left Mylius-Erichsen, he finds his body only. When Mylius-Erichsen died, he did not know with certainty. He can only write indefinitely "about two days". Then Jørgen Brønlund undertakes his last journey to the depot, where his body was found.

If, on the other hand, we read "10 days after", it is difficult to understand, why Jørgen Brønlund and Mylius-Erichsen should remain 10 days by Hagen's body and not try to reach the depot close at hand.

What has become of the diaries of Mylius-Erichsen and Høeg Hagen.

As explained previously, only his own diary and Høeg Hagen's chart-sketches were found by Jørgen Brønlund's body.

The question then arises, what has become of Mylius-Erichsen and Høeg Hagen's diaries, as we can be quite certain, that these

were written. Høeg Hagen in any case was accustomed always to keep a very detailed account of the days' journeys. We know further, that when Mylius-Erichsen's party met Koch's party at Cape Rigsdagen on May 27th, Høeg Hagen showed Koch his journal containing sketches of the interior of Danmarks Fjord (see p. 131). It was from the drawings in this journal, that Hagen drew his chart-sketches.

Had Høeg Hagen taken his diary and sketch book with him, we may be sure, that Jørgen Brønlund would also have had these as well as the chart-sketches; everything indicates, namely, that right to the very last, even when they knew death was approaching, they were full of the thought, that the results of their journey at least must be saved.

But it is perhaps just in this heroic effort to save the results of their journey, that we may find the explanation why none of the diaries were found with Jørgen Brønlund's body.

When they were forced by circumstances to ascend the inland ice, they have probably foreseen the possibility, that they would never succeed in getting down again. Before they ascended therefore, they have presumably deposited their diaries and sketch-books in the belief, that these would be found by the relief expedition from the ship and that the results of their journey would be saved in this way.

But they took with them the chart-sketches of Høeg Hagen. If they should reach the ship, contrary to their expectation, or if their bodies were found, Jørgen Brønlund's diary and the chart-sketches would be sufficient to show the main lines of their journey and its results, though naturally Høeg Hagen's diary and sketch books must be considered as the true original documents.

It is very probable, therefore, that these important documents were deposited at Antarctic Bay or in the neighbourhood about there.

Let us hope they may be found at some time and brought home.

Remarks on the chart-sketches and sketches of Høeg Hagen[1].

All the chart-sketches planned and drawn by Høeg Hagen, which were found by Jørgen Brønlund's body, are reproduced here on Plates IV to IX.

Pl. IV is a very carefully drawn contour outline of the new land visited.

Pl. V shows the same, but is less carefully worked. The contours of the hills etc. were also drawn in on this.

According to Hagen's sketches and Koch's survey measurements

[1] The chart-sketches and sketches have been presented to the large Royal Library in Copenhagen.

the chart represents Danmarks Fjord, Hagens Fjord and Independence Bay with the neighbouring land (see Meddelelser om Grønland, Bd. XLVI, No. 2, Pl. IV).

If we compare the names on Plates IV and V, however, with the names on the published chart, we find several differences.

These differences arose from the desire of the surviving members of the Danmark Espedition, when they became certain of Mylius-Erichsen's fate, to give the northernmost land visited by him his name. For this reason the name "Kronprins Christian Land" had to be moved. Thus, the land east of Danmarks Fjord received this name and the Alexandrine Mountains must naturally also lie here [1]. That the "Jydske Aas" should be at the same time moved over to Mylius-Erichsen's Land, is also easily understood, as Mylius-Erichsen was himself from Jutland and has sung its praises both in prose and verse.

Further, Koch did not wish his name to be used for the regions traversed by him and J. P. Koch's Bay was therefore renamed Wandels Hav.

The other small differences are of no importance.

Finally, there are some discrepancies between the names and the places of the names on Plates IV and V. As Pl. IV, however, is the one most carefully executed and has undoubtedly been drawn last, Plate IV has been followed, apart from the above-mentioned exceptions.

Pl. VI represents a drawing of the east side of Danmarks Fjord from north to south, made from the top of a hill ca. 5 kilometers south of Gundersteddal.

Above the drawing is written "Station top between Elvkløft and Spids Top on Nordlandet", and on Pl. V "Spids Top" and the" survey station" itself are indicated.

As Høeg Hagen was at that time of opinion, that they found themselves in Independence Bay, it is not to be wondered at that he called it a drawing of "the continental coast", being in the belief, that he was on Peary Land.

Pl. VII Høeg Hagen calls a drawing of "Elvkløft on Nordlandet".

As Høeg Hagen states, that Pl. VI has been drawn from the top of a hill between Spids Top and Elvkløft on Nordlandet and it is seen from Pl. V, that this top lies between Spids Top and Gundersteddal, it is most probable that Pl. VII actually represents Gundersteddal.

Pl. VIII according to Hagen has been drawn on May 29th from the tent-place near an iceberg in Independence Bay and represents the entrance to a bay. As Pl. V shows an iceberg

[1] Alexandrine, the name of the former Crown Princess, now the Queen.

at the entrance to Hagens Fjord and as on May 29th they were actually at the entrance to this fjord, it is clear, that the sketch represents the entrance to Hagens Fjord.

Pl. IX bears the heading "Head of Independence Bay 1/VI 1907".

At this time they were probably in Hagens Fjord[1] but believed they were in Independence Bay, a belief still shared by Hagen when he made his sketch.

The sketch thus in reality represents the head of Hagens Fjord.

[1] See p. 204, note, and p. 214, note.

H. The period from the discovery of Jørgen Brønlund to the return voyage.

While Koch was away on the relief and search sledge expedition in the north, Trolle together with Hagerup and Fritz Johansen made an excursion with drag-sledge from the 16th to the 30th of March for hydrographical and zoological purposes. They travelled down along the west side of Store Koldewey Island to a little south of Bergs Fjord, then turned due westwards out on the bay, thereafter up towards Orientering Islands and from there home again. It was a fatiguing tour, the temperature being down at — 35° C. For hydrographical purposes they sometimes cut holes in the ice, which was about 2 meters thick.

From the 17th to the 25th of March another party, consisting of Peter Hansen, Jarner and Hendrik Olsen, made a drag-sledge expedition to Orientering Islands and Hvalrosodden, in order to raise a tent at the first-mentioned place and deposit provisions etc. at both places, all in view of the summer excursions. In order to facilitate these, Trolle as in the previous year had tents raised at various places in the neighbourhood of Danmarks Fjord.

On March 26th Tobias Gabrielsen and Koch returned with the sad news that Mylius-Erichsen, Høeg Hagen and Jørgen Brønlund had perished (see p. 195).

Reference has already been made to the deep sorrow and gloom, that settled down on all onboard, now that the tragic fate of the 3 lost men was ascertained.

It would not have been surprising indeed, if these sad news along with their uncertain fate — they did not know whether the ship would be able to get out of the ice during the coming summer or whether they might perhaps be obliged to leave it and retreat southwards — had had a depressing effect on the members of the Expedition and reduced their working power.

This was not so, however, the energy of the members appeared to be the same and during the following months one expedition after another set out in order to complete and extend the great and splendid results already obtained. (See list of the journeys made from the station in Danmarks Havn).

On April 3rd Lindhard, Wegener and Weinschenck returned from their extremely interesting journey to "Dronning Louises Land" (see p. 186). Bertelsen, the leader of the expedition, had been left at the station in Pustervig, where he relieved Charles Poulsen.

Koch was now also intent upon making a journey to this land,

but by another route from that followed by BERTELSEN's party. KOCH meant to cross the newly-discovered large lake Annekssø, survey it and then try to get up on the inland ice from the head of the lake and across this to Dronning Louises Land.

In order to facilitate this expedition, which had to be made by drag-sledge, they decided to lay out a depot near the southern end of Annekssø.

From the 9th to the 12th of April this depot was laid out by ACHTON-FRIIS, LUNDAGER and G. THOSTRUP with a dog-sledge.

On April 15th two expeditions, both of which were to be away for some time, made their departure.

The first, which lasted from April 15th to May 27th, was carried out by means of dog-sledge and its object was to make geological investigations on Shannon Island and in Ardencaple Inlet and to survey and investigate the unknown inner branches of this fjord. The party consisted of TOBIAS GABRIELSEN, JARNER and HENDRIK OLSEN.

The second, from April 15th to June 3rd, was made by drag-sledge and its object was to make surveys in Dove Bay and in Bessels Fjord. The members were BISTRUP and HAGERUP.

In support of the two last expeditions and also in support of the artists (see below), depots as mentioned were laid out at Teufel Cape, in Roon Bay and in Bessels Fjord in February.

On April 21st FREUCHEN and BERTELSEN returned from Pustervig. They had been replaced by FRITZ JOHANSEN and TROLLE, who had left the ship with a dog-sledge on April 17th.

Up to that time FREUCHEN had been about 6 months on end out at the station in Pustervig; under very primitive conditions he had carried out the meteorological observations etc. with praiseworthy energy and care. One might imagine, that FREUCHEN would now enjoy life onboard ship and rest himself after his long sojourn in Pustervig. But this did not suit Freuchen's nature. On April 24th already, only 3 days later, he set off again.

From April 24th till June 5th, namely, he went with GUNDAHL KNUDSEN and KOCH on the drag-sledge journey to the inland ice, which has been mentioned above.

On April 27th both of the artists, BERTELSEN and ACHTON FRIIS set out for Teufel Cape to make sketches in the neighbourhood. WEINSCHENCK accompanied them to drive back the dog-team, which drew the two sledges, to the ship, when Teufel Cape had been reached.

Teufel Cape was reached on April 29th. Next day WEINSCHENCK returned, whilst the artists continued on to Bælget with the sledge. Here they stayed for a month and took 14 studies in this beautiful district. The return journey was made with BISTRUP's party (see p. 231).

From May 3rd to June 3rd Koefoed and Chr. Bendix Thostrup travelled about the district round Danmarks Havn with a drag-sledge for the purpose of making cartographic and ethnographical investigations. Lille Koldewey Island, the northern part of Store Koldewey Island and the district round Snenæs and Storm Cape were visited.

On May 13th Fritz Johansen and Trolle returned from Pustervig. On May 8th they had been replaced by Wegener and had thereafter made a journey for hydrographical and zoological purposes over to Hvalrosodden and up to Sælsø.

The day after their return to the ship they drove off again with the dog-sledge, accompanied this time by Peter Hansen. From the 14th to the 19th of May they again made an excursion to Sælsø and from there along the river-bed up to Annekssø, to continue the hydrographical and zoological investigations in these two lakes, having discovered on their previous journey that the bottom-water in Sælsø was salt.

From May 22nd to July 3rd Manniche camped out at Storm Cape to carry out zoological investigations. But from June 7th to 10th he went with Peter Hansen on a sledge journey to Sælsø to make zoological investigations there and from June 21st to 23rd he made a sledge journey with Bistrup and Peter Hansen to the northern Orientering Islands to collect birds eggs.

From May 30th to June 2nd Lundager went to Pustervig to fetch Wegener, who had been there quite alone from May 8th. This terminated the work at the station in Pustervig. The station had been in activity from 1st of November and the following had been in charge of it during that period.

From	To	In charge of	
1. November	ca. 8. November	Freuchen	Weinschenck
ca. 8. —	ca. 15. —		Chr. Bendix Thostrup
ca. 15. —	ca. 22. —		Weinschenck
ca. 22. —	ca. 22. December		Fritz Johansen
ca. 22. December	ca. 30. January		Gundahl Knudsen
ca. 30. January	ca. 6. March		Lundager
ca. 6. March	ca. 1. April		Charles Poulsen
ca. 1. April	ca. 19. —		Bertelsen
ca. 19. —	ca. 8. May	Fritz Johansen	Trolle
ca. 8. May	ca. 1. June	Wegener	

From June 4th to the 13th Fritz Johansen and Trolle again set off to make hydrographical and zoological investigations. The journey extended to Storm Bay and Dove Bay.

From June 5th to 8th and from the 12th to the 17th Chr. Bendix Thostrup along with Tobias Gabrielsen and Hendrik Olsen under-

took sledge journeys for ethnographical purposes to Cape Marie Valdemar and Baadskær.

From June 11th to the 21st BISTRUP along with HAGERUP made an excursion with the dog-sledge to the bay off Brede Bræ (Broad Glacier) to carry out cartographical work.

This was the last journey with the dog-sledge. With the drag-sledge, however, some more excursions were made.

From June 24th to 26th and from June 29th to July 8th HAGERUP and TROLLE undertook drag-sledge journeys to the waters between Maroussia and Lille Koldewey Island and to the sound between the two Koldewey Islands.

From June 27th to July 4th LINDHARD and KOCH journeyed with drag-sledge to Winges Coast, to prepare a detailed chart of a part of this Coast.

With this the drag-sledge journeys also came to an end. But a number of excursions were still made by boat and on foot.

Before these are mentioned, a brief description may be given of the most prolonged of the above-mentioned journeys with drag-sledge and with dog-sledge.

Sledge journey to Ardencaple Inlet and Shannon Island, $^{15}/_{4}$ to $^{27}/_{5}$, 1908.

The main object of the journey was to make a thorough geological survey of Ardencaple Inlet and neighbourhood. An attempt would also be made to penetrate into the inner, completely unknown part of Ardencaple Inlet and investigate and take measurements there. To procure dog food for the journey a visit would first be made to the depot at Cape Philip Broke on Shannon Island, and the post of the Expedition was to be deposited there.

The members of the expedition, which was led by JARNER, were TOBIAS GABRIELSEN and HENDRIK OLSEN.

On *April 15th* the party set out with 2 sledges and 22 dogs. To begin with, however, they gave up 6 of the dogs to the small drag-sledge of BISTRUP and HAGERUP, so that they had only 8 dogs to each of their two Eskimo sledges. After travelling 34 kilometers by odometer, they raised the tent at 4 p. m. on the ice west of Store Koldewey Island.

On *April 16th* the going was very heavy. To make the advance easier JARNER set off on his skis in front of the sledge to mark out the route. When about 24 kilometers had been travelled from 9 a. m. to 4.30 p. m. the tent was raised on the ice almost at the level of Teufel Cape.

On *April 17th* the party had only advanced a couple of kilometers from the tenting place of the previous day when they caught sight

of two bears. Tobias and Hendrik Olsen at once gave chase and managed to shoot them both. They were extremely welcome as food for the dogs. The day was spent in skinning the bears; after which Tobias and Hendrik drove in and deposited the skins at Teufel Cape.

On *April 18th* they reached the tent place at Cape Peschel. The going was heavy almost the whole time and Jarner again ran on his skis in front to mark out the way.

On *April 19th* the sledging was excellent; smooth ice the whole time and the depot in Bessels Fjord was already reached by 2 p. m. Here another bear was shot. The depot had been visited by bears, however, though the cases had not been opened.

On *April 20th* the party remained at the depot to give the dogs a rest and to use up some of the bear-meat; Jarner himself made an excursion on skis into Bessels Fjord. This day Bistrup and Hagerup left the party.

On *April 21st* the sledging was again good. After travelling about 30 kilometers the tent was raised a little north of Haystack.

In the morning of *April 22nd* Jarner made an excursion in over the land inside Haystack, after which the journey southward was continued. In the evening the tent was raised off Cape Oswald Heer.

On *April 23rd* about 41 kilometers were travelled southwards along the quite low and flat Hochstetters Forland, which forms a complete contrast to the steep, rugged slopes of Bessels Fjord.

On *April 24th* the party drove right over the land to Peters Bay. Here a depot was made.

On *April 25th* they drove with the light sledges on good ice over to Shannon Island and and pitched the tent in the district about Cape David Gray. Here they found 3 old, Eskimo winter-houses and other Eskimo ruins.

On *April 26th* they arrived at the depot on Cape Philip Broke. There was open water about 1 kilometer from land. It extended right down to and beyond Bass Rock but not far to the north or outwards. During the days they remained at the depot, however, the open water increased in extent and on the 30th it reached out eastward as far as the eye could see.

On *May 2nd* the party left the depot. Previously the post was deposited in the depot shed and as much dog-food (cakes) was taken as could be carried on the sledges. Further, they also took with them from the depot a small sledge (of Nansen's model), which Jarner thereafter drove, the dogs being divided among all 3 sledges. In the evening the tent was raised at Cape David Gray, at the same place as on the out-journey. The Eskimo ruins there were measured and examined.

On *May 3rd*, after travelling only about 22 kilometers, they came

upon fresh tracks of bears. As it was of importance to get fresh bear-meat for the dogs, the tent was raised and the hunt begun. No less than 2 bears formed the booty and on the next forenoon 3 more bears were shot at this hunting place, thus 5 in all.

On *May 5th* the party drove with half loads to the river-bed on the south side of Muschelberg; the remainder was fetched later by Tobias Gabrielsen and Hendrik Olsen, whilst Jarner made geological investigations in the neighbourhood of the tent place.

In the afternoon of *May 7th* they drove on and on

May 8th in the forenoon the tent was raised at the depot in Peters Bay. On the way they again met with a large bear. From a coal-bed close to the depot they obtained coal — so they could not ask for much more.

On *May 9th* at midnight they drove further from Peters Bay into Ardencaple Inlet, the first 10 kilometers through deep and soft snow; but thereafter the sledging improved and at the end they had smooth ice. Unfortunately, a fog came on. On the way they got another bear. After travelling about 28 kilometers the tent was raised.

The fog persisted on *May 10th.* In the evening, however, the journey was continued into the fjord and

On *May 11th* towards morning the tent was pitched about 23 kilometers further in, on the north side of the fjord just off Femdalene (the 5 valleys).

On *May 12th* the weather at last cleared and the journey was continued into the fjord, Brede Fjord, which Jarner had seen cutting in north of Cape Daly.

Early in the morning of *May 13th* the party reached the head of the fjord and camped off a small glacier in there. In the course of the day the fjord was surveyed and investigated and on

May 14th, just after midnight, they again drove out of the fjord. They next rounded Cape Daly and entered the unknown, narrow fjord, Smalle Fjord, which Jarner had observed cutting in south of Cape Daly.

On *May 15th* they reached the glacier on the south side of the fjord. Here Jarner made some measurements. Towards the evening the journey out of the fjord was begun and the tent raised in the mouth of Smalle Fjord. These were hard days for Jarner, who suffered from a bad wound on the one leg, accompanied by fever and severe pain.

On *May 16th* the party camped at Cape Reinhardt.

On *May 17th* they drove round Cape Buch and camped at the small island in the mouth of the fjord, which cuts into the land south of the promontory.

On *May 18th* they set off for home. The route lay over the depot

in Peters Bay. All the stores deposited were taken on and in the afternoon the tent was raised at Cape Rink.

On *May 20th*, after depositing 10 cases of American dog-cakes and a sledge-case at Cape Rink, the party drove on at 10 a. m. and in the afternoon of the same day camped far to the north, up on Hochstetters Forland. On the way they passed close to Ailsa Hill, which Jarner climbed.

Early in the morning of *May 24th* they reached Teufel Cape.

On *May 25th* in the morning they camped on the ice between Teufel Cape and the Orientering Island, a bear being shot there.

On *May 26th* they camped at Orientering Island and on

May 27th the party arrived back at the ship.

The expedition to Ardencaple Inlet had been exceedingly successful. The two unknown inner branches of the fjord had been surveyed and investigated. The geological booty of the journey was very rich and the ethnographical results were also excellent. Lastly, the hunting had been exceedingly good. Not only had the dogs been kept alive, they actually returned to the ship in excellent condition.

When Jarner set out, the general belief was, that he would be obliged to shoot the dogs one by one and use them to carry out his journey. Great was the rejoicing, therefore, when all the dogs returned safely. All onboard felt closely bound to these excellent animals, which had been of such great use to the expedition.

Finally, Jarner had been able to place the post in the depot near Cape Philip Broke.

Drag-sledge journey to Dove Bay and Bessels Fjord, $^{15}/_{4}$ to $^{3}/_{6}$, 1908.

The main object of the journey was to survey Dove Bay and Bessels Fjord.

The journey, which was made by drag-sledge, was carried out by Bistrup and Hagerup, with the first-mentioned as leader.

From *April 15th* to the *20th* they travelled together with Jarner's party, which was bound for Ardencaple Inlet (see p. 227).

April 20th. Near Depotskjæret at the entrance to Bessels Fjord the two parties separated. While Jarner remained at the depot Bistrup went westwards and

From *April 20th* to the *25th* Bistrup and Hagerup worked their way into the head of Bessels Fjord and

From *April 27th* to *May 1st* they drove out of the fjord again to the Depotskjæret; both on the in and out journey they carefully measured and investigated the fjord.

May 1st. After taking provisions from the depot they continued the journey over to Cape Beurmann Point and

On *May 5th* they reached Cape Peschel, where they took with

them some provisions deposited on the journey out, afterwards continuing the journey to the skerries off the foreland.

On *May 9th* they reached Bælgen where they met BERTELSEN and ACHTON FRIIS.

From *May 10th* to the *20th* the sounds and islands between Teufel Cape Island and the mainland south thereof were traversed and surveyed. In the sound south of Teufel Cape Island they shot a bear and two cubs.

On *May 20th* BISTRUP and HAGERUP again met the artists off Bælgen.

On *May 22nd* they all four drove over to Hestefoden.

May 23rd. While HAGERUP went back to the ship on his skis to fetch the dogs, if possible, BISTRUP and the artists drove over to a naze on the north side of Teufel Cape, in order to climb the foreland from there.

From *May 24th* to the *30th* they lay still here owing to a snowstorm.

On *May 30th* HAGERUP returned from the ship with the dogs. The ca. 56 kilometers to the ship on skis had been extremely laborious. HAGERUP had covered the distance in 14 hours.

On *May 31st* BISTRUP and HAGERUP climbed Teufel Cape which is about 900 meters high. The ascent was very difficult owing to the thick snow that had fallen during the snowstorm.

On *June 1st* they started on the return journey and

On *June 3rd* they all 4 came back to the ship.

The journey had yielded excellent results in every respect. Bessels Fjord and the regions round Teufel Cape had been surveyed and carefully investigated.

From April 20th to May 20th, 30 days in all, BISTRUP and HAGERUP had dragged the sledge about 230 kilometers, i. e. on an average 8.2 kilometers per day. Deducting the 7 resting days this is on an average 10 kilometers per day. Besides this distance they had also covered about 70 kilometers without sledge.

Drag-sledge journey over Annekssø to Ymers Nunatak, $^{24}/_{4}$ to $^{5}/_{6}$, 1908.

The object of the expedition was to chart Annekssø and to investigate if from the head of this lake they could come up on the inland ice and cross this to Dronning Louises Land.

The members of this expedition were FREUCHEN, GUNDAHL KNUDSEN and KOCH, the latter being the leader.

Before the departure, as already mentioned, 1 sledge-case had been deposited near Hvalrosodden and 5 sledge-cases and 40 liters of petroleum near the south-eastern end of Annekssø.

April 24th. At 10 p. m. the departure took place from Danmarks Havn.

April 25th. Raised the tent at Snenæs at 3.45 a. m. Set off at 6.15 p. m. Good sledging. Pitched the tent at 11.30 p. m. at the mouth of Laxeelv near Hvalrosodden.

April 26th. Departure at 5 p. m. Raised the tent at 11 p. m. on the north side of Sælsø about 6 kilometers north-west of Trekroner.

April 27th. Up in the hills to reconnoitre from 12.30 p. m. to 3.15 p. m. Departure 6.15 p. m. Raised the tent at 9 p. m. on the north side of Sælsø near the southern end of the valley connecting it with Annekssø. Distance about 8 kilometers.

April 28th. Made survey of the base. Departure at 8.30 p. m.

April 29th. Raised the tent at 1 a. m. near the depot on Annekssø. Distance about 14 kilometers. Survey. Left at the depot 1½ sledge-cases and about 15 liters of petroleum. Departure 5 p. m.; pitched the tent at 6.30 p. m. near the glacier on the north side of the lake. Distance about 4 kilometers. Made a survey.

April 30th. Departure 3.45 p. m. Very heavy sledging. Raised the tent at 8.45 p. m. off a large valley at 77°17′ N. lat.; 21°00′ W. long. Distance about 10 kilometers.

May 1st. Departure 9 a. m.; pitched the tent at noon. Departure at 5.30 p. m.; raised the tent 8.30 p. m. at 77°20′ N. lat.; 21°08′ W. long. Total distance about 6 kilometers. The sledging was bad, deep snow with crust only firm in parts. It was only by using all their strength that the 3 men could drag the ca. 350 kg. heavy sledge.

May 2nd. Departure 8 a. m. Raised the tent at 10.30 a. m. Departure 9 p. m.; pitched the tent at midnight at 77°25′ N. lat.; 21°30′ W. long. Total distance 16 kilometers.

May 3rd. Departure 3.15 p. m.; raised the tent 6.30 p. m. at 77°27′ N. lat.; 21°36′ W. long. Heavy sledging; distance about 6 kilometers.

May 4th. Made a survey. Departure 3.30 p. m. Passed out of Annekssø and continued the journey towards the N.W. on the river, which as they approached the inland ice wound its way through a marked moraine landscape. About 1½ kilometers from the border of the inland ice the river bent towards the N.E. Here the tent was raised 7.30 p. m. at 77°30′ N. lat.; 21°41′ W. long., distance about 5 kilometers. The inland ice here showed a vertical wall about 30 meters high: further south it sloped smoothly over into the gneiss-plateau.

May 5th. Made a survey. Departure 9.30 p. m. Followed the border of the inland ice towards the N.E. Raised the tent at midnight, all further advance with sledge being impossible. 77°31′ N. lat.; 21°34′ W. long.

From *May 6th* to the *10th* Koch made a minute survey of the interesting moraine landscape and the sedimentary cleft.

May 11th. Departure 8 a. m. towards the south-west. Raised

the tent at 12 noon a few kilometers south of the tent-place of the night between the 4th and 5th of May. Made everything ready for the ascent to the inland ice, which was begun at 7.30 p. m. It was exceedingly easy. The total weight of the sledge was about 225 to 235 kg. (including the sledge), i. e. a little more than 75 kg. per man. Nevertheless, they succeeded without too great exertion in drawing up the whole at one time. The first steep ascent was approximately 150 meters high and the slope might be reckoned at ca. 5°.

The melting-ice knolls now and then projected through the snow but did not cause any trouble and to begin with no fissures were observed. After they had come up over the slope the layer of snow became thinner, the melting-ice hummocks appeared more distinctly and began to interfere with the sledging, and fissures were now met with. These all ran in the direction east to west and in the beginning were only ½ to 1 meter broad. Often they were so completely hidden under the snow-layer, that their presence was only discovered after falling in.

Gradually the fissures increased in size, up to 5 m. broad and very deep; down in the darkness the bottom could not be seen. Both Koch and Freuchen fell into the fissures but fortunately remained hanging. To diminish the risk of this danger from the fissures, one of the traces was made twice as long as the other two and the first man (Koch) carried a "Tokejærn", with which he steadily probed the snow in front.

May 12th. Raised the tent 12.30 a. m. at 77°28′ N. lat. and 22°02′ W. long. Total distance about 15 kilometers, 8 of which on the inland ice. Departure 6.30 p. m. Good advance made. In the beginning broad fissures everywhere, but later these became smaller and the snow-layer at the same time became somewhat more solid.

May 13th. Camped 12.30 a. m. at 77°25′ N. lat. and 22°30′ W. long. Distance about 15 kilometers. Measurements taken. Rested owing to fog.

May 14th. Departure 3.30 p. m. Previously the course had been towards Dronning Louises Land. The ice however had gradually become so uneven, that it proved impossible to reach into land in this direction. But between the large ice-stream, which falls into Jøkelbugt and the ice-stream going to the north of Dronning Louises Land there was quite a narrow belt, at places hardly more than a couple of hundred meters broad, where the ice was comparatively level. Along this belt the party tried to penetrate further in a direction almost west. Freuchen again fell into a fissure this day in a very unpleasant manner; he completely disappeared from the view of the others but, fortunately, the line held him up.

Koch now arranged, that each man should have a tent-pole and

carry it horizontally, so that if he fell into a fissure the pole might span over this and thus help to hold him up.

Camped 10.45 p. m. at 77°25′ N. lat. and 22°50′ W. long. Distance covered about 14 kilometers.

May 15th. Surveying. Departure 3.30 p. m. Good sledging this day over a solid crust, bearing as a rule. Good advance made though the slope was fairly steep. The fissures, which here ran in the direction N.—S., were not numerous; the melting-ice hummocks were quite low and rounded, only some few decimeters high and only here and there projecting up through the snow-layer. Raised the tent 10.45 p. m. at 77°25′ N. lat. and 23°29′ W. long. Distance about 19 kilometers.

May 16th. Surveying. Departure 6.30 p. m. Shortly after the start the ice became more uneven. The ice-stream, which comes down along the north side of Dronning Louises Land also passes north round Ymers Nunatak and had therefore to be traversed before reaching down to the land. A fairly good passage was found through a transverse cleft, about 50 meters broad, which was filled with good, firm snow. Even here, however, the way was very rough and the sledge was constantly upset. But the passage seemed quite free of danger. After the true ice-stream had been passed, the tent was raised 10.15 p. m. at 77°25′ N. lat. and 23°43′ W. long. about 2 kilometers from Ymers Nunatak. Distance 8 kilometers.

May 17th. As the ice was still hard, the party agreed that nothing would be gained by dragging the sledge down to the Nunatak. The tent was left standing, therefore, and at 3 p. m. the party proceeded on foot to the Nunatak. The inland ice fell steeply down towards the land and some time was taken to find a place where the descent could be made, though with considerable difficulty.

The time now until the 20th of May was spent in survey work and natural history investigations on the Nunatak.

On *May 20th* the return journey was begun just after midnight.

The old track was followed homewards, which made the journey much easier. Not only was it unnecessary to reconnoitre, but there was less danger of falling into fissures.

The descent from the inland ice was easy. The large and dangerous clefts, which had made the ascent so difficult, were now readily passed, following the old tracks. But the snow was now somewhat looser than during the ascent and the result was, that the party broke through at various, less dangerous places which had earlier been traversed without difficulty.

During the whole journey on the inland ice it was remarked that old snow lay on the ice at only a few places. It seemed almost, as if the whole layer of snow melts quite away in the course of the sum-

mer, so that in the autumn the inland ice would be simply a large, uneven, snow-free ice surface.

The air up on the inland ice was generally extremely dry. Even the dripping wet kamikker could be dried in a few hours and on warm days they had to be dried in the shade, otherwise they became too hard and stiff.

May 23rd. The foot of the inland ice was reached at 2 a. m. and the tent raised at the old tenting place. At 10.30 p. m. the journey was continued.

May 24th. Kulhøj was reached at 2 a. m. and the tent raised. The day was used in making natural history investigations.

From the *25th* to the *31st of May* the party worked their way through Annekssø. During the 12 days they had been up on the inland ice the snow had melted a great deal. This in conjunction with snow, fog and storm made this part of the journey difficult, at times exceedingly laborious. At places the men had to toil through the snow up to their knees and the advance was thus very slow. The sledge often cut so deep down, that it could hardly be dragged forward. The way was so difficult indeed, that the party could only work 10 minutes at a time, then rest 5 minutes and so on.

On *May 31st* Annekssø was left behind at 2.30 a. m. and the tent raised at Sælsø at 8 a. m.

On *June 1st* the party camped about 3 kilometers north of Trekroner.

On *June 2nd* Gundahl Knudsen and Koch made an excursion on foot across the land over towards Skærfjord, while Freuchen, who was snow-blind, remained at the tent. The goal of the journey was a hill-top 300 meters high, west of a lake about 4 kilometers long,. from which they had a good view over Skærfjord. The whole excursion lasted 13 hours.

On *June 3rd* the homeward journey was continued.

In the morning of *June 5th* the party camped about midway over Storm Bay and were fetched in the afternoon by sledge.

Like the previous drag-sledge journey to the inland ice, it had been an extremely interesting and fruitful journey. The nature of the inland ice became better known. The scientific booty was considerable and Koch added one more successful and interesting journey to his achievements in arctic regions.

Sledge journey to the bay off Brede Glacier, $^{11}/_{6}$ to $^{21}/_{6}$, 1908.

The main object of the journey was to make survey measurements in the waters south of Helle Fjord land and in the bay off Brede Glacier.

The expedition was led by Bistrup, who was accompanied by Hagerup.

On *June 11th* about 10 a. m. the two men set out with 1 sledge drawn by 8 dogs.

June 12th. The sledging was good, the snow forming a crust that could bear the dogs and sledge. The route lay past Storm Cape between the two northernmost Orientering Islands, to Vindsel Island where the tent was raised at 5 a. m. At 10 p. m. the journey was continued.

June 13th. The going was heavy and one of the men had to run on skis in front of the dogs. The snow crust could not bear the dogs except at just a few places. About 4 a. m. the tent was raised at one of the islands west of Røde Island. Departure 10 p. m.

June 14th. The sledging was good along the land south of Helle Fjord, the ice being quite free of snow. They camped on the peninsula which here runs out from the land. Departure at midnight.

On *June 15th* they drove among countless icebergs down to the islands lying off Brede Glacier, the Glacier Islands. The melting of the snow was far advanced in here. Under a thin crust, which could not bear them, much water had collected and both men and dogs had to wade through it.

On *June 16th* the weather was fine and Bistrup obtained a number of good bearings to points on Dronning Louises Land.

June 17th. To avoid the difficulties among the icebergs Bistrup resolved to drive straight across the land to the head of Helle Fjord. They were also successful in finding snow to drive on practically the whole time, though at a few places they had to drive over snow-free spots.

On *June 18th* they reached the head of Helle Fjord. They camped on the north side of the fjord.

On *June 19th* the journey was continued out of the fjord. There was a quantity of water on the ice, otherwise the sledging was good. The tent was raised at Spydodden.

On *June 20th* they camped at Pladen.

On *June 21st* they reached Storm Cape. From here Hagerup went on to the ship, whilst Bistrup with Peter Hansen and Manniche drove with the sledge to the northern Orientering Island to help in collecting birds eggs.

On *June 23rd* Bistrup returned to the ship.

In cartographical regards the journey had yielded excellent results and the surveying of the inner branches of Dove Bay was now completed.

As mentioned previously, some few excursions were made by boat or on foot even after the journeys with dog-sledges and drag-

sledges had been given up (see List of journeys made from the Station in Danmarks Havn).

Thus, from June 17th to the 20th Fritz Johansen and Trolle went on foot to Maroussia to carry out hydrographical and zoological investigations.

From June 20th to July 15th Lundager camped out at Snenæs to make botanical investigations.

From June 20th to July 18th Freuchen, Jarner, Fritz Johansen and Chr. Bendix Thostrup made an excursion by boat, sledge and on foot to Hvalrosodden and the neighbourhood, to carry out natural history and ethnographical investigations. The Greenlanders Tobias Gabrielsen and Hendrik Olsen were to drive them by sledge to their destination, so far as this could be done. Lundager accompanied them to Snenæs. On July 7th the Hvalrosodden party were to leave Hvalrosodden with the Amdrup boat, which was laid up there.

As the party had not returned by the 13th, G. Thostrup and Weinschenck sailed some distance along the coast that day in the motor-boat, but saw nothing of them.

In the afternoon of the 15th, however, Lundager came on foot from Snenæs and reported, that the Hvalrosodden party had arrived at Snenæs after a difficult return journey, as the Amdrup boat was found to be leaking a great deal, when placed in the water after lying so long on land.

G. Thostrup and Weinschenck now tried with the motor-boat to get into connection with Snenæs; but did not reach the place owing to ice. They returned on the 16th.

Nor did Bertelsen, Tobias Gabrielsen and Weinschenck fare any better on the 17th and it was only on the 18th, that the ice conditions became so favourable, that Gundahl Knudsen and Trolle were able to reach Snenæs with the motor-boat and bring back the collections and the goods and the members of the party still staying out there. Several of them had already come back to the ship by land.

On July 10th the members of the Expedition had an unexpected visit in Danmarks Havn from the captains of 3 Norwegian fishing-vessels, the sloops "Vesterisen", "Sjøblomsten" and the cutter "Havfruen", all of Aalesund. The ships lay near the sea-ice off the outer coast and the 3 captains had walked over land to Danmarks Havn.

This unexpected visit naturally gave the greatest pleasure on-board, not less so because the 3 captains brought letters and communications for nearly all the members of the Expedition [1].

[1] At the request of the Committee the relatives of the members of the Expedition had sent in to the Committee some short communications and greetings which they wanted if possible to be forwarded to their absent ones. The Com-

They stated also, that the pack-ice was so scattered off the coast there, that they could feel the swell close in to land. Near Shannon Island the drift-ice had been still more spread than up there. From Shannon Island to Cape Bismarck they had been sailing in floating ice. They all 3 said, that they had never seen such favourable ice conditions in those latitudes.

From 72° to 75° N. lat., on the other hand, they had met much ice.

This favourable news naturally raised the greatest satisfaction onboard, though they had certainly all the time been expecting and hoping for a good ice-year, having had many warnings. Thus, the winter 1907—08 had on the whole been much milder than the winter 1906—07. On March 1st 1908 the average thickness of the ice in the harbour was only about 100 cm., while at the same time of the year before it had been 158 cm. The ice had also comparatively early assumed the porous, brittle appearance indicating an easy breaking up. And the first open cracks had been observed comparatively early.

In spite of all this, however, they had constantly been working with the possibility of a 3rd winter in view or a retreat southwards along the coast. In these circumstances the dogs would be of invaluable use. It was therefore very important to keep them alive and procure some good food for them. Tobias Gabrielsen and Hendrik Olsen were therefore constantly out hunting and they gradually succeeded in shooting so many seals and a walrus, that this object had been fully achieved.

While numerous expeditions were being carried out during the spring the ship was got into order. And there were many things to be done. Already in May the upper structure was taken off the ship and the rigging got up again.

The hold was gradually cleared and put in order. About 35 tons of stones were taken onboard as ballast. Water was taken in. The boats were taken onboard and hoisted on to the davits.

Machinery and rigging were examined and the sails bent on. Engines and boilers were tested and appeared to be in good working condition.

Lastly, everything laid up on land was taken onboard with exception of some provisions, coal, petroleum, clothes etc. etc., which were placed in depot on land.

One of the last things done by the Expedition before it left Danmarks Havn, was to build an enormous cairn inland with a wooden cross on the top in memory of the 3 who had perished up there. In the report on the Expedition sent in by Trolle to the Committee, he writes the following beautiful lines.

mittee had them printed and the letters thus multiplied had been given to every ship starting for the Greenland Sea in 1907 and 1908. No matter which ship they met, the members of the Expedition would always be sure of their post.

"One single thing we survivors could do for our dead comrades — we placed stone upon stone in remembrance of the three men, until there stood a memorial on the slope near Danmarks Havn.

The cross points to the sky and looks towards the north where our three comrades rest in everlasting sleep.

It stands out clear against the sky as a visible sign of our sorrow and admiration of their deeds.

There is no inscription on the column. It has been erected by the Danmark Expedition in memory of MYLIUS-ERICHSEN, HAGEN and BRØNLUND who perished in their struggle to gain new land for Denmark.

Honoured is the memory of these men among their comrades and honoured will it be in our beloved fatherland, which sent them out and to which their last thoughts were devoted".

I. Home voyage.

On *July 21st* at 6.45 p. m. the Danmark steered out of Danmarks Havn, where it had found a safe anchorage for almost 2 years, and out between Maroussia and Lille Koldewey Island. At 10 p. m. they moored to an ice-floe owing to fog. In the course of the night LUNDAGER, KOCH, MANNICHE and CHR. BENDIX THOSTRUP made an excursion with the motor-boat to Renskæret and Cape Bismarck for scientific purposes.

July 22nd. It would not have been surprising if the Expedition, after its long absence from home of more than two years, had sailed through the pack-ice belt and on homewards as quickly as possible. But the energy of the Expedition did not fail right to the very last.

TROLLE desired to supplement his hydrographical series as much as possible and at the same time to trawl, collect plankton, take soundings and bottom samples. And he specially wanted to make these investigations as far north as possible, because so far as he could see there was this year a rare chance of carrying out scientific investigations in these waters, which as a rule certainly are impassable owing to ice. He therefore steered northwards at 5 p. m. along the land in very scattered ice.

On *July 23rd* the ice conditions were again extremely favourable. There was more open water than ice. They were constantly steering northwards.

July 24th when they reached the 78th degree of latitude they steered eastwards at 6 a. m. It was foggy. In the fog the ship ran against a large ice field and at this time the boiler sprang a leak. The water had to be blown out of the boiler before the leakage could be stopped. While this was being done, they moored to the large ice-field.

On *July 25th* they again had fog. At 6 a. m. they cast loose again, steering southwards along the border of some large ice-fields. At 11 p. m. they again moored to an ice-floe owing to fog.

On *July 26th* it was still very foggy and the ship almost the whole day lay moored to the ice. Now and then they worked the ship a little in order not to get enclosed by the ice, which gathered round the ship.

On *July 27th* the fog lifted so much, that they succeeded in getting out among more spread ice and now steered southwards. In

the afternoon it cleared up still more and they could see much open water in the direction S.E.

On *July 28th* they had fog as usual but much spread ice. Unfortunately, they had to give up the hydrographical investigations, because the boiler was constantly very leaky. They had always to reckon with the possibility that the engines might be unfit for use. Under these circumstances TROLLE considered it the best thing to stop and try to repair the boiler. At 2.30 p. m., therefore, they moored to an ice-floe.

July 29th. Thanks to the skill of WEINSCHENCK, the 1st engineer, they succeeded comparatively quickly in getting the boiler in fairly good order and at 8 a. m. they had steam up again; but the boiler was still somewhat leaky. It was constantly foggy. At 8.45 a. m. they cast loose and continued the voyage. The ice was scattered nearly the whole time, but at one place they met with pack-ice, and here the ship got pinched a little between two ice-floes, which ran together.

On *July 30th* it was still foggy. The character of the ice had now altered and they were often sailing in quite broken ice. They were evidently approaching the edge of the pack-ice. In the evening the fog became so thick, that they had to moor to the ice.

On *July 31st* at 9.15 a. m. the voyage was continued in almost open water. The swell was felt more and more. There could be no doubt that they would soon be out of the ice. The view was however quite obscured, the fog still prevailing.

At 5 p. m. they nevertheless got through the outer belt of the pack-ice, which consisted of densely packed small hummocks, and the "Danmark" was again rocking on the open sea.

On *August 15th* they called in at Bergen, partly to load coal, partly to get the boiler repaired. As it appeared, however, that the repairing of the boiler would be an expensive matter and take up too much time, it was determined to tow the Danmark to Copenhagen, so that the members of the Expedition might reach home as quickly as possible.

On *August 19th* therefore the Danmark left Bergen in charge of a tug-boat.

On *Sunday the 23rd of August* at 10 a. m. the Danmark anchored in the roads of Copenhagen, where the members of the Expedition were received with great honour.

Extracts from the log

for the voyage out through the pack-ice belt[1].

Month and date	Time	Wind	Weather	Temperature		Position estimated		Position observed	
				air	sea	N. lat.	W. long.	N. lat.	W. long.
Thursday July 23rd	4 a. m.	S.W.1	cloudy	3.8	2.0	—	—	—	—
	8 —	—	—	—	—	—	—	—	—
	12 noon	S.W.1	clear	5.0	2.5		16° 00′	77° 27′	
	4 p. m.	N.1	clear	—	—	—	—	—	—
	8 —	N.2	clear	6.4	1.2	—	—	—	—
	12 night	N.2	clear	5.2	1.2	—	—	—	—
Friday July 24th	4 a. m.	N.N.E.1	fog	—	—	—	—	—	—
	8 —	S.E.1	fog	3.5	0.4	—	—	—	—
	12 noon	E.1	fog	—	—	78° 04′	14° 00′	—	—
	4 p. m.	S.E.1	fog	3.6	0.3	—	—	—	—
	8 —	—	fog	—	—	—	—	—	—
	12 night	S.1	fog	—	—	—	—	—	—
Saturday July 25th	4 a. m.	S.S.W.1	fog	0.2	— 0.6	—	—	—	—
	8 —	—	fog	—	—	—	—	—	—
	12 noon	S.1	fog	4.8	1.3	77° 46′	14° 17′	77° 36′	—
	4 p. m.	S.1	fog	—	—	—	—	—	—
	8 —	S.1	fog	2.7	2.0	—	—	—	—
	12 night	calm	fog	—	—	—	—	—	—
Sunday July 26th	4 a. m.	calm	fog	—	—	—	—	—	—
	8 —	calm	fog	3.1	2.0	—	—	—	—
	12 noon	calm	fog	—	—	77° 21′	15° 26′	—	—
	4 p. m.	S.1	fog	2.2	1.6	—	—	—	—
	8 —	—	fog	—	—	—	—	—	—
	12 night	S.1	fog	—	—	—	—	—	—
Monday July 27th	4 a. m.	calm	fog	3.3	1.2	—	—	—	—
	8 —	N.E.1	fog	—	—	—	—	—	—
	12 noon	N.E.1	fog	2.8	2.2	77° 08′	16° 06′		—
	4 p. m.	calm	fog	—	—	—	—	—	—
	8 —	S.W.1	fog	—	—	—	—	—	—
	12 night	S.W.1	fog	1.7	1.5	—	—	—	—
Tuesday July 28th	4 a. m.	S.1	fog	—	—	—	—	—	—
	8 —	S.W.3	fog	0.8	1.2	—	—	—	—
	12 noon	S.1	fog	—	—	76° 06′	13° 26′	—	—
	4 p. m.	S.S.W.1	fog	2.3	1.9	—	—	—	—
	8 —	S.1	fog	—	—	—	—	—	—
	12 night	S.1	fog	—	—	—	—	—	—
Wednesday July 29th	4 a. m.	W.S.W.1	cloudy	1.0	0.5	—	—	—	—
	8 —	S.W.2	fog	—	—	—	—	—	—
	12 noon	S.W.4	fog	1.0	1.2	75° 58′	11° 12′	75° 40′	11° 10′
	4 p. m.	S.W.4	fog	—	—	—	—	—	—
	8 —	S.W.4	fog	1.5	0.5	—	—	—	—
	12 night	S.S.W.4	fog	1.2	0.6	—	—	—	—
Thursday July 30th	4 a. m.	S.W.3	fog	—	—	—	—	—	—
	8 —	S.S.W.3	fog	2.5	0.2	—	—	—	—
	12 noon	S.2	fog	—	—	75° 26′	9° 34′	—	—
	4 p. m.	S.E.1	cloudy	3.7	0.6	—	—	—	—
	8 —	—	—	—	—	—	—	—	—
	12 night	E.1	fog	—	—	—	—	—	—
Friday July 31st	4 a. m.	E.N.E.1	fog	2.2	0.5	—	—	—	—
	8 —	E.N.E.1	fog	—	—	—	—	—	—
	12 noon	E.N.E.1	fog	4.8	1.3	75° 14′	8° 05′	74° 58′	—
	4 p. m.	S.E.1	fog	—	—	—	—	—	—
	8 —	calm	cloudy	5.3	1.4	—	—	—	—
	12 night	calm	cloudy	6.5	4.9	—	—	—	—

[1] See p. 70, note.

The Danmark Expedition was at an end.

The plan, which the leader, MYLIUS-ERICHSEN, had drawn up and on which he had worked with burning enthusiasm and untiring energy, had now been carried into life.

The main object of the Expedition, the exploration and survey of the extensive north-east coast, until then completely unknown, had been achieved under circumstances which called forth a wonderful display of courage and energy, and a large scientific material had been brought home from the whole of the length and breadth of the wide region traversed by the Expedition.

The achievement of the main object had already been brought considerably nearer, when TROLLE assisted by RING and all onboard succeeded in steering the ship into a harbour so far north as Cape Bismarck.

But it was MYLIUS-ERICHSEN, HØEG HAGEN and JØRGEN BRØNLUND, along with KOCH, BERTELSEN and TOBIAS GABRIELSEN, who set the crown upon the work, towards which each member of the Expedition had contributed his share of prolonged and willing labour.

It was KOCH and TOBIAS GABRIELSEN, further, who found and saved the great and splendid results, which MYLIUS-ERICHSEN and his companions had achieved, but which they themselves did not manage to bring home.

For the leader, the energetic and untiring MYLIUS-ERICHSEN, and his two faithful companions, the loyal, capable and friendly HØEG HAGEN and the heroic JØRGEN BRØNLUND had devoted their lives to reach the goal, the Expedition had set itself. With extraordinary hardihood and indomitable energy they had fought their way onward and successfully planted the Dannebrog on the farthest point. But the fruits of victory were denied them; one by one they succumbed on their way southwards, struggling under the most desperate conditions to bring back to the world knowledge of the results they had achieved.

As heroes they have fallen on the field of honour and given a brilliant example of courage, bravery and energy.

All honour to their memory!

SUMMARY.

During the Expedition nearly 200 journeys great and small were made, some with sledge and some by boat, motor-carriage and on foot.

The land from Cape Bismarck (ca. 77°01′ N. lat.) to the points reached by Peary from the west, Navy Cliff (81°37′ N. lat. and 34°05′ W. long.) and Cape Clarence Wyckoff (82°57′.7 N. lat. and 23°09′ W. long.), has been explored and charted; indeed, the Expedition has even penetrated up to ca. 83°28′ N. lat. The new land visited has been taken in possession and called Kong Frederik VIII Land.

The land from Ardencaple Inlet to Cape Bismarck, which was roughly charted by the 2nd German North Pole Expedition from a single sledge journey, has been accurately surveyed and explored by means of numerous journeys.

Sveral sledge journeys were made up on the inland ice behind Germania Land and an extensive, ice-free tract has been discovered inland.

Large collections of botanical, geological, zoological and ethnographical objects have been brought home.

A large material of observations on the meteorology, magnetism, air-electricity, astronomy, hydrography, glacial geology etc. of the regions visited has likewise been brought home.

230 paintings, sketches and drawings have been made by the two artists of the Expedition and about 1500 good photographic plates have been taken.

The total amount of game obtained on the Expedition amounted to about 90 bears, 30 walrus, 60 musk-oxen, 300 hares, 115 foxes and 5 wolves, as also a number of seals.

K. List of the journeys made from the station in Denmarks Havn.

1. Journeys with dog sledges.

Year	From	To	Number of days	Members	Number of dogs	Number of sledges	Object of journey	Remarks
1906.	1/10	19/10	19	Jørgen Brønlund, Jarner, Mylius-Erichsen and Trolle.			Laying out depots in the north and cartographical work in Skærfjord.	
	1/10	16/10	16	Hagen and Ring.			Laying out depots in the north and cartographical work in Jøkelbugt.	
	1/10 10/10 12/10	ca. 8/10 11/10 16/10	9 2 5	Bistrup and Peter Hansen.	ca. 90	10	Laying out depots at Cape Marie Valdemar and Cape Amélie.	
	1/10	11/10	11	Tobias Gabrielsen, Koch and G. Thostrup.			Laying out depots in the north and cartographical work in Jøkelbugt.	
	12/10	19/10	5	Tobias Gabrielsen and Hendrik Olsen.		2	Laying out depot at Cape Amélie.	
	26/10	31/10	6	Jørgen Brønlund, Achton Friis, Jarner, Fritz Johansen and Lundager.	32	4	Reconnoitring along the west side of Store Koldewey Isl. and laying out depot there.	
	28/10	30/10	3	Mylius-Erichsen and Wegener.		2	To examine the walrus meat depot at Hvalrosodden and fetch walrus meat from there.	
	28/10	3/11	7	Hendrik Olsen, Charles Poulsen and G. Thostrup.		2	Laying out depots at Cape Peschel. Cartographical work in the inner Dove Bay and round Teufel Cape and Cape Peschel.	
	28/10	5/11	9	Bertelsen and Bistrup.		2	Cartographical work in Mørke Fjord.	Bertelsen returns on 4/11 and is relieved by Fritz Johansen.
	31/10	31/10	1	Tobias Gabrielsen, Hans Jensen, Kofoed and Manniche.		2	Hunting excursion to Hvalrosodden.	In Storm Bay however they shoot 4 musk-oxen and then return with the booty.

Year	From	To	Number of days	Members	Number of dogs	Number of sledges	Object of journey	Remarks
1906	2/11	4/11	3	Jørgen Brønlund and Fritz Johansen.		1	Hunting excursion to Hvalrosodden.	Fritz Johansen relieves Bertelsen who returns with Jørgen Brønlund on 4/11.
	5/11	6/11	2	Jørgen Brønlund, Peter Hansen and Hendrik Olsen.		3	Hunting excursion to Hvalrosodden.	
	8/11	18/11	11	Jarner, Hendrik Olsen, Trolle and Weinschenck.	23	3	Journey round Store Koldewey Isl. for cartographical and geological purposes.	
	13/11	4/12	22	Jørgen Brønlund, Koch, Mylius-Erichsen, Ring, G. Thostrup and Wegener.	50	6	To examine the depots at Cape Philip Broke (Shannon Isl.) and on Bass Rock and make astronomical and magnetic observations in Germania Harbour.	
	23/11	25/11	3	Hagen, Peter Hansen and Charles Poulsen.		3	Laying out depots at Cape Peschel.	
	30/11	2/12	3	Tobias Gabrielsen, Peter Hansen and Trolle.		3	Hydrographical work.	
	27/12	31/12	5	Jørgen Brønlund and Hagerup.		1	Hunting expedition to Hvalrosodden.	Hagerup returns on the 28th with a bear shot on the way.
	28/12	30/12	3	Knud Christiansen and the brothers Thostrup.		4	To fetch walrus meat from the depot at Hvalrosodden.	
	28/12	5/1	9	Hagen and Koefoed.		2	To make observations on northern lights at Hvalrosodden.	
	30/12	31/12	2	Bistrup, Achton Friis and Peter Hansen.			Hunting expedition to Hvalrosodden.	
	2/1	3/1	2	Tobias Gabrielsen.			To bring out dog food etc. to Hagen and Kofoed.	
1907	3/1	5/1	4	PeterHansen,Fritz Johansen, Ring and Trolle.		4	Hydrographical and zoological excursion to Maroussia and eastwards in the screw-ice.	

Year	From	To	Number of days	Members	Number of		Object of journey	Remarks
					dogs	sledges		
1907	4/1	5/1	2	Hendrik Olsen and Lundager.			Hvalrosodden.	
	21/1	21/1	1	Jørgen Brønlund, Tobias Gabrielsen and Hendrik Olsen.		3	Hunting expedition to an opening east of Cape Bismarck.	
	27/1	28/1	2	Jørgen Brønlund, Tobias Gabrielsen and Hendrik Olsen.		3	Excursion to Store Koldewey Isl. to fetch some bear-meat deposited there.	
	29/1	4/2	7	Bertelsen, Jørgen Brønlund, Freuchen, Tobias Gabrielsen, Hagen, Hagerup, Peter Hansen, Koch and Mylius-Erichsen.	63	9	Laying out depots at Cape Marie Valdemar or Cape Amélie.	Owing to snow-storm they reached no further than a point a little south of Cape Marie Valdemar.
	20/2	28/2	9	Bertelsen, Jørgen Brønlund, Tobias Gabrielsen, Hagen, Hagerup, Peter Hansen, Koch, Mylius-Erichsen, Hendrik Olsen and Ring.	79	10	Laying out depot at Nordre Depot Isl.	The depot was laid out.
	5/3	9/3	5	Peter Hansen, Hendrik Olsen, Charles Poulsen and Trolle.		4	Hydrographical work.	
	9/3	12/3	4	Achton Friis, Lindhard, Manniche, Mylius-Erichsen and Ring.		3	Hunting excursion to Hvalrosodden.	Lindhard returns on 11/3.
	15/3	21/3	7	Peter Hansen, Hendrik Olsen, Charles Poulsen and G. Thostrup.		4	Laying out depot at Bjørneskærene.	
	16/3	19/3	3	Jørgen Brønlund, Hans Jensen and Manniche.		2	Hunting excursion to Hvalrosodden.	
	16/3	21/3	6	Bistrup, Tobias Gabrielsen, Gundahl Knudsen and Trolle.		4	Laying out depot at Bjørneskærene.	
	21/3		1	Jørgen Brønlund and Mylius-Erichsen.		2	Hunting excursion to Sonja Harbour and Store Koldewey Isl.	

Year	From	To	Number of days	Members	Number of dogs	Number of sledges	Object of journey	Remarks
1907	28/3			Jørgen Brønlund, Hagen and Mylius-Erichsen.	86	3	The great sledge journey to the north to chart and investigate the N. E. coast of Greenland.	
	28/3	23/6	88	Bertelsen, Tobias Gabrielsen and Koch.		3		
	28/3	13/5	47	Bistrup and Ring.		2		
	28/3	31/5	65	G. Thostrup and Wegener.		2		
	20/4	23/4	4	Knud Christiansen and Manniche.		1	Hunting excursion to Hvalrosodden.	
	3/5	9/5	7	Hendrik Olsen.	8	1	Laying out depot at Hagens Isl.	
	17/5	20/5	4	Hendrik Olsen.	8	1	Laying out depot on the east side of Store Koldewey Isl.	
	22/5		1	Hendrik Olsen and Koefoed.		2	Renskær, to cut up a bear and transport the meat to the ship.	
	6/6	7/6	2	Peter Hansen and Hendrik Olsen.		2	Hunting excursion to Storm Cape.	In order to facilitate these excursions from the ship tents were raised at various places in the neighbourhood of the station and provisions deposited.
	7/6	9/6	3	Peter Hansen and Hendrik Olsen.		2	Hunting excursion to Maroussia etc.	
	12/6	17/6	6	Peter Hansen and Hendrik Olsen.		2	Hunting.	
	14/6	18/6	5	Lindhard and Lundager.			Scientific investigations at Hvalrosodden.	
	18/6	22/6	5	Hendrik Olsen and G. Thostrup.		2	Expedition down the east side of Koldewey Isls. to assist Freuchen, Jarner and Gundahl Knudsen.	
	25/6	29/6	5	Knud Christiansen, Freuchen, Tobias Gabrielsen, Hagerup, Peter Hansen, Hendrik Olsen and Ring.			To fetch walrus meat from Hvalrosodden.	
	4/7	7/7	4	Bistrup and Hendrik Olsen.		2	To build a cairn on Orientering Isl.	
	19/7		1	Tobias Gabrielsen, Hagerup, Peter Hansen, Hendrik Olsen, G. Thostrup and Ring.		6	To fetch a walrus shot on the outer coast.	The sledges had to be driven across »Overkørslen« which was partly snow-free.

Year	From	To	Number of days	Members	Number of dogs	Number of sledges	Object of journey	Remarks
1907	$^{16}/_{9}$		1	Tobias Gabrielsen, Hendrik Olsen, G. Thostrup and Ring.		4	To fetch the rest of a walrus killed near the outer coast.	The sledges had to be driven across »Overkørslen« which was partly snow-free. Unfortunately the walrus had been eaten by bears.
	$^{22}/_{9}$	$^{24}/_{9}$	3	Hagerup.		1	To assist the relief sledge party at Cape Marie Valdemar	
	$^{22}/_{9}$	$^{18}/_{10}$	27	Peter Hansen, Hendrik Olsen and Ring.		4	Relief sledge journey to Lamberts Land.	
	$^{22}/_{9}$	$^{2}/_{11}$	42	Tobias Gabrielsen, Lindhard and G. Thostrup.		4	Relief sledge journey to Mallemukfjæld.	
	$^{26}/_{9}$	$^{29}/_{9}$	4	Knud Christiansen and Hagerup.	12	2	To transport stores to the station in Mørke Fjord.	
	$^{1}/_{10}$	$^{18}/_{10}$	18	Knud Christiansen, Hagerup and Gundahl Knudsen.	12	2	To establish a station in Mørke Fjord. It was established in Pustervig.	From $^{7}/_{10}$ to $^{11}/_{10}$ Knud Christiansen and from $^{8}/_{10}$ to $^{11}/_{10}$ Hagerup fetch stores from the ship.
	$^{10}/_{10}$	$^{18}/_{10}$	9	Bistrup and Weinschenck.				Bistrup and Hagerup return on the 15th, the other with a drag-sledge on the $^{18}/_{10}$.
	$^{17}/_{10}$	$^{28}/_{10}$	12	Bistrup and Hagerup.		2	Survey of the land between Helle Fjord and Teufel Cape.	From the 20th in the evening to the 21st in the morning they are onboard the ship, to get the cooking apparatus repaired.
	$^{26}/_{10}$		1	Peter Hansen, Hans Jensen, Hendrik Olsen and Ring.		4	To transport stores for the station in Pustervig out to Snenæs.	
	$^{27}/_{10}$	$^{30}/_{10}$	4	Peter Hansen, Hans Jensen and Ring.		3	To transport stores to the station in Pustervig and fetch walrus meat from Hvalrosodden.	
	$^{30}/_{10}$		1	Hagerup and Koefoed.		2	To fetch a tent etc. left at Røseløbet.	

Year	From	To	Number of days	Members	Number of dogs	Number of sledges	Object of journey	Remarks
	$^{3}/_{11}$	$^{4}/_{11}$	3	Hagerup, Peter Hansen, Gundahl Knudsen, Charles Poulsen and Ring.		5	To transport stores to the station in Pustervig and fetch walrus meat from Hvalrosodde.	
	$^{3}/_{11}$		1	Koefoed and Hendrik Olsen.		2	To fetch the bear at Syttenkilometernæsset shot by the relief sledge expedition.	
1907	$^{13}/_{11}$	$^{17}/_{11}$	5	G. Thostrup and Weinschenck.		2	To transport provisions to the station in Pustervig.	Chr. Bendix Thostrup is relieved by Weinschenck.
	$^{13}/_{11}$	$^{23}/_{11}$	11	Hagerup, Koefoed and Hendrik Olsen.		3	Sledge journey northwards to lay out depots.	Owing to bad weather they only reached Hagens Island.
	$^{19}/_{11}$			Tobias Gabrielsen and G. Thostrup.		2	To fetch some zoological apparatus left in Storm Bay.	
	$^{22}/_{11}$	$^{23}/_{11}$	2	Peter Hansen and Fritz Johansen.			To take coal and provisions to the station in Pustervig.	Weinschenck is relieved by Fritz Johansen.
1907—08	1907 $^{25}/_{11}$	1908 $^{23}/_{1}$	60	Tobias Gabrielsen, Hendrik Olsen, Charles Poulsen, G. Thostrup and Weinschenck.	40	5	To examine and count the American stores on Shannon Island and Bass Rock and fetch dog-food.	
1907	1907 $^{21}/_{12}$	1907 $^{24}/_{12}$	4	Peter Hansen and Gundahl Knudsen.		2	To transport coal and provisions to the station in Pustervig.	Fritz Johansen is relieved by Gundahl Knudsen.
	$^{27}/_{12}$	$^{27}/_{12}$	1	Hagerup.		1	To try and transport stores to the station in Pustervig.	Had to be given up owing to bad sledging.
1907—08	1907 $^{31}/_{12}$	1908 $^{6}/_{1}$	7	Hagerup and Peter Hansen.		1	To transport coal and provisions to the station in Pustervig.	
	$^{10}/_{1}$	$^{18}/_{1}$	9	Knud Christiansen and Ring.		2	To transport coal and provisions to the station in Pustervig.	
1908	$^{23}/_{1}$		1	Peter Hansen and Lundager.		2	To try and transport coal and provisions to the station in Pustervig.	Had to be given up owing to bad sledging.

Year	From	To	Number of days	Members	Number of dogs	Number of sledges	Object of journey	Remarks
1908	24/1		1	Peter Hansen and Lundager.		2	To try and transport coal and provisions to the station in Pustervig.	Had to be given up owing to bad sledging.
	29/1	1/2	4	Tobias Gabrielsen, Peter Hansen, Lundager and Hendrik Olsen.		4	To transport stores and provisions to the station in Pustervig.	Gundahl Knudsen is relieved by Lundager.
	4/2	8/2	5	Hagerup, Koefoed and Hendrik Olsen.		3	To transport stores and provisions to the station in Pustervig.	
	15/2	23/2	9	Koefoed, Hendrik Olsen and Chr. Bendix Thostrup.	27	3	Laying out depots at Teufel Cape, in Roon Bay and Bessels Fjord and making ethnographical investigations.	
	2/3		1	Koch and Tobias Gabrielsen.		2	Drive the baggage to Syttenkilometernæsset.	
	3/3	8/3	6	Hendrik Olsen and Charles Poulsen.		2	Transport stores to the station in Pustervig.	Lundager is relieved by Charles Poulsen.
	10/3	26/3	17	Tobias Gabrielsen and Koch.	20	3	To support and relieve Mylius-Erichsen, Høeg-Hagen and Brønlund.	
	31/3	31/3	1	Tobias Gabrielsen and Hendrik Olsen.	22	2	Hunting excursion to Cape Helgoland.	
	2/4	2/4	1	Tobias Gabrielsen and Hendrik Olsen.		2	Hunting excursion to Syttenkilometernæsset and laying out depot at Storm Cape.	The depot was laid out to support Manniche.
	6/4	7/4	2	Tobias Gabrielsen and Hendrik Olsen.		2	Hunting excursion to Maroussia and neighbourhood.	
	9/4	12/4	4	Achton Friis, Lundager and G. Thostrup.		3	Laying out depots near the south end of Annekssø.	
	15/4	27/5	43	Tobias Gabrielsen, Jarner and Hendrik Olsen.	22	2	Scientific excursion to Ardencaple Inlet and Shannon Isl.	

Year	From	To	Number of days	Members	Number of dogs	Number of sledges	Object of journey	Remarks
1908	$^{17}/_{4}$	$^{13}/_{5}$	27	Fritz Johansen and Trolle.		1	Hydrographical and zoological investigations in Mørke Fjord and Sælsø. Take care of the station in Pustervig from $^{19}/_{4}$ to $^{8}/_{5}$.	Bertelsen and Freuchen are relieved by Fritz Johansen and Trolle on $^{19}/_{4}$. Fritz Johansen and Trolle relieved by Wegener on $^{8}/_{5}$.
	$^{27}/_{4}$	$^{3}/_{6}$	38	Bertelsen, Achton Friis and Weinschenck.		1	Made studies in regions round Teufel Cape.	Weinschenck returned on $^{30}/_{4}$.
	$^{14}/_{5}$	$^{29}/_{5}$	16	Peter Hansen, Fritz Johansen and Trolle.		1	Hydrographical and zoological investigations at Sælsø and Annekssø.	
	$^{30}/_{5}$	$^{2}/_{6}$	4	Lundager.	10	1	Fetches Wegener in Pustervig.	The station in Pustervig is given up.
	$^{4}/_{6}$	$^{13}/_{6}$	10	Fritz Johansen and Trolle.			Hydrographical and zoological investigations in Storm Bay and Dove Bay.	
	$^{5}/_{6}$	$^{5}/_{6}$	1	Koefoed and Weinschenck.			To look for the motor carriage off Snenæs.	
	$^{5}/_{6}$	$^{8}/_{6}$	4	Tobias Gabrielsen, Hendrik Olsen and Chr. Bendix Thostrup.		2	Ethnographical investigations near Cape Marie Valdemar.	
	$^{7}/_{6}$	$^{10}/_{6}$	4	Peter Hansen and Manniche.			Zoological investigations at Sælsø.	
	$^{11}/_{6}$	$^{21}/_{6}$	11	Bistrup and Hagerup.	8	1	Survey of the bay off Brede Glacier.	Bistrup remains at Storm Cape.
	$^{12}/_{6}$	$^{17}/_{6}$	6	Tobias Gabrielsen, Hendrik Olsen and Chr. Bendix Thostrup.			Ethnographical investigations at Baadskær. Hunting.	Tobias and Hendrik continue the hunt here in the neighbouring regions till the end of the month.
	$^{21}/_{6}$	$^{23}/_{6}$	3	Bistrup, Peter Hansen and Manniche.			To collect birds eggs on Northern Orientering Isl.	

2. Sledge-journeys without dogs (Drag-sledge journeys).

Year	From	To	Number of days	Members	Number of sledges	Object of journey	Remarks
1907	$^{28}/_{1}$			Knud Christiansen, Jarner, Fritz Johansen, Gundahl Knudsen, Koefoed, Manniche, Charles Poulsen, G. Thostrup and Weinschenck.	3	To transport provisions for the depots to Syttenkilometernæsset.	
	$^{9}/_{2}$			9 men including Hagerup, Peter Hansen, Lundager, Hendrik Olsen, Charles Poulsen, G. Thostrup and Trolle.	3	To transport provisions for the depots to Syttenkilometernæsset.	
	$^{22}/_{2}$	$^{28}/_{2}$	7	Fritz Johansen, Koefoed and Manniche.		Camped at Cape Bismarck in order to hunt.	
	$^{22}/_{2}$			Freuchen, Achton Friis, Hagerup, Jarner, Hans Jensen, Fritz Johansen, Koefoed, Lindhard, Lundager, Manniche and Chr. Bendix Thostrup.		To transport provisions to the outer coast.	
	$^{8}/_{4}$	$^{26}/_{4}$	19	Hagerup, Peter Hansen, Hendrik Olsen and Trolle.	1	To lay out a depot on Hagens Isl.	
	$^{8}/_{4}$	$^{27}/_{4}$	20	Freuchen, Achton Friis, Koefoed and Lundager.	1	To lay out a depot on Hagens Isl.	
	$^{8}/_{-}$	$^{1}/_{5}$	24	Fritz Johansen, Gundahl Knudsen, Charles Poulsen and Chr. Bendix Thostrup.	1	To lay out a depot on Ile de France.	
	$^{28}/_{4}$	$^{4}/_{5}$	7	Jarner, Hans Jensen, Lindhard and Weinschenck.	1	Geological investigations on Store Koldewey Isl. and hunting.	
	$^{6}/_{5}$	$^{8}/_{5}$	3	Lindhard, Chr. Bendix, Thostrup and Weinschenck.	1	To search for the German cairn at Cape Bismarck.	
	$^{6}/_{5}$	$^{13}/_{5}$	8	Peter Hansen, Charles Poulsen and Trolle.	1	Hydrographical and hunting expedition to Maroussia	Also Manniche from $^{7}/_{5}$ to $^{12}/_{5}$.

Year	From	To	Number of days	Members	Number of sledges	Object of journey	Remarks
1907	$^{10}/_{5}$	$^{20}/_{6}$	42	Freuchen, Jarner and Gundahl Knudsen.	1	Geological investigation of Dove Bay, the land about Cape Peschel and the Koldewey Isls.	
	$^{13}/_{5}$	$^{21}/_{5}$	9	Koefoed, Hendrik Olsen and Weinschenck.	1	Hunting excursion to Maroussia, Renskæret and Cape Bismarck.	H. Olsen returns on $^{16}/_{5}$, Weinschenck on $^{18}/_{5}$.
	$^{17}/_{5}$	$^{21}/_{5}$	5	Hans Jensen.	1	Hunting excursion to Maroussia, Renskæret and Cape Bismarck.	
	$^{18}/_{5}$	$^{28}/_{5}$	11	Bistrup, Peter Hansen, Fritz Johansen and Manniche.		Scientific investigations, building cairns and hunting at Hvalrosodden and neighbourhood.	
	$^{22}/_{5}$	$^{23}/_{5}$	2	Charles Poulsen and Trolle.	1	Hydrographical work in Storm Bay.	
	$^{2}/_{6}$	$^{6}/_{6}$	5	Lindhard, Lundager and Manniche.		Scientific excursion to Storm Cape.	
	$^{11}/_{7}$	$^{18}/_{7}$	8	Tobias Gabrielsen and Hendrik Olsen.	1	Hunting excursion to Cape Bismarck and the sea ice.	
	$^{13}/_{7}$	$^{17}/_{7}$	5	Peter Hansen, Manniche and Trolle.	1	Hydrographical and zoological investigations at Maroussia.	Made an excursion from Maroussia to Sonja Harbour.
	$^{21}/_{7}$	$^{25}/_{7}$	5	Tobias Gabrielsen and Hendrik Olsen.	1	Hunting expedition to Cape Bismarck and the sea-ice.	
	$^{24}/_{9}$	$^{30}/_{9}$	7	Koefoed and Chr. Bendix Thostrup.	1	Minute survey of the district round Syttenkilometernæsset.	
	$^{5}/_{10}$	$^{17}/_{10}$	13	Koefoed and Chr. Bendix Thostrup.	1	Minute survey on the Koldewey Isls.	
	$^{2}/_{10}$	$^{16}/_{10}$	14	Fritz Johansen and Trolle.	1	Hydrographical and zoological investigations and surveys in the waters off Danmarks Havn.	

Year	From	To	Number of days	Members	Number of sledges	Object of journey	Remarks
1907	$^{17}/_{10}$		1	Fritz Johansen and Trolle.	1	Hydrographical and zoological investigations W. of Lille Koldewey Isl.	
	$^{18}/_{10}$		1	Fritz Johansen and Trolle.	1	Hydrographical and zoological investigations in Storm Bay.	
	$^{20}/_{10}$	$^{27}/_{10}$	8	Bertelsen and Manniche.	1	Hunting excursion to Maroussia.	
	$^{20}/_{10}$	$^{26}/_{10}$	7	Lundager and Koefoed.	1	Hunting excursion to Snenæs.	
	$^{21}/_{10}$		1	Fritz Johansen and Trolle.	1	Hydrographical and zoological investigations in the sound between the Koldewey Isls.	
	$^{22}/_{10}$		1	Fritz Johansen and Trolle.	1	Hydrographical and zoological investigations in the sound between the Koldewey Isls.	
	$^{25}/_{10}$			Freuchen, Jarner and Weinschenck.	1	Start for the station in Pustervig in order to set up instruments and begin observations on $^{1}/_{11}$.	Jarner returns on $^{4}/_{11}$, Weinschenck on $^{10}/_{11}$.
	$^{2}/_{11}$	$^{10}/_{11}$	9	Bertelsen, Koch, Chr. Bendix Thostrup and Wegener.	1	Survey and meteorological investigations in Pustervig.	Weinschenck is relieved by Chr. Bendix Thostrup in Pustervig.
1908	$^{29}/_{2}$	$^{8}/_{3}$	9	Peter Hansen and Ring.	1	Hunting excursion to Maroussia.	
	$^{1}/_{3}$	$^{3}/_{4}$	34	Bertelsen, Lindhard, Wegener and Weinschenck.	1	Scientific investigations on the inland ice and in Mørke Fjord.	Charles Poulsen is relieved by Bertelsen on $^{1}/_{4}$ in Pustervig.
	$^{3}/_{3}$	$^{5}/_{3}$	3	Fritz Johansen and Trolle.	1	Hydrographical and zoological investigations from Maroussia.	
	$^{16}/_{3}$	$^{30}/_{3}$	15	Hagerup, Fritz Johansen and Trolle.	1	Hydrographical and zoological investigations in Dove Bay.	
	$^{17}/_{3}$	$^{25}/_{3}$	9	Peter Hansen, Jarner and Hendrik Olsen.	1	Deposits several objects etc. etc. at Hvalrosodden and at other places on the way.	

Year	From	To	Number of days	Members	Number of sledges	Object of journey	Remarks
1908	$^{15}/_{4}$	$^{3}/_{6}$	50	Bistrup and Hagerup.	1	Survey work in Dove Bay and Bessels Fjord.	
	$^{24}/_{4}$	$^{5}/_{6}$	43	Freuchen, Gundahl Knudsen and Koch.	1	Scientific investigations on the inland ice.	
	$^{3}/_{5}$	$^{3}/_{6}$	32	Koefoed and Chr. Bendix Thostrup.	1	Cartographical and ethnographical work in the neighbourhood of Danmarks Havn.	
	$^{22}/_{5}$ $^{10}/_{6}$	$^{7}/_{6}$ $^{3}/_{7}$	17 24	Manniche.	1	Zoological investigations near Storm Cape.	Hans Jensen and Lindhard accompany Manniche to Storm Cape and return on the same day.
	$^{24}/_{6}$	$^{26}/_{6}$	3	Hagerup and Trolle.		Hydrographical investigations in the waters between Maroussia and Lille Koldewey Isl. and in the sound between the Koldewey Isls.	
	$^{27}/_{6}$	$^{4}/_{7}$	8	Lindhard and Koch.		Survey work in the regions round Storm Cape and Winges coast.	
	$^{29}/_{6}$	$^{8}/_{7}$	10	Hagerup and Trolle.		Hydrographical investigations in the waters between Maroussia and Lille Koldewey Isl. and the sound between the Koldewey Isls.	

3. Journeys by boat.

Year	From	To	Number of days	Members	Means of conveyance	Object of journey	Remarks
1906	$^{18}/_{8}$	$^{14}/_{9}$	28	Tobias Gabrielsen, Peter Hansen, Jarner, Fritz Johansen, Gundahl Knudsen, Lundager, Manniche, Mylius-Erichsen, and Chr. Bendix Thostrup. Achton Friis from $^{22}/_{8}$ to $^{5}/_{9}$.	Motor-boat and Amdrup-boat.	Hunting expedition and scientific investigations in Dove Bay.	Gundahl Knudsen and Lundager return on $^{27}/_{8}$, Peder Hansen and Manniche on $^{2}/_{9}$, Chr. Bendix Thostrup on $^{3}/_{9}$, AchtonFriis on $^{5}/_{9}$, Johansen on $^{8}/_{9}$, Jarner on $^{11}/_{9}$. Peter Hansen goes out again from $^{4}/_{9}$ to $^{13}/_{9}$ and Jarner on $^{13}/_{9}$.

Year	From	To	Number of days	Members	Means of conveyance	Object of journey	Remarks
1906	27/8	28/8	2	Brønlund, Gundahl Knudsen, G. Thostrup and Weinschenck.	Motor-boat.	To fetch a sledge with baggage left south of Cape Marie Valdemar on 25/8.	
	1/9	4/9	4	Hagen, Hagerup, Kock and Wegener.	Motor-boat.	Taking surveys and coloured photographs at Cape Bismarck and the Koldewey Isls.	
	5/9	14/9	10	Hagerup, Trolle and Weinschenck.	Motor-boat.	Started for Storm Cape to assist in transporting the goods to the ship.	Trolle and Weinschenck return by land on 6/9.
	14/9	15/9	2	Knud Christiansen, Charles Poulsen and Ring.	Amdrup-boat.	To fetch some meat in Storm Bay.	
	15/9	19/9	5	Bertelsen, Hagen, Jarner, Koch, Lindhard and G. Thostrup.	Boat No. 1.	Surveys at Cape Bismarck and the Koldewey Isls.	
1907	15/8			Knud Christiansen and Lundager.	Motor-boat.	Botanical investigations.	
	15/8			Knud Christiansen, Fritz Johansen and Trolle.	Motor-boat.	To try and sail to Hvalrosodden. Owing to ice they reach no further than Storm Bay.	Trolle walks to Hvalrosodden.
	18/8		1	Knud Christiansen, Fritz Johansen and Koefoed.	Motor-boat.	Zoological investigations round Storm Cape.	
	21/8	22/8	2	Knud Christiansen, Freuchen and Koefoed.	Motor-boat and Boat No. 1.	To transport timber and stores to the projected station in Mørke Fjord.	Owing to ice they reach no further than the rocks west of Storm Cape.
	21/8	31/8	11	Tobias Gabrielsen and Hendrik Olsen.	Kajak.	To transport a kajak to Hvalrosodden to be used by Bistrup during his surveying work. Hunting excursion.	The ice cuts the kajak to pieces. Covered the rest of the way to Hvalrosodden on foot.
	24/8		1	Knud Christiansen, Fritz Johansen and Lundager.	Motor-boat.	Zoological and botanical investigations round Storm Cape.	
	27/8	11/9	14	Bertelsen and Achton Friis.	Motor-boat and Boat No. 3.	To make studies and hunt near Cape Bismarck.	Bertelsen returns on 9/9, Achton Friis walked home on 11/9.

Year	From	To	Number of days	Members	Means of conveyance	Object of journey	Remarks
1907	28/8	29/8	2	Peter Hansen, Charles Poulsen and Trolle.	Motor-boat.	Hydrographical and hunting excursion to Maroussia.	
	29/8	30/8	2	Koefoed, Chr. Bendix Thostrup, G. Thostrup and Weinschenck.	Motor-boat and Boat No. 1.	To fetch the rest of the walrus killed near the outer coast.	The pack-ice prevented them from reaching out to Hvalrosodden, but they shot a walrus.
	29/8		1	Knud Christiansen and Fritz Johansen.	Motor-boat.	Zoological investigations.	
	30/8		1	Knud Christiansen, Peter Hansen and Charles Poulsen.	Motor-boat.	Hunting.	
	31/8	1/9	2	Koefoed, Chr. Bendix Thostrup, G. Thostrup and Weinschenck.	Motor-boat.	To fetch the rest of the walrus killed near the outer coast.	Also this time the pack-ice prevented them from getting out to the walrus.
	2/9		1	Knud Christiansen and Fritz Johansen.	Motor-boat.	Zoological investigations in Danmarks Havn and neighbourhood.	
	3/9		1	Knud Christiansen and Trolle.	Motor-boat.	Hydrographical investigations in Storm Bay.	At the same time Manniche and Johansen landed near Snenæs. The latter returns with the motor-boat the same day.
	6/9		1	Knud Christiansen, Tobias Gabrielsen, Hendrik Olsen and Charles Poulsen.	Motor-boat.	Hunting.	
	7/9	16/9	10	Hagerup, Peter Hansen, Hendrik Olsen, Charles Poulsen and Weinschenck.	Motor-boat.	To fetch the rest of the walrus killed near the outer coast. Hunting.	Again this time they were prevented by the pack-ice from getting out to the walrus.
	7/9		1	Tobias Gabrielsen.	Kajak	Hunting.	
	10/9		1	Knud Christiansen and Lundager.	Motor-boat.	Botanical investigations.	
	11/9		1	Knud Christiansen and Fritz Johansen.	Motor-boat.	Zoological investigations.	
	30/9		1	Knud Christiansen, Achton Friis, Hagerup, Gundahl Knudsen, Trolle.	Motor-boat.	Hunting.	

Year	From	To	Number of days	Members	Means of conveyance	Object of journey	Remarks
1908	13/7		1	G. Thostrup and Weinschenck.	Motor-boat.	Went westwards along the coast to look for the party coming back from Hvalrosodden.	
	15/7	16/7	2	G. Thostrup and Weinschenck.	Motor-boat.	To try and reach Snenæs where the Hvalrosodde party had arrived.	The ice prevents them from reaching Snenæs.
	17/7		1	Bertelsen, Tobias Gabrielsen and Weinschenck.	Motor-boat.	To try and reach Snenæs where the Hvalrosodde party had arrived.	
	18/7		1	Gundahl Knudsen and Trolle.	Motor-boat.	Proceed to Snenæs to fetch the Hvalrosodde party.	On returning they set off with Manniche for Maroussia.
	19/7		1	Fritz Johansen, Lundager and Koch.	Motor-boat.	Botanical and zoological investigations off Danmarks Havn.	
	20/7	21/7	2	Lindhard, Koch and Chr. Bendix Thostrup.	Motor-boat.	Ethnographical investigations at Maroussia and Renskæret.	
	22/7		1	Lundager, Koch, Manniche and Chr. Bendix Thostrup.	Motor-boat.	Scientific investigations at Cape Bismarck and Renskæret.	

4. Journeys in other ways.

Year	From	To	Number of days	Members	Means of conveyance	Object of journey	Remarks
1906	15/8	27/8	13	Bertelsen, Brønlund, Hagen, Hagerup, Koch, Lindhard.	Motor-boat, sledge and on foot.	Carthographical work near Cape Marie Valdemar.	
	2/9	14/9	13	Bertelsen, Bistrup, Brønlund, Knud Christiansen, Freuchen, Koefoed, Lundager, Hendrik Olsen, Weinschenck.	On foot.	To transport stores from Storm Naze.	Bertelsen, Koefoed, Lundager and Weinschenck return on 3/9; Bistrup, Brønlund and Freuchen on 12/9; Brønlund out again from 12/9 to 13/9.
	7/9	10/9	4	Hagen, Lindhard, Trolle and Weinschenck.	On foot.	To try and fetch the boat lying near Cape Marie Valdemar.	

Year	From	To	Number of days	Members	Means of conveyance	Object of journey	Remarks
1906	11/9	14/9	4	Achton Friis, Ring and Weinschenck.	On foot.	New crew for the motor-boat lying in Storm-Bay.	Achton Friis and Weinschenck return on 12/9.
	14/9	15/9	2	Tobias Gabrielsen, Johansen, Mylius-Erichsen and Hendrik Olsen.	Amdrup-boat and on foot.	Investigations at the (Eskimo) settlement in Storm-Bay.	
	7/5	12/5	6	Manniche.	On foot.	Ornithological investigations at Maroussia.	Stays with Trolle who camped at Maroussia.
	24/5	6/6	14	Knud Christiansen, Koefoed, Hendrik Olsen, Trolle and Weinschenck.	3 dog-sledges and on foot.	To fetch the boat near Cape Marie Valdemar.	Knud Christiansen and Hendrik Olsen return snowblind on 29/5. After G. Thostrup returned he and Hendrik Olsen take part in the transport of the boat.
	30/5	6/6	8	Peter Hansen and Charles Poulsen.			
	6/6	10/6	5	G. Thostrup and Weinschenck.	On foot.	Remain near the boats after these have been transported to Sytten-kilometernæsset.	
	9/6	28/6	20	Charles Poulsen and Trolle.	On foot.	Hydrographical investigations from Maroussia.	
	9/6	29/6	21	Fritz Johansen and Manniche.	On foot.	Zoological investigations near Storm Cape.	
1907	1/7	11/7	11	Peter Hansen, Fritz Johansen and Manniche.	Drag-sledge and on foot.	Scientific excursion to Storm Cape.	F. Johansen returns with drag-sledge on 2/7, Peter Hansen returns on 4/7.
	4/7	11/7	8	Lindhard and Koch.	On foot.	Minute survey in the neighbourhood of the station.	
	8/7	11/7	4	Trolle.	On foot.	Excursion to Storm Cape where Manniche was camped.	Assisted Manniche on his zoological excursions.
	12/7	31/7	20	Koch and Chr. Bendix Thostrup.	On foot.	Minute survey in the neighbourhood of the station.	
	24/7	29/7	6	Manniche and Trolle.	On foot.	Zoological investigations near Storm Cape.	Trolle returns on 26/7.
	29/7	31/7	3	Freuchen and Hendrik Olsen.	On foot.	Freuchen in order to assist Koch in the survey work, Hendrik Olsen in order to hunt.	

Year	From	To	Number of days	Members	Means of conveyance	Object of journey	Remarks
1907	29/7	1/8	4	Fritz Johansen and Trolle.	On foot.	Hydrographical and zoological investigations at Maroussia.	
	29/7	31/8	34	Bistrup, Tobias Gabrielsen, Hagerup, Peter Hansen, Manniche and Ring.	Amdrup-boat and drag-sledge.	Hunting excursion to Hvalrosodden.	Tobias returns on 20/8, Peter Hansen on 24/8, Bistrup takes part in the excursion to do survey work and Manniche to carry out zoological investigations. Manniche only meets the others at Storm Cape on 30/7.
	2/8	8/8	7	Freuchen and Chr. Bendix Thostrup.	On foot.	Minute survey of the district east of Danmarks Havn.	
	5/8	13/8	9	Bertelsen, Fritz Johansen, Lindhard, Hendrik Olsen, G. Thostrup and Weinschenck.	On foot.	Lindhard and G. Thostrup make minute surveys in the district round Syttenkilometer-næsset. Bertelsen paints, Hendrik Olsen hunts, Fritz Johansen carries on zoological investigations and Weinschenck inspects the motor-boat.	Fritz Johansen returns on 8/8. Bertelsen and Lindhard return on 11/8.
	10/8	11/8	2	Jarner.	On foot.	Geological investigations east of Danmarks Havn.	
	14/8	15/8	2	Hendrik Olsen, Koefoed, G. Thostrup and Weinschenck.	On foot and punt.	To fetch a shot walrus lying near the outer coast.	
	16/8	20/8	5	Trolle.	On foot.	To visit the hunting party at Hvalrosodden.	
	25/8	31/8	5	Freuchen and Trolle.	On foot.	To visit the hunting party at Hvalrosodden.	Trolle returns on 27/8.
	24/8	28/8	5	G. Thostrup and Weinschenck.	On foot, motor-boat and Boat No. 3.	Minute survey of the district round Syttenkilometer-næsset and to bring back the boats lying out there.	Together with the boats they brought back to the ship some meat of the walrus killed out near the outer coast.

Year	From	To	Number of days	Members	Means of conveyance	Object of journey	Remarks
	$^{25}/_{8}$	$^{31}/_{8}$	7	Trolle and Wegener.	On foot.	Reconnoitring expedition to Storm Bay and Hvalrosodden to see if they will be able to transport stores to Mørke Fjord.	Wegener returns on $^{26}/_{8}$, Trolle on $^{27}/_{8}$.
	$^{1}/_{9}$	$^{4}/_{9}$	4	Jarner and Lundager.	Amdrup-boat and on foot.	Scientific investigations at Hvalrosodden.	Owing to ice they reach no further than Snenæs.
	$^{2}/_{9}$	$^{5}/_{9}$	4	Freuchen, Tobias Gabrielsen, Lindhard, Hendrik Olsen, Ring, Chr. Bendix Thostrup, G. Thostrup and Weinschenck.	Motor-boat and Boat No. 1 and carriage.	To bring forward some stores to the projected station in Mørke Fjord.	The stores are deposited at Snenæs.
1907	$^{3}/_{9}$	$^{16}/_{9}$	15	Fritz Johansen and Manniche.	Motor-boat and on foot.	Zoological investigations round the lakes near Storm Naze.	Johansen returns on $^{3}/_{9}$.
	$^{21}/_{9}$		1	G. Thostrup and Trolle.	On foot.	To reconnoitre the ice conditions along the coast.	
	$^{24}/_{9}$		1	Freuchen and Weinschenck.	Motor-carriage	To reconnoitre the ice conditions towards the west.	To deposit benzine for the motor-carriage near Snenæs.
	$^{25}/_{9}$	$^{8}/_{10}$	24	Freuchen, Jarner and Weinschenck.	Motor-carriage, drag-sledge and on foot.	To transport stores down to the station in Mørke Fjord. Jarner took part in the journey mainly for scientific purposes.	Weinschenck returns with the motor-carriage on $^{29}/_{9}$, Jarner on foot on $^{1}/_{10}$ and Freuchen with the drag-sledge on $^{18}/_{10}$.
	$^{28}/_{10}$	$^{30}/_{10}$	3	Hendrik Olsen and Charles Poulsen.	On foot.	Hunting excursion to Maroussia.	
	$^{3}/_{1}$		1	Fritz Johansen and Trolle.	On foot.	Hydrographical and zoological investigations.	
	$^{7}/_{1}$		1	Fritz Johansen and Trolle.	On foot.	Hydrographical and zoological investigations.	
1908	$^{17}/_{6}$	$^{20}/_{6}$	4	Fritz Johansen and Trolle.	On foot.	Hydrographical and zoological investigations from Maroussia.	
	$^{20}/_{6}$	$^{15}/_{7}$	26	Lundager.	On foot.	Botanical investigations in the neighbourhood of Snenæs.	

Year	From	To	Number of days	Members	Means of conveyance	Object of journey	Remarks
1908	$^{20}/_{6}$	$^{18}/_{7}$	29	Freuchen, Jarner, FritzJohansen and Chr. Bendix Thostrup.	On foot.	Scientific and ethnographical excursion to the regions round Hvalrosodden.	
	$^{17}/_{7}$	$^{18}/_{7}$	2	Bertelsen, Tobias Gabrielsen andHagerup.	On foot.	Walk to Snenæs to assist the party coming from Hvalrosodden.	

L. List of the documents, diaries and reports used in the preparation of the Report.

Besides the papers mentioned in the foot-notes the following documents, diaries, reports etc. have been used in the preparation of the present Report.

I. The writings left by Mylius-Erichsen.

Diary from 24/VI to 16/VIII 1906.
Scattered notes from the boat excursion into Dove Bay from 18/VIII to 14/IX 1906.
Diary from 15/IX to 27/IX 1906.
Diary from 19/X to 8/XI 1906.
Scattered notes from the sledge excursion to the Pendulum Islands from 13/XI to 4/XII 1906.
Diary from 4/XII to 18/XII 1906.
Diary from 15/I to 28/I 1907.
Diary from 15/II to 24/II 1907.
Diary from 28/II to 25/III 1907.
Report from Mylius-Erichsen to the Committee, dated Frederikshavn 2/VII 1906.
Report from Mylius-Erichsen to the Committee, dated Cape Bismarck 12/XI 1906 [1].
6 letters from Mylius-Erichsen to Lieutenant Trolle written on the great sledge journey to the north, namely [2]:

1 dated Cape Amélie 30/III 1907.
1 — the Bjørneskær depot 3/IV 1907.
1 — 80°09′ N. lat. 21/IV 1907.
1 — 26th day of the journey 22/IV 1907.
1 — 80°42′6 N. lat. 26/IV 1907.
1 — ca. 82°03′ N. lat. 28/V 1907.

Mylius-Erichsen's book of instructions regarding the duties onboard. Orders for the various boat- and sledge-expeditions etc. starting from Danmarks Havn.

II. Reports sent in to the leader of the Expedition of the journeys etc. made from Danmarks Havn.

Sledge journey to Cape Peschel to lay out depots from 23/XI to 25/XI 1906 by Hagen.
Great sledge journey to the north from 28/III to 23/VI 1907 by Koch and Bertelsen.
Bistrup and Ring's return from the great sledge journey from 23/IV to 13/V 1907 by Bistrup.
Drag-sledge journey to Dove Bay, Cape Peschel and the Koldewey Islands from 10/V to 20/VI 1907 by Jarner.

[1] Brought home by the members of Einar Mikkelsen's Expedition to Greenland's N.E. coast who returned in 1910 under the charge of Mr. F. Laub, Lieutenant in the Royal Danish Navy.

[2] Lent by Lieutenant Trolle to the editor of this Report.

Hunting excursion to Hvalrosodden from 29/VII to 31/VIII 1907 by Ring.
Relief sledge expedition to the north from 22/IX to 2/XI 1907 by G. Thostrup.
Relief sledge expedition to the north from 22/IX to 18/X 1907 by Ring.
Setting up the meteorological station in Pustervig from 1/X to 18/X 1907 by Gundahl Knudsen.
Surveying sledge journey to Hellefjord and Teufel Cape from 17/X to 28/X 1907 by Bistrup.
Laying out a depot on Observation Island from 13/XI to 23/XI 1907 by Koefoed.
Sledge journey to Shannon Island and Bass Rock from 25/XI 1907 to 23/I 1908 by G. Thostrup.
Sledge journey to Teufel Cape, Roon Bay and Besselfjord to lay out depots from 15/II to 23/II 1908 by Koefoed.
Drag-sledge journey over Sælsø to Dronning Louises Land from 1/III to 3/IV 1908 by Bertelsen.
Relief and search journey with the sledge northwards from 10/III to 26/III 1908 by Koch.
Drag-sledge journey to Dove Bay and Besselfjord from 15/IV to 3/IV 1908 by Bistrup.
Drag-sledge journey over Annekssø to Ymers Nunatak from 24/IV to 5/VI 1908 by Koch.
Sledge journey to the bay off Brede Glacier from 11/VI to 21/VI 1908 by Bistrup.

III. Reports etc. sent in to the Committee.

Report on Mylius-Erichsen, Hagen and Brønlund's journey to the Peary Channel and the journeys connected therewith from 11/VIII 1908 by Trolle.
Report on the period from 7/VII to 15/VIII 1908 by Trolle.
Jørgen Brønlund's diary.
Lieutenant Trolle's instructions book regarding the duties onboard.
The log-book of the "Danmark" the ship of the Expedition.
The engineers' log of the "Danmark", the ship of the Expedition.

IV. Reports deposited near Cape Bismarck in July 1908[1].

Preliminary report on the course of the Expedition by Trolle.
Report on the geological investigations by Jarner.
— - - zoological investigations (fishes and invertebrates) by Johansen.
— - - botanical investigations by Lundager.
— - - zoological investigations (land-mammals and birds) by Manniche.
— - - ethnographical investigations by Chr. Bendix Thostrup.
— - - hydrographical investigations by Trolle.
— - - meteorological, air-electric and magnetic investigations by Wegener.

V. Reports, information etc. kindly placed at the disposal of the editor during the preparation of the present report.

Lieutenant Bistrup has given a description of the sledge expedition to Morkefjord from 28/X to 5/XI 1906.
Stud. med. Freuchen has lent all his diaries from the Expedition.
Inspector Hagen, father of Lieutenant Hagen, has lent all his son's diaries from the Expedition.

[1] Brought home by the members of Einar Mikkelsen's Expedition to Greenland's N.E. coast who returned in 1910 under the charge of Mr. F. Laub, Lieutenant in the Royal Danish Navy.

Stud. polyt. Jarner has lent 2 of his diaries from the Expedition.
Captain Koch has given a description of:

1. The station in Danmarks Havn.
2. The sledge journey to the Pendulum Islands from 13/XI to 4/XII 1906.
3. The great sledge journey to the north in the spring of 1907, and has lent one of his diaries and has always willingly given any information I desired.

The petty officer Chr. Bendix Thostrup has given some smaller pieces of information.

1st mate G. Thostrup has lent one of his diaries from the Expedition.

Lieutenant Trolle has lent his official diaries, a private diary from the excursions, 6 letters written by Mylius-Erichsen during the great sledge journey to the north in the spring of 1907 and a list of all the journeys made from the station in Danmarks Havn.

Further, Trolle has given an account of most of the excursions in which he took part and has lent various other records regarding the Expedition.

Besides, Lieutenant Trolle has always been willing to give any information desired.

Dr. phil. Wegener has lent one of his diaries.

The following members of the Expedition have given a brief account of their participation in the Expedition:

Aage Bertelsen, Artist.
Hans Ludvig Jensen, Steward.
Fritz Johansen, stud. mag.
Axel Peter Hansen, Sailor.
Jens Gundahl Knudsen, Carpenter.
Charles Sofus Poulsen, Sailor.
Karl Johan Ring, Ice-pilot.
Alf Trolle, Lieutenant.
Alfred Lothar Wegener, Dr. phil.

Further, the Committee's large collection of incoming and outgoing communications, especially regarding the preparations and early history of the Expedition, has been made use of.

Finally, the popular report of "Danmark Expeditionen til Grønlands Nordøstkyst" published in Copenhagen 1909 by one of the members of the Expedition, the artist Mr. Achton Friis, has on many points been of great use to me.

For all the support received from many quarters, without which I should not have been able to draw up the present report, I would here express my best thanks.

G. Amdrup.

M.

Index [1].

[1] No page numbers are given for the names of the members of the Expedition, as they occur so often in the Report.

[2] The present King Christian X.

[3] The present Queen Alexandrine.

II.

HYDROGRAPHICAL OBSERVATIONS FROM THE DANMARK EXPEDITION

BY

ALF TROLLE

1913

Introduction.

The investigations and observations discussed in the following pages have been made on the Danmark Expedition to the north-east coast of Greenland in 1906—08, which was planned and started by Mylius-Erichsen and was carried out under his direction until his death in 1907. Thereafter I had the honour of directing the Expedition and of bringing it home to Denmark.

The observations were carried out partly from the vessel of the Expedition "Danmark," during the voyage to N. E. Greenland in 1906 and on the return voyage to Denmark in 1908, partly in the winter-harbour and on sledge and boat journeys in the neighbourhood of this.

Where my duties as responsible leader of the vessel came into conflict with the hydrographical investigations, the latter as a rule had to give way, being of less importance than the rapid and safe conduct of the vessel; but in August 1908 a cruise was undertaken northwards and eastwards in the coastal water off Kong Frederik VIII Land, the object being to make good use of the specially favourable ice conditions for carrying out hydrographical observations, and for trawling and dredging.

I am indebted to several of the members of the Expedition for good assistance in collecting the material. The zoologists Fritz Johansen and A. L. V. Manniche often helped me; Peter Hansen and Charles Poulsen were always willing and untiring helpers, as also J. Ring and Hagerup. The engineers Weinschenck and Koefoed helped me very much in repairing the instruments and fitting out the sledge and boat installations.

First-lieut. Bistrup rendered valuable assistance with regard to the tidal measurements. To Dr. phil. A. Wegener my thanks are due for data regarding the temperature of the air.

In working up the material Prof. Martin Knudsen and Dr. J. Gehrke have lent me their valuable assistance.

When fitting out I received good and useful advice in the procuring of instruments from Prof. Martin Knudsen, Prof. Fr. Nansen, Prof. Pettersson and cand. mag. J. P. Jacobsen. To one and all I beg to offer my heartiest thanks.

Brief review of hydrographical investigations in the Greenland Sea off N. E. Greenland.

The principal expeditions, which had made hydrographical investigations in the waters off N. E. Greenland previous to the Danmark Expedition and had published their results before 1906, were the following;

1891—92 Danish Expedition under Captain C. Ryder,
1899 Swedish Expedition under Nathorst,
1900 Danish Expedition under Captain G. Amdrup,
1900 Swedish Expedition under Kolthoff,
1901 Norwegian Expedition under Roald Amundsen.

On the basis of the observations made by these expeditions, the following, general picture of the hydrographical conditions in the Greenland Sea could be formed in 1906, the year when the Danmark Expedition set out.

The Greenland Sea, which means the portion of the Norwegian Sea bounded by N. W. Spitzbergen to N. E. Greenland, from the latter to Jan Mayen and Bjørneøen (Bear Island), consists of a deep central part with a depth of over 3000 m. and has the form of a triangle with a broad base towards the south and the apex towards the north (see bathymetric chart of the Northern Ocean published in 1909 by Fr. Nansen and Helland-Hansen, and Pl. XI and XII at the end of this report).

The sides of the triangle are respectively the continental banks of Spitzbergen and North-East Greenland, that is to say, the slopes of varying breadth lying off the coasts of these countries.

In the eastern part of the Sea the Gulf Stream runs northwards along the coast of Spitzbergen, bringing with it water from the Atlantic of some considerable warmth and salinity. A part of the Stream passes beyond Spitzbergen into the northern Polar Sea. In the western part of the Sea the Polar Current runs southwards carrying with it the ice-masses of the North Polar Sea. This Current consists of water, which is mixed with Siberian river-water, being thus

of less salinity than the Gulf Stream as also very much colder owing to its ice-masses and northern origin.

The conditions in the northernmost part of the Greenland Sea off the North-East coast of Greenland were still unknown, however, as no hydrographical investigations had been made *during the winter* north of RYDER's winter station in Scoresby Sound (ca. 72° N. lat.).

The Danmark Expedition has succeeded in obtaining a hydrographical section with stations at ca. 76° N. lat. from 3° W. long. in towards land and succeeded, further, in carrying out investigations in hitherto unknown fjords in North-East Greenland and on the coast at different seasons of the year.

A work has been published recently (DUC d'ORLEANS: Croisiére océanographique) which shows, that on the Expedition of the Duke of Orleans with the "Belgica" in 1905 E. KOEFOED carried out a very extensive series of oceanographical investigations in the same region of Greenland as the Danmark Expedition.

The "Belgica" did not stay the winter there, and therefore can give us no material for comparison with the investigations of the Danmark Expedition during this season.

Hydrographical investigations made on the Danmark Expedition to the North-East coast of Greenland in 1906—1908.

Brief account of the route followed and of the position of the hydrographical stations (see Pl. XI and XIII).

On June 24th 1906 the "Danmark" left Copenhagen and on July 22nd sailed out of Eskefjord on East Iceland. On the same day the first hydrographical investigations were made in the East Icelandic Polar Current (Series I and II).

Thereafter the course was set north-eastwards round Jan Mayen, keeping steadily eastwards so as not to enter the ice in a fog south of the latitude (75° N. lat.) which I considered the best, if we were to reach into land at about 76° N. lat. On the way surface observations were constantly made and current-bottles thrown overboard.

On July 30th we sighted the first, very scattered ice at about 74° 18′ N. lat., 2° 46′ W. long.; on the same day we made a series of hydrographical investigations (Series III) (sounding 2080 m., no bottom), then stood in through the edge of the ice on July 31st at about 75° 14′ N. lat., 4° 34′ W. long. and passed a belt of drift-ice — called by the Norwegian whalers "ispakke", that is, an isolated pack of drift-ice, which had been blown out to sea from the land.

We then sailed in water almost free of ice as far as ca. $75^1/_4°$ N. lat., $8^3/_4°$ W. long., where we came close to the edge of dense ice on August 1st and sailed along this backwards and forwards from

the 1st to the 3rd of August without being able to find a way in. Hydrographical investigations were carried out partly in the deep basin (Series IV, depth 2440 m.), partly on the steeply rising ground of the Bank (Series V, depth 840 m.).

On August 3rd we stood westwards through a narrow channel in the pack-ice and worked westwards through the ice in the days from the 3rd to 13th August. On the latter date we were through the densest part of the drift-ice and now sailed northwards in almost ice-free water (coast-water); hydrographical investigations were made

Fig. 1. The Danmark in the drift-ice; Wegener phot.

over the Continental Shelf (Series VI—IX) and also near land in the coast-water (Series X).

I may give here a short extract from the ship's journal for the days of sailing through the ice.

July 31. Noon position calculated: 75° 14′ N., 4° 34′ W., 1 p. m. we passed through the outermost edge of the ice. South-east swell in at the ice kept this together at the edge, so that we were obliged to lie anchored for some hours in a small bight in the ice and wait a favourable opportunity. Then kept the course almost directly W. N. W. Ice somewhat scattered. 6 p. m. water almost free of ice.

1/8. Noon position observed: 75° 14′ N., 8° 40′ W. Wind: south-west. Weather: fog with clear intervals.

From midnight til 8 a. m. sailed in almost ice-free water. 8 till 11 a. m. sailed through a streak of spread ice. 11 a. m. till 2 p. m. went through very scattered ice; course steadily W. N. W. 2 p. m. the ice became denser. The ice-floes had changed their character, becoming larger; one could see that they had not been exposed to seaway, a few were screwed up. 4 p. m. till 10 p. m. lay anchored to an ice-floe, whilst the tubes in the boiler were being cleaned; hydrographical Series III carried out.

10 p. m. till midnight we sailed in a fog. The ice became gradually denser. 12 midnight anchored on a floe owing to fog. Wind northerly, fairly fresh.

$^2/_8$. Noon position obs.: 75° 36′ N., 10° 40′ W. 2 till 4 a. m. continued through fairly dense ice. We got fast a few times but soon came free again. 4 p. m. the fog cleared away. The pack-ice was pretty much scattered in N. W. by N., denser towards the north and south. The floes became larger (ca. 1000 m.²) and more screw-ice was seen.

From 4 to 8 p. m. steered N. W. by N. through somewhat scattered ice. 8 p. m. till 5 a. m. sailed N. by E. along the edge of dense ice. 5 a. m. anchored to an ice-floe owing to leaky boiler-tubes. Drifted in the direction N. E. Wind S. S. W. Strength 4—5. Weather: fog with clear intervals. Hydrographical observations made on the edge of the Bank (Series V; depth 840 m.).

$^3/_8$. Noon position obs.: 75° 56′ N., 10° 10′ W. Drifted with the ice-floe till 9 a. m. The boiler then repaired. Steered N.W. through somewhat scattered ice till 6 p. m. Fell in with denser ice and fog. Anchored to an ice-floe. Wind S.W., strength 4 to 5. Weather: fog with clear intervals. Made hydrographical observations and worked with the trawl on the Continental Bank (Series VI, depth 300 m.).

$^4/_8$. Noon position: 76° 07′ N., 10° 39′ W. Stationary owing to dense fog until 2 p. m. The fog then cleared somewhat and we steered westward until $4^1/_2$ p. m., when we met with dense, packed ice. 8 p. m. the fog cleared away. The pack-ice was dense everywhere, not a drop of water being seen to the west except a narrow channel. Entered this. Wind S.W. almost still. Weather: fog with clear intervals.

$^5/_8$. Noon position: 76° 01′ N. lat., 12° 27′ W. long. 12 midnight. Met with the first, large ice-field. Steered westward in the clearing till 5 a. m. Took a couple of hours to pass a place where two large ice-fields lay edge to edge (a so-called ice-lock). Continued westwards till 12 midday, when we anchored to a field of screw-ice amidst fog and dense ice. From 2 p. m. till 12 midnight fast in the ice. Wind S. W. Strength 1; weather: clear, a few banks of fog.

$^6/_8$. Noon position obs.: 75° 42′ N., 12° 35′ W. 12 midnight. Got free of the ice. Sailed out into a small lake between the ice-fields.

No advance possible in a westerly direction. 5 p. m. the ice separated a little towards N.W. 8 p. m. steered northwards through fairly passable channels between large ice-fields. Weather: clear; wind calm.

$^{7}/_{8}$. Noon position obs.: 75° 56′ N., 14° 05′ W. Steered northwards in a narrow channel between two large ice-fields until $11^{3}/_{4}$ a. m. It then became impossible to advance further. The ice-fields lay edge to edge and formed an impenetrable ring. Tried in vain to force this and in the endeavour very nearly caught between two ice-fields which screwed together. 5—8 p. m. Saw the ice getting a little more scattered. Tried in vain several times to force the ice-locks. 8 p. m. succeeded. Came out into fairly scattered ice in the direction N.W—W. N.W. $11^{1}/_{2}$ p. m. Sighted the Greenland coast. Weather: clear; wind still.

$^{8}/_{8}$. Noon position obs.: 76° 01′ N., 14° 30′ W. Kept in the direction N.W. in somewhat scattered ice between large ice-fields till 6 a. m. Held up by large ice-fields, which lay densely packed together. Turned southwards to find if possible a place to slip through further south. 2 p. m. ice dense in all directions. Anchored to an ice-field. Weather: clear; wind S. S. E.; strength: 1.

$^{9}/_{8}$. Noon position obs.: 76° 03′ N., 14° 44′ W. 1 a. m. the ice scattered towards N. N.W. Steered in this direction till 4 a. m. when the ice again became dense. Anchored to an ice-field. Weather: fog. Wind: still.

$^{10}/_{8}$. Noon position obs.: 76° 06′ N., 15° 46 W. 12 midnight, the fog lifted for a moment. Observed a passable way towards the north-west. The fog thickened again. Kept north-westwards in the fog till 11 a. m. It was then impossible to advance. Anchored to an ice-floe. Shut in by a ring of large floes, which lay edge to edge and pressed together by some large ice-fields. Made several vain attempts to force the ice-lock. Weather: fog, later clear. Wind: N. E., strength 1.

$^{11}/_{8}$. Noon position obs.: 76° 02′ N., 16° 14 W. Lay shut in the whole day. Made several fruitless attempts to get free. Weather: snow. Wind: N. N. E., strength 1.

$^{12}/_{8}$. Noon position cal.: 76° 11′ N., 17° 05′ W. 8 a. m. got free after several hours' work in forcing a way round a large ice-field. When we got clear of this, we had passed the innermost edge of the heavy drift-ice. We were in the so-called "coast-water." Soundings made continually. 8 p. m. came to a land-icefield about 5 miles from land (S. Koldewey Isl.). Steered first south then northwards outside some large ice-fields, which lay close to the coast. Weather: clear. Wind: still.

$^{13}/_{8}$. Noon position: 76° 20′ N., 18° 14′ W. Steered northwards, following the edge of the fast land-ice. 3 p. m. we reached close in to land. Continued north towards Cape Bismarck through very

scattered ice. Made soundings. The motor-boats put out to reconnoitre and act as pilots. Weather: fog. Wind: S.W., strength 1.

$^{14}/_{8}$. Noon position: 76° 35′ N., 18° 36′ W. Continued further north in very scattered ice and partly quite open coast-water. Made soundings. Weather: overcast. Wind: southerly, strength 1.

$^{15}/_{8}$. Noon position: 77° 27′ N., 18° 20′ W. Continued north till 6 a. m. along the edge of the land-ice. Met with dense pack-ice. Turned at 77° 32′ N. lat. and stood southwards to Cape Marie Valdemar. Moored in a small bay in the fast land-ice. Landed provisions. Weather: overcast. Wind: S.E. veering to N.E., strength 4—3.

$^{16}/_{8}$. 9 a.m. stood southwards along the edge of the fast land-ice, which came to an end at 77° 05′ N. lat. and from there to Cape Bismarck the water was free of ice in to the coast. Rounded Cape Bismark and kept to the course N.N.W. up the Sound (Øresund). Stood into a bay on the south side of Cape Bismark Land (Danmarks Havn) and moored to an ice-floe.

$^{17}/_{8}$. Felt our way up the harbour and moored the "Danmark" with bow to the south, both anchors out, and the stern as close as possible to the land. Led a wire-warp and chains from the stern to a bower-anchor and stones on land.

During our stay in North-East Greenland from $^{17}/_{8}$ 1906 till $^{21}/_{7}$ 1908 hydrographical investigations were made from sledge and boat at the following places.

1. Maroussia (outer coast), observations repeated at different seasons of the year. Series XIII, XV, XVIII, XX—XXIII, XXV—XXXVI, XXXIX, XLII, LXXIII and LXXIV.
2. Øresund: Series XI, XIV, XVI, XXIV, LX A and B, LXII—LXIX, LXXII.
3. Danmarks Havn: Series XXXVII, XXXVIII, XL, XLI, XLIII, XLV—L, LIII, LXX, LXXI.
4. Store Belt: Series LVIII.
5. Lille Belt: Series LXI.
6. Stormbugt: Series XVII, XLIV, LIX.
7. Dovebugt: LVI.
8. Sælsø: LII, LV.
9. Anneksø: LIV.
10. Skibssø: LVII.

On July 21st 1908 the return voyage was begun.

As the ice conditions were specially favourable this summer, I decided to make a cruise northwards in order to carry out soundings and marine investigations in these parts of the Greenland Sea, which

are usually very difficult to approach. The intention was, if possible, to find a way out through the pack-ice at the most northerly latitude possible, in order to investigate the hydrographical conditions near the supposed submarine ridge connecting N. E. Greenland to Spitzbergen, the existence of which had become more probable from the discovery, that Greenland extended far to the N. E., running out in the low peninsula charted by the Danmark Expedition.

We succeeded in making a number of soundings, as also zoological and hydrographical investigations in the "coast-water" off the Greenland coast as far as to ca. 78° N. lat. (Series LXXIII—LXXVII).

At this latitude we met with some dense ice in the attempt to get out eastwards and owing to damage to the engines and fog, we were compelled to turn southwards.

We tried first to keep our course due south, but constantly met with dense ice.

It was quite evident, that the pack-ice lay with an edge towards the land-water, which ran in the direction almost S. S. E. from the place where we had first encountered pack-ice, ca. 78° N. lat., 14° W. long.

To come free of the ice in the fog we held our course true S.W. until the water became almost free of ice, then kept south and later S. E., turning southwards when the ice became denser. In this way, in constant fog, we came out of the pack-ice almost at the same latitude as we had entered (ca. 76° N. lat.) and on the way carried out supplementary hydrographical investigations (Series LXXVIII and LXXIX).

I may give a brief extract from the log of the voyage out through the ice.

$^{22}/_{7}$ 1908. Hydrographical and trawling investigations off Maroussia.

$^{23}/_{7}$. Noon position: 77° 27′ N., 16° 0′ W. Stood N. N. E. out in the coast water. The water almost quite free of ice. The few large floes encountered quite eaten into and consist of winter-ice. Weather: clear. Wind: S.W.; strength 1.

$^{24}/_{7}$. Noon position cal.. 78° 04′ N., 14° 00′ W. Soundings and hydrographical investigations. Stood further north as far as 78° N. lat. and then due E. Encountered a dense ice-edge. 12 midday: Stopped the engines partly owing to leaky boiler tubes, partly owing to fog. Weather: fog. Wind: southerly; strength 1.

$^{25}/_{7}$. Noon position: 77° 36′ N., 14° 17′ W. 6 a. m. Boilers repaired. Steered in the fog along the ice-edge and then S.W. and W. clear of the ice. Weather: fog. Wind: still.

$^{26}/_{7}$. Noon position cal.: 77° 21′ N., 15° 26′ W. Surrounded in the fog by some large ice-fields. These were much eaten into and their thickness varied from $^{1}/_{4}$—$^{1}/_{2}$ m. Between the ice-fields were a few remains of mounds of screw-ice, which had a height of ca. 5 m. above

the water. Manœuvred S.W. between the ice-fields. There was quite a quantity of drift-wood. Weather: fog. Wind: still.

$^{27}/_{7}$. Noon position cal.: 77° 08′ N., 16° 06′ W. Steered W. some 5 miles. The ice became gradually more and more scattered and at ca. 16° W. the course was set due S. Made soundings and trawled. In the course of night the fog cleared now and the course was set due S. E. The ice-fields still lay scattered about, but became heavier and in part more screwed. Weather: fog. Wind: southerly; strength 2.

$^{28}/_{7}$. Noon position cal.: 76° 06′ N., 13° 26′ W. Steered S. E. through very scattered ice. Lay at anchor in the night to repair leaking boiler tubes. Made hydrographical observations and trawled. Weather: fog. Wind: southerly; strength 3.

$^{29}/_{7}$. Noon position obs.: 75° 40′ N., 11° 10′ W. Steered due S. E. from 9 a. m. till 5 p. m. Passed by a number of a large ice-fields, which lay in N.—S. direction, from 5 to 10 p. m. Taking soundings all the time. 10 p. m. at $10^{1}/_{2}$° W. long. a sounding gave 500 m., no bottom. Almost at the same time the water became practically free of ice, whereas in the previous hours we had manœuvred in the fog from the one ice-lock to the other between the large ice-fields. Weather: fog with clear intervals. Wind: S.W.; strength 4.

$^{30}/_{7}$. Noon position cal.: 75° 26′ N., 9° 34′ W. Steered S. E. through a belt of small, broken hummocks with a few larger floes of ice. This small ice has been packed together fairly closely by the easterly wind. Animal life very rich. Quantities of seals, little auks, gulls etc. Weather: fog with clear intervals. Wind: easterly; strength 1.

$^{31}/_{7}$. Noon position: 74° 58′ N., 8° 05′ W. Steered S. E. in water almost free of ice. Marked increasing swell from S. E. 3 p. m. came to the outermost edge of the ice. The ice-floes dense. Sailed up and down the ice-edge, but as there were no openings for a passage through the floes, we chose a place where swell appeared strongest. Here, as was to be expected, the ice belt was quite thin and we quickly broke through. The water was quite greenish from small algae.

$^{1}/_{8}$—$^{15}/_{8}$. Homeward bound under sail and steam. Made observations on the surface-water on the way.

$^{15}/_{8}$. Sailed into Bergen.

Soundings.

1. Greenland Sea.

a. Apparatus and methods.

These soundings were made from the Expedition's vessel "Danmark" partly in 1906 on the way in towards the coast of North-East Greenland, partly in 1908 on the way home.

Like the hydrographical observations to be mentioned later they were only taken as the opportunity permitted, the progress of the vessel being the most essential, the measurements coming second.

For sounding the great depths in the waters east of the Continental Bank or Shelf we used an ordinary 25 kg. lead. One could tell when the lead struck the bottom from the fact, that the time taken for a certain number of meters (100) to run out suddenly increased. The method of taking the soundings will be described in more detail, however, under the hydrographical observations.

On the Continental Bank Captain C. CLAUSEN's Control Depth-sounder was used, with 600 m. line.

The depth-sounder was in constant use and worked satisfactorily.

The bottom-samples were taken up by smearing tallow on the end of the lead or depth-sounder. They were handed over later to Cand. polyt. JARNER, the geologist of the Expedition, from whom a detailed report regarding them may be expected.

The positions of the soundings were observed as a rule. In such cases the situation has been determined in the usual manner by moving a forenoon or afternoon position line to cut an observed midday or midnight latitude. Such a position is noted as "obs.", to contrast with a calculated position, where both latitude and longitude have been calculated by deadreckoning, which is noted by "cal.". Where nothing is noted at noon position, only the one part (latitude or longitude) has heen observed, the other calculated.

b. **Observations. Soundings in the Greenland Sea. (Table 1).**

Date	Time	N. Lat.	W. Long.	Depth m.	Nature of bottom	Remarks		
30/VII 06	10 p. m.	74°45′	3°23′	2080	No bottom	Position observed.		Series III
1/VIII -	8 -	75°27′	10°00′	2440	Soft	—	—	— IV
2/VIII -	10.35 p. m.	75°43′	10°15′	840	Mud	—	—	— V
3/VIII -	9 a. m.	75°54′	10°00′	823	Clay	—	—	
3/VIII -	10 p. m.	76°05′	10°50′	300	Soft	—	—	— VI
4/VIII -	6.30 p. m.	76°05′	10°55′	310	—			
6/VIII -	2 a. m.	75°45′	12°27′	400	—			
8/VIII -	1—4 p. m.	76°00′	14°34′	310	—	—	—	— VII
9/VIII -	1 a. m.	75°57′	14°44′	300	—			
10/VIII -	10 -	76°06′	15°46′	180	—			
11/VIII -	3 -	76°05′	16°04′	170	Clay	—	—	— VIII
—	11 -	76°02′	16°14′	150	Clay	—	—	— IX
12/VIII -	10 -	76°10′	16°44′	83	Sand			
—	11 -	76°11′	16°56′	95	—			
—	12 noon	76°11′	17°05′	76	—			
—	1 p. m.	76°11′	17°12′	110	Fine Sand			
—	2 -	76°11′	17°22′	90	—			
—	3 -	76°11′	17°32′	300	No bottom			
—	4 -	76°11′	17°41′	220	Clay			
—	5 -	76°12′	17°50′	200	—			
—	6 -	76°12′	17°56′	150	—			
—	7 -	76°14′	18°09′	170	—			

Date	Time	N. Lat.	W. Long.	Depth m.	Nature of bottom	Remarks
12/VIII 06	8 p. m.	76°15′	18°22′	95	Mud	Position noted by bearings
—	9 -	76°13′	18°18′	110	Clay	
—	10 -	76°11′	18°15′	136	—	
—	11 -	76°12′	18°07′	182	Stones	
—	12 mn.	76°13′	17°58′	130	Mud	
13/VIII -	1 a. m.	76°15′	18°00′	113	—	
—	2 -	76°16′	18°06′	115	Clay	
—	3 -	76°17′	18°13′	110	—	
—	4 -	76°20′	18°14′	115	—	ca. 5 miles E. of Koldewey Isl.
—	5 -	76°20′	18°22′	135	—	
—	6 -	76°20′	18°29′	140	—	
—	7 p. m.	76°23′	18°33′	35	Mud	
—	8 -	76°27′	18°34′	86	Fine Sand	
—	9 -	76°31′	18°35′	155	Clay	
14/VIII -	3 p. m.	76°35′	18°36′	46	Stones	
—	4 -	76°38′	18°28′	147	—	
—	5 -	76°41′	18°20′	116	Stones	
—	6 -	76°44′	18°13′	225	Clay	
—	7 -	76°47′	18°06′	145	Stones	
—	8 -	76°50′	17°58′	84	—	
—	9 -	76°55′	17°58′	95	—	
—	10 -	76°59′	17°58′	190	—	
—	11 -	77°04′	17°58′	260	—	
—	12 mn.	77°08′	17°58′	280	—	
15/VIII -	1 a. m.	77°13′	17°58′	225	Clay	
—	2 -	77°17′	17°58′	140	Stones	
—	3 -	77°21′	17°58′	120	Clay	
—	4 -	77°25′	18°05′	90	—	
—	5 -	77°29′	18°14′	110	Clay	
—	6 -	77°32′	18°20′	180	Mud	
—	11 p. m.	77°18′	18°20′	65	Clay	At land-ice off Cape Marie Valdemar. Series X.
16/VIII -	3 -	76°53′	18°10′	140	—	
—	4.30 p. m.	76°50′	18°14′	160	—	
—	5 p. m.	76°47′	18°16′	285	—	
22/VII 08	10.25 a. m.	76°40′	18°27′	170	Mud	Position noted by bearings
—	10.56 -	76°40′	18°19′	120	—	— — - —
—	11.30 -	76°41′	18°11′	75	—	— — - —
—	56 -	76°42′	18°04′	300	—	— — - —
—	0.32 p. m.	76°42′	17°58′	320	—	
—	6 -	76°45′	17°52′	330	—	
—	7 -	76°47′	17°47′	350	Clay	
—	8 -	76°50′	17°42′	290	—	
—	9 -	76°52′	17°36′	275	—	
—	10 -	76°55′	17°31′	260	—	
—	11 -	76°57′	17°26′	260	—	
—	12 mn.	77°00′	17°20′	220	—	
23/VII -	1.05 a. m.	77°03′	17°06′	210	—	
—	2 -	77°05′	16°56′	210	—	
—	3 -	77°08′	16°45′	190	Mud	
—	3.50 -	77°10′	16°36′	160	—	
—	5 -	77°13′	16°26′	170	Clay	
—	6 -	77°16′	16°18′	205	—	
—	7 -	77°18′	16°09′	220	—	
—	8 -	77°21′	16°00′	285	Clay and stones	
—	9 -	77°24′	16°00′	300	Clay	Series LXXVI
—	0.30 p. m.	77°28′	16°00′	305	—	
—	1 -	77°30′	16°00′	325	—	
—	2 -	77°33′	16°00′	310	—	
—	3 -	77°37′	16°00′	320	—	
—	4 -	77°41′	10°00′	365	—	
—	5 -	77°43′	16°07′	370	—	

Date	Time	N. Lat.	W. Long.	Depth m.	Nature of bottom	Remarks
23/VII 08	6 p. m.	77°45′	15°50′	375	Clay	
—	7 -	77°47′	15°37′	375	—	
—	8 -	77°50′	15°30′	450	—	
—	9 -	77°53′	15°26′	400	—	
—	10 -	77°55′	15°17′	440	—	
—	11 -	77°56′	15°09′	430	Mud	
24/VII -	0.15 a. m.	77°58′	15°02′	450	Clay	
—	1 -	78°00′	15°12′	490	—	
—	2—5 -	78°00′	15°18′	424	—	Series LXXVII
—	6 -	78°01′	15°04′	500	No bottom	
—	7 -	78°02′	14°48′	450	Mud	
—	9 -	78°03′	14°24′	300	Clay	
—	10 -	78°03′	14°17′	160	—	
—	11 -	78°04′	14°08′	143	—	
—	11.40 a. m.	78°04′	14°03′	127	—	
—	0.30 p. m.	78°03′	14°04′	240	Mud	
—	2 -	78°01′	14°10′	375	—	
25/VII -	6 a. m.	77°55′	14°20′	375	—	
—	8 -	77°48′	14°35′	375	—	
—	10 -	77°42′	14°32′	400	Clay	
—	12 noon	77°36′	14°17′	325	—	
—	2 p. m.	77°32′	14°34′	300	—	
—	4 -	77°29′	14°51′	290	—	
—	6 -	77°29′	15°00′	300	—	
—	10 -	77°26′	15°23′	280	—	
—	12 mn.	77°25′	15°27′	300	—	
27/VII -	4 a. m.	77°17′	15°35′	300	—	
—	8 -	77°11′	15°46′	260	—	
27/VII -	11 -	77°09′	16°06′	220	Clay and shells	
—	2 p. m.	77°00′	16°06′	200	Clay and stones	
—	4 -	76°54′	16°06′	270	Clay	
—	7 -	76°42′	16°00′	190	—	
—	8 -	76°39′	15°48′	200	—	
—	9 -	76°36′	15°37′	188	—	
—	10 -	76°33′	15°25′	170	—	
—	11 -	76°30′	15°14′	200	—	
—	12 mn.	76°27′	15°03′	200	—	
28/VII -	2 a. m.	76°22′	14°41′	195	—	
—	3 -	76°19′	14°30′	190	—	
—	4 -	76°17′	14°10′	175	—	
—	6 -	76°10′	14°01′	200	—	
—	7 -	76°07′	13°50′	220	—	
—	8 -	76°05′	13°38′	210	—	
—	2.30 p. m.	76°06′	13°01′	360	—	
—	6 -	75°52′	12°15′	365	Mud	Series LXXVIII
29/VII -	4 a. m.	75°50′	11°38′	295	Clay	
—	10 -			270	—	
—	12 noon	75°40′	11°10′	290	—	
—	2 p. m.			265	—	
—	4 -	75°33′	11°04′	280	—	
—	8 -	75°33′	11°02′	290	—	
—	10 -	75°32′	10°26′	500	No bottom	Series LXXIX
30/VII -	10 -	75°15′	8°45′	2600	—	

c. **Remarks on the soundings.**

The soundings have been in part marked down on a Chart of the portion of the Greenland Sea, which lies off Kong Frederik VIII Land between 76°—78° N. lat. and 13°—22° W. long. (Pl. XIII). Part of them, with the permission of NANSEN and B. HELLAND-HANSEN, have been added to their bathymetric Chart of the Norwegian Sea (Pl. XII). A portion of this Chart between 74°—82° N. lat., is included as it gives an excellent view of the bathymetric conditions in the Greenland Sea.

It has been published as late as 1909 and even the most recent soundings from the "Belgica" Expedition of the Duke of Orleans in 1905 are included, and the land contours of North-East Greenland have been drawn in agreement with the discoveries of the Danmark Expedition.

The following are small corrections and additions to the Chart as the result of the Danmark-Expedition:

1. The 1500 m. curve obtains a somewhat different appearance at ca. 75°—76° N. lat.

2. A number of new soundings have been added on the Continental Bank and along the coast between 76° and 78° N. lat., thus filling out the isobath curves here. The soundings show, that there is a sloping bank in the Greenland Sea off the coast of Greenland at 76° N. lat. extending from ca. 10° W. long. in towards the land.

Similar banks occur everywhere off the Greenland coast at different latitudes, as can be seen from the bathymetric Chart.

This bank is the so-called Continental Bank, which, as known, forms a continuation of the mainland under the sea with comparatively shallow depths (less than 500 m.) and descends with a steep wall towards the great depths of the Atlantic (the so-called Continental Edge).

The Bank is cut through by deeper, submarine fjords running in the main direction E. N. E. and there are higher plateaus with fairly uniform depths. It seems to be shallowest at some distance from land (30—40 miles).

At ca. 76° N. lat., 17° W. long. a depth of only 76 m. was found, which was followed by a depth of over 300 m. some few kilometers nearer the land. The so-called Belgica Bank, where the "Belgica" in 1905 had a sounding of 56 m., is perhaps a similar ridge on the Bank, the western edge of which at 78° N. lat. presumably lies just at the place where the "Belgica" found the bank, as the shallowest soundings seem to lie almost parallel with the coast in the main direction N. N. E—S. S. W. and on an imaginary line connecting Greenland N. E. Runding to Shannon Island (see Pl. XII).

Between the Ridge and the coast a deeper channel was found (see Pl. XII and XV).

The nature of the bottom on the bank was mud or very soft clay, and in the deeper channel near to land mainly sand and gravel.

On the inner side of the deeper channel lie the fringe of islands and the fjord systems, partly shut off by barriers at the entrances, partly in communication with the submarine fjords, which transect the Bank.

The hydrographical investigations to be discussed later have shown the close connection which exists between this topographical nature of the bottom and the circulation of the water, a relation, however, which is found everywhere.

2. Fjords and sounds.

a. Method of the observations.

These soundings were made from the sledge in the autumn of 1907 and spring of 1908.

A 5 kg. lead was used. The method of taking the soundings is described in more detail later under the hydrographical observations.

The soundings in Øresund, Lille Belt and a part of Stormbugt (the waters in the neighbourhood of Danmarks Havn) were made in the autumn of 1907 on the newly frozen autumn-ice.

The soundings were taken along certain lines with a distance of ca. 450 steps between each sounding.

At every 3rd sounding the position was determined by measurement of the angles towards the cairns in the triangle determined astronomically.

The time for each sounding was noted, so as to correct the depths to the mean level of the water.

The depths proved to be inexact, however, within an error of 1 m., as the meter-wheel sometimes became frozen. The depth was then measured by counting the number of turns of the drum; but as the line could not always be wound quite uniformly on this, experiments were made, which showed, that the amount of accuracy could not be taken as greater than that indicated above.

The soundings in the Store Belt were made in the spring of 1908. As the ice at this time had a thickness of over 1 m., the taking of each sounding meant a fairly considerable amount of work, and the number of soundings made was therefore not great.

Time only permitted us to make a single line of soundings from Koldewey Island across towards Teufelkap.

In the spring of 1908 we also made some soundings in Mørkefjord and some few soundings in Sælsø and Annekssø, as also in Dove Bugt.

The nature of the bottom was determined in the ordinary way by fixing tallow on the end of the lead. The samples were given to the geologist for further investigation.

b. Observations. Soundings in the sounds, fjords and inland lakes. (Table 2).

1. Øresund, Lille Belt and Stormbugt.

Date	Time	N. Lat.	W. Long.	Depth m.	Nature of Bottom	Remarks
4/x 07		76°41'9	18°37'	44	Stones and shells	Cape Bismarck.
—		—	—	27	Sand	Maatten.
—	11.16 a. m.	—	—	27	Shells	Line past Renskæret.
—	35 -	—	—	107	Gravel	
—	47 -	—	—	82	Shells	
—	58 -	—	—	30	—	
—	12.07 p. m.	—	—	8	—	ca. 10 m from SE. point of Renskæret.
—	15 -	—	—	26	—	Line past Maroussia.
—	26 -	—	—	52	—	
—	37 -	—	—	59	—	
—	48 -	—	—	34	Stones and shells	
—	58 -	—	—	30	Shells	
—	1.43 -	—	—	14	—	ca. 10 m from Maroussia.
—	53 -	—	—	42	—	Line towards C. Christian.
—	2.04 -	—	—	161	—	
—	15 -	—	—	153	—	
—	26 -	—	—	110	Sand	
—	35 -	—	—	65	Sand and stones	
—	45 -	—	—	46	Shells	
—	53 -	—	—	44	—	
—	3.00 -	—	—	25	—	
—	11 -	—	—	77	Stones	
—	24 -	—	—	99	Gravel	
—	35 -	—	—	57	Shells	
—	55 -	—	—	38	—	
—	4.45 -	—	—	38	Clay	
—	58 -	—	—	32	Gravel and shells	
—	5.12 -	—	—	24	Stones	End.
—	23 -	—	—	36	Shells	Line past Bjørn Pt.
—	30 -	—	—	42	Clay	
5/x -	11.14 a. m.	—	—	61	—	
—	23 -	—	—	85	Stones	End.
—	12.44 p. m.	—	—	170	Gravel	Line from Maroussia towards J. P. Jacobsens Isl.
—	58 -	—	—	202	Sand	
—	1.09 -	—	—	124	—	
—	18 -	—	—	72	Shells	
—	26 -	—	—	25	Stones	
—	42 -	—	—	1.5	—	ca. 5 m from J. P. Jacobsens Isl.
—	2.35 -	—	—	26	Shells	Line towards Renskæret.
—	45 -	—	—	56	—	
—	3.01 -	—	—	165	Sand	
—	15 -	—	—	171	Gravel	
—	30 -	—	—	200	—	
—	56 -	—	—	156	Sand	
—	4.10 -	—	—	101	Shells	
—	19 -	—	—	29	—	Renskæret.
—	29 -	—	—	92	—	Line towards Simonsens Skerries.
6/x -	10.35 a. m.	—	—	167	Sand	
—	50 -	—	—	72	—	
—	11.00 -	—	—	89	Shells	
—	11 -	—	—	121	—	
—	22 -	—	—	108	Sand	
—	32. -	—	—	97	—	

Date	Time	N. Lat.	W. Long.	Depth m.	Nature of Bottom	Remarks
6/x 07	11.42 a. m.	—	—	89	Gravel	
—	59 -	—	—	60	Sand	
—	12.10 p. m.	—	—	52	Clay	
—	19 -	—	—	29	Shells	
—	28 -	—	—	37	—	
—	46 -	—	—	8	—	ca. 50 m from Simonsens Skerries.
—	1.23 -	—	—	31	—	Line towards Cape Bismarck cairn.
—	31 -	—	—	19	—	
—	40 -	—	—	31	—	
—	52 -	—	—	37	—	
—	2.00 -	—	—	69	—	
—	10 -	—	—	108	—	
—	20 -	—	—	123	Sand	
—	32 -	—	—	117	—	
—	42 -	—	—	73	Shells	
—	53 -	—	—	63	—	
—	3.02 -	—	—	40	—	
—	12 -	—	—	69	—	
—	25 -	—	—	144	—	
—	36 -	—	—	89	Stones	ca. 30 m from coast north of C. Bismarck.
7/x -	2.14 -	—	—	34	—	Line towards Lille Koldewey Isl.
—	25 -	—	—	104	—	
—	34 -	—	—	56	Shells	
—	46 -	—	—	30	Stones	
—	55 -	—	—	29	Shells	
—	3.03 -	—	—	54	—	
—	11 -	—	—	63	—	
—	22 -	—	—	57	Stones	
—	32 -	—	—	48	—	
—	40 -	—	—	52	—	
—	48 -	—	—	50	Shells	
—	56 -	—	—	28	Stones	
—	4.04 -	—	—	15	Stones and shells	ca. 275 m from coast of Lille Koldewey
—	35 -	—	—	12	Stones	Line towards C. Bismarck Peninsula.
—	44 -	—	—	37	Sand	
—	56 -	—	—	52	Clay	
—	5.06 -	—	—	65	Shells	
—	14 -	—	—	58	Clay	
—	24 -	—	—	53	Stones	
—	36 -	—	—	65	Shells	
—	46 -	—	—	64	Clay	
8/x -	10.45 a. m.	—	—	61	Clay and shells	
—	55 -	—	—	62	Shells	
—	11.04 -	—	—	85	Stones	
—	15 -	—	—	85	Shells	ca. 150 m from coast of C. Bismarck Peninsula.
—	50 -	—	—	16	Sand	Line towards Lille Koldewey Isl.
—	12.04 p. m.	—	—	121	Shells	
—	14 -	—	—	72	—	
—	24 -	—	—	50	—	
—	33 -	—	—	46	—	
—	42 -	—	—	74	Sand	
—	54 -	—	—	50	—	
—	1.03 -	—	—	58	Shells	
—	12 -	—	—	74	—	
—	25 -	—	—	42	—	
—	34 -	—	—	59	Clay	
—	44 -	—	—	51	Sand	
—	1.54 -	—	—	11	Gravel	ca. 75 m from coast of Lille Koldewey.

Date	Time	N. Lat.	W. Long.	Depth m.	Nature of Bottom	Remarks
8/x 07	2.00 p. m.	—	—	31	Shells	Line towards Vestre Havnenæs.
—	08 -	—	—	55	Clay	
—	18 -	—	—	49	Shells	
—	25 -	—	—	34	Sand and shells	
—	42 -	—	—	56	Shells	
—	54 -	—	—	104	Clay	
—	3.04 -	—	—	136	Clay	
—	15 -	—	—	105	Sand	
—	25 -	—	—	95	Clay	
—	36 -	—	—	86	—	
—	45 -	—	—	66	Sand and shells	
—	54 -	—	—	52	Shells	
—	4.00 -	—	—	26	—	
—	15 -	—	—	25	Stones	
—	26 -	—	—	25	—	ca. 375 m from V. Havnenæs.
9/x -	10.01 a. m.	—	—	13	Sand and shells	Line towards C. Bornholm.
—	19 -	—	—	25	Stones	
—	30 -	—	—	26	—	
—	37 -	—	—	33	Sand	
—	47 -	—	—	29	Shells	
—	55 -	—	—	59	—	
—	11.05 -	—	—	69	Sand and shells	
—	15 -	—	—	88	Sand	
—	24 -	—	—	105	Corals	
—	37 -	—	—	113	Shells	Ended at open water.
—	12.00 noon	—	—	52	Corals	Line Harefjeld cairn to Baadskær Isl.
—	10 p. m.	—	—	45	Gravel	
—	19 -	—	—	50	—	
—	30 -	—	—	86	Shells	
—	45 -	—	—	66	—	Ended at open water.
12/x -	11.36 a. m.	—	—	12	Sand	ca. 200 m from coast north of Vesterdalen.
—	45 -	—	—	25	Sand and Shells	Line from below Vesterdalen towards Trip-Trap Skerries.
—	55 -	—	—	72	—	
—	12.05 p. m.	—	—	107	—	
—	16 -	—	—	158	Clay	
—	30 -	—	—	214	—	
—	47 -	—	—	235	Sand	
—	1.02 -	—	—	242	—	
—	15 -	—	—	244	Clay	
—	30 -	—	—	226	—	
—	41 -	—	—	207	—	
—	2.00 -	—	—	216	Sand	
—	14 -	—	—	131	Shells	Bottom-sample kept.
—	24 -	—	—	111	Gravel	
—	35 -	—	—	98	Gravel and shells	
—	47 -	—	—	104	Sand	
—	3.00 -	—	—	96	Clay	
—	10 -	—	—	64	Sand	
—	17 -	—	—	48	Shells	
—	30 -	—	—	77	Clay	
—	39 -	—	—	52	Shells	
—	4.00 -	—	—	29	Gravel	ca. 150 m from Trip-Trap Skerries.
—	17 -	—	—	57	Clay	Line towards Terne Skerries.
—	28 -	—	—	79	Corals	
—	4.37 -	—	—	105	Gravel	

Date	Time	N. Lat.	W. Long.	Depth m.	Nature of Bottom	Remarks
12/x 07	4.51 p. m.	—	—	120	Clay	Bottom-sample kept.
—	5.04 -	—	—	125	—	
13/x -	10.24 a. m.	—	—	126	—	
—	36 -	—	—	125	—	
—	54 -	—	—	111	—	
—	11.12 -	—	—	120	—	
—	37 -	—	—	98	—	
—	55 -	—	—	98	—	End.
—	12.12 p. m.	—	—	125	—	Line towards 426 m cairn.
—	28	—	—	112	—	
—	1.04 -	—	—	142	—	
—	15 -	—	—	70	—	
—	30 -	—	—	58	Shells	
—	44 -	—	—	62	Clay	
—	55 -	—	—	78	Sand	
—	2.10 -	—	—	114	Clay	
—	24 -	—	—	144	—	
—	40 -	—	—	164	—	
—	55 -	—	—	131	—	
—	3.12 -	—	—	117	Sand	
—	25 -	—	—	105	Clay	
—	37 -	—	—	70	Gravel	
—	49 -	—	—	25	Clay	ca. 150 m from coast.
14/x -	10.51 a. m.	—	—	38	Sand and shells	Line towards Storm Cape.
—	11.06 -	—	—	71	—	
—	17 -	—	—	90	Shells	
—	30 -	—	—	96	Sand	
—	46 -	—	—	94	—	
—	12.00 -	—	—	75	—	
—	15 p. m.	—	—	56	—	
—	30 -	—	—	17	—	ca. 100 m from Storm Cape.
—	2.00 -	—	—	7	Gravel	Line from Terne Skerries to east point
—	15 -	—	—	50	Clay	on N.-side of Store Koldewey.
—	25 -	—	—	87	—	
—	40 -	—	—	108	—	
—	58 -	—	—	111	—	
—	3.12 -	—	—	104	—	
—	37 -	—	—	106	—	End.
15/x -	10.55 a. m.	—	—	10	Stones	ca. 85 m from coast S. of Vesterdalen.
—	11.07 -	—	—	22	—	Line towards E.-point on N.-side of
—	16 -	—	—	41	—	Store Koldewey.
—	30 -	—	—	70	Gravel	Bottom-sample kept.
—	40 -	—	—	101	—	
—	52 -	—	—	149	Sand	
—	12.15 p. m.	—	—	227	—	
—	30 -	—	—	195	Clay	
	43 -	—	—	185	Sand	
—	58 -	—	—	206	Clay	
—	1.12 -	—	—	201	—	
—	24 -	—	—	167	Sand	
—	37 -	—	—	163	Clay	
—	48 -	—	—	118	—	Ended at open water.
—	3.46 -	—	—	20	Sand and shells	Line from Trip-Trap Skerries to C. Bornholm.
—	4.06 -	—	—	28	Stones	
—	4.24 p. m.	—	—	42	Gravel	
—	45 -	—	—	135	Clay	
—	5.00 -	—	—	166	—	
—	15 -	—	—	180	Sand	
—	30 -	—	—	180	—	End

Date	Time	N. Lat.	W. Long.	Depth m.	Nature of Bottom	Remarks
20/x 07	—	—	—	71	Sand	Line from S. of Vesterdalen towards
—	—	—	—	48	Shells	E. point of N. side of Store Koldewey, continued to land.
—	—	—	—	35	Stones	ca. 175 m from coast.
—	—	—	—	16	Sand	ca. 75 m from coast.
—	—	—	—	57	Gravel	Line from Store Koldewey towards C.
—	—	—	—	60	Stones	Bornholm.
—	—	—	—	47	Sand	
—	—	—	—	95	Clay	
—	—	—	—	95	Sand	
—	—	—	—	125	Clay	
—	—	—	—	149	—	
—	—	—	—	154	—	
—	—	—	—	160	Sand	
—	—	—	—	79	—	
21/x -	—	—	—	45	Gravel and shells	Line from C. Bornholm towards Baadskær (Continuation).
—	—	—	—	46	Shells	
—	—	—	—	43	—	
—	—	—	—	68	—	Continued to Baadskær.
—	—	—	—	27	—	ca. 200 m from Baadskær.
—	—	—	—	122	Sand	Continuation of line Vestre Havnenæs
—	—	—	—	104	Gravel	to C. Bornholm.
—	—	—	—	66	Stones	ca. 400 m from coast at C. Bornholm.
—	—	—	—	18	Sand	Continuation of line from C. Bornholm
—	—	—	—	55	Stones	to Trip-Trap Skerries.
22/x -	—	—	—	56	Shells	Line from St. Koldewey towards 394
—	—	—	—	158	Sand	m cairn.
—	—	—	—	155	Clay	
—	—	—	—	150	—	
—	—	—	—	148	—	
—	—	—	—	105	Coral	
—	—	—	—	69	Clay	
—	—	—	—	18	Sand	ca. 100 m from coast.
—	—	—	—	25	Stones	
—	—	—	—	137	Sand	Line from St. Koldewey towards land
—	—	—	—	147	Clay	N. of Röselöbet.
—	—	—	—	147	—	
—	—	—	—	139	—	
—	—	—	—	122	—	
—	—	—	—	61	Gravel	ca. 350 m from coast.
—	—	—	—	66	—	Line from Lille Koldewey towards
—	—	—	—	132	Clay	Store Koldewey.
—	—	—	—	71	Sand	
—	—	—	—	42	Stones	ca. 150 m from coast.
—	—	—	—	27	Sand	Line from Store Koldewey towards
—	—	—	—	55	Stones	Skerries outside Sonja Havn.
—	—	—	—	47	—	
—	—	—	—	144	—	
—	—	—	—	171	—	
—	—	—	—	155	Clay	
—	—	—	—	128	Stones	
—	—	—	—	42	Shells	ca. 350 m from coast.
16/VIII 06	6.00 p. m.	76°43′	18°19′	85	—	due S 71 W.
—	25 -	—	—	59	Clay and shells	Entering Danmarks Havn.
—	35 -	—	—	31	Shells	
—	45 -	—	—	66	—	
—	55 -	—	—	35	Stones	
—	7.05 -	—	—	30	Shells	Maatten.
21/VII 08	6.05 p. m.	76°45′.2	18°45′	58	Clay	Østre Havnenæs.
—	16 -	—	—	57	—	Due S.

Date	Time	N. Lat.	W. Long.	Depth m.	Nature of Bottom	Remarks
21/VII 08	6.26 p. m.	—	—	63	Shells	Leaving Danmarks Havn.
—	40 -	—	—	60	Clay	
—	55 -	—	—	74	Sand and Gravel	Towards Maroussia due S 34 E.
—	7.05 -	—	—	60	Shells	
—	14 -	—	—	81	Sand and Clay	
—	30 -	—	—	102	Gravel	
—	35 -	—	—	106	Sand and gravel	
—	55 -	—	—	153	Clay	
—	8.18 -	—	—	178	Sand	
—	28 -	—	—	159	Sand and gravel	
22/VII -	10.25 a. m.	76°39′.8	18°28′	170	Mud	Due N 72 E.
—	56 -	76°40′.9	18°20′	120	Mud and stones	
			2. Store Belt, Dove Bugt.			
19/III 08	—	76°36′	19°14′	306	Mud	Position determined by bearings to land.
20/III -	—	76°28′	19°20′	300	—	
21/III -	—	76°27′	19°29′	387	—	
22/III -	—	76°26′	19°44′	355	—	
23/III -	—	76°25′	20°03′	121	—	
25/III -	—	76°36′	19°47′	256	—	
26/III -	—	76°39′	19°38′	193	—	
28/III -	—	76°44′	19°08′	62	Sand and clay	
28/V -	—	76°51′	19°51′	217	Clay	Series LVI. Bottom-sample kept.
7/VI -	—	76°29′	19°28′	357	Mud	— LVIII —
			3. Mörkefjord, Pustervig.			
23/IV -		76°56′	21°00′	24	Clay	Position determined by bearings to land.
24/IV -	—	76°56′	20°52′	66	—	
26/IV -		76°57′	20°58′	1.5	Gravel and small stones	Mouth of innermost part of fjord.
27/IV -	—	76°57′.5	21°02′	24	Sand and clay	Bottom-sample kept.
28/IV -	—	76°57′.2	21°07′	14	very soft clay	—
3/V -	—	76°57′.0	21°13′	15	—	—
			4. Sælsø, Annekssø, lake at Danmarks Havn.			
11/V -	—	77°02′.3	20°23′	69	grayish clay-ooze	Bottom-sample kept. Series LII.
24/V -	—	77°04′.8	20°47′	117	—	— — LV.
20/V -	—	77°15′.2	21°00′	90	brownish clay	— — LIV.
2/VI -	—	76°46′.5	18°47′	4	Gravel	Series LVII.

c. **Remarks on the soundings.**

The soundings have been noted on the special Chart of Danmarks Havn and Environs (Pl. XIV and on Pl. XIII).

Øresund, Lille Belt and Store Belt form the three entrances from the sea to Stormbugt and Dove Bugt, i. e. the inner waters south of Germania Land. In Øresund and Lille Belt there are bars at the

entrance with a depth of less than 100 m., whereas in Store Belt the depth on the bar is over 300 m. and the deep water extends south round the southern Koldewey Island, continuing as a submarine fjord, which transects the Continental Bank at ca. $75^3/_4°$ N. lat.

From Dove Bugt the Hellefjord and Mørkefjord cut right into the inland ice.

In the fjords and sounds more to the south (Hellefjord and sounds between Edwards Isl. and Carl Hegers Isl.) no soundings were taken. They seem to be deep in the westernmost part as here there were floating icebergs from Brede Glacier and L. Bistrups Glacier; the height of these above the sea was 30—40 m. and their depth must consequently have been ca. 300 m. — At the mouth of the fjords (towards east) most of the icebergs were grounded.

Deep water, which permitted passage of the icebergs, was found through A. Stillings Sound south of Teufelkap and was here probably in connection with the already mentioned deep water in Store Belt.

Temperature and salinity observations.

1. Apparatus.

2 Pettersson-Nansen water-bottles Nos. 86 and 89.

2 Ekman water-bottles.

4 thermometers for the Pettersson-Nansen water-bottles. 2 protected (23505, 23507), 2 unprotected (25207, 25208).

2 Richter reversible thermometers, Nos. 769 and 803.

2 cases of areometers.

2 meter-wheels (1 large and 1 small).

500 half-litre bottles for water-samples (in 10 boxes).

3 burettes.

3 pipettes (15 m., Knudsen).

25 tubes normal water

All the instruments were delivered and controlled by the Central Laboratory of Christiania.

The Pettersson-Nansen water-bottles were of the ordinary, well-known construction with thermometer attached.

I may assume, that the construction of these is so well-known, that a detailed description here is superfluous.

The water-bottles were without propeller, so that we always had to use a sinker, which meant a considerable loss of time at the greater depths, but on the other hand ensured a greater certainty in the working.

In the summer of 1906 both the water-bottles worked excellently. After the winter 1906—07 there were difficulties to begin with, partly because the rubber of the valves had been frozen in the winter, partly from the salt on the rods.

The water-bottles were then washed in tepid freshwater and the rods rubbed a little with oil; the whole then worked excellently.

To test the insulation of the water-bottles the following experiments were undertaken in the summer of 1907.

The water-bottles were filled with freshwater from a pool on land and the temperature was read for some time, whilst the water-bottle hung in the air, then it was let down to 5 m. in the cold water at the place. It was hauled up to the surface at short intervals and the temperature taken.

$^{19}/_{6}$ 1907. Water-bottle No. 39. Thermometer No. 23507.
Air temperature + 4°. Temp. of the water — 1·75°.

	Air readings	Difference
3·55	+ 3·57	
		+ 0·07
4·00	+ 3·64	
4·05	+ 3·74	+ 0·10
4·11	+ 3·87	+ 0·13
4·15	+ 3·98	+ 0·11
4·20 water-bottle let down and swung regularly backwards and forwards.		
	Water readings	Difference
4·26	+ 4·27	
		+ 0·10
4·31	+ 4·37	
4·36	+ 4·32	— 0·05
water-bottle hauled up into the air.		
4·41	+ 4·17	— 0·15
4·46	+ 3·88	— 0·29
4·51	+ 3·60	— 0·28
4·56	+ 3·37	— 0·23

The difference between the air and water temperature was 5·7°, and cold water made its influence felt in the innermost cylinder of the water-bottle after about 9 minutes.

$^{21}/_{6}$ 1907. Water-bottle No. 86. Thermometer No. 23507. Air temperature + 10 C. Water temperature — 1·7.

	Air readings	Difference
2·25	+ 9·63	
		+ 0·20
2.30	+ 9·83	
		+ 0·29
2·35·5	+ 10·12	
		+ 0·24
2·40	+ 10·36	
		+ 0·23
2·45	+ 10·59	

Water-bottle let down and swung forwards and backwards.

	Water readings	Difference
2·50·5	+ 10·76	+ 0·27
2·52·5	+ 10·75	— 0·01

The difference between the air and water temperature was 11·7°. The effect of the cold water was appreciable in the innermost cylinder of the water-bottle after about 6 minutes.

In addition, samples of water were drawn off from the innermost cylinder and it was found on titrating, that the chlorine contents of this water were unchanged before and after letting down; thus the water-bottle was water-tight.

Of the two Ekman water-bottles one was of an older, the other of a newer model. The older bottle would not close properly and was thus not used.

The new model, on the other hand, worked well as a rule. It was somewhat unreliable in the beginning, as it showed a tendency not to close completely especially in currents.

This condition improved when a heavier sinker was used.

It was a light and practical instrument, which was used with advantage especially on the sledge journeys, where lightness is of great importance in the matter of transport.

In the summer of 1907 this water-bottle was tested by filling the cylinder with water of a definite chlorinity, then let down to ca. 5 m. and swung backwards and forwards, which does not alter the chlorine content of the water.

The Richter reversible thermometers unfortunately were broken on a sledge journey in the screw ice in 1906—07. This was a great loss, as it thus became impossible to make temperature determinations with the Ekman water-bottle, nor could control temperature determinations be made with the Pettersson-Nansen water-bottle.

The thermometers of the Pettersson-Nansen water-bottle were of Jena glass III, divided into tenths from — 4 to + 14 C.

Control certificates from the Physikalisch-Technische Reichsanstalt in Charlottenburg accompanied the instruments.

Further, the zero correction was made onboard on $^{30}/_{1}$ 1907 and $^{4}/_{2}$ 1908 in the following manner.

Some distilled water was laid out to freeze in an open basin. The frozen distilled water was then broken into small pieces and placed in a tall cylinder. The thermometer was now inserted so that both the bulb and the whole of the stalk were surrounded by ice.

The investigations gave the following corrections.

Thermometer	23505	23507	25207	25208
$^{30}/_{1}$ 1907 . . . . . Corr.	+ 0·01	0·00	broken	— 0·01
$^{4}/_{2}$ 1908	broken	0·00		— 0·01

With the aid of a lens the thermometers could be read with certainty to 0·01.

2. Installation of the instruments and method of carrying out the observations.

a. Hydrographical investigations from the ship.

The winch for soundings and hydrographical work was situated on deck to port in front of the main hatch. The drum held 3000 m. of 3 mm. steel wire from Felten & Guillaume, with a breaking power of 500 kg. The brake was formed by a band round the axle. On hauling in, the drum axle was coupled up to an axle with a chain-wheel driven from the winch by means of a chain. Above there was an axle with a small toothed wheel, on which two handles could be fixed and, when hand power had to be used to haul in, the toothed wheel could be shunted into connection with a large cog-wheel on the drum axle (see fig. 2 and 3).

Fig. 2. Winch for soundings and hydrographical work; C. B. Thostrup phot.

a, chain to winch. *b*, toothed wheel on the axle, brought into use when hauling in by hand. *c*, axle do. *d*, cog wheel on the axle, for hauling in with steam. *e*, band brake.

Hauling in under steam proceeded at a rate of about 100 m. per minute.

An eye was spliced into the end of the steel-wire and led from the drum up through a large meter-wheel, suspended by a spring hook from an accumulator, which again was screwed and bolted fast at the end of a 3.2 cm. davit. The eye at the end of the wire was then fixed to the lead by means of a shackle or to the water-bottle with an ordinary screw-bolt. (The accumulator is not seen in the figure; the spring hook on the meter-wheel is here suspended in a strop round the end of the davit).

The davit could bear a weight of 500 kg., the same as the wire. Under the quiet conditions in the pack-ice, where no sea comes, we could easily manage with such relatively small dimensions of both wire and davit. (Fig. 3).

If our investigations down to depths of apout 3000 m. had been carried out in open sea, we should have required heavier apparatus.

A series of observations was carried out in the following manner.

First a sounding was taken with the lead (an ordinary 25 kg. lead). The time taken for each 100 m. to run out was noted. A man

Fig. 3. Winch for soundings and hydrographical work; C. B. Thostrup phot.
a—*e*, see above (Fig. 2). *h*, meter-wheel. *i*, davit. *k*, water-bottle.

held a wooden peg down over the wire, and another stood ready to brake, as soon as the first felt that the lead had touched bottom.

It is difficult to feel bottom, when more than ca. 1000 m. of wire was out, as 1000 m. of wire weighed 95 kg., thus almost four times as much as the lead (25 kg.).

Under the calm conditions, which prevailed in among the ice-fields, it was nevertheless possible to note bottom even at a depth of 2400 m. — Further, it was observed when the lead struck bottom by the time for 100 m. of the line running out suddenly becoming greater.

After the sounding samples of water were taken from various depths. The temperature was read by means of a lens. The lower tap was carefully dried and the water drawn off from the water-

bottle into half-litre bottles with patent stoppers. For the sake of certainty, these bottles were provided not only with paper labels, which readily came off, but also with hemp or other kind of string round the neck with a number tied in knots.

In addition to this larger installation for hydrographical work there was also an ordinary lead winch on the deck aft. Here we had 600 m. double-turned wire. Both winch and line were of the same kind as those used in the Royal Danish Navy.

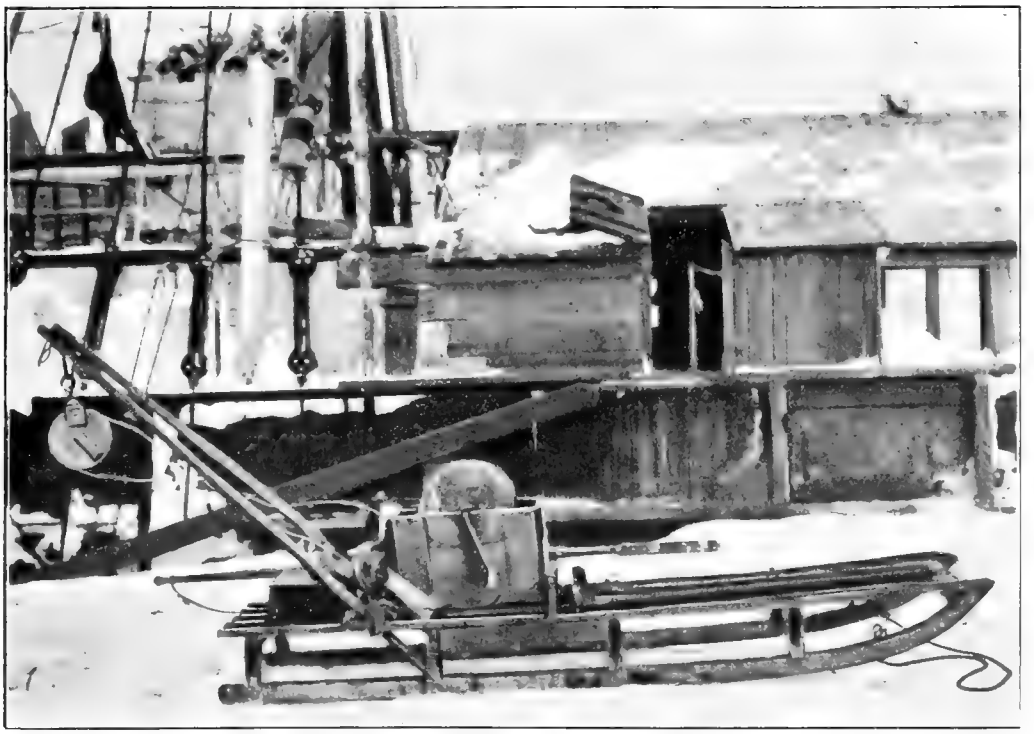


Fig. 4. Sledge with sounding-drum attached; C. B. Thostrup phot.

Here we used Captain C. Clausen's bathymeter (already mentioned under the soundings).

b. **Hydrographical work from boat.**

A 600 m. double-turned wire, which had been taken as reserve wire for the aft winch, was used. The motor-boats had not been fitted up at home for the installation of a hydrographical winch. Therefore we fitted up the apparatus ourselves in the following manner. The wire was rolled on a small drum, whose axle rested on a stand with two legs. One of these was fixed in the iron-work on the rail of the boat, the other was lashed to a thwart by rope. A

seal hook was lashed to the rail in front of the drum, and from its end hung a small meter-wheel. The end of the wire, with an eye spliced in it, was led up over the meter-wheel and then shackled to the lead or the water-bottle.

When the motor was going the temperature readings were inexact, wherefore it had to be stopped, so long as the series was being taken.

c. **Hydrographical work from the sledge.**

The same wire and drum as described under b. was used. The drum was fixed on a wooden framework with four legs, which were lashed securely to the sledge (fig. 4). The total weight of instruments and provisions on the sledge was considerable, whenever any journey was taken some distance from the ship.

A complete outfit for three sledges, equipped for hydrographical investigations, was as follows:

1 tent with 5 poles.
1 sledge box (provisions for the men).
Food for the dogs.
3 sleeping bags.
3 deerskins.
10 litre petroleum.
1 „ methylated spirits.
10 „ benzine.
1 blow-lamp.
2 tent-poles and a small iron lever. (These three poles were lashed together in a tripod to bear the meter-wheel).
1 wooden spade (for shovelling the snow).
1 iron-pick } to make holes in the ice.
1 ice-axe }
1 sack of sedge-grass.
1 outfit box containing:
1 Lux (petroleum apparatus) with reserve parts.
1 lantern.
A couple of candles.
1 lead box with 3 packets of matches.
1 sewing basket with awl, pins, needles, thread, string, thimble, wax tablet.
1 axe.
1 saw.
1 chisel.
1 pair of pincers.
1 file.

1 brush.
1 cloth.
2 cooking vessels.
3 plates, 3 small cups, 1 sugar box.
3 spoons, 3 teaspoons, 3 forks, 3 knives.

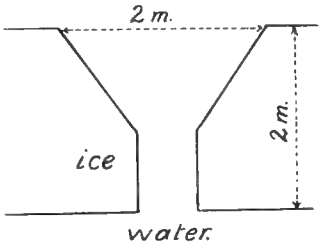
And the following instrumenfs:

Water-bottle in box.
Thermometer in box.
Sling thermometer.
Barometer.
Rod for measuring the thickness of the ice.
1 small meter-wheel.
1 box with bottles for water-samples. (Fig. 5).

When the intended position for observations had been reached, the tent was struck and a hole was made in the ice with the ice-axe and lever. The hole was cut square with the side of the same size as the supposed thickness of the ice at the place. Experience had shown us, that it was necessary to cut the hole so large to begin with, so as to have a large enough opening below for the passage of the water-bottle.

This was a very considerable work when the ice, as was often the case, had a thickness of 1 to 2 m. The ice-borers could not be used, as they did not make a large enough hole.

A section of the hole would have almost the following appearance. The man last down in the hole in digging was thus so deep down, that he almost disappeared from sight, and he was obliged to be agile in his movements, when the hole broke through, as the water burst up with great force into the opening owing to the pressure of the ice.



As soon as the water reached the surface, the surface temperature was observed. Then two tent-poles and a small lever were lashed together to form a tripod, so that the crossing-points hung directly over the opening (fig. 6).

The meter-wheel was hung in a strop on the cross and the sledge with the drum attached was then placed sideways in front of the hole.

The wire was now run out over the meter-wheel, a sounding was taken and the water-bottle let down to the various depths. Sometimes the meter-wheel froze fast and we were obliged to use the blow-lamp to thaw it. Inside the tent the Lux apparatus was kept constantly burning, so as to have the temperature positive. The water-bottle when brought up was taken in here each time and the water run into the half-litre bottles.

The first winter 1906—07 both reversible thermometers were broken during transport on the sledge and several water-samples were lost.

I was unwilling therefore to risk using the two remaining good thermometers for the Pettersson-Nansen water-bottles in the winter of 1907/08, and contented myself with taking samples with Ekman's water-bottle, which was the most convenient to handle in the cold.

Fig. 5. Sledge for a journey to make hydrographical observation; C. B. Thostrup phot.

It is a study to work with instruments at temperatures down to — 30° C., where everything is frozen hard the moment the water-bottle comes out of the water and the fingers become numb as soon as they are taken out of the mittens, and no little time is required to gain experience in the conditions of working from a sledge.

I may, therefore, quite briefly note some points which in my opinion should be taken into consideration in case of future similar investigations.

The tent ought to be able to close quite tightly, as it is otherwise impossible to maintain a positive temperature inside on specially cold days. Drum and wire should naturally be as light as possible, and similarly the lightest model of water-bottle (Ekman's) should be used. All rods or screws of metal, which have to be handled, should be covered with wood.

As bottles for the samples small medicine bottles of 30 gm. will be sufficient. Our half-litre bottles weighed far too much. It should be possible to pack the bottles in a small, light box, which can be closed, so as to be impenetrable in snow-storms, and each bottle should be so well packed, that it will not break even if the sledge

Fig. 6. Hydrographical work on the ice from a sledge; C. B. Thostrup phot.

is overturned. It should be remembered, not to fill the bottles quite full with water, as this expands on freezing and would thus break the bottle. Before departure the bottles should be marked with string clearly and distinctly round the neck or in some other way. Spring is the best time for making hydrographical investigations, as the direct sunshine on the dark water-bottle is sufficient to keep it thawed, even when the sling-thermometer shows an air temperature of — 10° to — 15°.

3. Investigation of the water-samples.

Titration.

The water-samples collected on the outward voyage and those taken later in 1906 and 1907 were titrated onboard by myself.

The titration was the usual chlorine titration as carried out by the international investigations. For this purpose, as is known, a solution of silver nitrate and potassium chromate is used as indicator. The following, detailed description may be of interest possibly to the non-experts.

With a so-called pipette ca. 15 gm. of the sample to be investigated was poured into a clean tube and then some drops of potassium chromate solution added. From a graduated burette the silver nitrate solution was now run drop by drop into the tube.

The silver nitrate combines with the chlorine of the sea-water and a white precipitate of silver chloride is formed. As soon as all the

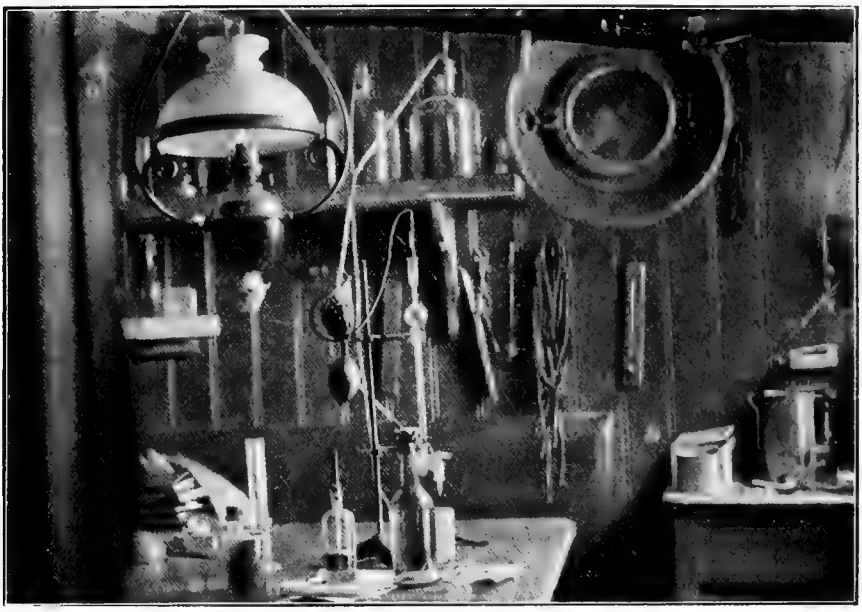


Fig. 7. Installation of the instruments for titration work; C. B. Thostrup phot.

chlorine is used up, the silver nitrate begins to act upon the potassium chromate and the liquid is coloured red.

Thus, a distinct change of colour occurs, as soon as all the chlorine is combined in the silver chloride and the quantity of silver nitrate necessary for this purpose is read off on the burette.

A quantity of normal water, that is, water in which the amount of chlorine had been very exactly determined beforehand, was obtained from the Central Laboratory in Christiania for use on the Expedition.

On investigating how much silver nitrate was required to neutralize the known amount of chlorine of the normal water, the amount of chlorine in the unknown sample could now be determined by the proportions between the readings.

As Knudsen's hydrographical tables were used, the last-mentioned reading on the burette must be almost equal to the chlorine contents of the normal water (19·39), and this was obtained by giving the solution of silver nitrate a suitable concentration.

The investigations were carried out in my berth and the arrangement was as shown in fig. 7.

The apparatus used for the titrations consisted of the following:

6 kg. silver nitrate divided into portions of 250 gm. each.
Two 8 litre bottles of coloured glass with glass-stopper.
4 carboys of distilled water.
Measuring glasses of 1000 gm., 500 gm. and 200 gm.
Measuring vessel.
Bent glass-tube and rubber stopper.
Glass-tube ca. $1^1/_2$ m. long, opening ca. 3 mm.
3 m. rubber tubing.
3 clips.
Tap lubricant (wax and grease).
2 rubber pipettes.
500 gm. glycerine (for pipettes).
1 burette tripod (50 cm.).
Water-glass and glass spatulas.
$^1/_2$ kg. neutral potassium chromate, with pipette.
1 areometer (35 × 5 cm.).
1 ,, (25 × 9 cm.).
Filter paper.
2 glazed clay jars (waste water).
$^1/_2$ kg. potassium hydrate (cleaning).
Pure concentrated sulphuric acid (cleaning).
1 areometric apparatus.
25 tubes of normal water (from the Central Laboratory in Christiania).
3 burettes (2 spherical, with 2 cc. divisions from 16 to 24, and 1 with 1 cm. divisions from 0—20).

The first titrations were made on 19.—22. December 1906 (of the Series I—X), and may be considered to be very reliable, as control determinations with normal water were made for each series.

In January 1907, however, a snowstorm led to the freezing of most of the normal water, which had been placed in the clock-case in the mess at the place believed to be the warmest in the ship. But even here the temperature became negative. Most fortunately, I had placed a tube of normal water under the mattress in my cabin and here it did not freeze.

As normal water for the later investigations I used, in addition to this tube, the samples from the deeper layers of the Atlantic, the

chlorine contents of which were determined onboard and found to be almost equal to the amount in the normal water.

The titrations in the winter of 1906/07 may thus also be considered to have been quite accurate, but after the summer of 1907 there seems to have been an error in the values found for the chlorine contents, as there is a difference between the values determined by titration onboard and those found at the Hydrographical Laboratory in Copenhagen after the return home, a difference which varies between 0·03 ‰ and 0·15 ‰ of the chlorine contents, the values found in the Hydrographical Laboratory being always greater than those which I had found onboard.

The reason for this difference I imagine to be, that some evaporation of the normal water may gradually have taken place, making it more saline in the later investigations. Each time the normal water was used the stopper had to be taken off, naturally, and this may have led to a very slight evaporation.

The samples of the following series XXX—XXXIII, XXV—XXXVII, XXXIX, XLVII—L and LIII were titrated onboard in the course of the winter 1907/08 without control titrations being made in Copenhagen. For all these series, therefore, the values of chlorine ‰ are probably too low in the Tables. The exact values may be considered to be on an average ca. 0·08 ‰ higher.

The areometers were used for surface determinations.

4. Corrections.

The followings corrections have been applied to the temperatures recorded.

1. The correction from the control certificates from the Physikalisch-Technische Reichsanstalt in Charlottenburg.

2. Correction for the cooling caused by expansion owing to diminution of pressure in the sample taken. This correction has been applied for depths of 500 m. and more and is in agreement with the Table p. 6 in NANSEN: *Norwegian North Polar Expedition, Vol. IX.*

Depth	500 m.:	correction	+ 0·02°
,,	1000 ,,	,,	+ 0·04°
,,	1500 ,,	,,	+ 0·05°
,,	2000 ,,	,,	+ 0·06°
,,	2400 ,,	,,	+ 0·07°

3. Correction for cooling caused by expansion of the fixed parts of the water-bottle. The Table is in agreement with the Table in NANSEN and HELLAND-HANSEN: *The Norwegian Sea, p. 48.*

Depth	500 m.:	correction	+ 0·01°
,,	1000 ,,	,,	+ 0·02°
,,	1500 ,,	,,	+ 0·03°
,,	2000 ,,	,,	+ 0·03°
,,	2400 ,,	,,	+ 0·04°

5. Observations.

a. Surface observations on the voyage to and from N. E. Greenland 1906—08. (Table 3.)

Date	Time	N. Lat.	W. Long.	Wind	Stream	Barom.	Air temp.	Surf. temp.	Therm. No.	Salin.	Remarks
14/VII 06	9 a. m.	62°40′	8°55′	S 3	...	759	+ 9.3	+ 9.1	M. I. 24	35.49	
	8 p. m.	63°09′	9°05′	W 4	...	754	+ 9.0	+ 9.0	—	35.31	
15/VII -	8 a. m.	63°40′	9°33′	NNW 3	...	754	+ 8.5	+ 8.7	—	35.26	
—	8 p. m.	63°48′	9°40′	NW 2	...	757	+ 9.0	+ 9.0		35.26	
16/VII -	8 a. m.	64°00′	9°30′	WNW 2	...	755	+ 6.7	+ 7.4	—	35.07	
	8 p. m.	64°37′	10°00′	calm	...	757	+ 8.5	+ 6.0		34.72	
17/VII -	8 a. m.	64°50′	11°00′	NNW 1	...	758	+ 5.2	+ 5.4		34.38	
23/VII -	8 a. m.	65°16′	12°34′	ENE 1	...	762	+ 4.5	+ 5.0		34.03	
—	12 noon	65°26′	12°22′	E 2	...	762	+ 4.9	+ 4.9	—	34.33	
—	4 p. m.	65°36′	12°13′	ENE 1	...	762	+ 4.8	+ 5.0		—	Series I.
—	8 -	65°39′	12°00′	NE 1	...	762	+ 4.8	+ 4.1	Richter	33.87	
-	12 mn.	65°51′	11°54′	NE 1	...	762	+ 5.0	+ 4.1	25207	33.61	
24/VII -	4 a. m.	65°58′	11°47′	ENE 1	...	761	+ 5.0	+ 4.4	—	33.87	
—	8 -	66°02′	11°56′	NE 1	...	762	+ 5.7	+ 4.7		34.05	Series II.
—	12 noon	66°02′	11°56′	ENE 1	...	762	+ 6.0	+ 5.2	—	33.61	
—	4 p. m.	66°09′	11°59′	NE 1	...	762	+ 5.7	+ 5.3	—	33.49	
—	8 -	66°18′	11°49′	calm	...	763	+ 5.8	+ 5.0	—	33.47	
	12 mn.	66°29′	11°44′	SE 1	...	764	+ 5.5	+ 4.4		33.13	
25 VII -	4 a. m.	66°43′	11°22′	SE 1	...	765	+ 4.6	+ 4.4	—	33.13	
	8 -	66°54′	11°18′	E 1	...	766	+ 5.8	+ 5.1	—	34.09	
	12 noon	67°01′	11°10′	E 1	...	767	+ 6.3	+ 4.6	—	33.55	
	4 p. m.	67°18′	10°57′	E 1	...	768	+ 6.2	+ 5.1	—	33.22	
—	8 -	67°24′	10°50′	calm	...	769	+ 6.5	+ 5.0	—	33.09	
—	12 mn.	67°36′	10°39′	calm	...	770	+ 5.8	+ 5.1	—	33.10	
26 VII -	4 a. m.	67°47′	10°30′	calm	...	771	+ 5.0	+ 5.2	—	33.61	
—	8 -	68°01′	10°20′	SSE 1	...	772	+ 6.0	+ 4.6		34.42	
-	12 noon	68°03′	10°10′	SSE 2	...	772	+ 6.0	+ 4.3	—	34.02	
—	4 p. m.	68°21′	9°43′	SE 2	...	773	+ 5.7	+ 4.3	—	34.26	
—	8 -	68°36′	9°23′	SE 3	...	773	+ 5.6	+ 4.4	—	34.41	
—	12 mn.	68°58′	8°52′	SE 3	...	772	+ 6.0	+ 4.4	—	34.03	
27/VII -	4 a. m.	69°20′	8°29′	SE 3	...	772	+ 6.2	+ 4.3	—	34.02	

Date	Time	N. Lat.	W. Long.	Wind	Stream	Barom.	Air temp.	Surf. temp.	Therm. No.	Salin.	Remarks
27/VII 06	8 a. m.	69°42′	8°22′	SE 4	...	774	+ 5.6	+ 5.2	Richter	34.36	
—	12 noon	70°07′	8°14′	SSE 3	...	775	+ 6.2	+ 4.3	25207	34.26	
—	4 p. m.	70°29′	7°52′	ESE 3	...	775	+ 4.8	+ 2.4	—	33.97	
—	8 -	70°50′	7°10′	SE 3	...	777	+ 5.2	+ 2.8	—	32.88	
—	12 mn.	70°59′	6°28′	SSE 2	...	777	+ 4.3	+ 2.7	—	32.86	
28/VII -	4 a. m.	71°10′	5°50′	SSE 2	...	777	+ 4.2	+ 2.0	—	32.56	
—	8 -	71°22′	5°13′	SE 2	...	777	+ 3.9	+ 3.0	—	33.40	
—	12 noon	71°28′	5°08′	ESE 2	...	777	+ 4.2	+ 2.5	—	32.34	
—	4 p. m.	71°37′	4°50′	ESE 2	...	776	+ 3.3	+ 2.3	—	32.21	
—	8 -	71°53′	4°35′	ESE 2	...	774	+ 3.8	+ 2.3	—	32.95	
—	12 mn.	72°10′	4°17′	ESE 2	...	774	+ 3.6	+ 2.3	—	32.56	
29/VII -	4 a. m.	72°26′	3°49′	ESE 2	...	773	+ 3.6	+ 2.1	—	32.57	
—	8 -	72°41′	3°21′	ESE 1	...	772	+ 3.5	+ 1.6	—	32.30	
—	12 noon	72°56′	2°56′	SE 2	...	772	+ 4.0	+ 2.3	—	32.46	
—	4 p. m.	73°09′	2°34′	SE 1	...	772	+ 3.6	+ 1.6	—	31.92	
—	8 -	73°25′	2°24′	SE 2	...	772	+ 2.8	+ 1.8	—	32.31	
—	12 mn.	73°42′	2°36′	ESE 2	...	772	+ 2.2	+ 1.0	—	32.27	
30/VII -	4 a. m.	73°57′	2°24′	ESE 2	...	772	+ 2.5	+ 0.7	—	32.01	
—	8 -	74°07′	2°24′	SSW 1	...	772	+ 3.6	+ 1.4	—	32.29	
—	12 noon	74°18′	2°46′	SSW 1	...	773	+ 3.1	+ 1.7	—	32.30	Ice in view.
—	4 p. m.	74°36′	3°10′	WSW 2	...	773	+ 2.3	+ 0.8	—	32.27	
—	8 -	74°45′	3°23′	SW 1	...	774	+ 1.7	+ 0.5	—	32.12	Dense small ice.
31/VII -	12 mn.	74°45′	3°23′	SW 1	...	774	+ 1.4	+ 0.4	—	32.12	Series III.
—	4 a. m.	74°50′	3°42′	SW 2	...	773	+ 1.5	+ 0.7	—	32.13	
—	8 -	75°11′	4°27′	SW 3	...	772	+ 0.6	+ 0.0	—	31.49	Edge of densely packed drift-ice.
—	12 noon	75°14′	4°34′	SW 2	...	772	+ 0.7	+ 0.4	—	31.87	
—	4 p. m.	75°19′	4°42′	WSW 2	...	772	+ 1.1	+ 0.0	—	31.87	In ice bay.
—	8 -	75°25′	6°03′	W 3	...	772	+ 0.5	+ 0.6	—	32.74	—
1/VIII -	12 mn.	75°30′	6°38′	WNW 2	...	773	÷ 0.3	+ 1.9	—	32.94	—
—	4 a. m.	75°34′	7°06′	WNW 2	...	773	÷ 0.5	+ 1.3	—	32.52	—
—	8 -	75°35′	7°46′	NNW 3	...	774	+ 0.5	+ 1.3	—	32.66	Among scattered ice-floes.
—	12 noon	75°14′	8°40′	N 2	...	776	0.0	+ 1.0	—	31.89	
—	4 p. m.	75°27′	10°00′	N 1	...	778	+ 2.5	÷ 0.1	—	31.85	Series IV.
—	8 -	75°27′	10°00′	calm	...	778	+ 0.6	0.0	—	31.85	In drift-ice belt.
2/VIII -	12 mn.	75°29′	10°20′	SW 1	...	778	— 1.0	— 0.4	—	31.85	
—	4 a. m.	75°29′	10°40′	SW 1	...	778	+ 0.5	— 0.7	—	31.24	
—	8 -	75°20′	11°10′	SW 1	...	776	+ 3.5	— 0.5	—	31.24	
—	12 noon	75°36′	10°40′	SW 1	...	776	+ 4.3	— 0.3	—	31.36	
—	4 p. m.	75°40′	10°30′	WSW 1	...	775	+ 3.6	— 0.1	—	31.90	
—	8 -	75°42′	10°20′	WSW 2	...	775	+ 1.3	— 0.8	—	31.24	
3/VIII -	12 mn.	75°43′	10°15′	SW 2	...	774	+ 1.4	— 0.6	—	31.24	Series V.
—	4 a. m.	75°48′	10°00′	SW 3	...	774	+ 1.5	— 0.5	—	31.24	

—	8 -	75°53′	9°50′	SW 2	...	773	+ 0.8	— 0.5	—	31.62	
—	12 noon	75°56′	10°10′	SW 2	...	772	+ 0.9	— 0.3	—	31.87	
—	4 p. m.	76°00′	10°25′	SW 2	...	772	0.0	— 0.5	—	—	
-	8 -	76°05′	10°50′	WSW 1	...	772	— 0.8	0.8	- -	31.9	Series VI.
4/VIII -	12 mn.	76°05′	10°50′	WNW 1	...	773	— 1.0	— 0.8	—	31.9	
—	4 a. m.	76°05′	10°45′	WSW 1	...	773	— 0.5	— 0.8	—	31.9	
—	8 -	76°05′	10°40′	calm	...	773	+ 0.5	— 0.9	—	31.2	
—	12 noon	76°07′	10°39′	—	...	772	+ 3.0	— 0.8	—	31.4	
-	4 p. m.	76°05′	10°55′	WSW 1	...	772	+ 0.5	— 0.6	—	31.2	
4/VIII -	8 -	76°03′	11°00′	WSW 1	...	771	— 0.5	— 1.0		31.2	
5/VIII -	12 mn.	75°58′	11°31′	WSW 1	...	771	— 0.8	— 1.2	—	31.8	
—	4 a. m.	75°59′	11°47′	SW 1	...	771	0.8	— 1.2		31.2	
	8 -	76°00′	12°05′	SW 1	...	772	+ 0.5	— 1.5	-	31.2	
	12 noon	76°01′	12°27′	SW 1	...	771	+ 1.5	— 0.9	- -	31.2	
-	4 p. m.	75°55′	12°27′	calm	...	774	+ 7.4	— 0.1		31.2	
-	8 -	75°50′	12°27′		...	773	+ 6.4	— 0.4	- -	31.2	
6/VIII -	12 mn.	75°47′	12°27′		...	773	— 1.9	— 1.0		31.2	
—	4 a. m.	75°46′	12°27′	—	...	773	— 0.7	— 1.5	—	31.2	
—	8 -	75°44′	12°27′	—	...	774	+ 7.4	— 0.1	—	31.2	
	12 noon	75°42′	12°35′		...	773	+ 6.5	— 0.4		31.2	
-	4 p. m.	75°41′	12°35′		...	773	+ 7.0	— 0.4		31.2	
—	8 -	75°41′	12°35′	—	...	774	— 2.7	— 0.6	—	31.2	
7/VIII -	12 mn.	75°48′	12°51′	—	...	774	+ 2.8	— 0.7	—	31.2	
—	4 a. m.	75°48′	13°13′	—	...	774	+ 4.0	— 1.0	—	31.8	
—	8 -	75°48′	13°18′	—	...	774	+ 2.0	— 0.2	—	31.8	
—	12 noon	75°56′	14°05′	—	...	775	+ 2.9	— 0.2	—	31.8	
—	4 p. m.	75°56′	14°05′	—	...	775	+ 2.5	— 0.4	—	31.2	
—	8 -	75°56′	14°11′	—	...	775	+ 4.5	— 0.9	—	31.2	
8/VIII -	12 m.n.	76°04′	14°44′	—	...	777	+ 2.0	— 1.1	—	29.8	
—	4 a. m.	76°09′	14°59′	—	...	776	+ 2.7	— 1.6	—	30.5	
—	8 -	76°09′	14°59′	—	...	776	+ 7.5	— 1.2	—	30.5	
-	12 noon	76°01′	14°30′	SSE 1	...	775	+ 5.0	+ 0.6		30.5	
—	4 p. m.	76°00′	14°34′	SSE 1	...	774	+ 2.6	— 1.2	—	30.7	Series VII.
—	8 -	75°55′	14°35′	SSE 1	...	775	+ 1.0	— 1.0	—	31.8	
9/VIII -	12 mn.	75°52′	14°35′	SSE 1	...	775	+ 0.2	— 1.1		31.2	Areometer broken.
—	4 a. m.	75°56′	14°45′	SSE 1	...	775	0.0	— 0.3		—	
22/VII 08	8 a. m.	76°39′,3	18°35′	calm	southg.		+ 7.0	+ 0.6		29.9	Series LXXIV. Coast water and spread ice.
—	3 p. m.	76°42′	18°05′		...		+ 6.0	+ 3.2		28.1	Series LXXV. Coast water and spread ice.
23/VII -	9,45 a. m.	77°24′	16°00′	—	...	—	+ 9.0	+ 2.1	—	29.4	Series LXXVI. Coast water and spread ice.
24/VII -	5 a. m.	78°00′	15°18′	—	...	—	+ 2.0	+ 0.7	—	28.7	Series LXXVII. Coast water and spread ice.
28/VII -	7 p. m.	75°52′	12°15′	—	...	—	+ 3.0	+ 1.5	—	31.1	Series LXXVIII. Coast water and spread ice.

Date	Time	N. Lat.	W. Long.	Wind	Stream	Barom.	Air temp.	Surf. temp.	Therm. No.	Salin.	Remarks
30/VII -	12 mn.	75°15′	8°45′	—	...	—	+ 3.0	+ 0.5	Richter	31.0	Series LXXIX. Coast water and spread ice.
31/VII -	12 noon	74°58′	8°05′	NE 1	...	758	+ 2.1	+ 1.5	25207	30.9	
—	4 p. m.	74°50′	7°50′	—	...	759	+ 2.5	+ 0.6	—	29.6	Passed outermost ice-edge.
—	8 -	74°44′	7°35′	—	...	759	+ 4.2	+ 1.4	—	—	Temp. varying between + 0.5 and + 1.5.
1/VIII -	9 a. m.	74°16′	6°30′	NNW 1	...	761	+ 6.5	+ 6.2	—	32.9	
—	12 noon	74°08′	6°13′	calm	...	762	+ 6.6	+ 5.9	—	—	Water green.
—	4 p m	74°02′	6°10′	W 1	...	761	+ 5 8	+ 7 2	—	33 2	
—	9 -	73°56′	6°05′	—	...	761	+ 6 0	+ 7 0	—	33 3	
2/VIII -	9 a. m.	73°42′	6°00′	SW 1	...	761	+ 6.8	+ 7.4	—	33.5	
—	4 p. m.	73°33′	6°00′	SE 1	...	760	+ 6.8	+ 6.6	—	34.6	
—	9 -	73°20′	6°00′	SE 3	...	759	+ 7.2	+ 7.1	—	33.1	
3/VIII -	9 a. m.	73°08′	6°00′	—	...	758	+ 7.2	+ 7.0	—	—	
—	12 noon	73°04′	6°00′	SE 1	...	758	+ 7.4	+ 7.0	—	33.7	
—	4 p. m.	72°58′	6°10′	SE 1	...	758	+ 7.5	+ 7.2	—	33.4	
—	9 -	72°56′	6°20′	SE 1	...	757	+ 7.5	+ 7.2	—	33.1	
4/VIII -	9 a. m.	72°20′	6°40′	E 1	...	756	+ 7.6	+ 7.8	—	33.4	
—	4 p. m.	72°15′	6°30′	SE 1	...	756	+ 6.8	+ 7.2	—	32.1	
—	9 -	72°10′	6°20′	SE 1	...	756	+ 6.8	+ 7.2	—	31 7	
5/VIII -	9 a. m.	71°50′	5°45′	W 2	...	756	+ 7.0	+ 7.2	—	33.4	
—	4 p. m.	71°40′	5°20′	SSW 4	...	753	+ 7.5	+ 7.2	—	—	
—	9 -	71°30′	4°20′	SW 4	...	752	+ 7.5	+ 7.2	—	34.3	
6/VIII -	9 a. m.	71°00′	3°00′	SW 4	...	753	+ 7.4	+ 7.2	—	—	
—	12 noon	70°50′	2°20′	SW 3	...	754	+ 8.8	+ 8.8	M. I. 72	33.1	
—	9 p. m.	70°25′	1°40′	WSW 2	...	754	+ 8.9	+ 8.5	—	35.0	
7/VIII -	9 a. m.	69°50′	1°10′	SW 1	...	753	+ 9.0	+ 9.2	—	—	
—	12 noon	69°39′	0°50′	—	...	755	+ 9.0	+ 9.6	—	35.1	
—	9 p. m.	69°16′	0°10′	W	...	756	+ 8.2	+ 10,0	—	35.1	
8/VIII -	9 a. m.	68°45′	0°30′ E. L.	E	...	753	+ 9.2	+ 10.1	—	34.9	
—	4 p. m.	68°28′	1°00′	calm	...	750	+ 9.6	+ 10.4	—	35.0	
9/VIII -	9 a. m.	68°12′	1°30′	SW 1	...	750	+ 10.4	+ 10.2	—	34.9	
—	4 p. m.	68°00′	2°00′	SW 3	...	750	+ 9.2	+ 10.1	—	35.0	
10/VIII -	9 a. m.	67°36′	3°30′	SE 2	...	753	+ 10.2	+ 10.6	—	35.1	

Remarks: The observations were made after leaving the Færoes on July 14th 1906 every four hours on the out-voyage until midnight of August 9th; thereafter they were taken less frequently, the areometer used for the salinity determinations being broken.

As the variations in the surface temperature and salinity in among the ice-fields proved to be irregular owing to quite local occurrences of melting ice, however, it was also of no great importance to continue the investigations here at intervals of 4 hours.

From August 9th to 13th, when we reached the coast of Greenland, no other surface observations were taken than those included in the hydrographical series.

On the return voyage surface observations were taken three times in the 24 hours during the voyage from the ice-edge over towards the Norwegian coast. The samples of the surface water were titrated after returning home at the Hydrographical Laboratory in Copenhagen.

The surface observations taken on the voyage out show decreasing temperature and salinity from the Atlantic water in towards the Polar Current, the variations being frequently very abrupt. There was no sudden transition from Atlantic to Polar Current water, so that the surface observations of the salinity could not indicate a definite boundary between the two regions.

Between the drift-ice in over the Continental Bank the salinity, with quite few exceptions, was below 32 ‰ and the water cooled down below 0°. Near to the coast the salinity was even somewhat lower (ca. 31 ‰) owing to mixture with river water from the coast in the summer.

On the return voyage the surface salinities were on the whole lower (28 ‰—31 ‰) and the temperature higher (up to + 3·15°) than on the way out, though the return voyage was earlier in the summer, and the fresh-water had been flowing from the land for a shorter time.

After getting out of the ice the above-mentioned surface observations were made three times in the 24 hours. They show, how both the surface salinity and temperature increase greatly from the ice-edge out towards the Atlantic water. The changes in the salinity were very irregular, those of the temperature more uniform.

b. **Surface observations in the fjords and sounds of N. E. Greenland 1906—08. (Table 4.)**

Date	Time	Lat.	Long.	Surf. temp.	Surf. sal.	Remarks
14/VIII 06	8 a. m.	76°46′.2 N.	18°46′ W.	— 0.6	18.8	
19/VIII -	—	—	—	— 0.6	29.3	
20/VIII -	—	—	—	— 0.6	29.6	
13/IX -	—	—	—	— 1.6	29.6	
21/IX -	—	—	—	— 1.6	30.2	
1/X -	—	—	—	— 1.7	30.7	
5/X -	—	—	—	— 1.7	30.8	
11/X -	—	—	—	— 1.7	31.1	
15/X -	—	—	—	— 1.7	31.3	
20/X -	—	—	—	—	31.3	
24/X -	—	—	—	—	31.3	
1/XI -	—	—	—	—	31.4	
5/XI -	—	—	—	—	31.5	
27/XI -	—	—	—	—	31.5	
3/XII -	—	—	—	—	31.7	
5/XII -	—	—	—	—	31.8	
19/XII -	—	—	—	—	32.0	
27/XII 06	—	—	—	—	32.0	
2/I 07	—	—	—	—	32.3	
28/I -	—	—	—	—	32.3	
15/II -	—	—	—	—	32.5	
9/III -	—	76°39′.3	18°35′	—	32.2	
28/IV -	—	—	—	— 1.8	32.6	
7/V -	—	—	—	— 1.8	32.5	
23/V -	—	—	—	— 1.8	32.6	
11/VI -	—	—	—	— 1.7	30.9	
13/VI -	—	—	—	— 1.5	32.3	
15/VI -	—	—	—	— 1.5	32.3	
19/VI -	—	—	—	— 0.4	10.9	
26/VI -	—	—	—	— 0.2	9.1	
15/VII -	—	—	—	+ 0.2	0.5	
16/VII -	—	—	—	+ 0.5	0.9	
18/VII -	—	76°46′.2	18°46′	+ 2.8	0.6	
27/VII -	—	—	—	+ 7.2	0.6	
30/VII -	—	76°39′.3	18°35′	0.0	15.4	
6/VIII -	—	76°46′.2	18°46′	+ 3.7	1.8	
23/VIII -	—	—	—	— 0.5	27.1	
29/VIII -	—	76°39′.3	18°35′	— 1.3	29.7	
30/VIII -	—	76°46′.2	18°46′	— 0.2	16.3	
3/IX -	—	76°46′.8	19°00′	— 0.7	15.4	
13/IX -	—	76°46′.2	18°46′	— 1.5	28.8	
14/IX -	—	—	—	— 1.5	29.4	
1/XI -	—	—	—	—	30.3	
1/XII 07	—	—	—	—	31.0	
14/I 08	—	—	—	—	31.3	
20/II -	—	—	—	—	31.5	
11/III -	—	—	—	—	32.0	
31/III -	—	—	—	—	32.0	
14/IV -	—	—	—	— 1.7	32.4	
15/V -	—	—	—	—	32.2	
28/V -	—	76°51′	19°51′	— 1.7	32.1	Temp. and sal. at a depth of 2 m.
11/VI -	—	76°46′	19°00′	— 1.7	32.2	— — 1.5 m.
18/VI -	—	76°39′	18°37′	— 1.8	32.4	— — 1.3 -
26/VI -	—	76°42′.6	18°47′	— 1.7	32.4	— — 1 -
7/VII -	—	76°46′.2	18°46′	+ 9.3	0.9	
19/VII -	—	76°41′	18°43′	— 0.5	31.7	
22/VII -	—	76°39′.3	18°35′	— 0.5	30.4	

Remarks: The surface salinity in the Greenland fjords increased, as the Table 4 shows, from a minimum in summer to a maximum in winter, whilst conversely the temperature decreased from a maximum in summer to a minimum in winter.

The variations were caused by the downflow of warmer freshwater in summer from the melting ice and snow, the separation of chlorides in winter on the freezing of the water and the constant, though slight addition of heat and chlorides from the deeper layers due to mixing processes which were set up by the tidal wave coming in from the deeper ocean over the barriers at the mouths of the fjords.

A further discussion of these observations will be given under surface salinity and thickness of the ice in Danmarks Havn and surface salinity and thickness of the ice in the fjords, as also under the discussion of the different hydrographical series.

c. Temperature, salinity and density series. (Table 5.)

Column 1: Date.
„ 2: Time, i. e. local time.
„ 3: Latitude and longitude.
„ 4: Wind, direction from which it blows, magnetic.
„ 5: Current, direction to which it is running, „
„ 6: Barometer in mm.
„ 7: Air temperature in Centigrade.
„ 8: Depth in meters.
„ 9: Temperature recorded.
„ 10: Temperature correction.
„ 11: Corrected temperature.
„ 12: No. of thermometer.
„ 13: Amount of chlorine determined by titration (Mohr).
„ 14: Salinity calculated from the amount of chlorine by means of Knudsen's tables.
„ 15: Density of the sea-water at a pressure of one atmosphere calculated from the amount of chlorine and temperature by means of Knudsen's tables.
„ 16: Temperature of freezing-point corresponding to the amount of chlorine in the water; taken from Martin Knudsen's freezing-point tables.

Series I. Ship.

Date	Time	Lat. (observed)	Long. (observed)	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
23/VII 06	4 p. m.	65°36′ N	12°13′ W	ENE	..	762.2	+ 4.8	0	+ 5.00	0	+ 5.00	23505	frozen	frozen		
								10	+ 4.70	..	+ 4.70	..	18.81	33.98		
								20	+ 4.60	..	+ 4.60	..	19.00	34.33		
								50	+ 2.68	..	+ 2.68	..	19.02	34.36		
								100	+ 1.02	..	+ 1.02	..	frozen	frozen		
								180	+ 0.80	..	+ 0.80	..	—	—		

P. N. water bottle No. 86 used. Samples titrated onboard 19/XII 06. Depth: 191 m.; bottom-soil — blue clay, mud.

Series II. Ship.

Date	Time	Lat. (observed)	Long. (observed)	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
24/VII 06	8 a. m.	66°02′ N	11°56′ W	ENE 1	..	761.5	+ 5.7	0	+ 4.72	0	+ 4.72	23505	18.96	34.25		
								10	+ 4.80	..	+ 4.80	..	19.01	34.34		
								25	+ 4.68	..	+ 4.68	..	19.11	34.52		
								75	+ 0.62	..	+ 0.62	..	19.20	34.69		
								150	— 0.51	..	— 0.51	..	19.34	34.94		
								250	— 0.16	..	— 0.16	..	frozen	frozen		

P. N. water bottle No. 86 used. The lead (25 kg.) took 126 sec. to reach the bottom.
Samples titrated onboard 19/XII 06. Depth: 303 m.; bottom-soil — blue clay, mud.

Series III. Ship.

Date	Time	Lat. (calculated)	Long. (calculated)	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
30/VII 06	8 p. m.— 12 mn.	74°45′ N	3°23′ W	SW 1	..	774.3	+ 1.7	0	+ 0.41	0	+ 0.41	23505	17.89	32.32	25.95	
								2	+ 1.23	..	+ 1.23	..	17.96	32.45	26.00	
								5	+ 1.23	..	+ 1.23	..	17.96	32.45	26.00	
								10	+ 1.48	..	+ 1.48	..	17.96	32.45	25.99	
								25	— 0.86	..	— 0.86	..	18.43	33.30	26.79	
								50	— 0.87	..	— 0.87	..	19.12	34.54	27.80	— 1.88
								100	— 0.92	..	— 0.92	..	19.29	34.85	28.05	— 1.90
								200	— 0.98	..	— 0.98	..	19.29	34.85	28.05	— 1.90
								300	— 1.15	..	— 1.15	..	frozen	frozen		
								500	— 1.05	+ 0.03	— 1.02	..	19.31	34.88	28.08	— 1.90

P. N. water bottle No. 86 used.
Samples titrated onboard 19/XII 06.
Ship surrounded by small ice.

Series broken off owing to the ice.
Depth: 2080 m., no bottom.

Series IV. Ship.

		observed												
1/VIII 06	4—9 p. m.	75°27′ N 10°00′ W	N 1	..	778	+ 0.6	0	— 0.10	0	— 0.10	23505	frozen	frozen	
							2	+ 0.70	..	+ 0.70	..	—	—	
							5	+ 0.58	..	+ 0.58	..	—	—	
							10	+ 1.08	..	+ 1.08	..	17.34	31.33	25.12
							50	— 0.16	..	— 0.16	..	frozen	frozen	
							100	+ 0.49	..	+ 0.49	..	—	—	
							150	+ 1.12	..	+ 1.12	..	19.36	34.97	28.04
							250	+ 0.32	..	+ 0.32	..	frozen	frozen	
							500	— 0.50	+ 0.03	— 0.47	..	19.34	34.94	28.10
							1500	— 1.08	+ 0.08	— 1.00	..	19.31	34.88	28.09 — 1.90
							2400	— 1.44	+ 0.11	— 1.33	..	19.32	34.90	2811 . — 1.90

P. N. water bottle No. 86 used.
Samples titrated onboard 21/XII 06.
Lead 13 m. 0 s. in reaching bottom.
Before lead touched bottom 100 m. wire took 32 s. to run out.
After lead touched bottom 100 m. wire took 45 s. to run out.

Water-bottle took 9 m. 50 s. to reach 1500 m.
Whole duration of series ca. 4½ hours.
Ship moored to an ice-floe in scattered ice.
Depth: 2440 m.; soft bottom, clay.

Series V. Ship.

		observed												
3/VIII 06	12 mn.— 4 a.m.	75°43′ N 10°15′ W	SW 3	..	774.5	— 1.4	0	— 0.54	0	— 0.54	23505	frozen	frozen	
							2	+ 0.01	..	+ 0.01	..	—	—	
							5	0.00	..	0.00	..	—	—	
							10	0.00	..	0.00	..	—	—	
							25	— 0.71	..	— 0.71	..	—	—	
							75	— 1.61	..	— 1.61	..	—	—	
							100	— 1.62	..	— 1.62	..	—	—	
							150	+ 1.30	..	+ 1.30	..	—	—	
							300	+ 1.30	..	+ 1.30	..	—	—	
							500	+ 0.30	+ 0.03	+ 0.33	..	—	—	
							800	— 0.10	+ 0.05	— 0.05	..			

Depth: 840 m.; bottom-soil — soft clay.

Series VI. Ship.

Date	Time	Lat. (observed)	Long. (observed)	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
3/VIII 06	8—11 p. m.	76°05′ N	10°50′ W	calm	..	..	— 0.8	0	— 0.38	0	— 0.38	23505	16.42	29.70	23.87	
								2	— 0.22	..	— 0.22	..	16.69	30.16	24.24	
								5	— 0.30	..	— 0.30	..	17.12	30.93	24.86	
								10	— 0.30	..	— 0.30	..	17.70	31.98	25.73	
								25	— 1.12	..	— 1.12	..	frozen	frozen		
								50	— 1.60	..	— 1.60	..	18.52	33.46	2694	
								100	— 1.50	..	— 1.50	..	frozen	frozen		
								150	— 0.98	..	— 0.98	..	1910.	34.51	27.77	
								200	+ 0.62	..	+ 0.62	..	19.27	34.81	27.94	
								250	+ 1.08	..	+ 1.08	..	19.32	34.91	27.99	
								300	+ 0.60	..	+ 0.60	..	19.33	34.92	28.02	

Made fast to an ice-floe.
P. N. water-bottle No. 86 used.

Samples titrated onboard 21/XII 06.
Depth: 300 m.; bottom-soil — soft bottom.

Series VII. Ship.

Date	Time	Lat. (observed)	Long. (observed)	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
8/VIII 06	1—4 p. m.	76°00′ N	14°34′ W	SSE 1	..	775	+ 2.6	0	— 0.10	0	— 0.10	23505	17.40	31.44	25.26	
								2	— 0.28	..	— 0.28	..	17.48	31.58	25.38	— 1.71
								5	— 0.30	..	— 0.30	..	17.48	31.58	25.38	— 1.71
								10	— 1.20	..	— 1.20	..	17.63	31.85	25.63	— 1.72
								25	— 1.59	..	— 1.59	..	17.80	32.16	25.89	— 1.75
								50	— 1.70	..	— 1.70	..	18.17	32.83	26.43	— 1.78
								100	— 1.65	..	— 1.65	..	18.60	33.60	27.06	— 1.82
								150	— 1.58	..	— 1.58	..	18.90	34.14	27.50	
								200	— 1.34	..	— 1.34	..	19.03	34.38	27.68	
								250	— 0.19	..	— 0.19	..	19.20	34.69	27.88	
								300	+ 0.50	..	+ 0.50	..	19.30	34.87	27.99	
								310	+ 0.50	..	+ 0.50	..	19.30	34.87	27.99	

P. N. water-bottle No. 86 used.
Samples titrated onboard 22/XII 06.

Made fast to an ice-floe.
Depth: 310 m.; bottom-soil — soft bottom.

Series VIII. Ship.

		observed														
11/VIII 06	2—3 a. m.	76°05′ N	16°04′ W	calm	..	..	÷ 2,0	0	— 1.25	0	— 1.25	23505				
								2	0.40	..	— 0.40	..	15.4	27.8	22.35	
								5	1.28	..	— 1.28	..	17.25	31.17	25.08	
								10								
								25								
								50								
								75	— 1.70	..	— 1.70	..	18.21	32.90	26.48	
								100								
								125								
								150								
								170								

P. N. water-bottle No. 86 used. Samples titrated onboard 22/XII 06. Ship lay in a small clearing between large ice floes. Series broken off, as the ice forced the ship to change place. Depth: 170 m.; bottom-soil — soft, clay.

Series IX. Ship.

		observed														
11/VIII 06	9—11 a. m.	76°02′ N	16°14′ W	calm	..	..	..	0	— 0.87	0	— 0.87	23505				
								2	— 0.50	..	0.50	..	16.12	29.13	23.42	
								5	— 1.10	..	1.10	..	17.25	31.17	25.07	
								10	— 1.40	..	1.40	..	17.51	31.64	25.47	
								25	— 1.53	..	1.53	..	17.85	32.25	25.96	
								50	— 1.70	..	1.70	..	18.12	32.74	26.35	
								75	— 1.69	..	1.69	..	18.23	32.94	26.52	
								100	— 1.70	..	1.70	..	18.39	33.22	26.76	
								125	— 1.70	..	— 1.70	..	18.59	33.58	27.05	
								150	— 1.65	..	— 1.65	..	18.76	33.89	27.28	

P. N. water-bottle No. 86 used. Samples titrated onboard 22/XII 06. Depth: 150 m.; bottom-soil — soft, clay.

Series X. Ship.

15/VIII 06	8 p. m.— 12 mn.	77°18′ N	18°20′ W	NE 2	..	776	— 1,0	0	— 0.47	0	— 0.47	23505	frozen	frozen		
								2	— 0.94	..	— 0.94	..	—	—		
								5	— 1.10	..	— 1.10	..	16.97	30.66	24.66	— 1.66
								10	— 1.19	..	— 1.19	..	16.97	30.66	24.66	— 1.66
								20	— 1.32	..	— 1.32	..	17.30	31.26	25.15	— 1.69
								30	— 1.49	..	— 1.49	..	17.58	31.76	25.56	— 1.72
								40	— 1.60	..	— 1.60	..	17.68	31.94	25.71	— 1.74
								50	— 1.69	..	— 1.69	..	17.98	32.48	26.15	— 1.77
								55	— 1.69	..	— 1.69	..	18.06	32.63	26.27	— 1.77

P. N. water-bottle No. 86 used. Samples titrated onboard 22/XII 06. Made fast to edge of land ice. Depth: 65 m.; bottom-soil — clay.

Series XI. Boat.

Date	Time	Lat.	Long.	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	*Cl* ‰	*S* ‰	ρ_t	τ
18/IX 06	11 a. m.— 1 p. m.	76°44′ N	18°49′ W	NE 2	..	..	+ 8.0	0	— 1.6	0	— 1.6	23505	16.95	30.62	24.6	— 1.66
								1	— 1.6	..	— 1.6	..	16.93	30.59	24.6	— 1.66
								2	— 1.6	..	— 1.6	..	16.93	30.59	24.6	— 1.66
								3	— 1.6	..	— 1.6	..	16.93	30.59	24.6	— 1.66
								4	— 1.6	..	— 1.6	..	16.93	30.59	24.6	— 1.66
								5	— 1.6	..	— 1.6	..	16.93	30.59	24.6	— 1.66
								15	— 1.6	..	— 1.6	..	16.98	30.68	24.7	— 1.67
								25	— 1.5	..	— 1.5	..	17.81	32.18	25.9	— 1.75
								40	— 1.5	..	— 1.5	..	17.99	32.50	26.2	— 1.77
								60	— 1.5	..	— 1.5	..	18.11	32.72	26.3	— 1.78
								80	— 1.5	..	— 1.5	..	18.11	32.72	26.3	— 1.78
								105	— 1.5	..	— 1.5					

Used P. N. water-bottle No. 86, which worked not so well, owing to ice on the rubber rings.
Reading of temperature difficult owing to shaking of motorboat.
Thin ice on the water.
Samples titrated onboard 30/I 07.
Depth: 111 m.; bottom-soil — shells.

Series XII. Sledge.

30/X 06		Øresund 76°44′ N	18°49′ W	calm	south. (ebb)	..	— 1.8	0	..	..	..	..	16.81	30.4		
								1	..	..	..	..	17.39	31.4		
								2	..	..	..	..	17.3	31.3		
								5	..	..	..	..	17.3	31.3		
								15	..	..	..	..	17.3	31.3		
								20	..	..	..	..	17.3	31.3		
								30	..	..	..	..	17.3	31.3		
								40	..	..	..	..	17.4	31.5		
								50	..	..	..	..	17.2?	31.0?		
								60	..	..	..	..	17.5	31.7		
								70	..	..	..	..	17.6	31.8		
								80	..	..	..	..	17.7	32.0		
								90	..	..	..	..	17.8	32.2		
								100	..	..	..	..	—	—		

tical in cold.
The values of $S\,{}^0/_{00}$ doubtful, snow-flakes getting into neck of bottles in which the samples were preserved.

Thickness of ice 47 cm.
Samples titrated onboard 31/1 07.
Depth: 102 m.; bottom-soil — shells.

Series XIII. Sledge.

30/XI 06	2—5 p. m.	c. 2 km. SSE of Marous-sia 76°39.3′ N 18°35′ W		calm	strong southg. (ebb)	..	÷ 34	0	..	..	..	..	17.5	31.7	25.7	— 1.7
								10	..	..	..	..	17.7	31.9	25.7	— 1.7
								20	..	..	..	..	17.5	31.7	25.4	— 1.7
								30	..	..	..	..	17.5	31.7	25.5	1.7
								40	..	..	..	..	17.6	31.8	25.6	— 1.7
								50	..	..	..	..	17.9	32.4	26.1	— 1.8
								75	..	..	..	..	17.7?	31.9?		
								100	..	..	..	..	18.4	33.2	26.7	— 1.8
								125	..	..	..	..	18.6	33.5	27.0	— 1.8
								150	..	..	..	..	18.8	34.0	27.4	

Used Ekman's water-bottle.
2 Richter thermometers broken under transport.
Some of the samples seem to have been affected by snow-powder in neck of bottles and the values for $S\,{}^0/_{00}$ thus possibly unreliable.
Samples taken through a tidal opening in the ice of ca. 1 m. breadth.

Ice 91 cm. thick.
In calculating the density the assumption is made, that the water has been cooled down to freezing point.
Samples titrated onboard 27/1 07.
Depth: 160 m.

Series XIV. Sledge.

1/XII 06	4—6 a. m.	Øresund off Kronborg 76°44′ N 18°51′ W	calm	..	..	..	0	..	..	..	..	17.8	32.1	
							2	..	..	..	..	17.8	32.1	
							5	..	..	..	..	17.7	32.0	
							10	..	..	..	..	17.7	32.0	
							20	..	..	..	..	17.7	32.0	
							30	..	..	..	..	17.5?	31.6?	
							40	..	..	..	..	17.7	32.0	

Used Ekman's water-bottle.
It still seems impossible to prevent snow powder from sometimes getting into the neck of the bottles.
Cut a hole in the ice.

Thickness of ice 80 cm.
Samples titrated onboard 28/1 07.
Depth: 40 m.

Series XV. Sledge.

Date	Time	Lat. Long. observed	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
3/I 07	c. 5 a. m.	Øresund same place as S. XIII 76°39′.3N 18°35′W	calm	weak n.-going (flood)	..	÷ 23	0	..	..	..	..	17.8	32.1	25.8	— 1.7
							10	..	..	..	..	16.6?	30.0?		
							20	..	..	..	..	18.0	32.6	26.3	— 1.8
							30	..	..	..	..	17.8	32.1	25.8	— 1.7
							40	..	..	..	..	17.8	32.1	25.8	— 1.7
							50	..	..	..	..	18.0	32.6	26.3	— 1.8
							75	..	..	..	..	18.0	32.6	26.3	— 1.8
							100	..	..	..	..	18.3	33.0	26.6	
							125	..	..	..	..	frozen	frozen		
							150	..	..	..	..	frozen	frozen		

Used Ekman's water-bottle.
A somewhat heavier sinker (ca. 1.5 kg.) used, which gave more reliable closing of the water-bottle.
Samples taken through a tidal opening in the ice at the same place as series XIII.
Tidal-fissure seem to be always open.

Constant irregularities in the values for S ‰ owing to snow-powder.
In calculating density, assumption is made that the water has been cooled down to freezing point.
Samples titrated onboard 1/II 07.

Series XVI. Sledge.

Date	Time	Lat. Long. observed	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
4/I 07	2 a. m.	Øresund 76°44′ N 18°50′ W	calm	..	..	÷ 31	0								
							2	..	..	..	..	17.8	32.1		
							5	..	..	..	..	17.7	32.0		
							10	..	..	..	..	17.6	31.9		
							20	..	..	..	..	16.6?	30.0?		
							30	..	..	..	..	17.5	31.6		
							40	..	..	..	..	17.6	31.9		
							50	..	..	..	..	17.8	32.1		
							75	..	..	..	..	17.8	32.1		
							90	..	..	..	..	frozen	frozen		

Used Ekman's water-bottle which worked well.
Still snow powder in bottles.
Cut a hole in the ice.
Thickness of ice 100 cm.
Samples titrated on board 5/II 07.
Depth: 90 m

4/II 07	10 a. m.—2 p. m.	ca. 6 km. S. from Stormkap 76°46′.5 N	19°05′ W	calm	..	..	— 29	0	..	..	..	..	17.8	32.1		
								10	..	..	..	..	17.8	32.1		
								20	..	..	..	..	17.8	32.1		
								30	..	..	..	..	17.8	32.1		
								40	..	..	..	..	17.9	32.4		
								50	..	..	..	..	18.0	32.5		
								75	..	..	..	..	18.0	32.5		
								100	..	..	..	..	18.1	32.7		
								120	..	..	..	..	18.3	33.1		
								140	..	..	..	..	18.5	33.5		

Used Ekman's water-bottle.
Cut hole in the ice.
Thickness of ice 140 cm. (1 hour's work for 3 men to cut the hole).

Samples titrated onboard 6/II 07.
Depth: 140 m.

Series XVIII. Sledge.

9/III 07	11 a. m.—2 p. m.	Øresund 76°39′.3 N	18°35′ W	calm	strong S.-going	..	— 27	0	..	..	..	..	18.0	32.5	26.2	— 1.8
								1	..	..	..	..	18.0	32.5	26.2	— 1.8
								2	..	..	..	..	18.0	32.5	26.2	— 1.8
								5	..	..	..	..	18.0	32.5	26.2	— 1.8
								10	..	..	..	..	18.0	32.5	26.2	— 1.8
								20								
								30								
								40								
								50								
								75								
								100								
								125								
								150								
								170								

Used Ekman's water-bottle
Snow powder in samples from 20—170 m., so that $S\,‰$ valueless.
The samples obtained through the same tidal opening in the ice as S. XIII and XV.

Thickness of ice 153 cm.
In calculating density, assumption is made that the water has been cooled down to freezing point.
Samples titrated onboard 6/IV 07.

Series XIX. Sledge.

Omitted, all the samples frozen and bottles burst.

Series XX. Sledge.

Date	Time	Lat. (observed)	Long. (observed)	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
8/v 07	7.00 p. m.	Øresund		calm	none	..	— 12	0	— 1.79	+ 0.01	— 1.78	23505	17.98	32.48	26.16	— 1.77
	6.50 -	Maroussia		..	..	..	..	1.5	— 1.79	..	— 1.78	..	17.98	32.48	26.16	— 1.77
	6.40 -	76°39.3′	18°35′	..	..	..	..	2	— 1.78	..	— 1.77	..	17.98	32.48	26.16	— 1.77
	6.30 -	N	W	..	..	..	..	3	— 1.78	..	— 1.77	..	17.98	32.48	26.16	— 1.77
	6.20 -	..	..	..	..	..	..	4	— 1.78	..	— 1.77	..	17.97	32.47	26.15	— 1.77
	6.10 -	..	..	..	..	..	..	5	— 1.78	..	— 1.77	..	17.99	32.50	26.17	— 1.77
	6.00 -	..	..	..	..	..	..	10	— 1.78	..	— 1.77	..	17.98	32.48	26.16	— 1.77
	5.50 -	..	..	..	..	..	..	20	— 1.78	..	— 1.77	..	17.97	32.47	26.15	— 1.77
	5.40 -	..	..	..	..	..	..	30	— 1.78	..	— 1.77	..	17.98	32.48	26.16	— 1.77
	5.30 -	..	..	..	..	..	..	40	— 1.78	..	— 1.77	..	17.99	32.50	26.17	— 1.77
	5.15 -	..	..	..	..	..	..	50	— 1.78	..	— 1.77	..	17.97	32.47	26.15	— 1.77
	5.00 -	..	..	..	..	..	..	75	— 1.77	..	— 1.76	..	17.98	32.48	26.16	— 1.77
	4.50 -	..	..	..	..	..	..	100	— 1.77	..	— 1.76	..	17.98	32.48	26.16	— 1.77
	4.40 -	..	..	..	..	..	..	125	— 1.77	..	— 1.76	..	18.01	32.54	26.20	— 1.77
	4.25 -	..	..	..	..	..	..	140	— 1.77	..	— 1.76	..	18.03	32.57	26.23	— 1.77
	4.15 -	..	..	..	..	..	..	150	— 1.73	..	— 1.72	..	18.19	32.86	26.45	— 1.78
	4.00 -	..	..	..	..	..	..	157	— 1.64	..	— 1.63	..	18.31	33.08	26.63	— 1.80
	3.45 -	..	..	..	..	..	..	158	— 1.59	..	— 1.58	..	18.41	33.26	26.77	— 1.81
	3.30 -	..	..	..	..	..	..	158	— 1.57	..	— 1.56	..	18.54	33.49	26.97	— 1.82

P. N. water-bottle No. 86 used.
Samples obtained in the tidal fissure Maroussia—Sonja Havn.
Thickness of ice 160 cm.

The two successive samples from 158 m. had different temperature and salinity.
Samples titrated onboard 16/v 07.
Depth: 159 m.

Series XXI. Sledge.

11/v 07	ca. 3.30 p. m.	Maroussia		calm	..	..	— 12	145	— 1.78	+ 0.01	— 1.77	23505	18.25	32.97	26.54	
	3.40 -	76°39′.3	18°35′	..	..	..	..	148	— 1.76	..	— 1.75	..	18.28	33.03	26.59	
	4.00 -	N	W	..	..	..	..	150	— 1.75	..	— 1.74	..	18.32	33.10	26.64	
	4.10 -	..	..	..	..	..	..	151	— 1.68	..	— 1.67	..	18.28	33.03	26.59	
								152	— 1.65	..	— 1.64	..	18.32	33.10	26.64	

Object of investigations to determine the exact boundary depth for the water cooled down to freezing point.

Samples titrated onboard 17/v 07.

Series XXII. Sledge.

12/v 07	ca. 1.00 p. m.	Maroussia		..	none	..	—6	140	—1.64	+ 0.01	— 1.63	23505	18.34	33.13	26.68
	1.15 -	76°39′.3	18°35′	..	..	..	..	142	— 1.61	..	— 1.60	..	18.39	33.22	26.76
	1.30 -	N	W	..	..	..	..	144	— 1.60	..	— 1.59	..	18.40	33.24	26.77
	1.40 -	..	..	..	..	..	..	146	— 1.60	..	— 1.59	..	18.43	33.30	26.83
	2.00 -	..	..	..	..	..	..	148	— 1.60	..	— 1.59	..	18.48	33.39	26.89
	3.00 -	..	..	..	..	..	..	150.5	— 1.57	..	— 1.56	..	18.49	33.40	26.90

P. N. water-bottle No. 86 used. Samples titrated onboard 18/v 07.

Series XXIII. Sledge.

13/v 07	ca. 1.00 p. m.	Maroussia		..	..	..	—7	138	— 1.61	0	1.61	23507	18.40	33.24	26.77
	1.15 -	76°39′.3	18°35′	calm	..	..	..	130	— 1.71	..	- 1.71	..	18.21	32.90	26.49
	1.30 -	N	W	..	..	..	..	134	— 1.60	..	- 1.60	..	18.40	33.24	26.77
	1.45 -	..	..	..	..	..	..	132	— 1.59	..	— 1.59	..	18.43	33.30	26.81
	2.00 -	..	..	..	..	..	..	131	— 1.59	..	— 1.59	..	18.43	33.30	26.81
	2.15 -	..	..	..	..	..	..	130.5	— 1.59	..	— 1.59	..	18.41	33.26	26.78
	2.30 -	..	..	..	..	..	..	130	— 1.60	..	— 1.60	..	18.42	33.28	26.80
	2.45 -	..	..	..	..	..	..	128	— 1.61	..	— 1.61	..	18.39	33.22	26.76
	3.00 -	..	..	..	..	..	..	126	— 1.62	..	— 1.62	..	18.36	33.17	26.71
	3.15 -	..	..	..	..	..	..	124	— 1.63	..	1.63	..	18.32	33.10	26.65
	3.30 -	..	..	..	..	..	..	120	— 1.70	..	— 1.70	..	18.25	32.97	26.54
	3.45 -	..	..	..	..	..	..	122	— 1.71	..	— 1.71	..	18.21	32.90	26.48
	4.00 -	..	..	..	..	..	..	123	— 1.72	..	— 1.72	..	18.19	32.86	26.45
	4.10 -	..	..	..	..	..	..	123.5	— 1.71	..	— 1.71	..	18.20	32.88	26.47
	4.20 -	..	..	..	..	..	..	124	— 1.72	..	1.72				
	4.30 -	..	..	..	..	..	..	125	— 1.72	..	— 1.72				
	4.40 -	..	..	..	..	..	..	130	— 1.71	..	— 1.71				
	4.50 -	..	..	..	..	..	..	134	— 1.70	..	— 1.70				
	5.00 -	..	..	..	..	..	..	140	— 1.64	..	— 1.64				
	5.10 -	..	..	..	..	..	..	150	— 1.62	..	— 1.62				
	5.20 -	..	..	..	..	..	..	158	— 1.45	..	— 1.45	..	18.69	33.77	27.19

P. N. water-bottle No. 86 used.
Object of investigations, to determine the variation in temperature and S ‰ at the same depth at different hours of the day.
Samples titrated onboard 18/v 07.

Series XXIV. Sledge.

Date	Time	Lat. (observed)	Long. (observed)	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
23/v 07	ca. 3.00 p. m.	Øresund		calm	strong	..	— 4	0	— 1.80	+ 0.01	— 1.79	23505	18.04	32.29	26.25	— 1.77
	3.50 -	Baadskær		..	N.-	..	..	1	— 1.79	..	— 1.78	..	18.00	32.52	26.19	— 1.77
	3.40 -	76°45′	18°51′	..	going	..	..	2	— 1.79	..	— 1.78	..	18.00	32.52	26.19	— 1.77
	3.30 -	N	W	..	..	..	..	3	— 1.79	..	— 1.78	..	18.00	32.52	26.19	— 1.77
	3.20 -	..	..	..	..	..	..	4	— 1.78	..	— 1.77	..	18.02	32.56	26.22	— 1.77
	3.10 -	..	..	..	..	..	..	5	— 1.77	..	— 1.76	..	18.02	32.56	26.22	— 1.77
	4.00 -	..	..	..	..	..	..	10	— 1.78	..	— 1.77	..	18.01	32.54	26.20	— 1.77
	4.10 -	..	..	..	..	..	..	20	— 1.78	..	— 1.77	..	18.01	32.54	26.20	— 1.77
	4.20 -	..	..	..	..	..	..	30	— 1.78	..	— 1.77	..	18.02	32.56	26.22	— 1.77
	4.30 -	..	..	..	..	..	..	40	— 1.79	..	— 1.78	..	18.01	32.54	26.20	— 1.77
	4.40 -	..	..	..	..	..	..	50	— 1.78	..	— 1.77	..	18.01	32.54	26.20	— 1.77
	4.50 -	..	..	..	..	..	..	60	— 1.78	..	— 1.77	..	18.01	32.54	26.20	— 1.77
	5.00 -	..	..	..	..	..	..	70	— 1.78	..	— 1.77	..	18.01	32.54	26.20	— 1.77
	5.10 -	..	..	..	..	..	..	73	— 1.78	..	— 1.77	..	18.02	32.56	26.22	— 1.77

Used P. N. water-bottle No. 86, which would not close until the rods were well-rubbed with oil; thereafter it worked excellently.
Hole cut in a fissure.

Thickness of ice 102 cm.
Samples titrated onboard 24/v 07.
Depth: 73 m.

Series XXV. Sledge.

11/vi 07	ca. noon	Maroussia		calm	weak	..	+ 1	0	—	+ 0.01	—	23505	17.06	30.82		
		76°39′.3	18°35′		S.-			1	— 1.72	..	— 1.71	..	18.00	32.52	26.18	— 1.77
		N	W		going			2	— 1.72	..	— 1.71	..	18.00	32.52	26.18	— 1.77
								3	— 1.74	..	— 1.73	..	18.00	32.52	26.18	— 1.77
								4	— .177	..	— 1.76	..	17.99	32.50	26.16	— 1.77
								5	— 1.77	..	— 1.76	..	17.99	32.50	26.16	— 1.77
								10	— 1.77	..	— 1.76	..	17.96	32.45	26.13	— 1.77
								20	— 1.77	..	— 1.76	..	17.98	32.48	26.16	— 1.77
								30	— 1.77	..	— 1.76	..	17.98	32.48	26.16	— 1.77
								40	— 1.78	..	— 1.77	..	17.98	32.48	26.16	— 1.77
								50	— 1.78		— 1.77		18.04	32.59	26.25	— 1.77

								100	— 1.77	..	— 1.76	..	18.04	32.59	26.25	— 1.77
								125	— 1.71	..	— 1.70	..	18.18	32.84	26.45	— 1.78
								140	— 1.53	..	— 1.52	..	18.42	33.28	26.79	— 1.81
								150	— 1.42	..	— 1.41	..	18.60	33.60	27.05	— 1.82
								157	— 1.38	..	— 1.37	..	18.69	33.77	27.18	— 1.82

P. N. water-bottle No. 86 used.
Samples titrated onboard 26/IX 07.

Series XXVI. Sledge.

12/VI 07	ca. 11.00 a. m.	Maroussia		calm	none	..	+ 3	0	— 1.62	+ 0.01	— 1.61	23505	17.98	32.48	2615.	— 1.77
	11.10 -	76°39′.3	18°35′	..	..	..	..	¼	— 1.73	..	— 1.72	..	18.00	32.52	26.18	— 1.77
	11.20 -	N	W	..	..	..	..	½	— 1.74	..	— 1.72	..	18.00	32.52	26.18	— 1.77
	11.40 -	..	..	..	..	..	..	100	— 1.76	..	— 1.75	..	18.06	32.63	26.28	— 1.77
	12.00 noon	..	..	..	..	..	..	110	— 1.73	..	— 1.72	..	18.13	32.75	26.38	— 1.78
	12.20 p. m.	..	..	..	..	..	..	120	— 1.70	..	— 1.69	..	18.20	32.88	26.48	— 1.78
	12.40 -	..	..	..	..	..	..	125	— 1.64	..	— 1.63	..	18.31	33.08	26.64	— 1.80
	1.00 -	..	..	..	..	..	..	130	— 1.38	..	— 1.37	..	18.71	33.80	27.21	
	1.20 -	..	..	..	(S.- going)	..	..	135	— 1.37	..	— 1.36	..				
	1.40 -	..	..	..	..	..	..	140	— 1.32	..	— 1.31	..	18.73	33.84	27.24	
	2.00 -	..	..	..	..	..	..	145	— 1.33	..	— 1.32	..	18.72	33.82	27.23	
	2.30 -	..	..	..	..	..	..	150	— 1.31	..	— 1.30	..	18.72	33.82	27.23	
	3.00 -	..	..	..	..	..	..	155	— 1.32	..	— 1.31	..	18.74	33.86	27.25	
	3.30 -	..	..	..	..	..	..	158	— 1.27	..	1.26	..	18.82	34.00	27.37	
	4.00 -	..	..	..	..	..	..	128	— 1.62	..	1.61	..	18.27	33.01	26.58	
	4.20 -	..	..	..	..	..	..	129	— 1.61	..	— 1.60	..	18.34	33.13	26.68	
	4.40 -	..	..	..	..	..	..	130	— 1.62	..	1.61	..	18.30	33.06	26.62	
	5.00 -	..	..	..	..	..	..	130	— 1.66	..	— 1.65	..	18.20	32.88	26.48	
	5.20 -	..	..	..	..	..	..	130	— 1.68	..	1.67	..	18.20	32.88	26.48	
	5.40 -	..	..	..	..	..	..	130	— 1.68	..	— 1.67	..	18.16	32.81	26.42	
	6.00 -	..	..	..	..	..	..	130	— 1.70	..	— 1.69	..	18.13	32.75	26.38	

P. N. water-bottle No. 86 used.
It seems from the sounding-line as if there were a strong S.-going current in the uppermost 100 m., below this depth the line becomes vertical again; there is thus probably a N.-going current here.
Samples titrated onboard 27/IX 07.

Series XXVII. Sledge.

Date	Time	Lat. (observed)	Long. (observed)	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
13/VI 07	noon	Maroussia		calm	none	..	+ 2	0	— 1.53	+ 0.01	— 1.52	23505	17.84	32.23	25.95	
	1.00 p. m.	76°39′.3	18°35′	..	..	..	..	¼	— 1.69	..	— 1.68	..	17.96	32.45	26.13	
	1.10 -	N	W	..	..	..	..	½	— 1.72	..	— 1.71	..	17.98	32.48	26.16	
	1.30 -	..	..	..	..	..	..	1	— 1.73	..	— 1.72	..	18.01	32.54	26.20	
	1.50 -	..	..	..	..	..	..	2	— 1.77	..	— 1.76	..	18.01	32.54	26.20	
	2.10 -	..	..	..	..	..	..	10	— 1.78	..	— 1.77	..	18.03	32.57	26.23	
	2.25 -	..	..	..	..	..	..	50	— 1.78	..	— 1.77	..	18.01	32.54	26.20	
	2.35 -	..	..	..	..	..	..	100	— 1.74	..	— 1.73	..	18.02	32.56	26.22	
	2.49 -	..	..	..	S.-going	..	..	110	— 1.73	..	— 1.72	..	18.10	32.70	26.33	
	3.02 -	..	..	..	..	..	..	120	— 1.63	..	— 1.62	..	18.31	33.08	26.64	
	3.13 -	..	..	..	..	..	..	130	— 1.41	..	— 1.40	..	18.66	33.71	27.14	
	3.28 -	..	..	..	..	..	..	140	— 1.36	..	— 1.35	..	18.66	33.71	27.14	
	4.07 -	..	..	..	..	..	..	150	— 1.30	..	— 1.29	..	18.70	33.78	27.20	
	4.22 -	..	..	..	..	..	..	158	— 1.22	..	— 1.21	..	18.81	33.98	27.36	
	4.40 -	..	..	..	..	..	..	125	— 1.62	..	— 1.61	..	18.24	32.95	26.54	
	4.57 -	..	..	..	..	..	..	128	— 1.63	..	— 1.62	..	18.27	33.01	26.58	
	5.10 -	..	..	..	..	..	..	130	— 1.63	..	— 1.62	..	18.27	33.01	26.58	
	5.24 -	..	..	..	..	..	..	135	— 1.46	..	— 1.45	..	18.57	33.55	27.01	
	5.40 -	..	..	..	..	..	..	135	— 1.50	..	— 1.49	..	18.48	33.39	26.88	

P. N. water-bottle No. 86 used.
Decreasing temperature and salinity at a depth of 135 m. from 5.24 to 5.40 p. m.
3 plankton hauls made by zoologist at the same time.
Samples titrated onboard 29/IX 07.

Series XXVIII. Sledge.

15/VI 07	2.53 p. m.	Maroussia		calm	..	..	+ 2	0	— 1.03	0	— 1.03	23507	17.90	32.34	26.02	— 1.76
	3.00 -	76°39′.3	18°35′	..	..	..	..	¼	— 1.66	..	— 1.66	..	17.92	32.38	26.06	— 1.76
	3.08 -	N	W	..	..	..	..	½	— 1.74	..	— 1.74	..	17.96	32.45	26.12	— 1.77
	3.18 -	..	..	..	..	..	..	1	— 1.76	..	— 1.76	..	17.98	32.48	26.16	— 1.77
	3.26 -	..	..	..	..	..	..	2	— 1.78	..	— 1.78	..	18.00	32.52	26.19	
	3.38 -	..	..	..	..	..	..	10	— 1.78	..	— 1.78	..	17.99	32.50	26.17	— 1.77
	3.47 -	..	..	..	..	..	..	50	— 1.78	..	— 1.78	..	18.00	32.52	26.19	— 1.77
	3.56 -	..	..	..	..	..	..	100	— 1.75	..	— 1.75	..	18.05	32.61	26.26	— 1.77
	4.10 -	..	..	..	S.-going	..	..	120	— 1.62	..	— 1.62	..	18.36	33.17	26.71	— 1.81
	4.23 -	..	..	..	..	..	..	140	— 1.37	..	— 1.37	..	18.71	33.80	27.21	— 1.84
	4.38 -	..	..	..	..	..	..	158	— 1.32	..	— 1.32	..	18.81	33.98	27.36	
	4.55 -	..	..	..	..	..	..	130	— 1.49	..	— 1.49	..	18.55	33.51	26.98	
	5.15 -	..	..	..	..	..	..	135	— 1.45	..	— 1.45	..	18.57	33.55	27.01	
								135	— 1.46		— 1.46		18.61	33.62	27.07	

	5.44 -	..	..	..	..	..	..	135	— 1.51	..	— 1.51	..	18.58	33.57	27.03		
	6.00 -	..	..	..	..	..	..	135	— 1.50	..	— 1.50	..	18.61	33.62	27.08		
	6.13 -	..	..	..	..	..	..	135	— 1.50	..	— 1.50	..	18.57	33.55	27.01		

P. N. water-bottle No. 89 used.
Thickness of ice 156 cm.
Water on the ice 16 cm.
Samples titrated onboard 9—10/VIII 07.

Series XXIX. Sledge.

19/VI 07	5.30 p. m.	Maroussia		calm	..	..	+ 4	0	— 0.38	0	— 0.38	23507	6.0				
	5.47 -	76°39'.3	18°35'	..	..	..	..	¼	— 1.60	..	— 1.60	..	17.49	31.60	25.44	— 1.72	
	6.00 -	N	W	..	..	..	..	½	— 1.74	..	— 1.74	..	18.00	32.52	26 19	— 1.77	
	6.12 -	..	..	..	..	..	..	1	— 1.72	..	— 1.72	..	17.97	32.47	26.15	— 1.77	
	6.24 -	..	..	..	..	..	..	2	— 1.71	..	— 1.71	..	17.98	32.48	26.16	— 1.77	
	6.36 -	..	..	..	..	..	..	3	— 1.74	..	— 1.74	..	17.98	32.48	26.16	— 1.77	
	6.48 -	..	..	..	..	..	..	4	— 1.73	..	— 1.73	..	17.99	32.50	26.17	— 1.77	
	7.01 -	..	..	..	..	..	..	5	— 1.75	..	— 1.75	..	17.98	32.48	26.16	— 1.77	

P. N. water-bottle No. 89 used.
3 planktons hauls made by zoologist at the same time.
Samples titrated onboard 11/IX 07.

Series XXX. Sledge.

20/VI 07	3.06 p. m.	Maroussia		calm	..	..	+ 3	0	— 0.18	0	— 0.18	23507	5.0				
	3.17 -	76°39'.3	18°35'	..	..	..	..	¼	— 1.62	..	— 1.62	..	17.58	31.76	25.57	— 1.73	
	3.27 -	N	W	..	..	..	..	½	— 1.73	..	— 1.73	..	17.83	32.21	25.94	— 1.75	
	4.22 -	..	..	..	..	..	..	1	— 1.70	..	— 1.70	..	17.83	32.21	25.94	— 1.75	
	4.30 -	..	..	..	..	..	..	5	— 1.74	..	— 1.74	..	17.89	32.32	26.03	— 1.76	
	4.41 -																
	4.51 -	..	..	..	..	..	..	10	— 1.78	..	— 1.78	..	18.00	32.52	26.19	— 1.71	
	5.02 -	..	..	..	..	..	..	50	— 1.78	..	— 1.78	..	18.11?	32.72?	26.35?	— 1.78	
	5.12 -	..	..	..	..	..	..	75	— 1.78	..	— 1.78		17.99	32.50	26.17	— 1.77	
	5.25 -	..	..	..	..	..	..	100	— 1.77	..	— 1.77	..	18.05	32.61	26.26	— 1.78	
	5.45 -	..	..	..	..	..	..	120	— 1.61	..	— 1.61	..	18.53	33.48	26.96	— 1.82	
	6.00 -	..	..	..	..	..	..	140	— 1.39	..	— 1.39	..	18.71	33.80	27.21	— 1.84	
	6.15 -	..	..	..	..	..	..	158	— 1.31	..	— 1.31	..	18.82	34.00	27.37		
	6.26 -	..	..	..	..	..	..	130	— 1.45	..	— 1.45	..	18.63	33.66	27.09		
	6.40 -	..	..	..	..	..	..	110	— 1.65	..	— 1.65	..	18.35	33.15	26.70		
	6.55 -	..	..	..	..	..	..	150	— 1.35	..	— 1.35	..	18.77	33.91	27.30		
	7.05 -	..	..	..	..	..	..	105	— 1.72	..	— 1.72	..	18.15	32.79	26.41		
	7.20 -	..	..	..	..	..	..	125	— 1.50	..	— 1.50	..	18.65	33.69	27.12		
	7.33 -	..	..	..	..	..	..	125	— 1.50	..	— 1.50	..	18.62	33.64	27.08		
	7.45 -	..	..	..	..	..	..	125	— 1.49	..	— 1.49	..	18.62	33.64	27.08		

P. N. water-bottle No. 89 used.
Thickness of ice 156 cm.
Water on ice 17 cm.
On under edge of opening in the ice a thin layer of fine ice-needles, which floated to the surface when the water-bottle broke through.
Cl ‰ values noted probably ca. 0.08 ‰ too low.
Samples titrated onboard 6/I 08.

Series XXXI. Sledge.

Date	Time	Lat. (observed)	Long. (observed)	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
21/VI 07	3.45 p. m.	Maroussia		calm	N.-going	..	+ 6	120	— 1.69	0	— 1.69	23507	18.16	32.81	26.42	
	3.54 -	76°39′.3	18°35′	..	..	..	..	121	— 1.68	..	— 1.68	..	18.24	32.95	26.54	
	4.12 -	N	W	..	..	..	..	122	— 1.67	..	— 1.67	..	18.30	33.06	26.62	
	4.24 -	..	..	..	almost no current	..	..	123	— 1.66	..	— 1.66	..	18.30	33.06	26.62	
	4.35 -	..	..	..	..	..	..	124	— 1.61	..	— 1.61	..	18.37	33.19	26.73	
	4.46 -	..	..	..	..	..	..	125	— 1.61	..	— 1.61	..	18.40	33.24	26.77	
	5.01 -	..	..	..	..	..	..	126	— 1.61	..	— 1.61	..	18.45	33.33	26.84	
	5.12 -	..	..	..	..	..	..	127	— 1.61	..	— 1.61	..	18.48	33.39	26.89	
	5.24 -	..	..	..	..	..	..	128	— 1.61	..	— 1.61	..	18.53	33.48	26.96	
	5.36 -	..	..	..	..	..	..	129	— 1.58	..	— 1.58	..	18.52	33.46	26.94	
	5.50 -	..	..	..	..	..	..	130	— 1.53	..	— 1.53	..	18.58	33.57	27.03	
	6.02 -	..	..	..	..	..	..	131	— 1.51	..	— 1.51	..	18.60	33.60	27.06	
	6.15 -	..	..	..	..	..	..	132	— 1.54	..	— 1.54	..	18.56	33.53	27.00	
	6.29 -	..	..	..	..	..	..	133	— 1.51	..	— 1.51	..	18.60	33.60	27.06	
	6.45 -	..	..	..	..	..	..	134	— 1.51	..	— 1.51	..	18.58	33.57	27.03	
	7.00 -	..	..	..	..	..	..	135	— 1.51	..	— 1.51	..	18.59	33.58	27.05	
	7.16 -	..	..	..	..	..	..	136	— 1.47	..	— 1.47	..	18.65	33.69	27.13	

P. N. water-bottle No. 89 used.
Thickness of ice 155 cm.
Water on ice 19 cm.

Values of Cl ‰ probably ca. 0.08 ‰ too low.
Samples titrated onboard 6—12/I 08.

Series XXXII. Sledge.

22/VI 07	2.44 p. m.	Maroussia		calm	weak	..	+ 6	123	— 1.54?	0	— 1.54?	23507	18.26	32.99	26.56	
		76°39′.3	18°35′		N.-going	..		—	— 1.66	..	— 1.66	..	18.26	32.99	26.56	
		N	W					—	— 1.68	..	— 1.68	..	18.25	32.97	26.54	
								—	— 1.66	..	— 1.66	..	18.29	33.04	26.60	
								—	— 1.65	..	— 1.65	..	18.29	33.04	26.60	
								—	— 1.68	..	— 1.68	..	18.26	32.99	26.56	
								—	— 1.67	..	— 1.67	..	18.34	33.13	26.67	
								—	— 1.66	..	— 1.66	..	18.29	33.04	26.60	
								—	— 1.67	..	— 1.67	..	18.34	33.13	26.67	
								—	— 1.68	..	— 1.68	..	18.29	33.04	26.60	

								—	— 1.68	..	— 1.68	..	18.26	32.99	26.56	
								125	— 1.61	..	— 1.61	..	18.39	33.22	26.75	

P. N. water-bottle No. 89 used.
Thickness of ice 153 cm.
Water on ice 21 cm.
Thin layer of new ice on upper and under side of hole in ice.

Plankton haul taken at the same time.
Values of Cl ‰ probably ca. 0.08 ‰ too low.
Samples titrated onboard 12/I 08.

Series XXXIII. Sledge.

25/VI 07	..	Maroussia		calm	..	..	+ 9	0	+ 1.27	0	+ 1.27	23507				
		76°39′.3	18°35′					¼	+ 0.01	..	+ 0.01	..	3.00	5.45	4.33	
		N	W					½	— 1.64	..	— 1.64					
								1	— 1.74	..	— 1.74	..	17.79	32.14	25.88	— 1.75

P. N. water-bottle No. 89 used.
Thickness of ice 149 cm.
Water on ice 25 cm.

Values of Cl ‰ probably ca. 0.08 ‰ too low.
Samples titrated onboard 12/I 08.

Series XXXIV. Sledge.

15/VII 07	3.51 p. m.	Maroussia		calm	weak N.-going	..	+ 2	0	+ 0.19	0	+ 0.19	23507	0.25			
	4.01 -	76°39′.3	18°35′		..	..	..	½	+ 0.08	..	+ 0.08	..	0.99			
	4.11 -	N	W	..	..	..	..	1	— 0.02	..	— 0.02	..	1.05	1.93	1.51	
	4.20 -	..	..	..	..	..	..	1.5	— 0.39	..	— 0.39	..	7.14	12.92	10.38	
	4.31 -	..	..	..	..	..	..	2	— 1.60	..	— 1.60	..	17.63	31.85	25.64	— 1.72
	4.43 -	..	..	..	..	..	..	3	— 1.62	..	— 1.62	..	17.80	32.16	25.89	— 1.75
	4.53 -	..	..	..	..	..	..	4	— 1.68	..	— 1.68	..	17.80	32.16	25.90	— 1.75
	5.04 -	..	..	..	..	..	..	5	— 1.62	..	— 1.62	..	17.86	32.27	25.98	— 1.76
	5.15 -	..	..	..	..	..	..	10	— 1.67	..	— 1.67	..	17.92	32.38	26.07	— 1.76
	5.27 -	..	..	..	..	..	..	20	— 1.70	..	— 1.70	..	18.01	32.54	26.20	— 1.77
	5.40 -	..	..	..	S.-going	..	..	30	— 1.71	..	— 1.71	..				
	5.54 -	..	..	..	..	..	..	50	— 1.72	..	— 1.72	..	18.02	32.56	26.22	— 1.77
	6.10 -	..	..	..	..	..	..	75	— 1.72	..	— 1.72	..	18.02	32.56	26.22	— 1.77
	6.58 -	..	..	..	..	..	..	100	— 1.69	..	—1.69	..	18.10	32.70	26.32	— 1.78
	7.20 -	..	..	..	..	..	..	125	— 1.42	..	— 1.42	..	18.66	33.71	27.14	— 1.83
	7.38 -	..	..	..	..	..	..	150	— 1.37	..	— 1.37	..	18.74	33.86	27.25	— 1.84
	7.56 -	..	..	..	..	..	..	158	— 1.37	..	— 1.37	..	18.78	33.93	27.31	— 1.84

P. N. water-bottle No. 89 used.
Tidal opening now broader (ca. 1 m.). On the under side pulpy ice ca. 3—4 cm. thick.

The ice has increased in thickness since the last measurements.
Samples titrated onboard 30/IX 07.

Series XXXV. Sledge.

Date	Time	Lat. observed	Long. observed	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
16/VII 07	3.55 p. m.	Maroussia		..	..	..	+ 4	0	+ 0.49	0	+ 0.49	23507	1.22	2.23	1.83	
	4.06 -	76°39′.3	18°35′	..	..	..	..	0.5	+ 0.14	..	+ 0.14	..	1.27	2.32	1.89	
	4.23 -	N	W	..	..	..	..	1	— 0.02	..	— 0.02	..	1.27	2.32	1.89	
	4.33 -	..	..	..	..	..	..	1.5	— 1.53	..	— 1.53	..	17.57	31.74	25.55	— 1.72
	4.43 -	..	..	..	..	..	..	2								
	4.53 -	..	..	..	..	..	..	3	— 1.64	..	— 1.64	..	17.80	32.16	25.89	— 1.75
	5.00 -	..	..	..	..	..	..	4	— 1.67	..	— 1.67	..	17.85	32.25	25.96	— 1.76
	5.07 -	..	..	..	..	..	..	5	— 1.61	..	— 1.61	..	17.86	32.27	25.98	— 1.76
	5.21 -	..	..	..	..	..	..	10	— 1.68	..	— 1.68	..	17.90	32.34	26.03	— 1.76

P. N. water-bottle No. 89 used.
Several layers of freshwater ice could be traced in the opening, — this is water from melting snow and ice which steadily becomes thicker and freezes on contact with the ice-cold salt seawater.
The values of Cl ‰ probably ca. 0.08 ‰ too low.
Samples titrated onboard 3/1 08.

Series XXXVI. Sledge.

Date	Time	Lat.	Long.	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
16/VII 07	5.40 p. m.	Maroussia		..	..	..	+ 4	0	+ 0.77	0	+ 0.77	23507	0.50			
	5.50 -	76°39′.3	18°35′	..	..	..	..	0.5	+ 0.59	..	+ 0.59	..	0.58			
	6.01 -	N	W	..	..	..	..	1	+ 0.39	..	+ 0.39	..	0.66			
	6.16 -	..	..	..	..	..	..	1.5	— 0.06	..	— 0.06	..	1.85	3.37	2.72	
	6.26 -	..	..	..	..	..	..	2	— 1.49	..	— 1.49	..	16.71	30.19	24.29	— 1.65
	6.36 -	..	..	..	..	..	..	3	— 1.58	..	— 1.58	..	17.74	32.05	25.79	— 1.75

P. N. water-bottle No. 89 used.
Thickness of ice 148 cm.
On the under side of hole in the ice a layer of newly frozen, freshwater ice of 14 cm. in thickness.
Values of Cl ‰ probably ca. 0.08 ‰ too low.
Samples titrated onboard 3/1 08.

Series XXXVII. Ship.

Date	Time	Lat.	Long.	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
18/VII 07	..	Danmarks Havn from aft end of ship		..	..	..	+ 4	0	+ 2.79	0	+ 2.79	23507	0.35			
		N	W	..				0.5	+ 2.66	..	+ 2.66	..	0.40			
								1	+ 2.52	..	+ 2.52	..	0.48			
								1.5	+ 2.32	..	+ 2.32	..	1.96	3.57	2.97	
											0.64		17.75	32.07	25.79	— 1.75

								2.5	— 0.80	..	— 0.80	..	17.69	31.96	25.71	— 1.74
								3	— 1.08	..	— 1.08	..	17.71	32.00	25.75	— 1.75
								4	— 1.08	..	— 1.08	..	17.73	32.03	25.78	— 1.75
								5	— 1.22	..	— 1.22	..	17.77	32.10	25.83	— 1.75

P. N. water-bottle No. 86 used.
Note the sharp boundary between fresh and salt water at 1.5 to 2 m.'s depth.

Values of Cl ‰ probably ca. 0.08 ‰ too low.
Samples titrated onboard 12/I 08.

Series XXXVIII. Ship.

27/VII 07	..	Danmarks Havn from aft end of ship		..	..	..	..	0	+ 7.19	0	+ 7.19	23507	c. 0.25			
								1	+ 6.45	..	+ 6.45	..	c. 1.25	c. 2.29	1.81	
								1.5	— 0.70	..	— 0.70	..	17.61	31.82	25.59	— 1.73
		76°46′.2 N	18°46′ W					2	— 0.82	..	— 0.82					
								3	— 0.92	..	— 0.92	..	17.63	31.85	25.62	— 1.73
								4	— 0.93	..	— 0.93	..	17.74	32.05	25.78	— 1.74

P. N. water-bottle No. 89 used.
Note boundary between fresh and salt water lying higher than in preceding series.
Samples titrated onboard 7/VIII 07.

Series XXXIX. Sledge.

30-31/VII 07	7.56 p. m.	Maroussia		..	S.-going	..	+ 1	0	— 0.04	0	— 0.04	23507	c. 8.5	c. 15.4	12.5	— 0.83
	8.10 -	76°39′.3 N	18°35′ W	..	..	..	..	0.5	— 1.21	..	— 1.21	..	c. 13.5	c. 24.4	19.7	— 1.32
	8.25 -	..	..	..	..	..	..	1	— 1.60	..	— 1.60	..	17.45	31.53	25.38	— 1.72
	8.35 -	..	..	..	..	..	..	2	— 1.63	..	— 1.63	..	17.82	32.20	25.92	— 1.76
	8.48 -	..	..	..	..	..	..	3	— 1.62	..	— 1.62	..	17.67	31.92	25.70	— 1.75
	8.58 -	..	..	..	..	..	..	4	— 1.68	..	— 1.68	..	17.84	32.23	25.95	— 1.76
	9.10 -	..	..	..	..	..	..	5	— 1.68	..	— 1.68	..	17.89	32.32	26.02	— 1.77
	9.20 -	..	..	..	..	..	..	10	— 1.69	..	— 1.69	..	17.90	32.34	26.03	— 1.77
	9.30 -	..	..	..	..	..	..	20	— 1.69	..	— 1.69	..	17.90	32.34	26.03	— 1.77
	9.40 -	..	..	..	..	..	..	30	— 1.69	..	— 1.69	..	17.89	32.32	26.02	— 1.77
	9.52 -	..	..	..	..	..	..	40	— 1.69	..	— 1.69	..	17.92	32.38	26.06	— 1.77
	10.02 -	..	..	..	..	..	..	50	— 1.69	..	— 1.69	..	17.95	32.43	26.11	— 1.77
	10.19 -	..	..	..	..	..	..	75	— 1.71	..	— 1.71	..	17.97	32.47	26.14	— 1.77
31/VII 07	5.05 a. m.	..	..	..	..	..	..	100	— 1.61	..	— 1.61	..	18.40	33.24	25.96	— 1.82
	5.25 -	..	..	..	..	..	..	125	— 1.37	..	— 1.37	..	18.70	33.78	27.20	
	5.42 -	..	..	..	..	..	..	150	— 1.29	..	— 1.29	..	18.74	33.86	27.25	
	5.57 -	..	..	..	..	..	..	158	— 1.26	..	— 1.26	..	18.83	34.02	27.39	

P. N. water-bottle No. 86 used.
Distance from upper edge of water to lower edge of fresh ice 155 cm.; distance to upper edge 150 cm.; distance to lower edge of old ice 132 cm.

The values of the Cl ‰ are probably ca. 0.08 ‰ too low.
Samples titrated onboard 4/I 08.

Series XL. Ship.

Date	Time	Lat. (observed)	Long. (observed)	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
6/VIII 07	..	Danmarks Havn aft end of ship 76°46′.2 N	18°46′ W	..	..	..	+ 7	0	+ 3.65	0	+ 3.65	23507	c. 1.0	c. 1.8	1.5	
				..	..	..	..	0.5	+ 3.48	..	+ 3.48	..	c. 1.2	2.2	1.8	
								1	+ 1.92	..	+ 1.92	..	c. 1.7	3.1	2.5	
								1.5	+ 0.18	..	+ 0.18	..	16.37	29.58	23.75	
								2	— 0.16	..	— 01.6	..	16.78	30.32	24.37	— 1.65
								3	— 0.62	..	— 0.62	..	17.05	30.81	24.77	— 1.67
								4	— 0.71	..	— 0.71	..				
								5	— 0.90	..	— 0.90	..	17.20	31.08	25.01	— 1.68

P. N. water-bottle No. 89 used.
The boundary between the fresher and salter water is now between 1 and 1.5 m. and not so marked.

Samples titrated onboard 7/VIII 07.
Depth: 5½ m.

Series XLI. Ship.

Date	Time	Lat. (observed)	Long. (observed)	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
23/VIII 07	ca. 2 p. m.	Danmarks Havn aft end of ship 76°46′.2 N	18°46′ W	..	..	..	+ 5	0	— 0.47	0	— 0.47	23507	c. 15.0	c. 27.1	21.8	— 1.47
								1	— 0.80	..	— 0.80	..	c. 15.2	c. 27.5	22.1	— 1.49
								2	— 0.70	..	— 0.70	..	c. 15.4	c. 27.8	22.3	— 1.51
								3	— 0.61	..	— 0.61	..	16.40	29.63	23.83	— 1.60
								4	— 0.73	..	— 0.73	..	16.82	30.39	24.44	— 1.65
								5	— 0.91	..	— 0.91	..	16.88	30.50	24.53	— 1.66
								6	— 0.96	..	— 0.96	..	17.02	30.75	24.74	— 1.67
								7	— 0.91	..	— 0.91	..	17.02	30.75	24.74	— 1.67

P. N. water-bottle No. 89 used.
The boundary between fresh and salt water has now disappeared after the ice in the fjord had broken up on 13/VIII.

Samples titrated onboard 12/IX 07.
Depth: 7½ m.

Series XLII. Motor-boat.

Date	Time	Lat. (observed)	Long. (observed)	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
29/VIII 07	..	Maroussia 76°39′,3 N	18°35′ W	..	..	..	0	0	— 1.31	0	— 1.31	23507	16.42	29.67	23.86	— 1.60
								1	— 1.40	..	— 1.40	..	16.54	29.88	24.05	— 1.61
								2	— 1.28	..	— 1.28	..	16.58	29.96	24.10	— 1.63
								5	— 1.26	..	— 1.26	..	16.78	30.32	24.39	— 1.65
								10	— 1.29	..	— 1.29	..	16.82	30.39	24.46	— 1.65
								20	— 1.23	..	— 1.23	..	17.22	31.11	25.04	— 1.69

							50	— 1.48	..	— 1.48	..	17.95	32.43	26.11	— 1.76
							75	— 1.71	..	— 1.71	..	18.16	32.81	26.41	— 1.78
							100	— 1.69	..	— 1.69	..	18.35	33.15	26.69	— 1.81
							125	— 1.33	..	— 1.33	..	18.73	33.84	27.24	— 1.85
							150	— 1.22	..	— 1.22	..	18.86	34.07	27.43	
							170	— 1.18	..	— 1.18	..	18.86	34.07	27.43	

P. N. water-bottle No. 89 used.
The observations made ca. 500 m. further to the south than previously.

Drift-ice in Øresund.
Samples titrated onboard 12/IX 07.
Depth: 173 m.

Series XLIII. Ship.

30 VIII 07		Danmarks Havn aft end of ship 76°46'.2 N	18°46' W	..	..	..	0	0	— 0.17	0	— 0.17	23507	c. 9.0	c. 16.3	c. 1.31	— 0.87
							1	— 0.72	..	— 0.72	..	16.38	29.60	23.80	— 1.60
							2	— 0.80	..	— 0.80	..	16.42	29.67	23.85	— 1.60
							3	— 0.82	..	— 0.82	..	16.50	29.81	23.97	— 1.61
							4	— 0.91	..	— 0.91	..	16.77	30.30	24.37	— 1.65
							5	— 1.06	..	— 1.06	..	16.84	30.43	24.47	— 1.66
							6	— 1.10	..	— 1.10	..	—	—	—	
							7	— 1.12	..	— 1.12	..	16.97	30.66	24.63	— 1.67

P. N. water-bottle No. 89 used.
New ice.
Samples titrated onboard 16/IX 07.

Series XLIV. Motor-boat.

3/IX 07	.. ..	Stormbugt 76°46'.8 N	19°00' W	..	..	..	+ 1	0	— 0.71	0	— 0.71	23507	c. 8.5	c. 15.4	c. 12.4	— 0.80
								1	— 0.52	..	— 0.52	..	13.5	24.40	19.61	— 1.32
								5	— 1.03	..	— 1.03	..	16.13	29.14	23.44	— 1.58
								10	— 1.18	..	— 1.18	..	16.76	30.28	24.36	— 1.64
								20	— 1.28	..	— 1.28	..	17.43	31.49	25.34	— 1.70
								50	— 1.48	..	— 1.48	..	17.91	32.36	26.05	— 1.76
								75	— 1.64	..	— 1.64	..	18.16	32.81	26.41	— 1.78
								100	— 1.64	..	— 1.64	..	18.31	33.08	26.63	— 1.79
								120	— 1.64	..	— 1.64	..	18.31	33.08	26.63	— 1.79
								133	— 1.64	..	— 1.64	..	18.32	33.10	26.64	— 1.80

P. N. water-bottle No. 89 used.
Motor-boat anchored to an ice-field, drift-ice in fjord.

Samples titrated onboard 13/IX 07.
Depth: 133 m.

Series XLV. Ship.

Date	Time	Lat. (observed)	Long. (observed)	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
13/IX 07	..	Danmarks Havn aft end of ship 76°46′.2 N	18°46′ W	..	..	..	— 4	0	— 1.50	0	— 1.50	23507	15.96	28.84	23.20	— 1.56
								0.5	— 1.56	..	— 1.56	..	16.26	29.38	23.63	— 1.59
								1	— 1.18	..	— 1.18	..	16.36	29.56	23.78	— 1.60
								2	— 1.30	..	— 1.30	..	16.09	29.07		
								3	— 1.32	..	— 1.32	..	16.42	29.67	23.86	— 1.61
								4	— 1.30	..	— 1.30	..	16.44	29.70	23.89	— 1.61
								5	— 1.26	..	— 1.26	..				
								6	— 1.28	..	— 1.28	..	16.44	29.70	23.89	— 1.61

P. N. water-bottle No. 89 used.
The rivers frozen on 10/IX — no fresh surface-water.
Samples titrated onboard 16/IX 07.

Series XLVI. Ship.

14/IX0 7	..	Danmarks Havn from midships 76°46′.2 N	18°46′ W	..	..	..	— 2	0	— 1.48	0	— 1.48	23507	16.29	29.43	23.69	— 1.59
								1	— 1.41	..	— 1.41	..	16.28	29.42	23.68	— 1.59
								5	— 1.30	..	— 1.30	..	16.53	29.87	24.02	— 1.61
								10	— 1.23	..	— 1.23	..	16.73	30.23	24.31	— 1.63
								15	— 1.24	..	— 1.24	..	16.94	30.61	24.63	— 1.66
								16	— 1.25	..	— 1.25	..	16.96	30.64	24.66	— 1.66

P. N. water-bottle No. 89 used.
Samples titrated onboard 16/IX 007.
Depth: 16 m.

Series XLVII. Ship.

17/I 08	..	Danmarks Havn fire hole 76°46′.2 N	18°46′ W	..	..	..	— 26	0	..	..	..	..	17.31	31.27	25 .18	
								4	..	..	..	..	17.23	31.13	25.06	
								8	..	..	..	..	17.29	31.24	25.15	
								12	..	..	..	..	17.29	31.24	25.15	
								16	..	..	..	..	17.29	31.24	25.15	

The values of Cl ‰ probably ca. 0.08 ‰ too low.
In calculating ρ_t assumption is made that the water has been cooled to freezing point.
Samples titrated onboard 17/II 08.

Series XLVIII. Ship.

18/II 08	..	Danmarks Havn fire hole	..	..	..	— 30	0	..	..	..	..	17.43	31.49
	..						8	..	..	..	..	17.41	31.46
		76°46′.2 N	18°46′ W				16	..	..	..	..	—	—

Used Ekman's water-bottle.
The values of Cl ‰ probably ca. 0.08 ‰ too low.
Samples titrated onboard 19/II 08.

Series XLIX. Ship.

8/IV 08	..	Danmarks Havn fire hole	..	..	..	÷ 17	0	..	..	..	..	17.72	32.01
							8	..	..	..	..	17.69	31.96
		76°46′.2 N	18°46′ W				16	..	..	..	..	17.69	31.96

Used Ekman's water-bottle.
The values of Cl ‰ probably ca. 0.08 ‰ too low.
Samples titrated onboard 11/IV 08.

Series L. Ship.

16/IV 08	..	Danmarks Havn fire hole	..	..	..	..	0	..	..	..	..	17.98	32.48
							8	..	..	..	..	17.80	32.16
		76°46′.2 N	18°46′ W				16	..	..	..	..	17.80	32.16

Used Ekman's water-bottle.
The values of Cl ‰ probably ca. 0.08 ‰ too low.
Samples titrated onboard 16/IV 08.

Series LI. Sledge.

Omitted, the samples disturbed.

Series LII. Sledge.

Date	Time	Lat.	Long.	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	s_t	τ
11/v 08	..	Sælsø St. I 77°02′ N	20°23′ W	..	..	..	— 10	0	+ 0.22	0	+ 0.22	23507				
								2.5	+ 0.07	..	+ 0.07					
								20	+ 0.11	..	+ 0.11					
								40	+ 0.29	..	+ 0.29					
								50	+ 0.61	..	+ 0.61	..	0.19	0.35	0.25	[1]
								54	+ 0.86	..	+ 0.86	..	0.13	0.23		
								55	+ 0.91	..	+ 0.91					
								56	+ 1.11	..	+ 1.11	..	4.47	8.10	6.51	
								57 5	+ 1.32	..	+ 1.32	..	10.64	19.24	15.44	
								60	+ 1.53	..	+ 1.53	..	13.04	23.57	18.89	
								68	+ 1.70	..	+ 1.70	..	15.17	27.41	21.95	[2]

[1] Stopper not tight. [2] Smell of hydrogen sulphide.

P. N. water-bottle No. 86 used.
Thickness of ice 212 cm.
The water rises to 12 cm. below edge of ice.
Snow on ice 15 cm.

Ice very hard.
Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.
Depth: 69 m.; bottom-soil — light, very soft clay (mud).

Series LIII. Ship.

Date	Time	Lat.	Long.	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	s_t	τ
15/v 08	..	Danmarks Havn fire hole 76°46′.2 N	18°46′ W	..	..	..	..	0	— 1.73	0	— 1.73	23507	17.74	32.05	25.80	— 1.75
								8	— 1.73	..	— 1.73	..	17.76	32.09	25.83	— 1.75
								16	— 1.73	..	— 1.73	..	17.74	32.05	25.80	— 1.75

P. N. water-bottle No. 86 used.
Values of Cl ‰ probably ca. 0.08 ‰ too low.
Samples titrated onboard 15/v 08.

Series LIV. Sledge.

Date	Time	Lat.	Long.	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	s_t	τ
22/v 08	2—8 a. m.	Anneks Sø 77°15′.2 N	21°00′ W	calm	..	..	— 4	0	+ 0.30 + 0.00 + 0.12	0	+ 0.30 + 0.00 + 0.12	23507				

									20	+ 1.60	..	+ 1.60	..	0.03	0.05	
									30	+ 1.67	..	+ 1.67				
									40	+ 1.71	..	+ 1.71	..	0.03	0.05	
									50	+ 1.75	..	+ 1.75				
									60	+ 1.77	..	+ 1.77	..	0.03	0.05	
									70	+ 1.80	..	+ 1.80				
									80	+ 1.84	..	+ 1.84	..	0.04	0.07	
									85	+ 1.93	..	+ 1.93				
									87	+ 1.98	..	+ 1.98	..	0.04	0.07	

P. N. water-bottle No. 86 used.
Distance of lower edge of ice to surface of water 233 cm.
The water rises to 17 cm. below edge of ice.
Thickness of ice 250 cm.
Snow on the ice 0—5 cm.
Ice very hard (6 hour's work for 3 men to cut through it).
The water appears turbid.

The 3 surface temperatures were taken 1) immediately after hole was cut through, 2) after thin ice had formed on the surface, 3) later in the day in sunshine.
Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.
Depth $89^3/_4$ m.; bottom-soil — brownish clay.

Series LV. Sledge.

24/v 08	7 p. m.— 12 mn.	Sælsø 77°04′.8 N	20°47′ W	..	..	..	— 1	0	0.00	0	0.00	23507	0.19	0.35	0.21	
								2	0.00	..	0.00					
								10	+ 0.17	..	+ 0.17					
								20	+ 0.26	..	+ 0.26	..	0.18	0.34	0.21	
								40	+ 0.43	..	+ 0.43					
								50	+ 0.67	..	+ 0.67	..	0.19	0.35	0.25	
								54	+ 0.93	..	+ 0.93	..	0.19	0.35	0.26	
								55	+ 1.00	..	+ 1.00	..	0.42	0.79	0.60	
								56	+ 1.18	..	+ 1.18	..	4.02	7.29	5.85	
								57	+ 1.29	..	+ 1.29	..	8.99	16.26	13.05	
								60	+ 1.53	..	+ 1.53	..	13.94	25.19	20.19	
								70	+ 1.72	..	+ 1.72	..	15.25	27.56	22.07	[1]
								80	+ 1.93	..	+ 1.93	..	15.46	27.94	22.35	[1]
								90	+ 2.12	..	+ 2.12	..	15.51	28.03	22.41	[1]
								100	+ 2.19	..	+ 2.19	..	15.54	28.08	22.45	[1]
								110	+ 2.32	..	+ 2.32	..	15.58	28.15	22.50	[1]
								$115^3/_4$	+ 2.36	..	+ 2.36	..	15.58	28.15	22.50	[1]

[1] Smelt of hydrogen sulphide.

P. N. water-bottle No. 86 used.
Distance of lower edge of ice to surface of water 178 cm.
The water rises to 2 cm. above edge of ice.
Thickness of ice 176 cm.

Snow on the ice 39 cm.
Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.
Depth: $115^3/_4$ m.; bottom-soil — light clay, mud.

Series LVI. Sledge.

Date	Time	Lat.	Long.	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
28/v 08	—	Dove Bugt		calm	..	..	— 0.5	0	— 1.50	0	— 1.50	23507				
	12.50 p. m.	76°51′	19°51′	..	..	..	..	2	— 1.72	..	— 1.72	..	17.74	32.05	25.80	— 1.74
	1.06 -	N	W	..	..	..	..	5	— 1.73	..	— 1.73	..				
	1.13 -	..	..	..	..	..	..	10	— 1.73	..	— 1.73					
	1.20 -	..	..	..	..	..	..	20	— 1.68	..	— 1.68	..				
	9.53 a. m.	..	..	..	..	..	..	25	— 1.65	..	— 1.65	..	17.84	32.23	25.95	— 1.75
	1.28 p. m.	..	..	..	..	..	..	30	— 1.70	..	— 1.70					
	1.38 -	..	..	..	..	..	..	40	— 1.67	..	— 1.67					
	10.03 a. m.	..	..	..	..	..	..	50	— 1.69	..	— 1.69	..	17.98	32.48	26.15	— 1.77
	10.17 -	..	..	..	..	..	..	75	— 1.70	..	— 1.70	..	18.18	32.84	26.44	— 1.78
	1.56 p. m.	..	..	..	..	..	..	90	— 1.63	..	— 1.63					
	10.33 a. m.	..	..	..	..	..	..	100	— 1.61	..	— 1.61	..	18.37	33.19	26.73	— 1.80
	10.47 -	..	..	..	..	..	..	125	— 1.39	..	— 1.39	..	18.67	33.73	27.15	
	11.19 -	..	..	..	..	..	..	150	— 1.19	..	— 1.19	..	18.88	34.11	27.46	
	11.48 -	..	..	..	..	..	..	180	— 1.08	..	— 1.08	..	18.95	34.23	27.56	
	12.24 p. m.	..	..	..	..	..	..	215	— 1.02	..	— 1.02	..	18.96	34.25	27.56	

P. N. water-bottle No. 86 used.
Distance of lower edge of ice to surface of water 184 cm.
The water rises to 6—10 cm. below edge of ice.
Thickness of ice ca. 190 cm.

Snow on the ice ca. 60 cm.
Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.
Depth: 216¾ m.; bottom-soil — clay.

Series LVII. Sledge.

3/vi 08	..	Lake at Danmarks Havn		..	..	..	..	0	+ 0.38	0	+ 0.38	23507				
	..	76°46′.5	18°47′					0.5	+ 0.41	..	+ 0.41					
		N	W					1	+ 0.45	..	+ 0.45					
								1.5	+ 0.72	..	+ 0.72					
								2	+ 3.75	..	+ 3.75					
								2.5	+ 4.26	..	+ 4.26					
								3	+ 4.48	..	+ 4.48					
								3.5	+ 4.00	..	+ 4.00	..	—	0.07		

P. N. water-bottle No. 86 used.
Thickness of ice 1¾ m.

7—8/VI 08	..	Store Belt 76°28′ N	19°28′ W	..	..	..	0	0	— 1.58	0	— 1.58	23507				
								1¼	— 1.66	..	— 1.66	..	17.73	32.03	25.79	— 1.74
								1½	— 1.72	..	— 1.72					
								2	— 1.72	..	— 1.72					
								5	— 1.74	..	— 1.74	..	17.71	32.00	25.76	— 1.74
								10	— 1.73	..	— 1.73	..	17.17	32.00	25.76	— 1.74
								25	— 1.71	..	— 1.71	..	17.84	32.23	25.95	— 1.75
								50	— 1.75	..	— 1.75	..	18.01	32.54	26.19	— 1.77
								75	— 1.76	..	— 1.76	..	18.13	32.75	26.37	— 1.78
								100	— 1.69	..	— 1.69	..	18.37	33.19	26.72	— 1.80
								125	— 1.51	..	— 1.51	..	18.65	33.69	27.12	— 1.83
								150	— 1.39	..	— 1.39	..	18.86	34.07	27.43	
								175	— 1.07	..	— 1.07	..	19.01	34.34	27.64	
								200	— 0.71	..	— 0.71	..	19.08	34.47	27.73	
								225	— 0.32	..	— 0.32	..	19.16	34.61	27.83	
								250	— 0.07	..	— 0.07	..	19.21	34.70	27.89	
								300	+ 0.46	..	+ 0.46	..	19.29	34.85	27.97	
								350	+ 0.58	..	+ 0.58	..	19.30	34.87	27.99	

P. N. water-bottle No. 86 used.
Distance of lower edge of ice to surface of water 120 cm.
The water rises to 8 cm. below edge of ice.
Thickness of ice 128 cm.

Snow on the ice 22 cm.
Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/X 08.
Depth: 357 m.; bottom-soil — soft, clay, mud.

Series LIX. Sledge.

11-12/VI 08	..	Stormbugt 76°46′ N	19°00′ W	SE	..	..	— 0.8	0	— 1.7	0	— 1.7	23507				
11/VI 08	11.30 p. m.			..	..	..	..	1½	— 1.74	..	— 1.74	..	17.82	32.20	25.92	— 1.75
	11.47 -			..	..	..	..	5	— 1.74	..	— 1.74	..	17.82	32.20	25.92	— 1.75
12/VI 08	12.06 a. m.	..	..	..	..	..	..	10	— 1.73	..	— 1.73	..	17.87	32.29	25.99	— 1.75
	12.17 -	..	..	..	..	..	..	25	— 1.72	..	— 1.72	..	17.95	32.43	26.11	— 1.76
	12.40 -	..	..	..	..	..	..	50	— 1.72	..	— 1.72	..	18.00	32.52	26.18	— 1.77
	12.57 -	..	..	..	..	..	..	75	— 1.71	..	— 1.71	..	18.17	32.83	26.43	— 1.78
	3.07 -	..	..	..	..	..	..	90	— 1.69	..	— 1.69	..	18.29	33.04	26.61	— 1.79
	1.05 -	..	..	..	..	..	..	100	— 1.63	..	— 1.63	..	18.38	33.21	26.74	— 1.80
	1.27 -	..	..	..	..	..	..	125	— 1.62	..	— 1.62	..	18.41	33.26	26.78	— 1.80
	1.45 -	..	..	..	..	..	..	150	— 1.62	..	— 1.62	..	18.42	33.28	26.80	— 1.81
	2.07 -	..	..	..	..	..	..	175	— 1.61	..	— 1.61	..	18.45	33.33	26.84	— 1.82
	2.41 -	..	..	..	..	..	..	200	— 1.60	..	— 1.60	..	18.49	33.40	26.90	— 1.82

P. N. water-bottle No. 86 used.
Distance of lower edge of ice to surface of water 120 cm.
The water rises to 14 cm. above edge of ice.

Thickness of ice 106 cm.
Water on ice had a temp. of — 2.1°.
Depth: 212 m.; bottom-soil — gravel, shells.

Series LX A. Sledge.

Date	Time	Lat.	Long.	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
18/VI 08	1.59 p. m.	Øresund		NW	N.-g.	..	+ 7	1¼	— 1.76	0	— 1.76	23507	17.92	32.38	26.06	— 1.76
	2.14 -	Maroussia to		..	..	..	..	5	— 1.76	..	— 1.76	..	17.98	32.48	26.15	— 1.77
	2.52 -	I. P. Jacobsen Ø		..	..	..	..	10	— 1.76	..	— 1.76	..	17.99	32.50	26.16	— 1.77
	3.15 -	76°39′.0 N	18°37′ W	..	..	..	..	25	— 1.75	..	— 1.75	..	18.01	32.54	26.18	— 1.77
	3.33 -			..	..	..	..	50	— 1.72	..	— 1.72	..	18.07	32.65	26.28	— 1.77
	3.50 -	..	..	..	..	..	..	75	— 1.71	..	— 1.71	..	18.22	32.92	26.51	— 1.78
	4.07 -	..	..	..	..	..	..	100	— 1.38	..	— 1.38	..	18.68	33.75	27.17	— 1.83
	4.48 -	..	..	..	..	..	..	125	— 1.30	..	— 1.30	..	18.75	33.87	27.27	
	5.22 -	..	..	..	..	..	..	150	— 1.29	..	— 1.29	..	18.77	33.91	27.30	
	5.57 -	..	..	..	..	..	..	175	— 1.20	..	— 1.20	..	18.87	34.09	27.44	
	6.26 -	..	..	..	..	..	..	200	— 1.19	..	— 1.19	..	18.87	34.09	27.44	
	7.00 -	..	..	..	..	..	..	216	— 1.14	..	— 1.14	..	18.90	34.14	27.49	
	7.43 -	..	..	..	..	..	..	90	— 1.61	..	— 1.61	..	18.27	33.01	26.58	
	8.14 -	..	..	..	..	..	..	100	— 1.52	..	— 1.52	..	18.42	33 28	26.79	

P. N. water-bottle No. 86 used.
Current-measurements and plankton-samples taken at the same time.

Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.

Series LX B. Sledge.

19-20/VI 08	10.36 p. m.	Øresund		calm	S.-g.	..	+ 6	100	— 1.54	0	— 1.54	23507	18.47	33.37	26.87	
	1.02 a. m.	Maroussia to		..	no current	..	..	100	— 1.54	..	— 1.54	..	18.43	33.28	26.80	
	2.42 -	I. P. Jacobsen Ø		..	N.-g.	..	..	100	— 1.44	..	— 1.44	..	18.62	33.64	42.08	
		76°39′.0 N	18°37′ W													

P. N. water-bottle No. 86 used.
Object of investigations to determine whether there is any connection at 100 m. between the variations in temp. and sal. and tidal movements.

Samples titrated at Hydrographical Laboratory at Copenhagen 3—10/x 08.

Series LXI. Sledge.

25/VI 08	9.36 a. m.	Lille Belt		WSW	weak N.-g.	..	+ 3	1¼	— 1.72	0	— 1.72	23507	17.91	32.36	26.05	— 1.77
	9.53 -	76°40′.2	18°51′	..	..	..	..	5	— 1.72	..	— 1.72	..	17.91	32.36	26.05	— 1.76
	10.16 -	N	W	..	..	..	..	10	— 1.72	..	— 1.72	..	17.91	32.36	26.05	— 1.76
	10.38 -	..	..	..	..	..	..	25	— 1.72	..	— 1.72	..	17.95	32.43	26.11	— 1.77
	10.52 -	..	..	..	..	..	..	50	— 1.72	..	— 1.72	..	17.99	32.50	26.16	— 1.77
	11.15 -	..	..	..	..	..	..	75	— 1.68	..	— 1.68	..	18.13	32.75	26.37	— 1.78
	11.35 -	..	..	..	..	..	..	100	— 1.59	..	— 1.59	..	18.40	33.24	26.77	
	11.59 a. m.	..	..	..	..	..	..	125	— 1.57	..	— 1.57	..	18.48	33.39	26.89	
	12.27 p. m.	..	..	..	current chang.	..	..	140	— 1.53	..	— 1.53	..	18.48	33.39	26.89	
	12.51 -	..	..	..	S.-g.	..	..	90	— 1.61	..	— 1.61	..	18.35	33.15	26.70	
	1.50 -	..	..	..	..	..	..	82½	— 1.60	..	— 1.60	..	18.40	33.24	26.77	

P. N. water-bottle No. 86.
Distance of lower edge of ice from surface of water 108 cm.
Layer of snow and water on the ice with thickness of 50 cm.

Thickness of ice 58 cm.
Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.

Series LXII. Sledge.

26/VI 08	10.12 a. m.	Øresund		W	S.-g.	..	+ 5	0.5	— 0.80	0	— 0.80	23057				
	10.30 -	76°42′.6	18°47′	..	..	..	..	1	— 1.70	..	— 1.70	..	17.94	32.41	26.09	
	10.41 -	N	W	..	..	..	..	2	— 1.69	..	— 1.69	..				
	10.53 -	..	..	..	..	..	..	3	— 1.69	..	— 1.69					
	10.57 -	..	..	..	..	..	..	4	— 1.69	..	— 1.69	..	17.92	32.38	26.06	
	11.14 -	..	..	..	..	..	..	5	— 1.69	..	— 1.69					
	11.37 -	..	..	..	..	..	..	10	— 1.70	..	— 1.70					
	11.43 -	..	..	..	..	..	..	20	— 1.70	..	— 1.70					
	11.53 -	..	..	..	..	..	..	30	— 1.71	..	— 1.71					
	12.05 p. m.	..	..	..	..	..	..	37	— 1.71	..	— 1.71	..	18.00	32.52	26.18	

P. N. water-bottle No. 86 used.
Air-bubbles in all pools on the ice.
It is noticed that the flowing water carries away icicles from the under side of ice. Water turbid from such icicles. Water clear when no current.

Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.
Depth: 40 m.

Series LXIII. Sledge.

Date	Time	Lat.	Long.	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
26/VI 08	2.57 p. m.	Øresund		calm	S.-g.	..	+ 6	0.75	— 1.68	0	— 1.68	23507	17.90	32.34	26.03	
	3.08 -	76°44′.1	18°48′	..	..	..	..	2	— 1.68	..	— 1.68					
	3.15 -	N	W	..	chang.	..	..	3	— 1.64	..	— 1.64					
	3.22 -	..	..	..	N.-g.	..	..	4	— 1.62	..	— 1.62					
	3.56 -	..	..	..	..	..	..	5	— 1.65	..	— 1.65	..	17.90	32.34	26.03	
	4.06 -	..	..	..	..	..	..	10	— 1.65	..	— 1.65	..	17.91	32.36	26.05	
	4.17 -	..	..	..	..	..	..	25	— 1.70	..	— 1.70					
	4.29 -	..	..	..	..	..	..	50	— 1.72	..	— 1.72	..	17.95	32.43	26.11	
	4.51 -	..	..	..	..	..	..	75	— 1.72	..	— 1.72					
	5.02 -	..	..	..	..	..	..	100	— 1.72	..	— 1.72	..	18.02	32.56	26.21	

P. N. water-bottle No. 86 used.
Distance from under edge of ice to surface of water 67 cm.

Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.
Depth: 108 m.

Series LXIV A. Sledge.

Date	Time	Lat.	Long.	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
29/VI 00	12.49 p. m.	Maroussia to		calm	S.-g.	..	+ 7	100	— 1.33	0	— 1.33	23507	18.73	33.84	27.24	
	2.21 -	I. P. Jacobsen Ø		..	..	..	..	..	— 1.39	..	— 1.39	..	18.67	33.73	27.15	
	3.30 -	76°39′.5	18°57′	..	..	..	..	..	— 1.52	..	— 1.52	..	18.46	33.35	26.85	
	5.00 -	N	W	..	..	..	..	..	— 1.53	..	— 1.53	..	18.46	33.35	26.85	
	6.34 -	..	..	..	..	..	..	..	— 1.57	..	— 1.57	..	18.41	33.26	26.78	
	7.40 -	..	..	..	none	..	..	..	— 1.56	..	— 1.56	..	18.38	33.21	26.74	
	9.00 -	..	..	..	N.-g.	..	..	..	— 1.50	..	— 1.50	..	18.50	33.42	26.91	

Object of observations, to follow the variations in temp. and salin. at 100 m. simultaneously with current-measurements.
Angles for the position: Harefjeld—Cape Bismarck 16°11′.
Cape Bismarck—Maroussia 91°58′.

P. N. water-bottle No. 86 used.
Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.

Series LXIV B. Sledge.

Date	Time	Lat.	Long.	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
30/VI 08	5.30 p. m.	Maroussia to		calm	S.-g. / none	..	+ 2	100	— 1.55	0	— 1.55	23507	18.41	33.26	26.77	
	6.00 -	I. P. Jacobsen Ø		..	N.-g.	..	..	..	— 1.58	..	— 1.58	..				

	8.00 -	N	W	..	..	..	..	..	— 1.53	..	— 1.53	..	18.45	33.36	26.89
	9.00 -	..	..	..	..	..	..	..	— 1.53	..	— 1.53	..	18.49	33.40	26.89
	10.00 -	..	..	..	..	..	..	..	— 1.52	..	— 1.52	..	18.48	33.39	26.88
	11.02 -	..	..	..	..	..	..	..	— 1.42	..	— 1.42	..	18.61	33.62	27.07
	12.00 mn.	..	..	..	none / S.-g.	..	..	..	— 1.46	..	— 1.46	..	18.56	33.53	26.99
1/VII 00	1.10 a. m.	..	..	..	..	..	..	..	— 1.50	..	— 1.50	..	18.54	33.49	26.96

P. N. water-bottle No. 86 used.
30/VI. Low water at Maroussia 6.30 a. m.
1/VII. High water 12.10 a. m.
Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.

Series LXIV C. Sledge.

1 2/VII 08	11.40 p. m.	Maroussia to		calm	..	..	+ 0.6	100	— 1.49	0	— 1.49	23507	18.51	33.44	26.92
	12.33 a. m.	I. P. Jacobsen Ø		..	S.-g.	..	..	..	— 1.49	..	— 1.49	..	18.58	33.57	27.02
	1.25 -	76°39′.5	18°37′	..	..	..	..	..	— 1.57	..	— 1.57	..	18.51	33.44	26.92
	2.05 -	yN	W	..	..	..	..	..	— 1.53	..	— 1.53	..	18.47	33.37	26.86
	2.35 -	..	..	..	..	..	..	..	— 1.57	..	— 1.57	..	18.44	33.31	26.83
	3.00 -	..	..	..	..	..	..	..	— 1.58	..	— 1.58	..	18.37	33.19	26.73
	4.02 -	..	..	..	..	..	..	..	— 1.61	..	— 1.61	..	18.33	33.12	26 67
	5.00 -	..	..	..	..	..	..	..	— 1.64	..	— 1.64	..	18.21	32.90	26.49
	6.00 -	..	..	..	none	..	..	..	— 1.65	..	— 1.65	..	18.18	32.84	26.45
	7.35 -	..	..	..	N.-g.	..	..	..	— 1.61	..	— 1.61	..	18.32	33.10	26.65

P. N. water-bottle No. 86 used.
2/VII. High water at Maroussia 12.20 a. m.
Low water 6.40 a. m.
Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.

LXIV D. Sledge.

3/VII 08	6.30 a. m.	Maroussia		NW	N.-g.	..	+ 6	100	— 1.66	0	— 1.66	23507	18.22	32.92	26.51
	8.10 -	I. P. Jacobsen Ø		..	..	..	..	—	— 1.62	..	— 1.62	..	18.36	33.17	26.71
	9.10 -	76°39′.5	18°37′	..	..	..	..	—	— 1.64	..	— 1.64	..	18.33	33.12	26.67
	11.00 -	N	W	..	..	..	..	—	— 1.62	..	— 1.62	..	18.45	33.33	26.84
	12.10 p. m.	..	..	..	..	..	..	—	— 1.58	..	— 1.58	..	18.47	33.37	26.87
	3.10 -	..	..	..	..	..	..	—	— 1.34	..	— 1.34	..	18.75	33.87	27.27
	4.15 -	..	..	..	none	..	..	—	— 1.44	..	— 1.44	..	18.61	33.62	27.07
	12.28 -	..	..	..		..	..	75	— 1.72	..	— 1.72	..			
	12.20 -	..	..	..		..	..	125	— 1.40	..	— 1.40				
	3.25 -	..	..	..		..	..	175	— 1.20	..	— 1.20	..	18.85	34.05	27.41
	3.35 -	..	..	..		..	..	200	— 1.15	..	— 1.15	..	18.88	34.11	27.46

P. N. water-bottle No. 86 used.
3/VII. Low water at Maroussia 7.15 a. m.
High water 1.40 p. m.
At 100 m. current running out after low water and in after high water.
N. B. High water in the day higher than at night.
The corresponding temp. and salin. in 100 m. likewise higher in the day-time.

Daytime	Temp.	Sal.	Nighttime	Temp.	Sal.
29/VI ...	— 1.33	33.84	30/VI ...	— 1.42	33.62
3/VII ...	— 1.34	33.87	1-2/VII ..	— 1.49	33.57
4/VII ...	— 1.39				

Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.

Series LXV. Sledge.

Date	Time	Lat.	Long.	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
29/VI 08	8.27 p. m.	Maroussia to		calm	N.-g.	..	+ 4	1	— 1.36	0	— 1.36	23507	17.56	31.73	25.53	
	8.23 -	I. P. Jacobsen Ø		..	..	..	..	2	— 1.40	..	— 1.40	..	17.58	31.76	25.56	
	8.17 -	76°39′.5	18°37′	..	..	..	..	3	— 1.46	..	— 1.46	..	17.65	31.89	25.66	
	8.12 -	N	W	..	..	..	..	4	— 1.50	..	— 1.50	..	17.77	32.10	25.84	
	7.56 -	..	..	..	..	..	..	5	— 1.48	..	— 1.48	..	17.72	32.01	25.77	
	8.33 -	..	..	..	..	..	..	10	— 1.49	..	— 1.49	..	17.76	32.09	25.83	
	8.37 -	..	..	..	..	..	..	25	— 1.61	..	— 1.61	..	17.86	32.27	25.98	
	8.44 -	..	..	..	..	..	..	50	— 1.66	..	— 1.66	..	17.95	32.43	26.12	
	8.53 -	..	..	..	..	..	..	75	— 1.73	..	— 1.73	..	18.20	32.88	26.48	
30/VI 08	9.00 -	..	..	..	..	..	..	100	— 1.53	..	— 1.53	..	18.49	33.40	26.89	
	9.25 -	..	..	..	..	..	..	125	— 1.37	..	— 1.37	..	18.64	33.68	27.11	
	9.37 -	..	..	..	..	..	..	150	— 1.28	..	— 1.28	..	18.71	33.80	27.21	
	9.49 -	..	..	..	..	..	..	175	— 1.20	..	— 1.20	..	18.83	34.02	27.39	
	10.15 -	..	..	..	..	..	..	200	— 1.18	..	— 1.18	..	18.85	34.05	27.41	

P. N. water-bottle No. 86 used.
30/VI. High water at Maroussia 12.10 a. m.

Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.

Series LXVI. Sledge.

2/VII 08	4.28 a. m.	Maroussia to		..	S.-g.	..	+ 1	1	— 1.60	0	— 1.60	..	17.70	31.98	25.74	
	4.45 -	I. P. Jacobsen Ø		..	..	..	..	5	— 1.58	..	— 1.58	..	17.72	32.01	25.77	
	4.50 -	76°39′.5	18°37′	..	..	..	..	10	— 1.58	..	— 1.58	..	17.74	32.05	25.80	
	5.10 -	N	W	..	..	..	..	25	— 1.60	..	— 1.60	..	17.85	32.25	25.96	
	5.18 -	..	..	..	..	..	..	50	— 1.65	..	— 1.65	..	17.98	32.48	26.15	
	5.26 -	..	..	..	..	..	..	75	— 1.68	..	— 1.68	..	18.12	32.74	26.35	
	5.42 -	..	..	..	..	..	..	100	— 1.64	..	— 1.64	..	18.20	32.88	26.47	
	5.42 -	..	..	..	..	..	..	125	— 1.48	..	— 1.48	..	18.56	33.53	26.99	
	6.12 -	..	..	..	..	..	..	150	— 1.30	..	— 1.30	..	18.75	33.87	27.27	
3/VII 08	8.22 -	..	..	..	..	..	..	175	— 1.27	..	— 1.27	..	18.73	33.84	27.24	
	8.42 -	..	..	..	..	..	..	200	— 1.20	..	— 1.20	..	18.82	34.00	27.37	

P. N. water-bottle No. 86 used.
Low water at Maroussia: 2/VII, 6.40 a. m.; 3/VII, 7.15 a. m

Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.

Series LXVII A. Sledge.

4/VII 08	3.50 p. m.	I. P. Jacobsen Ø		calm	S.-g.	..	+ 8	100	— 1.39	0	— 1.39	23507				
	5.42 -	to Renskær.		..	..	..	..	—	— 1.52	..	— 1.52	..	18.55	33.51	26.98	
	7.10 -	76°40′.6	18°36′	..	..	..	..	—	— 1.59	..	— 1.59	..	18.45	33.33	26.84	
	8.02 -	N	W					—	— 1.61	..	— 1.61	..	18.46	33.35	26.85	

10.15	-	..	..	..	..	..	..	—	— 1.62	..	— 1.62	..	18.37	33.19	26.72	
11.00	-	..	..	..	..	..	..	—	— 1.62	..	— 1.62	..	18.38	33.21	26.73	
5.24	-	..	..	..	..	..	..	75	— 1.61	..	— 1.61	..	18.36	33.17	26.70	
7.20	-	..	..	..	..	..	..	—	— 1.63	..	— 1.63	..	18.23	32.94	26.51	
8.12	-	..	..	..	..	..	..	—	— 1.63	..	— 1.63	..	18.22	32.92	26.50	
9.13	-	..	..	..	..	..	..	—	— 1.64	..	— 1.64	..	18.17	32.83	26.43	
10.28	-	..	..	..	..	..	..	—	— 1.65	..	— 1.65	..	18.25	32.79	26.40	
11.10	-	..	..	..	..	..	..	—	— 1.65	..	— 1.65	..	18.15	32.79	26.40	
5.53	-	..	..	..	..	..	..	125	— 1.34	..	— 1.34	..	18.77	33.91	27.30	
8.22	-	..	..	..	..	..	..	—	— 1.47	..	— 1.47	..	18.64	33.68	27.12	
6.06	-	..	..	..	..	..	..	140	— 1.30	..	— 1.30	..	18.79	33.95	27.33	
8.34	-	..	..	..	..	..	..	—	— 1.37	..	— 1.37	..	18.73	33.84	27.24	
9.44	-	..	..	..	..	..	..	50	— 1.60	..	— 1.60	..	17.95	32.43	26.11	
9.52	-	..	..	..	..	..	..	25	— 1.54	..	— 1.54	..	17.86	32.27	25.98	
10.00	-	..	..	..	..	..	..	10	— 1.48	..	— 1.48	..	17.76	32.09	25.83	
10.08	-	..	..	..	..	..	..	5	— 1.37	..	— 1.37	..	17.68	31.94	25.71	
10.45	-	..	..	..	..	..	..	1	— 1.41	..	— 1.41	..	17.65	31.89	25.67	

P. N. water-bottle No. 86 used.
4/VII. High water at Maroussia 2.15 p. m.

Low water 8.40 p. m.
Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.

LXVII B. Sledge.

5/VII 08	mn.	I. P. Jacobsen Ø		calm	weak	..	+ 2	100	— 1.60	0	— 1.60	23507	18.43	33.30	26.80	night
	1.07 a. m.	to Renskær.		..	(—) N.-g.	..	..	—	— 1.60	..	— 1.60	..	18.40	33.24	26.76	—
	2.57 -	76°40′.6	18°36′	..		..	..	—	— 1.59	..	— 1.59	..	18.40	33.25	26.76	
	3.47 -	N	W	..	S.-g.	..	..	—	— 1.60	..	— 1.60	..	18.40	33.24	26.76	—
	4.17 p. m.	..	..	..	N.-g.	..	..	—	— 1.50	..	— 1.50	..	18.58	33.57	27.02	day
	4.57 -	..	..	..	—	..	..	—	— 1.44	..	— 1.44	..	18.66	33.71	27.14	—
	5.22 -	..	..	..		..	..	—	— 1.50	..	— 1.50	..	18.58	33.57	27.02	-
	5.45 -	..	..	..	S.-g.	..	..	—	— 1.50	..	— 1.50	..	18.54	33.49	26.96	
	6.09 -	..	..	..	—	..	..	—	— 1.52	..	— 1.52	..	18.51	33.44	26.92	—
	12.30 a. m.	..	..	..	N.-g.	..	..	75	— 1.63	..	— 1.63	..	18.21	32.90	26.48	night
	1.13 -	..	..	..	—	..	..	—	— 1.63	..	— 1 63	..	18.26	32.99	26.56	—
	3.15 -	..	..	..		..	..	—	— 1.63	..	— 1.63	..	18.27	33.01	26.57	—
	4.28 -	..	..	..	N.-g.	..	..	—	— 1.70	..	— 1.70	..	18.39	33.22	26.76	day
	4.43 -	..	..	..	—	..	..	—	— 1.71	..	— 1.71	..	18.37	33.19	26.73	
	5.11 -	..	..	..	—	..	..	—	— 1.68	..	— 1.68	..	18.31	33.08	26.64	—
	5.55 -	..	..	..	—	..	..	—	— 1.66	..	— 1.66	..	18.21	32.90	26.49	—
	6.19 -	..	..	..	S.-g.	..	..	—	— 1.65	..	— 1.65	..	18.21	32.90	26.49	—

P. N. water-bottle No. 86 used.
5/VI. High water at Maroussia 2.00 a. m., 2.50 p. m.

Low water 9.02 p. m.
Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.

Series LXVIII. Sledge.

Date	Time	Lat.	Long.	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	*Cl* ‰	*S* ‰	ρ	τ
6/VII 08	9.25 a. m.	Oresund		W.	N.-g.	..	+ 4	100	— 1.52	0	— 1.52	23507	18.51	33.44	26.92	
	10.25 -	76°41′.4	18°38′	..	—	..	..	—	— 1.56	..	— 1.56	..	18.47	33.37	26.86	
	11.22 -	N	W	..	—	..	..	—	— 1.48	..	— 1.48	..	18.62	33.64	27.08	
	12.15 p. m.	..	..	..	—	..	..	—	— 1.43	..	— 1.43	..	18.61	33.62	27.07	
	1.22 -	..	..	..	—	..	..	—	— 1.47	..	— 1.47	..	18.60	33.60	27.05	
	2.35 -	..	..	..	—	..	..	—	— 1.43	..	— 1.43	..	18.63	33.66	27.09	
	9.35 a. m.	..	..	..	none	..	..	75	— 1.67	..	— 1.67	..	18.16	32.81	26.41	
	10.35 -	..	..	..	N.-g.	..	..	—	— 1.67	..	— 1.67	..	18.20	32.88	26.47	
	11.48 -	..	..	..	—	..	..	—	— 1.67	..	— 1.67	..	18.17	32.83	26.43	
	12.33 p. m.	..	..	..	—	..	..	—	— 1.67	..	— 1.67	..	18.21	32.90	26.48	
	1.35 -	..	..	..	—	..	..	—	— 1.62	..	— 1.62	..	18.28	33.03	26.59	
	2.48 -	..	..	..	—	..	..	—	— 1.67	..	— 1.67	..	18.37	33.19	26.73	

P. N. water-bottle No. 86 used.
6/VII. High water at Maroussia 3.00 a. m.

Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.
Depth: 104 m.

Series LXIX. Sledge.

Date	Time	Lat.	Long.	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	*Cl* ‰	*S* ‰	ρ	τ
6/VII 08	3.35 p. m.	Oresund		..	N.-g.	..	+ 4	100	— 1.36	0	— 1.36	23507	18.72	33.82	27.23	
	4.25 -	76°40′.7	18°39′	..	—	..	..	—	— 1.42	..	— 1.42	..	18 68	33.75	27.17	
	5.07 -	N	W	..	S.-g.	..	..	—	— 1.47	..	— 1.47	..	18.60	33.60	27.05	
	4.05 -	..	..	..	N.-g.	..	..	75	— 1.72	..	— 1.72	..	18.34	33.13	26.68	
	4.32 -	..	..	..	none	..	..	—	— 1.62	..	— 1.62	..	18.35	33.15	26.69	
	5.15 -	..	..	..	S.-g.	..	..	—	— 1.63	..	— 1.63	..	18.37	33.19	26.72	
	4.15 -	..	..	..	N.-g.	..	..	120	— 1.32	..	— 1.32	..	18.74	33.86	27.25	
	4.40 -	..	..	..	S.-g.	..	..	—	— 1.33	..	— 1.33	..	18.74	33.86	27.25	

P. N. water-bottle No. 86 used.
6/VII. High water at Maroussia 3.30 p. m.

Angles for position: Harefield—Cape Bismarck cairn 21°49′. Cape Bismarck —Maroussia cairn 121°14′.
Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.

Series LXX. Ship.

Date	Time	Lat.	Long.	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	*Cl* ‰	*S* ‰	ρ	τ
7/VII 08	4.20 p. m.	Danmarks Havn		..	..	..	..	0	+ 9.28	0	+ 9.28	23507	0.49	0.90		
	4.25 -	aft end of ship		..	..	..	..	0.5	+ 5.98	..	+ 5.98	..	0.95	1.71		
	4.35 -	76°46′.2	18°46′	..	..	..	..	1	+ 0.28	..	+ 0.28	..	16.82	30.39	24.41	
								1.5	0.28		0.28		17.05	30.81	24.76	

	4.50 -	..	..	..	..	..	..	3	— 0.68	..	— 0.68	..	17.35	31.35	25.20		
	4.55 -	..	..	..	..	..	..	4	— 0.81	..	— 0.81	..	17.40	31.44	25.28		
	5.02 -	..	..	..	..	..	..	5	— 0.65	..	— 0.65	..	17.32	31.29	25.16	[1]	

[1] Sample taken twice with same result.

P. N. water-bottle No. 89 used.
Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.

Series LXXI. Ship.

16/VII 08	1.50 p. m.	Danmarks Havn		E	none	..	..	0	+ 2.32	0	+ 2.32	23507	15.54	28.08	22.45		
	2.02 -	aft end of ship		..	..	..	..	0.5	+ 1.53	..	+ 1.53	..	16.23	29.33	23.49		
	2.10 -	76°46′.2	18°46′	..	..	..	..	1	+ 1.49	..	+ 1.49	..	16.20	29.27	23.45		
	2.21 -	N	W	..	..	..	..	1.5	+ 0.74	..	+ 0.74	..	16.81	30.37	24.37		
	2.28 -	..	..	..	..	..	..	2	+ 0.58	..	+ 0.58	..	16.87	30.48	24.46		
	2.40 -	..	..	..	..	..	..	3	— 0.13	..	— 0.13	..	17.26	31.18	25.05		
	2.50 -	..	..	..	..	..	..	4	— 0.16	..	— 0.16	..	17.27	31.20	25.07		
	3.00 -	..	..	..	..	..	..	5	— 0.18	..	— 0.18	..	17.26	31.18	25.05		

P. N. water-bottle No. 86 used.
The ice has now broken up in the harbour; the fresh surface layer has become mixed with the deeper layer.

Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.

Series LXXII. Boat.

19/VII 08	2.40 a. m.	Oresund		E	none	..	..	75	— 1.60	0	— 1.60	23507	18.26	32.99	26.56		
	4.30 -	76°41′	18°43′	..	..	..	..	75	— 1.59	..	— 1.59	..	18.22	32.92	26.50		
	2.30 -	N	W	..	..	..	..	50	— 1.62	..	— 1.62	..	18.11	32.72	26.34		
	4.42 -	..	..	..	..	..	..	50	— 1.46	..	— 1.46	..	18.04	32.59	26.24		
	3.39 -	..	..	..	..	..	..	0	— 0.53	..	— 0.53	..	17.53	31.67	25.47		
	3.32 -	..	..	..	..	..	..	1	— 0.58	..	— 0.58	..	17.54	31.69	25.48		
	3.45 -	..	..	..	..	..	..	2	— 0.59	..	— 0.59	..	17.54	31.69	25.48		
	3.53 -	..	..	..	..	..	..	3	— 0.63	..	— 0.63	..	17.56	31.73	25.51		
	4.00 -	..	..	..	..	..	..	4	— 0.71	..	— 0.71	..	17.55	31.71	25.50		
	3.24 -	..	..	..	..	..	..	5	— 0.96	..	— 0.96	..	17.60	31.80	25.59		
	3.00 -	..	..	..	..	..	..	10	— 0.97	..	— 0.97	..	17.71	32.00	25.75		
	3.07 -	..	..	..	..	..	..	20	— 1.17	..	— 1.17	..	17.83	32.21	25.92		
	2.59 -	..	..	..	..	..	..	30	— 1.39	..	— 1.39	..	17.99	32.50	26.16		
	2.51 -	..	..	..	..	..	..	40	— 1.52	..	— 1.52	..	18.06	32.63	26.27		

P. N. water-bottle No. 86 used. Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.

Series LXXIII. Ship.

Date	Time	Lat.	Long.	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read.	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
22/VII 08	2.23 a. m.	Maroussia		calm	weak N.-g.	..	+ 7	0	— 0.51	0	— 0.51	23507	16.82	30.39	24.44	
	2.15 -	76°39′.3	18°35′	..	..	..	..	5	— 0.71	..	— 0.71	..	17.51	31.64	25.44	
	2.08 -	N	W	..	..	..	..	10	— 0.98	..	— 0.98	..	17.73	32.03	25.78	
	2.00 -	..	..	..	..	..	..	25	— 1.37	..	— 1.37	..	17.93	32.39	26.08	
	1.40 -	..	..	..	..	..	..	50	— 1.50	..	— 1.50	..	18.04	32.59	26.24	
	1.23 -	..	..	..	..	..	..	75	— 1.60	..	— 1.60	..	18.10	32.70	26.32	
	1.13 -	..	..	..	..	..	..	100	— 1.48	..	— 1.48	..	18.59	33.58	27.05	
	1.01 -	..	..	..	..	..	..	125	— 1.34	..	— 1.34	..	18.73	33.84	27.24	
	12.48 -	..	..	..	..	..	..	150	— 0.98	..	— 0.98	..	18.96	34.25	27.56	
	12.40 -	..	..	..	..	..	..	170	— 0.82	..	— 0.82	..	19.00	34.33	27.62	
	2.33 -	..	..	..	..	..	..	150	— 0.89	..	— 0.89	..	19.00	34.33	27.62	
	2.41 -	..	..	..	..	..	..	100	— 1.52	..	— 1.52	..	18.54	33.49	26.97	

P. N. water-bottle No. 86 used.
Difference of watch from true time at the place + 1 h. 06 m.
Plankton haul and dredging made.
Position: 1 cable-length NW from the ordinary hydrographical station at Maroussia.

Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08
Depth: 177 m.

Series LXXIV. Ship.

Date	Time	Lat.	Long.	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read.	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
22/VII 08	8.47 a. m.	Maroussia		calm	weak S.-g.	..	+ 7	0	+ 0.58	0	+ 0.58	23507	16.57	29.94	24.03	
	8.43 -	76°39′.3	18°35′	..	..	..	..	5	— 0.37	..	— 0.37	..	17.50	31.62	25.41	
	8.39 -	N	W	..	..	..	..	10	— 0.73	..	— 0.73	..	17.70	31.98	25.72	
	8.34 -	..	..	..	..	..	..	25	— 1.28	..	— 1.28	..	17.91	32.36	26.05	— 1.76
	8.29 -	..	..	..	..	..	..	50	— 1.59	..	— 1.59	..	18.04	32.59	26.24	— 1.77
	8.22 -	..	..	..	..	..	..	75	— 1.68	..	— 1.68	..	18.25	32.97	26.55	— 1.79
	8.16 -	..	..	..	..	..	..	100	— 1.55	..	— 1.55	..	18.53	33.48	26.96	— 1.81
	8.07 -	..	..	..	..	..	..	125	— 1.21	..	— 1.21	..	18.80	33.96	27.34	— 1.86
	7.56 -	..	..	..	..	..	..	150	— 1.08	..	— 1.08	..	18.87	34.09	27.43	
	7.44 -	..	..	..	none	..	..	160	— 1.01	..	— 1.01	..	18.91	34.16	27.49	

P. N. water-bottle No. 86 used.
Plankton haul taken at the same time.
Position: some few meters from ordinary hydrographical station at Maroussia.

Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.
Depth: 162 m.

Series LXXV. Ship.

		observed														
22/VII 08	3.11 p. m.	76°42′	18°05′	calm	..	..	+ 6	0	+ 3.15	0	+ 3.15	23507	15.53	28.06	22.37	
	3.24 -	N	W	..	..	..	..	5	0.00	..	0.00	..	17.43	31.49	25.30	
	3.33 -	..	..	..	..	..	..	10	— 1.09	..	— 1.09	..	17.86	32.27	25.93	
	3.02 -	..	..	..	..	..	..	25	— 1.59	..	— 1.59	..	18.03	32.57	26.22	— 1.77
	2.50 -	..	..	..	..	..	..	75	— 1.76	..	— 1.76	..	18.29	33.04	26.51	— 1.79
	2.39 -	..	..	..	..	..	..	125	— 1.56	..	— 1.56	..	18.70	33.78	27.21	— 1.83
	2.29 -	..	..	..	..	..	..	175	— 0.99	..	— 0.99	..	18.99	34.31	27.61	
	2.18 -	..	..	..	..	..	..	200	— 0.62	..	— 0.62	..	19.08	34.47	27.73	
	2.01 -	..	..	..	..	..	..	225	— 0.23	..	— 0.23	..	19.17	34.63	27.84	
	2.00 -	..	..	..	..	..	..	250	+ 0.19	..	+ 0.19	..	19.21	34.70	27.88	
	1.34 -	..	..	..	..	..	..	275	+ 0.48	..	+ 0.48	..	19.28	34.83	27.96	
	1.11 -	..	..	..	..	..	..	300	+ 0.54	..	+ 0.54	..	19.27	34.81	27.95	

P. N. water-bottle No. 86 used.
Plankton haul and trawl haul taken at the same time.

Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.
Depth: 304 m.; bottom-soil — mud.

Series LXXVI. Ship.

23/VII 08	9.46 a. m.	77°24′	16°00′	..	..	..	+ 9	0	+ 2.10	0	+ 2.10	23507	16.25	29.36	23.48	
	9.38 -	N	W	..	..	..	..	5	— 0.08	..	— 0.08	..	17.51	31.64	25.42	
	9.31 -	..	..	..	..	..	..	10	— 0.72	..	— 0.72	..	17.73	32.03	25.77	
	9.25 -	..	..	..	..	..	..	25	— 1.51	..	— 1.51	..	18.08	32.66	26.29	— 1.77
	9.18 -	..	..	..	..	..	..	75	— 1.72	..	— 1.72	..	18.34	33.13	26.68	— 1.79
	9.08 -	..	..	..	..	..	..	125	— 1.68	..	— 1.68	..	18.63	33.66	27.10	— 1.83
	8.58 -	..	..	..	..	..	..	175	— 1.60	..	— 1.60	..	18.85	34.05	27.42	
	8.46 -	..	..	..	..	..	..	225	— 0.53	..	— 0.53	..	19.10	34.51	27.75	
	8.33 -	..	..	..	..	..	..	275	+ 0.18	..	+ 0.18	..	19.22	34.72	27.89	
	8.20 -	..	..	..	..	..	..	300	+ 0.30	..	+ 0.30	..	19.26	34.79	27.94	

P. N. water-bottle No. 86 used.
Plankton haul taken at the same time.
Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.
Depth: 300 m.; bottom-soil — mud.

Series LXXVII. Ship.

Date	Time	Lat. (calculated)	Long. (calculated)	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
24/VII 08	5.08 a. m.	78°00′	15°18′	calm	..	..	+ 2	0	+ 0.69	0	+ 0.69	23507	15.88	28.69	23.02	
	5.04 -	N	W	..	..	..	..	5	— 1.38	..	— 1.38	..				
	4.59 -	..	..	..	..	..	..	10	— 1.48	..	— 1.48	..				
	4.49 -	..	..	..	..	..	..	25	— 1.50	..	— 1.50	..	18.06	32.63	26.27	— 1.77
	4.29 -	..	..	..	..	..	..	75	— 1.75	..	— 1.75	..	18.42	33.28	26.80	— 1.80
	4.18 -	..	..	..	..	..	..	125	— 1.80	..	— 1.80	..	18.74	33.86	27.26	— 1.85
	4.08 -	..	..	..	..	..	..	175	— 1.45	..	— 1.45	..	18.90	34.14	27.49	— 1.86
	3.55 -	..	..	..	..	..	..	225	— 0.45	..	— 0.45	..	19.11	34.52	27.76	
	3.43 -	..	..	..	..	..	..	275	+ 0.31	..	+ 0.31	..	19.21	34.70	27.87	
	5.21 -	..	..	..	..	..	..	300	+ 0.53	..	+ 0.53	..	19.27	34.81	27.95	
	3.38 -	..	..	..	..	..	..	325	+ 0.62	..	+ 0.62	..	19.28	34.83	27.95	
	3.18 -	..	..	..	..	..	..	375	+ 0.59	..	+ 0.59	..	19.28	34.83	27.96	
	2.58 -	..	..	..	..	..	..	420	+ 0.57	+ 0.03	+ 0.60	..	19.29	34.85	27.97	

P. N. water-bottle No. 86 used.
Plankton and trawl hauls made at the same time.
Ship surrounded by scattered ice.
Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.
Depth: 424 m.; bottom-soil — clay.

Series LXXVIII. Ship.

Date	Time	Lat. (observed)	Long. (observed)	Wind	Current	Barom.	Air temp.	Depth, meters	Temp. read	Thermom. correction	Corr. temp.	Thermom. No.	Cl ‰	S ‰	ρ_t	τ
28/VII 08	6.53 p. m.	75°52′	12°15′	calm	S.-g.	..	+ 3	0	+ 1.53	0	+ 1.53	23507	17.19	31.06	24.87	
	6.49 -	N	W	..	..	..	..	5	+ 1.48	..	+ 1.48					
	6.44 -	..	..	..	..	..	..	10	— 0.12	..	— 0.12	..	18.20	32.88	26.43	
	6.38 -	..	..	..	..	..	..	25	— 1.21	..	— 1.21	..	18.71	33 80	27.21	— 1.83
	6.30 -	..	..	..	..	..	..	75	— 1.71	..	— 1.71	..	18.95	34.23	27.36	— 1.87
	6.19 -	..	..	..	..	..	..	125	— 1.71	..	— 1.71	..	18.98	34.29	27.61	— 1.87
	6.07 -	..	..	..	..	..	..	175	— 0.85	..	— 0.85	..	19.11	34.52	27 78	— 1 88
	7.04 -	..	..	..	..	..	..	200	+ 0.52	..	+ 0.52	..	19.27	34.81	27.95	

	10.02 -	..	..	..	..	..	..	250	+ 0.73?	..	+ 0.73?	..	19.27?	34.81?	27.94?	
	5.28 -	..	..	..	..	..	..	275	+ 1.10	..	+ 1.10	..	19.35	34.96	28.02	
	5.10 -	..	..	..	..	..	..	300	+ 0.73	..	+ 0.73	..	19.32	34.90	28.01	
	4.50	..	..	..	..	..	..	325	+ 0.70	..	+ 0.70	..	19.32	34.90	28.01	
	4.27 -	..	..	..	..	..	..	350	+ 0.63	..	+ 0.63	..	19.34	34.94	28.04	

P. N. water-bottle No. 86 used.
Plankton haul and dredged at the same time.
Sample from 250 m. obviously erroneous; water-bottle has probably closed at ca. 200 m.
Ship surrounded by scattered ice.
Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.
Depth: 365 m.; bottom-soil — clay, mud.

Series LXXIX. Ship.

		calculated														
30/VII 08	m. n.	75°15′	8°45′	calm	..	..	+ 3	0	+ 0.5	0	+ 0.5	23507	17.16	31.00	24.89	
	11.56 p. m.	..	..	..	..	..	..	5	+ 0.12	..	+ 0.12	..	17.21	31.09	24.98	
	11.48 -	..	..	..	..	..	..	10	+ 1.15	..	+ 1.15	..	18.54	33.49	26.84	
	11.40 -	..	..	..	..	..	..	25	+ 1.28	..	+ 1.28	..	19.19	34.67	27.78	
	11.34 -	..	..	..	..	..	..	50	+ 0.29	..	+ 0.29	..	19.25	34.78	27.93	
	11.28 -	..	..	..	..	..	..	75	+ 0.58	..	+ 0.58	..	19.29	34.85	27.97	— 1.90
	11.12 -	..	..	..	..	..	..	100	+ 0.86	..	+ 0.86	..	19.30	34.87	27.97	— 1.90
	10.47 -	..	..	..	..	..	..	150	+ 0.26	..	+ 0.26	..	19.30	34.87	28.01	1.90
	10.37 -	..	..	..	..	..	..	200	— 0.34	..	0.34	..	19.29	34.85	28.02	— 1.90
	10.24 -	..	..	..	..	..	..	250	— 0.37	..	0.37	..	19.30	34.87	28.04	— 1.90
	10.11 -	..	..	..	..	..	..	300	— 0.62	..	— 0.62	..	19.29	34.85	28.03	— 1.90
	10.00 -	..	..	..	..	..	..	400	— 0.68	..	— 0.68	..	19.30	34.87	28.05	1.90
	7.53 -	..	..	..	..	..	..	500	— 0.73	0.03	— 0.70	..	19.30	34.87	28.05	— 1.90
	8.27 -	..	..	..	..	..	..	1500	— 0.71	+ 0.08	— 0.63	..	19.30	34.87	28.05	— 1.90

P. N. water-bottle No. 86 used.
Hauling in from 1500 m. lasted 42 min.
Ship made fast to an ice-floe in somewhat scattered small ice.
Samples titrated at Hydrographical Laboratory in Copenhagen 3—10/x 08.
Depth: 2600 m.; no bottom.

Discussion of the Observations.

The series from stations in the Greenland Sea. Series III—XI and LXXIII—LXXIX.

As already mentioned, these series were taken from the "Danmark" during the voyage to and from N. E. Greenland.

As they were mainly taken as occasion permitted, e. g. when the ship was not moving for other reasons (ice hindrances, fog, damage to engines or the like), the situation of the stations is not always just what the hydrographical investigations alone would prescribe, but on the whole they give a good picture of the great changes in the temperature and salinity, which we encountered as we sailed in from the deep Greenland Sea towards the Greenland coast over the Continental Shelf, and of the reciprocal action between water of Atlantic and Polar Current origin, which occurred here.

The results from several of the stations are shown in sections. Of these Sect. I passes through the stations at ca. 76° N. L., the direction being thus almost across the direction of the Polar Current. The section embraces stations investigated both in 1906 and in 1908; it does not reach the land, as we did not have hydrographical stations in under the land at this latitude.

Sect. II passes through the stations which we investigated at quite short intervals on our departure from Danmarks Havn in the deeper water between the coast and the Continental Shelf. The direction of the section is almost parallel with the direction of the Polar Current.

Sect. III is a section imagined as the continuation of Sect. I right into land, in order to give a picture of the isopykns there.

I shall not endeavour to give an exhaustive description of the interesting hydrographical conditions found in this part of the sea on the basis of our observations, but may refer to B. Helland-Hansens's paper in "Duc d'Orléans: Croisière Océanographique 1905", where these conditions have been dealt with in detail on the basis of Mag. Koefoed's large material of observations.

My observations give on the whole the same picture of the conditions as those from 1905. In the following I shall restrict myself to some details in connection with the sections.

Remarks on Sect. I. (Pl. XV).

The section passes through the stations III to IX of 1906, VIII and LXXIX of 1908. In thus including in the same section stations which have been investigated in different years, an error is certainly made, but a comparison with earlier observations shows, that the changes from year to year are very small in comparison with the changes in the direction from east to west.

The main direction of the section is from E. S. E. to W .N. W., thus almost transversely to the Polar Current and the section gives, therefore, a good picture of the variations in this across the direction of the Current.

This direction is chosen as a mean between the stations and these are marked off by section of the mean direction plane with the meridian plane through the stations.

The reason for this deviation from the usual method of noting the stations (which is by means of their geographical distance) is the fact, that the greatest changes in the situation of the isotherms and isohalines occur at the edge of the Continental Shelf.

We are thus able, in my opinion, to give a truer picture of the actual conditions by noting the stations with reference to this edge, the direction of which is nearly N. N. E. (see Pl. XII).

Looking at Sect. I, Pl. XV, it will be seen, that the greatest changes in the course of the curves take place at the edge of the Continental Shelf. The stations IV, V and VI are situated here on the steeply ascending ground from 2440 m. to 300 m.

The true Polar Current can be seen in over the Continental Shelf, with salinities of 32 to 34.80 p. m. and low temperatures. Out over the Greenland Sea deep basin it is very quickly lost.

As boundary for the Polar Current I have chosen 34.80 p. m. isohaline, which follows approximately the 0° isotherm.

This boundary is to some extent arbitrary, but it agrees well with the depth of the Polar Current, ca. 200 m., calculated by Helland-Hansen in his above-mentioned work on the Duke of Orleans' Expedition.

The course of the isohalines and isotherms is almost parallel.

In the south-going Current they are curved down in towards the land, the water-masses owing to the rotation of the earth having the tendency, as known, to bend to the right, in this case, therefore in towards the land where they are dammed up.

Nearer the land the curves course almost horizontally, which leads one to suspect, that the south-going Current there is less extensive.

The great break in the 34 p. m. isohaline at St. LXXVIII is certainly due to the fact, that this station was investigated in 1908, whilst the neighbouring stations were taken in 1906.

Under the true Polar Current there is a layer of warmer and salter water, the existence of which was discovered for the first time by the then First-Lieutenant Ryder in 1891. It has a kernel of water over 34.90 p. m. and $+1°$ teperature. Further to the west this warm and salt water is gradually pressed deeper down by the overlying Polar Current and becomes the bottom-layer, and its temperature and salinity decrease slightly. We found it again later in the

region of the coastal water (Sect. II, Pl. XVII) and in the Store Belt at a depth of 250—300 m.

Towards the east, out over the Greenland Sea basin, the 0° isotherm and 34.80 p. m. isohaline rise very abruptly on account of the cold and salt water, found in the central part of that Sea, where the hydrographical conditions are known from Roald Amundsen's investigations in 1901 and where, according to Fr. Nansen, the cold bottom-water of the Norwegian Sea is formed (see Fr. Nansen: Northern Waters. Christiania 1906).

Immediately to the east of the edge there is a layer of warmed-up surface water with a depth of ca. 25 m. and temperature of over + 1°. This relatively considerable amount of heat is due to the warmth of the atmosphere and the fact, that the summer heat has been able to penetrate so far down shows, that the waters here must have been comparatively free of ice in the period dealt with.

As soon as we came further west, inside the edge of the Continental Shelf, this warm surface layer disappeared and we only found quite local, heated patches of a depth down to some few meters. We may conclude from this, that in over the Continental Shelf, we may expect to meet with continuous masses of drift-ice, which cover the greater part of the surface and thus prevent the summer heat from penetrating downwards, whilst further east out over the basin of the Greenland Sea the drift-ice will generally be found to be much more scattered.

The — 1° isotherm forms a closed curve, the point extending out over the edge of the Continental Shelf and the uppermost arm approaching the surface in the western part of the section, whilst its lower arm here lies deeper down. Thus, the water seems to be most cooled in the western part of the Polar Current, and this seems to be a constant feature in the hydrography of this Sea. It is mentioned by F. Åkerblom: Recherches océanographiques, p. 15, and it can be seen to have been the case in 1905 on Pl. LXXI of the cited work of Helland-Hansen in Duc d'Orléans: Croisière Océanographique.

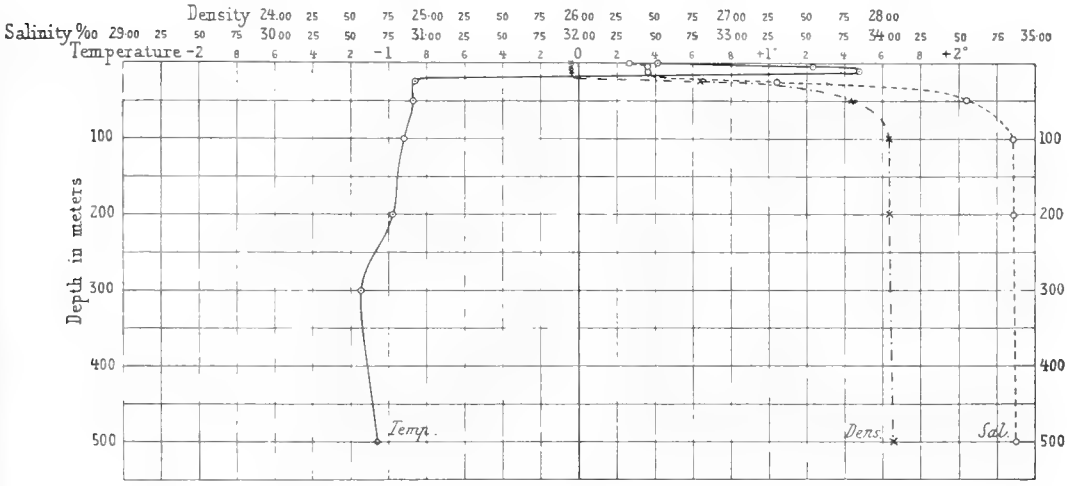
It may be explained from the fact, that the south-going Polar Current along the Greenland coast forms the main outlet for the surface water of the North Polar Ocean. The western part of this Current will consequently bring down water which comes from the northern side of the Current in the North Polar Ocean and it is natural, that the cooling due to the atmosphere is here the greatest (cf. also Fr. Nansen: The Oceanography of the North Polar Basin, p. 338).

Remarks on the temperature, salinity and density diagrams for the stations in Section I.

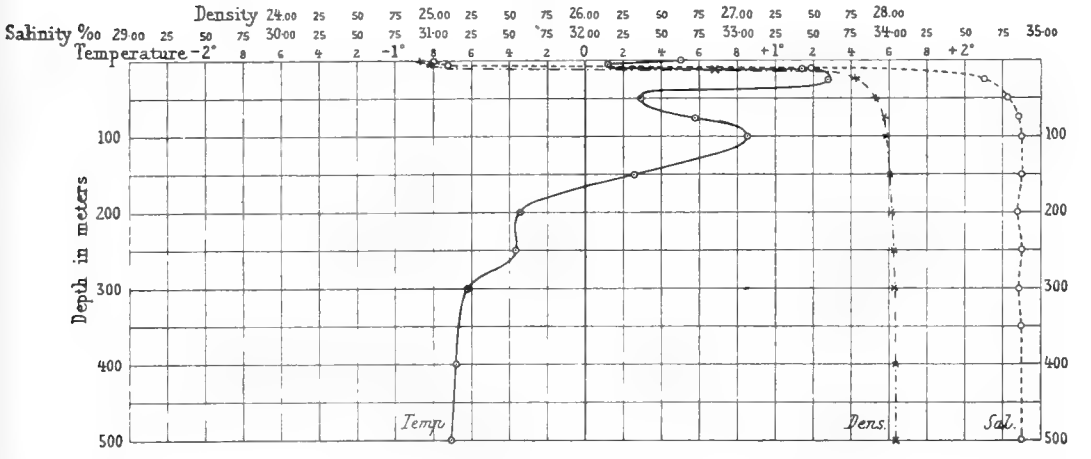
Station III, 30/7 1906. Situation 74°45′ N., 3°23′ W. The diagrams for this station show the presence of a summer wave of heat

in a surface layer of polar origin, thereafter follow decreasing temperatures in water of the kind characteristic for the deep Norwegian Sea basin.

The station lies in the central part of the Norwegian Sea and water of similar temperature and salinity to that found in the great



Station III.



Station LXXIX.

depths of the Norwegian Sea, comes up close to the surface here. The salinity at a depth of 500 m. is 34.88 p. m. (0.02 p. m. lower than in the corresponding depth at R. Amundsen's St. 16, the position of which is almost the same as St. III), and the temperature is somewhat higher (— 1.02 at St. III against — 1.21 at Amundsen's St. 16), but the agreement between the hydrographical conditions at the two stations mentioned, of which Amundsen's was investigated in

1901 and the other in 1906, shows on the whole, that the presence of cold bottom-water from the Norwegian Sea near the surface is typical for this portion of the sea.

St. LXXIX, 30/VII 1908. Situation 75°15′ N., 8°45′ W. The temperature curve has a curiously complicated course, whilst the curves for the density and salinity show regularly increasing values towards the bottom. The bent course of the temperature curve is due to the fact, that there are two waves of heat, one from above from the atmosphere and one from a warm intermediate stream.

In the uppermost 5 m. there is a warm wave which is due to the heat of the day. Then follows the summer heat wave of the atmosphere which has its maximum (+ 1.3°) at a depth of ca. 25 m., after which the temperature decreases down to ca. 50 m. to a minimum of + 0.3°. From this depth the temperature increases again to a maximum of + 0.9° at a depth of 100 m. as the result of the intermediate layer of warm and very saline water which occurs here. Finally the temperature decreases towards the bottom.

The salinity curve shows a constant salinity of 34.87 p. m. in the water from 100 m. down to the bottom — it is thus unmixed Norwegian Sea bottom-water; the salinity is certainly ca. 0.03 p. m. lower than the average salinity of the bottom-water of the Norwegian Sea found by Amundsen and other observers (34.90), but the difference is not so great but that it may arise from the use of different methods of titration.

From 0—100 m. the water is mixed with Polar Current water; the true surface-layer of Polar Current water with the salinity below 33 p. m. has only a thickness of ca. 10 m.

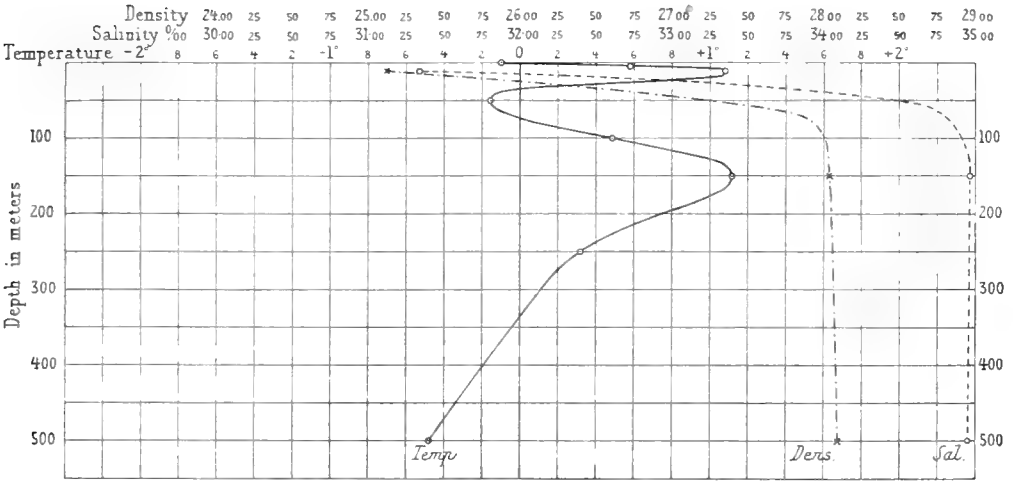
It was certainly curious, that the water at this station, which lay among the ice-fields of the drift-ice, had positive temperatures from the surface down to a depth of 160 m. This was due to the fact, that the earlier mentioned, intermediate layer of warm water of Atlantic origin, which pushes in above the cold Norwegian Sea bottom-water along the edge of the Continental Shelf, here approached the surface, at the same time that the cold surface layer of Polar origin was much heated from the atmosphere.

Stations IV, 1/VIII 1906 and V, 3/VIII 1906.

Position:	75°27′ N.	75°43′ N.
	10°00′ W.	10°15′ W.

The diagram shows quite similar hydrographical conditions to those described for St. LXXIX.

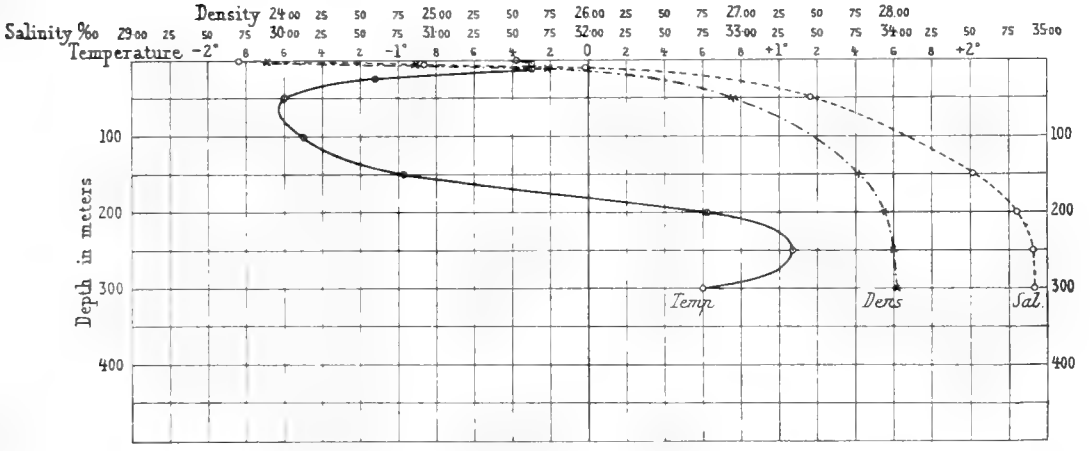
The nearer the stations are situated in towards the edge of the Continental Shelf, the smaller becomes the heat-wave of the atmosphere and the more the cold surface-layer of Polar water origin increases in extent.



Station IV.

Stations VI, 3/VIII 1906, LXXVIII, 28/VII 1908,
Position: 76°05′ N. 75°52′ N.
10°50′ W. 12°15′ W.

Stations VII, 8/VIII 1906, IX, 11/VIII 1906
Position: 76°00′ N. 76°02′ N.
14°34′ W. 16°14′ W.



Station VI.

These stations all lie in the Polar Current in over the Greenland Continental Shelf and the diagram shows a completely changed distribution of temperature and salinity from that of the earlier stations. Very striking especially is the difference between the conditions at St. VI and St. V, which are only some few miles distant from one

another geographically but lie on different sides of the edge of the Continental Shelf. It is over this, that the great changes occur.

At all the stations VI, LXXVIII, VII, IX the distribution is in the main the same, namely, first, temperature decreasing to a minimum, then increasing to a maximum and below this again slightly decreasing, whilst the salinity increases to a maximum and thereafter remains almost unchanged.

This distribution is a consequence of the position of the stations in the south-going Polar Current, which flows down over the Continental Shelf and the depth of which (when the boundary, as mentioned above, is placed at the 34 p. m. isohaline) increases from 200 m., eastern part, to ca. 300 m., western part, whilst the water in the greater depths below the Polar Current has a temperature of ca. + 0.5° and a salinity of ca. 34.87 p. m.

Remarks on Sect. II. (Plan XVI).

The section passes through the stations LXXIII, LXXV, LXXVI and LXXVII from 1908.

Its principal direction is N. N. E. to S. S. W., which is almost at right angles to Sect. I and parallel with the coast and the direction of the Polar Current.

The stations lie in the region of the coastal water, where the stream is mainly due to tides, whilst there is no marked, south-going current, such as is found further east out over the Continental Shelf.

The hydrographical conditions are essentially as in the western part of the Polar Current, that is, the uppermost layer is much cooled down and consists of Polar Current water, which comes from the northernmost part of the Current down over the Polar Sea, and in the deeper parts below a depth of ca. 300 m. there is water of ca. + 0.5° temperature and ca. 34.85 p. m. salinity.

This warm bottom-layer has the same origin, in my opinion, as the warm intermediate layer (the already mentioned Ryder layer) in the eastern part of the Polar Current, which is pressed down towards the bottom by the overlying Polar Current in its western pars and was found here (see Sect. I) at the same depth and with almost the same temperature and salinity as the bottom-water of the coastal water.

The course of the isopykns shows, that this water had the same movement towards the south as the overlying cold water. Its temperature and salinity were a little lower than those of the intermediate layer. This was probably caused by a slight admixture with Polar Current water further north, where it may be suspected to have come in along the supposed, submarine ridge Spitzbergen—N. E. Greenland as an offshoot from the deeper layer of the Gulf Stream at Spitzbergen.

This supposition was first put forward by Ryder and was supported later, among others, by Fr. Nansen and B. Helland-Hansen; in my opinion, it is the most probable explanation, until direct observations in the northernmost part of the Greenland Sea decide the question once for all.

We may believe, that the warm current comes in at a latitude of ca. 80° and then follows the Polar Current southwards, whilst through the submarine fjords in the Continental Shelf it flows in towards land and fills up the deeper parts of the waters here and the fjords.

During this movement of the current towards land it must pass over bars, where a slight mixing with Polar Current water may occur.

As all the stations in the section were taken at intervals of a few days, we may conclude, that the difference in temperature and salinity, at the same depth at different stations, is for the most part due to different geographical situation.

The direction from St. LXXIII over LXXV to LXXVI points somewhat out from land, whilst the direction between St. LXXVI and St. LXXVII is nearly parallel with the line of the coast and the direction of the Polar Current.

Between the last two stations the direction of the curves is almost horizontal. The temperature and salinity, in other words, remain almost unchanged, as we go parallel to the coast in the direction of the Polar Current. As we approach the land, however, as, for example, in Sect. II following the curves from St. LXXVI inwards, these are slightly raised except the 33 p. m. isohaline, which lies deeper owing to special conditions in under the land, where, as will be shown later, mixing takes place between the water-layers at a depth of ca. 50 to 100 m. At the same time the 32.50 p. m. isohaline shows a greater bend in towards land than the 33 p. m. This is due to a mixing with fresh water from the rivers in the uppermost layers.

At St. LXXIII in the mouth of Øresund the average salinity of the layer 0—50 m. was 32.55 p. m. in the middle of June. From the middle of June to the middle of July this average salinity decreased, owing to the outflow of water from the melting ice and snow, to 32.05 p. m. At the same time as this (middle of June) the average salinity for the layer 0—50 m. at St. LXXVI further from land was 32.30 p. m., thus considerably greater.

Owing to the difference in the average density of the two layers (26.02 at St. LXXVI against 25.80 at St. LXXIII) there must have been an east-going movement in the uppermost 50 m. of the coastal water, a movement which has helped to keep the drift-ice away from shore.

Along with this movement in the upper layers there must have been a reaction current in the deeper layers, which can also be traced in the 34 p . m. isohaline, which rises up towards the land. In spite

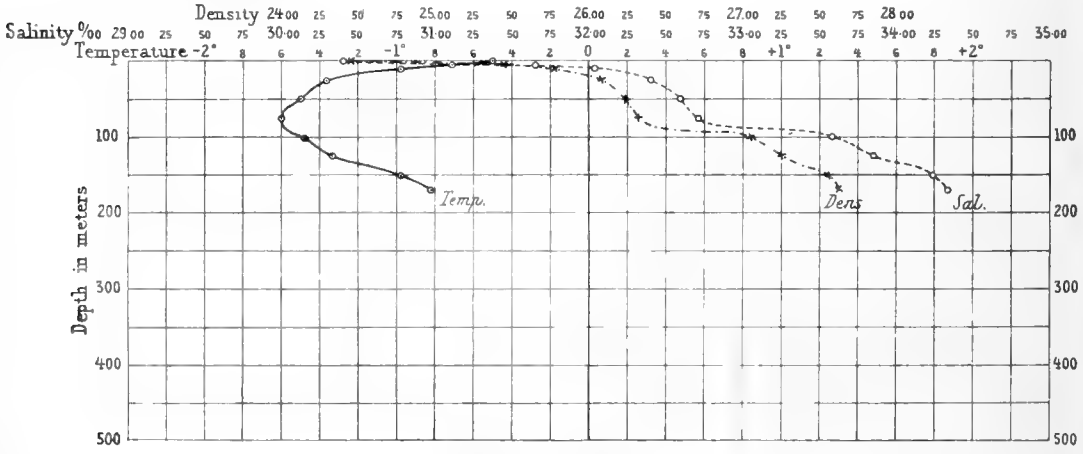
of this reaction current, however, the average salinity of the lowermost layer in the mouth of Øresund did not increase during the period mentioned; this can be explained as due to the position of the station near the bar at the mouth of the fjord, where along with the inward movement of the lower layers there has been a vertical movement, bringing the deeper layers upwards and partially mixing them with the less saline upper layer, the mixture being carried eastwards.

The — 1.5° isotherm shows in its course, that there is a rise in temperature in towards land, caused by the lowermost and warm layer being pressed a little upward, and that a mixture of warmer, fresher water has occurred in the uppermost layers.

Remarks on the temperature, salinity and density diagrams for the stations in Sect. II.

Station LXXIII, 22/VII 1908. 76°39.5′ N., 18°35′ W.
— LXXV, 23/VII 1908. 76°42′ N., 18°05′ W.
— LXXVI, 23/VII 1908. 77°24′ N., 16°00′ W.
— LXXVII, 24/VII 1908. 78°00′ N., 15°18′ W.

The diagrams for these four stations show in the main quite a uniform distribution of temperature and salinity, and the conditions, as already mentioned, correspond to those in the western part of the Polar Stream.

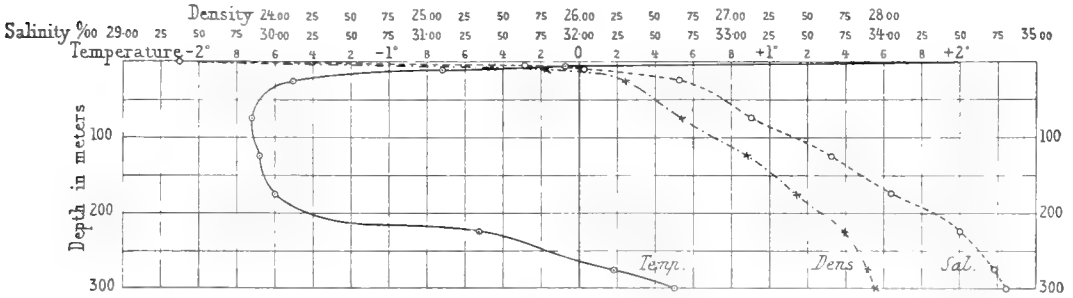


Station LXXIII.

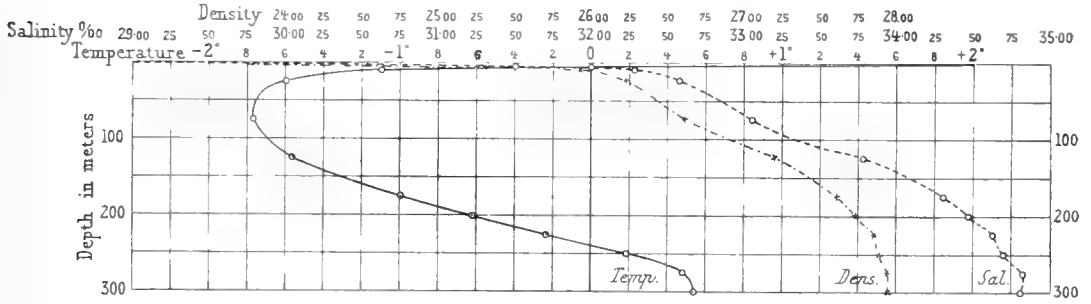
The diagrams for the uppermost 150 m. of St. LXXVII are almost analogous to the diagrams for St. IX in Sect. I. At these two stations the temperature minimum reaches its lowest value and lies deepest.

When we took these series, we were in both cases at the western edge of the heavy, polar drift-ice (the first time (1906) we came from the east, the second time (1908) from the west).

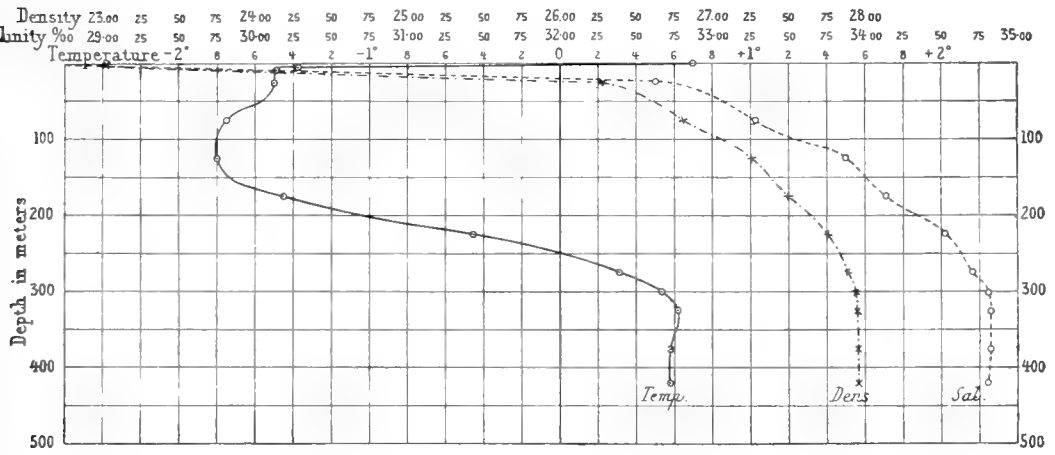
This agrees with the observations already mentioned, that the water most cooled is found in the western part of the true Polar Cur-



Station LXXV.



Station LXXVI.



Station LXXVII.

rent, and that the latter does not reach further in than to a distance of 6—8 miles from the coast at 76°—78° N. L.

At the stations LXXV and LXXVI we find a surface-layer of polar water, which down to a depth of ca. 5 m. is warmed up to over

0°. The presence of this warm layer, which is due to the warmth from the atmosphere, shows, that the water has been fairly free of ice during the period dealt with. At St. LXXVII, which, as already mentioned, lay in the neighbourhood of the western edge of the polar pack-ice, it is not found.

It is a characteristic feature in the density curves, that there is a break between 75 and 100 m., showing a sudden increase of density at this depth. This is most marked nearest the land (at St. LXXIII) and gradually becomes less marked the further we come from land (St. LXXV and LXXVI) until every trace of it is lost at St. LXXVII, where the density curve courses quite evenly. This break is due to the earlier described, special circulation, which was at that time proceeding between the upper and lower layers; the upper layers tending away from land, the lower layers in towards land.

This circulation thus reached out to the eastern part of the coastal water.

We see, that the coastal water is in reality in hydrographical regards a region for itself, within which the water-layers circulate independently, even though dependent on the Polar Current in that its water-masses are gradually renewed from the western side of the Current.

Remarks on Section III.

The section passes through the stations IV, VI, VII and IX from 1906 and LXXIII, LXXVII and LXXVIII from 1908.

As already mentioned, Sect. I did not reach quite into the coast. As it is of great interest, however, to follow the course of the isopykns especially here, I have in place of the station wanting at ca. 76° N. included St. LXXVII, which lies at ca. 78° N. L., and imagined it to be at the position ca. 76° N. 17° W. in continuation of Sect. I. In other words, I assume, that the hydrographical conditions at two stations lying at ca. 76° N., 17° W. and 78° N., 15¼° W. will be almost the same at the same time. I base the correctness of this assumption on a comparison of observations from different stations in the coastal water north of 75° N. L., which show, that the hydrographical conditions there are dependent especially on the distance of the station from land, but in very small degree on its geographical latitude.

Sect. II shows now, that the hydrographical conditions at St. LXXVII, 78° N., 15¼° W. and at St. LXXVI, 77½° N., 16° W., were very much the same and it is thus permissible to conclude, that a third station at ca. 76° N. L., taken at the same time and at the same distance from land as the others, would have nearly the same temperature and salinity.

We may therefore imagine St. LXXVII moved S. S. W. past St. LXXVI to meet the line from Sect. I, thus coming to lie at ca.

76° N., 17° W., and assume, that by doing so the hydrographical conditions at the station are nearly unchanged.

St. LXXIII, taken at the mouth of Øresund, is moved in a similar manner to cut with Sect. I.

We may in this way draw the isopykns between the stations IV, VI, LXXVIII, VII, IX and the removed stations LXXVII and LXXIII [1].

The typical course of the isopykns appears to be as follows: they are greatly depressed over the Continental Shelf and then run nearly horizontally in towards land. The great depression is due to the tendency of the water-masses to move towards the west in the south-going current, thus becoming dammed up towards land. When therefore the depression ceases at some distance from land, it is a sign, that the south-going current does not occur near land (or at any rate only to a small degree).

The course of the isopykns shows, that there are two different current-regions in the waters outside the Greenland coast at ca. 76° N. L., from the eastern edge of the Continental Shelf and in towards the land; one region with a south-going current over the Continental Shelf and another with comparatively stationary water and irregular currents in over the deeper channels near the coast between the Continental Shelf and the coastal banks.

It is the last-mentioned region, which is called the region of the coastal water.

Here we find almost ice-free water both in 1906 and in 1908, and in my opinion the reason is mainly this, that because the Polar Current with its ice-masses does not reach quite into land only comparatively small portions of drift-ice are brought in by wind, current or other causes, and are prevented from coming near land by an east-going movement in the surface-water in the summer.

In this coastal water the "Danmark" drifted towards the north in 1906, whilst further from land in the Polar Current the drift had been in a south-westerly direction (see Table 9).

Thus whether we regard the current conditions, ice conditions or the hydrographical conditions, we come to the same view, that there is a special region to the west of the Polar Current — the region of the coastal water (which at ca. 76° N. L. extends from the coast to ca. 16½° W. L.).

(The situation of the 26.50 isopykn is different from that of the others, being greatly inclined down towards the land; this is probably caused by the later mentioned mixing processes between more and less dense water in the mouth of Øresund).

[1] It has to be remembered here that the stations LXXIII, LXXVII and LXVIII were taken in 1908, the others in 1906, and the bend in the isopykns which is found at St. LXXVIII is certainly due to this fact.

Average density of the Polar Current.

If we take the boundary of the Polar Current at the depth where the bottom-layer with nearly constant density of 1.02800 begins, the Current increases between the stations IV and VI from ca. 75 to ca. 200 m. and then to ca. 300 m. at St. VII.

The average density is as follows:

Station	VI	Depth	0—200 m.....	1.02755
—	LXXVIII	—	0—200 -	1.02747
—	VII	—	0—300 -	1.02734
—	LXXVII	—	0—300 -	1.02712

The average density is thus greatest in the central part of the Current.

These average densities are somewhat greater than the average density at Nansen's St. XXIII in the North Polar Basin, which is given by Nansen as 1.02694 (see Fr. Nansen: Oceanography of the North Polar Basin, p. 400, Christiania 1902).

Remarks on Section I compared with Section V, Pl. VII, Fr. Nansen: Northern Waters.

The latter section passes through F. Åkerblom's stations VII and IX, taken on A. G. Nathorst's Expedition in 1899, Ryder's station XII in 1891 and Roald Amundsen's station XXIII in 1901.

It is referred to here to show the marked change which occurs in the position of the true Polar Current in relation to land at a latitude of ca. 75° N., a change which in my opinion is of importance for the spreading of the pack-ice which occurs each year at this latitude and which permits vessels to pass in through here to the coast.

On comparing Sect. V with Sect. I it is at once seen, that the true Polar Current, which is revealed in the section by greatly depressed isopykns, in the former section reaches right into land, whereas in the latter it only extends to about 60 km. from land, whereby a region of coastal water in under land is formed.

This coastal water is thus not found at ca. 75° N. L.; here the main current itself reaches right into land. This is certainly connected with the fact, that the edge of the Continental Shelf approaches the land at ca. 75° N. L. (see Pl. XII). The eastern boundary of the Polar Current, namely, follows the eastern edge of the Continental Shelf and the Current becomes lost out over the Greenland Sea; this is apparent from both Sect. I and Sect. V. The western boundary of the Current is pushed out to ca. 10°—12° W. L. at about 81° N. L. by the peninsula stretching out here far to the east, and when the coast-line retreats westerly to the south of this, the main Current pesumably does not follow along this but flows at some distance from land with almost unchanged breadth of ca. 175 km., fol-

lowing the eastern edge of the Continental Shelf. It is not before ca. 75° N. L., that the Current again reaches right into land.

The shallowest soundings on the Continental Shelf, indicating its weastern edge in towards the deeper parts near land, are found almost on the inner boundary indicated for the Polar Current, on the line Greenland N. E. Runding to Shannon Island; similarly, the western boundary for the central, heavy, polar pack-ice was met with almost on the same line.

These facts have led me to the view, that the main portion of the Polar Current, which forms the outlet for the water and ice of the Polar Basin, flows southwards almost like a river with a breadth of about 175 km. in its northern part. The Continental Shelf off the Greenland coast forms the bed of the river and the Norwegian Sea east of the edge of the Shelf is the one margin (retaining the simile), whilst towards the land it has no definite boundary but keeps its breadth almost unchanged, its direction of flow being towards Shannon Island.

On the inner side of the Polar Current we have the region of the coastal water, where the currents are irregular, even if the resultant movement of the water-masses in the course of a year is certainly towards the south.

It is indeed a remarkable fact, that the masses of water and ice do not press right into the coast, when we remember that the rotation of the earth tends to make the south-going Current flow towards the west. But we find similar conditions, for example, on the Norwegian coast north of 62° N. L., where the north-going stream is strongest about 60—120 km. from land, whilst nearer land the currents are irregular, though the resultant movement of the water-masses here also tends in the course of a year in the same direction as the stream further out (see Norway Pilot, Part II, London 1905, p. 16).

South of ca. 76° N. L. the Current becomes of less breadth than ca. 175 km. at the same time that it approaches the land. Always taking the boundary of the main Current to be at the eastern edge of the Continental Shelf, its breadth at 75° N. L. is about 140 km. (which is the distance from the eastern edge of the Continental Shelf to Shannon Island). At the same time that the breadth of the Current is here reduced from about 175 km. to about 140 km., its depth is probably also reduced; off Shannon Isl. soundings of less than 200 m. have been made (see Chart II), whilst the depth of the Current in Sect. I was down to ca. 300 m.

The consequence of this narrowing of the Current must be an increased velocity, which may be considered to be greatest in the upper layers where the friction is least. The surface water and the ice-masses accompanying it will thus presumably obtain here a sudden increase of velocity and this must tend to scatter the ice. This is

in good agreement with our observations on the sledge journeys, on which both in November 1906 and December—January 1907/08 — thus in the middle of winter — we saw large, open channels, which indicated much movement among the drift-ice off Shannon Island, whereas at the same time the ice off Maroussia lay fast and immovable.

Average density of the Polar Current.

Station IX (Åkerblom)	Depth	0—300 m.....	1.02746
— VII —	—	0—200 -	1.02763

The average density is thus somewhat greater here than in Sect. III, but, as there, is greatest in the centre of the Current.

This increase in the average density (which may indeed be due to variation from year to year) may be caused by the Current flowing over a comparatively shallower bank, which would lead to the heavier bottom-water being raised somewhat and mixed with the overlying layers. This is also suggested by the fact, that the 0° isotherm lies higher here than in the more northerly section.

2. The series from stations in the Greenland fjords.

a. Entrance to Øresund. Series XI, XIII—XVI, XVII, XX—XXXVI, XXXIX, XLII, LX A and B, LXII—LXIX, LXXII.

Introduction.

The station, at which the main portion of the investigations at different seasons were made, lay in the mouth of Øresund, ca. ½ km. from a small, rocky island on the outer coast called Maroussia (see Pl. XIV), where a depot was formed with provisions and instruments. It will be seen from Pl. XIV, that the station lay in a comparatively deep channel (depth 150—200 meters); to the west was a part with shallower water (depth 50—75 m.), which was called the bar or barrier, the inflowing water-masses being dammed up here.

The situation of the station satisfied the necessary conditions for obtaining a valuable series of hydrographical observations. There was sufficient depth (158 m.) to reach down to the warmer layer below the temperature minimum and there was free circulation of the water-masses in the sea down to this depth, as Øresund was not shut off by submarine ridges east of the station.

All the series were taken at the same place in a tidal fissure in the fjord-ice, which extended in the direction towards Sonja Havn and which was open in both winters 1906—07, 1907—08. Only a few of the last series in 1908 were taken further in Øresund.

During the first winter 1906—07 a number of series were taken in the dark period of the year, and we succeeded in obtaining water-

samples and bringing them to the ship, though the dark and the temperature about — 30° presented considerable difficulties.

Titration of the samples showed, however, that it was impossible under such unfavourable conditions to completely escape from getting snow-flakes in the bottles and other causes of inaccuracy, which made the value of the investigations at this season problematical. In addition, both of the Richter reversible thermometers were broken on a journey over the screw-ice in the first winter. Taught by these experiences, we did not attempt any investigations in the winter of 1907—08.

As the station lay in a deep channel running in from the sea some kilometers into Øresund (see Pl. XIV), the hydrographical conditions were very nearly the same as in the sea, as is apparent from Sect. II, Pl. XVI (note agreement between series LXXIII and the series for the stations in the coastal water).

The water was thus Polar Current water with its characteristic temperature minimum at a depth of ca. 75 m. and increasing salinity from surface to bottom.

How the conditions varied from time to time, however, can be seen from Pl. XX, which shows all the series taken at Maroussia from September 1906—July 1908, and from Pl. XVIII and XIX, which show that the salinity and temperature could be different at exactly the same spot within very short intervals of only a few hours. The changes occurring were partly those caused by the changing of the seasons or variations in the sea and similar causes, partly those due to the influence of the tides.

The periodic, daily changes in temperature and salinity caused by the tides.

In 1907 already I had noticed irregularities in the values for the temperature and salinity from the same depth at different times of the same day. A number of investigations were undertaken to test the matter (series XXII, XXVI, XXVII and XXVIII, XXXI and XXXII), but without result. The changes were small and irregular.

In 1908 the investigations were continued and it proved, that these changes stood in connection with the tides.

Owing to the ice conditions the investigations in 1908 could not be carried out at the usual station at Maroussia, but were made ca. 1 km. further north in the deep channel in Øresund. Samples for the determination of the temperature and salinity were taken here every hour at a depth of 100 m. throughout four changes of the tide (Series LXIV, A. B, C, D), The results are shown on Pl. XVIII. (At the same time measurements were made of the velocity of the surface current and tidal measurements were made at Maroussia (see Tab. 12)).

The samples were taken at a depth of 100 m., the increase in temperature and salinity per meter being greatest at this depth, and

the time chosen was about the change of moon, when the changes due to the tide might be considered to be maximum.

In addition, observations were made a few km. further north in the mouth of Øresund through two changes of the current (series LXVII A and B) and also somewhat further up in Øresund during the period about high water (series LXIX) (the results are noted down on Pl. XIX).

All the observations were made through holes in the ice and it was possible on this steady surface to obtain great accuracy.

Results of the observations.

It will be seen from Pl. XVIII and XIX, that there was a close connection between the differences just mentioned in temperature and salinity and the course of the tidal wave. These differences may be imagined to arise through the horizontal tidal currents in the sea becoming partly transformed to vertical currents, when the tidal wave entered the mouth of Øresund and passed over the ascending sea-bottom (called the barrier in the following).

The lowermost water-layers ran in parallel with the bottom, thus rising upwards so as to become partly mixed with the overlying water-layers, which flowed in horizontally. The amplitude in salinity varied between 0.95 p. m. and 0.36 p. m. and the amplitude in temperature between 0.16° C. and 0.32° C. The average of the amplitude was 0.63 p. m. and 0.23° C.

The curves (Pl. XVIII and XIX compared with the observations in Tab. 12) show the following features.

The temperature and salinity curves follow very closely together in the series LXIV A, B, C, D (Pl. XVIII), rising water giving increasing temperature and salinity, whilst falling water gave the opposite result. The times for the highest and lowest values, however, did not fall exactly at the times for high and low water. At a depth of 100 m. the water sometimes flowed in after high water and out after low water.

A characteristic of the two curves about high water is the sudden rise of temperature and salinity in its neighbourhood. The current measurements at the surface showed, that there was still water there, thus at the same time that the water at 100 m. was running in and pressing upwards in a wave. Similar waves were found in series LXXVII B (Pl. XIX), which was taken further up in Øresund at the period about high water.

At the latter station measurements were made through two current changes and the samples were taken from the depths 75, 100 and 125 m. as quickly as possible after each other, in order to follow the variation in these depths as nearly simultaneously as possible.

In the series LXIV A (falling water) the salinity and temperature changed in the same way in all three depths, the lowest values occurring ca. 1½ hours after low water.

In the series LXIV B (rising water) the salinity at a depth of 75 m. is seen to have increased, approaching to the salinity at 100 m. which has remained nearly constant as also the temperature, whilst the temperature at 75 m. has decreased.

Some time after high water the water in 100 m. is pressed up in a wave and runs out immediately afterwards, whilst the water in 75 m. has already previously begun to run outwards.

Changes also occurred in the temperature and salinity at other depths than those mentioned, but as in the upper layers (0—75 m.) the temperature and salinity were nearly uniform beforehand, the changes could here only be inconsiderable.

Discussion.

On the basis of the available material it is not possible to discuss in too great detail what occurred, when the tidal wave forced its way into the mouth of Øresund; for this we ought to have a series of simultaneous observations at different depths and from different stations.

The movement of the water-masses, however, has evidently given rise to two kinds of variations in the temperature and salinity,

1. those due to the periodic movement in from the sea up over the barrier and out again, and

2. those due to the mixing which occurred over the barrier and which led to actual changes in the water-masses there, a nearly homogenous mixed layer being formed.

1. The first-mentioned variations were observed in the layer 75—150 m. depth and could attain to such considerable values, that to compare observations from these depths we should require to refer them to a definite point of time. The material of observations is, however, not large enough to permit of a correction table being drawn up; it may be said quite in general, that temperature and salinity increased with rising water and decreased with falling water.

2. As mentioned, we may imagine the condition to be, that the water-masses below the depth of the barrier (ca. 50—75 m.) ran in parallel to the rising sea-bottom, whilst the water-masses above the depth of the barrier ran nearly horizontally. Consequently, there was a tendency to the formation of a homogenous mixed layer on the barrier, and as the salinity and temperature in the uppermost 75 m. in Øresund were as a rule lower than in the sea below this depth, there resulted an inflow of heat and chlorides from the deeper

layers in the sea to the upper layers in the mouth of Øresund, which spread further from there in a horizontal direction by means of the tidal currents.

The area over which this mixing took place was certainly very small in comparison with the surrounding water-masses, and the increase in temperature and salinity after a single, incoming tide was probably very slight, but owing to the constant renewal twice in the 24 hours the total effect was appreciable.

It is conceivable, that mixing processes of a similar nature occur everywhere in the mouths of fjords and wherever there is an elevation in the sea-bottom, which stems the tidal wave. Herein we possibly have an explanation of the presence of the characteristic temperature minimum, which occurs in summer at a depth of ca. 50—75 m. in all water in the Greenland Sea of so-called arctic origin.

If we imagine, namely, that such mixing processes are the principal cause of the temperature changes in a vertical section, the origin of the temperature minimum and its uniform depth everywhere in the Greenland Sea can be explained in the following way. In winter the uppermost layers of water are cooled down to freezing point and convection currents then arise, producing uniform salinity in the water-masses down to a depth of over 100 m. and cooling them down to freezing point. Everywhere on the barriers, however, the mixing processes occurring there between the ice-cold surface water and warmer, more saline water from deeper layers in the sea will bring chlorides and heat to the upper layer.

Thus, the ice-cold upper layer can only obtain a thickness, which is equal to the average depth on the barriers, where these mixing processes occur.

In the course of summer the uppermost layers become greatly heated, in part directly by contact with the atmosphere, in part by the downflow of warm water from the melting snow and ice of the land, and only the lowermost part of the ice-cold layer from the winter remains. Here probably there is a constant inflow of warmth from below through the mixing processes on the barrier, but this is exceedingly small in comparison with the heat added to the uppermost layers and in this way a temperature minimum is then formed at the same depth as the lower edge of the ice-cold layer of water (this depth, as mentioned above, being equal to the average depth on the barriers) and the temperature of this minimum is raised in the course of the summer some hundredths of a degree above the freezing-point temperature from the winter.

That it really is the mixing processes, which mainly cause the propagation of the temperature changes, can be seen e. g. from the

series for the summer from Danmarks Havn and Øresund. These series show, that greatly heated and almost fresh water from the melting snow and ice can persist for a long time as a definitely bounded layer above the sea-water cooled down in winter, without any increase in temperature occurring in the under layers so long as the mixing processes at the surface are restricted on account of the ice. But very soon after the ice had broken up and the mixing processes at the surface owing to the movement of the waves became stronger an equalisation of temperature took place.

Changes from surface to bottom in the mouth of Øresund from September 1906 to June 1908. (Pl. XX—XXII).

(In the following all water with a temperature above the freezing point temperature corresponding to the salinity will be called "warm" water.)

From the middle of September to May 1906—07 the salinity in the layer 0—75 m. increased, that in the layer 75—150 m. decreased at the same time, the average salinity of the whole layer 0—150 m. decreased (see Pl. XV).

The increase of salinity in the upper layers was due mainly to the separation of the chlorides owing to the freezing of the seawater, in less degree to inflow from deeper layers by the mixing processes on the barrier referred to.

In the layer 0—50 m. the average salinity increased during this period from 31.44 to 32.50. A layer of ice with an average thickness of $1\frac{3}{4}$ m. was formed; this ice had a salinity of about 9 pCt. (the salinity of some sea ice, which for experiment was melted in the spring of 1907).

In the autumn, when the formation of ice was strongest, the salinity of the surface water was ca. 31 p. m. Thus, by the freezing of a layer of water 175 m. thick 0.175×22 gm. chlorides were separated out, which distributed over a layer of 50 m. in thickness caused an average increase in the whole layer of $\frac{1.75 \times 22}{50} = 0.77$. The total increase however was 1.06 p. m., so that an increase of ca. 0.29 p. m. was due to an inflow from the deeper layers through mixing processes.

This inflow took place especially in the first part of the winter, when the water out at sea was warmer and more saline below 75 m. than above this depth (see the series XI, XIII and XV).

In the course of the winter the average salinity decreased greatly in the layer 75—100 m. and in the whole layer 0—150 m. (see Pl. XX).

The warm and salt bottom-water in Øresund was drawn out and replaced by less saline and colder water from the upper layers in the sea.

In the latter part of the winter — after January 1907 — the inflow of chlorides and heat from below gradually decreased; the water in the deeper layers, which now came up on the barrier, had a similar temperature and salinity as the water there. A layer with uniform salinity was formed, the cold spreading downwards through it by convection currents.

In the middle of May this layer had a thickness of 140 m.; the salinity throughout was 32.48 p. m. and the temperature — 1.78° (the freezing point temperature corresponding to this salinity) (see series XX).

From the middle of May to the middle of June 1907 warmer and salter bottom-water again made its way into Øresund, probably pressed in by density changes in the sea, as no such changes occurred at the same time in the upper layers in the inner waters (the ice had namely a thickness of ca. 1¾ m. everywhere in the fjords and the sea ice was solid and immovable).

This increasing warmth and salinity were propagated quite slowly from below upwards to a depth of ca. 50 m. (series XX and XXV).

In the series XXXIV (middle of July) we see, that this so-called ascending wave of heat meets with a slight warming of the uppermost layers, caused by a slight mixture of warmed up water from the rivers which had begun to flow in the beginning of June. (The salinity had decreased down to ca. 10 m., and the temperature increased). From 10—75 m. the salinity remained almost unchanged, but the temperature rose a little. Thus, mixing had occurred here between water-layers with salinity one above and the other below 32.48 p. m. and both with temperature above freezing point.

From the middle to the end of July the ice still lay unbroken everywhere in the fjords; nor did any great salinity and temperature changes occur here during this period. (In series XXXIX the Cl. p. m. are not quite reliable — they are probably ca. 0.08 p. m. too low, and assuming this, the temperature and salinity had very slightly increased during this period).

In the beginning of August the ice broke up in the fjords and in the course of the month thereafter a great decrease in salinity and increase in temperature occurred in the layer 0—50 m. (series XLII). This layer had a well-defined boundary towards the mixed layer in 50—75 m., where the salinity remained nearly unchanged, whilst the temperature rose. In the under layer (75—150 m.) the temperature and salinity rose a little.

As already mentioned, the condition has been, that the upper layers in under the land have decreased more in density than the cor-

responding layers further out in the sea and thus tended to move eastwards, whilst the under layers, as reaction current, had a west-going tendency and mixed with the upper layer on the barrier into Øresund. In the beginning of September the rivers froze over. It may be assumed, that there was now equilibrium for a time between the water-masses near land and out in the sea, so that the east-going movement of the surface water ceased. The fjords then froze and the salinity increased consequently in the upper layers.

In the course of the winter 1907—08 the reverse to what took place in the summer probably occurred, the upper layers in the fjords now increasing in density (both owing to the formation of ice and the mixing processes) more than the corresponding layers of the already ice-covered sea. Thus, some of the bottom-layer was drawn out.

From September 1907 to the middle of June 1908 we have no observations, but the series LX (middle of June) indicates this increase of the salinity in the surface layer in the course of the winter.

In the layer 0—50 m. the average salinity rose from 31.26 to 32.55 (see Pl. XX), thus altogether 1.19 p. m. A layer of ice of ca. 1¼ m. in thickness was formed and if, as already explained, we take the salinity of the ice as 9 p .m., the freezing of a layer of 1.25 m. causes an average increase in salinity of only 0.55 p. m. in the layer from 0—50 m. The remaining and greater part of the salinity increase, 0.74 p .m., must therefore have been caused by mixing with deeper layers.

On comparing the series LX A and XXV, both taken at the same time of year (middle of June) in 1908 and 1907, we see, that the layer of ice-cold water (i. e. at freezing point) and of nearly homogenous salinity, was only ca. 10 m. deep in 1908 against over 100 m. in 1907, and that the under layer (75—150 m.) was considerabley warmer and more saline in 1908 than in 1907. The average salinity was 33.16 in 1908 against 32.84 in 1907.

The characteristic feature of the changes in the mouths of Øresund was, that at a depth of ca. 50—75 m. a mixed layer with almost unchanged temperature and salinity occurred the whole year round, forming the boundary between an upper and lower layer with currents flowing in different directions.

Throughout this mixed layer, under ordinary conditions, a flow of heat passed to the upper layer, which would tend to hinder the formation of ice in the winter.

At the same depth as the mixed layer most of the series show an abrupt transition in density, proving that a boundary existed here between two layers of different character.

The mixing processes would naturally tend to even out this difference in density between upper and lower layer; since nevertheless

the difference as a rule occurred, it must have been due to inflow of new water-masses into both layers.

The depth of the mixed layer and of the abrupt transition in density was nearly the same as that on the barrier in the mouth of Øresund (ca. 50—75 m.).

Changes with the seasons.

Pl. XXI and XXII show at a depth of 50—75 m. the nearly homogenous layer, in which both temperature and salinity remained almost unchanged the whole year round. Thus, we may conclude that the direct influence of the atmosphere reached down to this depth and that here was a boundary between an upper layer from 0—50 m. and an under layer from 75—100 m., in which layers the changes had a different character.

The influence of the seasons led to density changes in the upper layers, which were different near land and further out in the sea and consequently led to currents.

The changes in the course of a year consisted partly of (1) vertical changes owing to direct conduction of heat, diffusion, mixing processes between the layers and convection currents and (2) changes owing to horizontal currents.

As we had no simultaneous measurements in the fjords and sea, it is not possible with certainty to indicate in which of these ways the changes at the station have occurred, but we may assume that the changes in the upper layer (0—50 m.) were essentially due to the varying influence of the atmosphere whilst the changes in the lower layer mainly were due to the currents (the direct influence of the atmosphere not reaching so far down).

The propagation of the changes from the surface downwards in a vertical section was essentially due to processes between the layers or convection currents and not to direct conduction of heat or diffusion. Thus the investigations in the spring and summer of 1907 showed that the warmth from the atmosphere and from the downflow of melted ice-water were only carried downwards after the ice had broken up in the fjords and wave motion and the like had caused intensive mixing in the upper layers. So long as the principal mass of ice remained unbroken, the warmed up water from the melting ice and snow lay in the open parts off the river mouths and between the ice-fields as a thin film over the upper layer, the temperature and salinity of which remained almost unchanged what they had been in the winter.

During 9 months of the year (September—June) the atmosphere was colder than the surface of the sea (— 1.7), and during this period, consequently, cooling of the uppermost layer of water took place — in part in connection with the formation of ice.

Both causes led to an increase in the density of the water-particles in the surface layer, these sinking down and warmer particles from the deeper layers coming to the surface, where these were cooled down and so on; in other words, convection currents were set up, by means of which the cold was spread deeper and deeper down.

In the first part of the winter 1906—07 (until January 1907, series XV) these convection currents reached down to a depth of ca. 50 m. Here there was always a break in the salinity gradient, this in the layer 50—75 m. remaining unchanged about 32½ p. m.

Below 75 m. the conditions during this period were normal (that is, increasing temperature and salinity greater than 33 p. m.) and chlorides and heat were carried from there to the mixed layer on the barrier.

The warm and saline bottom-water was drawn out of Øresund in the course of the winter 1906—07 and became replaced by greatly cooled surface water with salinity about 32½ p. m. coming in from the sea. The boundary between the upper and lower layers in Øresund was thus smoothed out and the homogenous, ice-cold layer formed (with a depth of 140 m., salinity 32½ p. m. and temperature — 1.78°), which was found in the middle of May 1907 (series XX).

As soon as the average density rose in the sea (May 1907), the bottom-water flowed in and a transference of warmth and clorides occurred, leading again to the formation of a division between upper and lower layer at a depth of 75 m. This movement of the bottom-water was independent of changes caused by the influence of the atmosphere in the upper layers, for in the middle of May the mean air temperature was still — 8° and no changes of density occurred in the upper layer in May—June, which could give rise to movement of the bottom-layer.

It was not until the months of June, July and August, that the mean air temperature became higher than that of the surface of the sea (— 1.7°) and then on the one hand direct transference of heat took place, and on the other mixing with the warmed up water from the melting snow and ice was going on.

The average salinity of the layer 0—50 m. decreased to ca. 31.3 p. m. and the temperature rose; the great break in salinity at 50 m. in the series XLII shows, that there was constantly a boundary at this depth between two layers of different character.

In September 1907 the air temperature again grew lower than that of the surface of the sea and in the course of the winter 1907—08 the surface layer 0—50 m. was cooled down to nearly freezing point, while the salinity was increased to ca. 32½ p. m.

Less ice was formed this winter than in the preceding, nevertheless the increase in salinity was somewhat greater and the temperature of the upper layer was on an average somewhat higher (which

was due to greater salinity and heat in the lower layer and consequently greater transport of chlorides and warmth from below upwards due to mixing processes).

Changes in temperature and salinity caused by variations of density in the sea, which were independent of the local influence of the atmosphere.

The changes in temperature and salinity in the layers below ca. 75 m. were not caused, according to what has been shown above, by the local influence of the atmosphere, but must have arisen from currents.

To understand the conditions we may recall what has been mentioned above, that the water-masses in the sea near the coast (the coast-water) consisted of a mixture of true Polar Current water and of Gulf Stream water, the latter flowing in towards land through submarine fjords in the Continental Shelf from the warm intermediate layer and during the passage in towards land raised by the slope of the bottom and mixed with the overlying Polar Current water. Consequently, changes in density may conceivably occur, when from some cause or another the proportion is changed between the amount of true Polar water (i. e. a mixture of American and Siberian river-water and Gulf Stream) and of Gulf Stream water. And it is conceivable, at the same time, that changes may occur as a consequence of variations in the velocity of the Polar Current, for increasing velocity will naturally increase the force of deflection and must consequently increase the depth of the Polar Current near land, thus leading to a decrease in the average density of the layer 0—150 m. and conversely.

The density changes in Øresund discussed here took place in such a way, that nearly the same temperature corresponded always to a definite salinity and we may conclude from this, that they were mainly caused by fluctations in the velocity of the Polar Current and less by changes in the composition of the water-masses.

It may be concluded, therefore, that the velocity of the Polar Current has been on the increase from September 1906 to May 1907 and on the decrease from May to September 1907.

We did not succeed in making observations in the winter of 1907—08, but it seems as if the decrease of temperature and salinity in the deeper layers of the water-masses in the coast-water is an annual, periodic occurrence, as it is mentioned by Ryder (Meddelelse af Grønland, Bind XVII, p. 214): "With regard to the deeper layers, on the other hand, the samples taken show on an average a less salinity in the winter and spring months than in August, a phenomenon which, owing to the somewhat problematic trustworthiness of the samples, I shall not venture to try to explain — —".

The series of temperatures from that Expedition show, that the bottom-water (100—400 m.) had decreasing temperature from September to March, increasing from March to June. Ryder's station lay in Scoresby Sound and, like our station in Øresund, was in free communication with the sea. At both stations the temperature and salinity decreased in the deeper layers in winter.

We may perhaps conclude, therefore, that this decrease is a phenomenon which recurs annually and that the cause (or the main cause at any rate) has been the same in both cases, namely, increasing velocity of the Polar Current in winter.

Summary.

Pl. XX shows the variations in temperature and salinity in different depths in the mouth of Øresund in 1906—08.

It is seen, that in the upper layer 0—50 m. the temperature was increasing in summer whilst the salinity decreased, and conversely in winter — that the temperature and salinity in the mixed layer 50—75 m. was nearly unchanged the whole year round — and that the temperature and salinity in the lower layer (75—150 m.) decreased and increased simultaneously.

It appears from this, that the sea did not store up any heat from the atmosphere, but that the heat, which penetrated downwards in the surface layer in summer, was again lost in winter. When the sea below a depth of 75 m. now as a rule possessed a considerable amount of heat, this must have been due to mixing with Gulf Stream water and it may be remembered, that this warmer under layer on the barrier in Øresund was mixed with water of the upper layer, which would mean here a constant transference of heat from below upwards. In other words, the atmosphere received heat from the sea here and this tended to hinder the formation of ice in winter.

Changes in the velocity of the Polar Current and variations in the proportion between the amount of Polar Current water and Gulf Stream water influenced the temperature and salinity below a depth of 75 m. and through this affected the formation of ice in Øresund.

It proved, that in the winter of 1906—07, when the sea was very cold, the ice in Øresund had an average thickness of ca. 1¾ m. and only broke up in the beginning of August, whereas in the winter of 1907—08, when the sea was much warmer, the ice only had a thickness of ca. 1¼ m. and broke up already in July.

It may be said quite generally, that the relatively considerable amount of heat, which the sea at the coast below a depth of 75 m. possessed as a rule and which resulted from an infusion of Gulf Stream

water, was carried up to the surface layer by means of the mixing processes mentioned and thus led to a less formation of ice in winter and earlier breaking up of the ice, than would have been the case if the water-masses in the sea had consisted merely of greatly cooled Polar Current water.

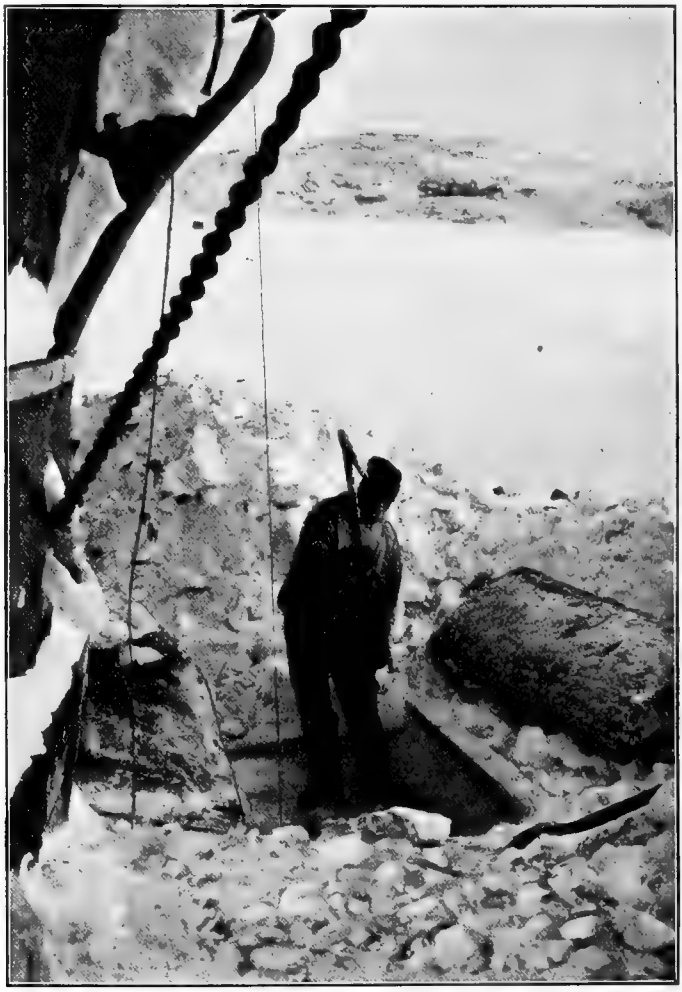


Fig. 8. Fire opening cut in the ice; C. B. Thostrup phot.

The series from Danmarks Havn. (Series XXXVII, XXXVIII, XL, XLI, XLIII, XLV, L, LIII, LXX and LXXI).

Danmarks Havn lies in a bay opening out of Øresund and the hydrographical conditions here were therefore nearly the same as those already described for Maroussia.

The observations were made from the ship partly from the aft end, partly from a hole in the ice (a fire-opening) at the forepart of the ship, and the depth of these places varied between 5 and 16 m.

Throughout the whole winter the salinity was nearly the same from surface to bottom and the temperature was the freezing point temperature corresponding to the salinity (see series XLVII—L and LIII). The salinity rose in the course of the winter, partly owing to separation of the chlorides when the sea-water froze, partly owing to intrusions from the deeper layers on the barrier further out in Øresund.

At the end of July the rivers began to flow and as the ship lay off such a river, the warm water from the melting snow and ice (with a temperature of + 10—+15° C.) streamed down over the ice and attacked this both from above and from the side. The consequence was, that the ice round about the ship melted away in the course of about ten days, though it still remained a long time in the outer part of the harbour and in Øresund.

In 1907 the rivers began to run on June 28th, on July 6th the ship was free of ice, but it was not until August 13th, that the ice broke up in the outer part of the harbour and in the fjord. In 1908 the dates were June 18th, July 4th and 18th.

From this period we have the series XXXVII, XXXVIII, XL, LXX and LXX and LXXI, which show, how the downflow of warm river-water spread out over the very cold and saline surface-water in the harbour as a layer whose thickness was nearly the same as the average thickness of the ice in the outer part of the harbour. For example, on July 18th 1907 the average thickness of the ice was ca. 1.8 m. and the depth of the warm, almost fresh layer was likewise ca. 1.8 m. (series XXXVII); on July 27th the thickness of the ice had decreased to a little over 1 m. and that of the warm layer was also between 1 and 1.5 m. (series XXXVIII).

During this time there was a sharp boundary between the fresh and the salt water.

As soon as the ice broke up in the outer part of the harbour and the fjord, the warm and fresh water became mixed with the cold and salt water to form a nearly homogenous mass (series XLI and LXXI).

In September cooling of the uppermost layer began, as also formation of ice and then followed again an increase in salinity.

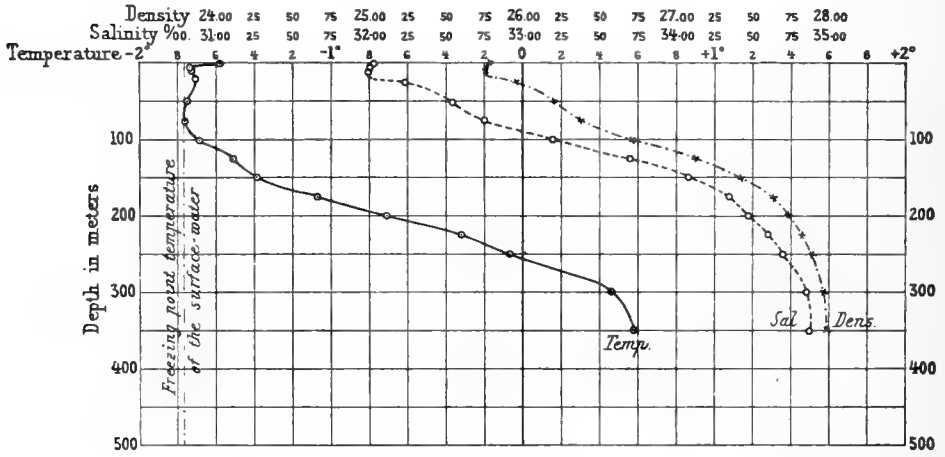
The series from the fjords and sounds at ca. 76° N. L. in North-East Greenland. (Series LVI, LVIII, LIX, LXI).

Three entrances led into Stormbugt and Dovebugt: Øresund, Store Belt and Lille Belt. Of these the Store Belt was in free communication with the Greenland Sea down to a depth of over 300 m., whilst

Øresund and Lille Belt were shut off by submarine ridges with depths on the saddle of ca. 60 and ca. 130 m. (The saddle depth means the depth below which no water can pass in by horizontal currents).

The observations were taken from a sledge in the course of May 1908, thus at a time of year when the average air temperature was — 8°, and when the thickness of the ice had reached its maximum.

According to the observations from the station at Maroussia in May 1907 we therefore should have expected, that the water-masses in the sounds in May 1908 had homogenous salinity down to a similar depth as there (ca. 140 m.) and had been cooled down to the



Station LVIII. Store Belt.

freezing point temperature corresponding to this salinity. This was not the case, however, the homogenous ice-cold layer had a much less thickness.

There was a considerable difference in the hydrographical conditions of the uppermost 75 m. in the spring of the two years 1907 and 1908, which was to some extent due to different meteorological conditions, and also to differences in the marine currents and the consequent difference in the amount of surface water, which had circulated from the sea into the fjords and sounds in the course of the winter.

The following remarks may be appended to the various series.

Series LVIII, Station Store Belt 7—8 June 1908. The station lay at the inner end of a submarine fjord, which transects the Continental Shelf in the direction N. W. at ca. 75½° N. L. and continues southwards round the southern Koldewey Island (see bathymetric Chart, Pl. XII).

The distribution of temperature and salinity was the same as at the stations in the coast water (see the diagrams).

For the layers below 100 m. there is a striking resemblance between the diagrams for this station and those for St. LXXV in the coastal water at ca. 77° N. L., 17¼° W. L.

It might be thought, that such a great resemblance was a pure chance, especially as the series LVIII was taken on June 7—8 and the other on July 23, thus six weeks later, but the measurements at Maroussia show, that in the interval no changes occurred in the deeper layers of the coast-water. This agreement between the series therefore is no chance but indicates, that the hydrographical conditions at the bottom of the submarine fjords are generally the same throughout the whole layer of 0—300 meters in depth, though there is no communication between the fjords in the direction N.—S. below 200 m.

This strengthens the view, that the circulation in the deeper layers does not proceed in the direction N.—S., but E.—W. from the warm undercurrent in the eastern part of the Polar Current in towards land.

The observations were made in the beginning of June at a time when the melting of the ice had not yet begun, nor is there any sign of fresher water at the surface. The surface layer is rather more saline than the underlying layers, probably owing to formation of thin ice on the surface of the opening.

In the uppermost 10 m. the salinity was nearly constant at 32 p.m. This homogenous layer may be considered to have been formed partly by the separation of chlorides when the sea-water became frozen and it has quite a small thickness by comparison with the corresponding layer at Maroussia in the previous year, which was over 100 m. deep.

The reason for this difference, apart from the earlier mentioned variation in the surface current, arises from the fact, that the ice in the winter of 1907—08 was mainly snow-ice, which does not separate out chlorides when formed, whilst the ice in 1906—07 was mainly formed by direct freezing of the sea.

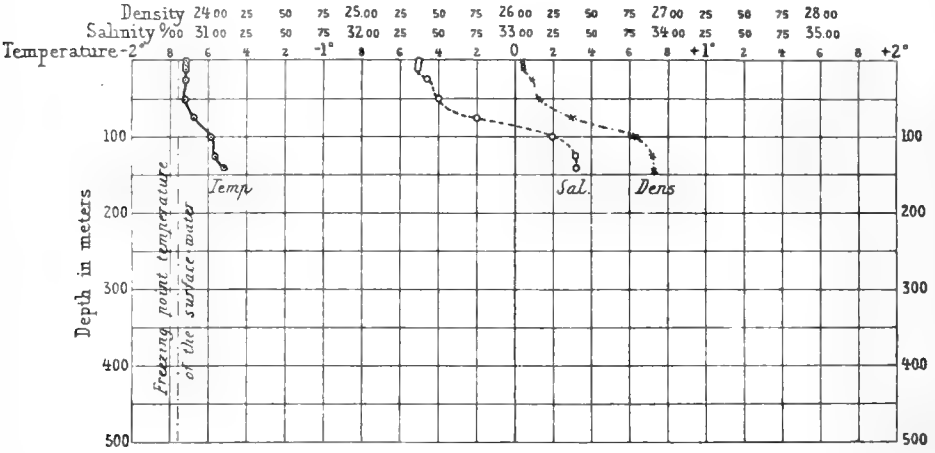
Series LXI, Lille Belt. 25 June 1908.

The station lay in the middle of the Belt off Röse-Løbet.

The distribution of temperature and salinity was in close agreement with that found in the mouth of Øresund (at Maroussia) down to a depth of 100 m.; below this depth the temperature and salinity became nearly constant, a consequence of the submarine ridges with ca. 100 m. of depth over them in the mouth of Lille Belt.

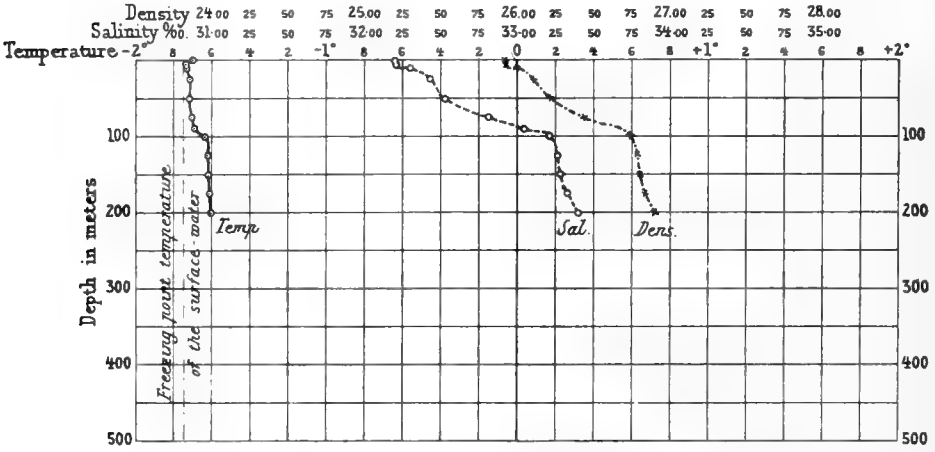
The salinity in the uppermost 25 m. was somewhat less than at Maroussia, but somewhat greater than further into Stormbugt.

The temperature was 0.04° above freezing point and the cause of this rise of the temperature above the freezing point temperature



Station LXI. Lille-Belt.

was, probably, in part mixing with warmer water from the deeper layers, in part mixing with the warmed water from the melting snow and ice, which filtered through the porous ice.



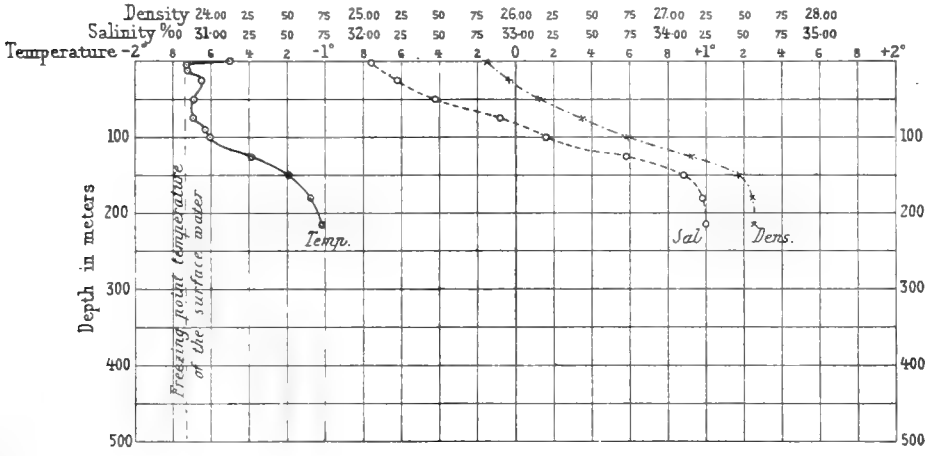
Station LIX. Stormbugt.

Series LIX, Stormbugt. 11—12 June 1908.

The station lay in a small bay, which united the three entrances Store Belt, Lille Belt and Øresund and which received the name of Stormbugt from the German Germania Expedition of 1870—71.

In the uppermost 100 m. the salinity and temperature were nearly the same as in Øresund and Lille Belt. The temperature minimum lay at a depth of ca. 10 m., and the increasing temperature below this depth was due, therefore, not to conduction from above but from the deeper layers.

The surface salinity was somewhat greater than at the station in Store Belt and Dovebugt, probably due to the fact, that the ice in Stormbugt and the other sounds broke up in the summer of 1907, with the result that more chlorides were separated out when the ice came the following winter than in Store Belt and Dovebugt, where the ice did not break up in the summer of 1907, partly also because



Station LVI. Dove-Bugt.

the latter waters lie nearer to the large river at the head of Dovebugt, from which there flowed fresh water throughout the whole winter.

Below a depth of 100 m. the temperature and salinity were nearly constant, a consequence of the fact, that Stormbugt forms an isolated basin, surrounded by banks with a saddle depth of ca. 100 m.

Series LVI. Dovebugt. 28 May 1908.

The station lay in the innermost part of Dovebugt between Orientering Islands and Germania Land. The water here is a continuation of Store Belt.

Down to a depth of 150 m., consequently, the temperature and salinity were nearly quite the same as those found at the station in Store Belt.

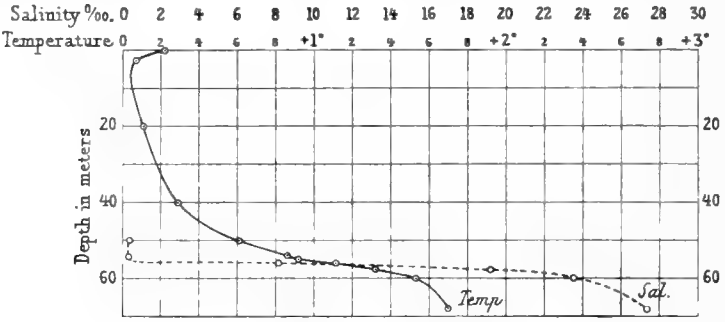
Below 150 m. the salinity and temperature were nearly constant. Thus Dovebugt must be an isolated basin, surrounded by banks with a saddle-depth of ca. 150 m.

The surface salinity was somewhat less than in Øresund and the Lille Belt, due in part, as already mentioned, to the neighbourhood of the large river at Hvalrosodden.

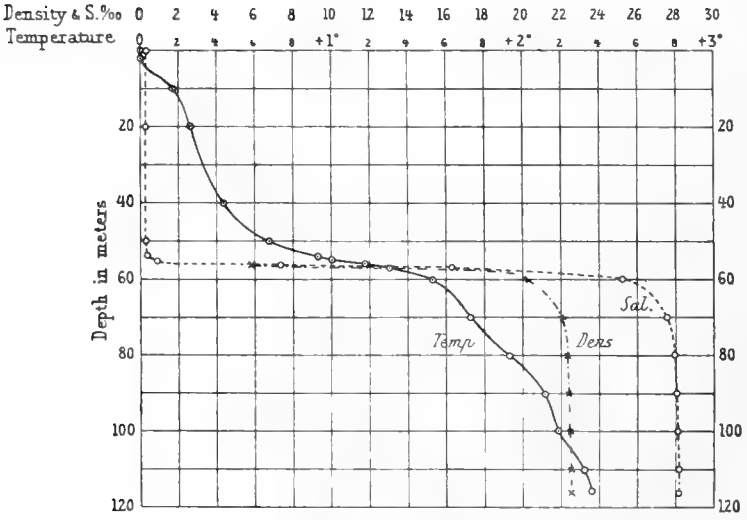
3. The series from the inland lakes. Series LII, LIV, LV, LVII.

1. Sælsøen. Series LII and LV.

Sælsø lies parallel with Mørkefjord and Hellefjord and, like these, extends in among high mountains with a relatively narrow breadth.



Station LII. Sælsø I.



Station LV. Sælsø II.

The level of the lake was ca. 4 m. above the sea, from which it was shut off by a clay and gravel plain; a river ca. 7 km. long cut through the plain, forming the outlet of the lake.

The results of the investigations at the two stations can be seen from the diagrams.

A characteristic feature at precisely the same depth in both series (56¾ m.) is the sharp boundary between a nearly fresh, upper layer with a temperature of about — 1° and a lower layer with fairly considerable amount of salinity, which from 70 m. downwards as far as the observations were carried was nearly uniform, whilst the temperature increased. This warm and salt bottom-water had a very strong smell of hydrogen sulphide.

The diagrams show, that the salt and fresh layers were sharply bounded towards each other and thus only became mixed to a small degree.

The fresh layer was probably renewed by downflow from the glacier at the head of the lake, and the outflow to the sea through the river meant a certain amount of circulation. As the salt bottom-water smelt of hydrogen sulphide, it was probably stationary.

The question is now, where this considerable layer of salt and warm water came from. The salinity (ca. 28 p. m.) was slightly lower than the average salinity of the sea outside. There could not be any constant communication between the two, however, since the lake, as already noted, lay ca. 4 m. above the level of the sea. Further, the temperature of the warm bottom-layer was considerably higher than the average temperature in the sea even at the hottest time in summer.

There was a possibility, that the salt water came from salt in the ground and not at all from the sea. To get this question decided, the samples of bottom-water from the two stations in the lake were subjected to a more exact chemical analysis by Dr. Niels Bjerrum in Copenhagen.

The result of his analysis was the following.

Investigation of two samples of water from Greenland lakes.

The investigation, which was to determine, whether the very saline samples of water had the same composition as sea-water, gave the result, that this was the case. This was decided by the determination of the chlorine, traces of sulphuric acid, sodium, magnesium, calcium, potassium and of the density.

The samples, which had been kept in soda-water bottles (½ litre) with porcelain stopper tightened by a rubber ring, were filtered. Then the amount of sulphates in 50 cc. was determined by precipitation with barium chloride and weighing as barium sulphate. The chlorine was determined in 5 cc., which were weighed and titrated with 0.1 normal silver nitrate solution with potassium chromate as indicator. The calcium was precipitated from 50 cc. by ammonia and ammonium oxalate and weighed as oxygen. The same process

will also precipitate phosphoric acid, iron and aluminium if present, but qualitative tests showed, that these were not present in any considerable quantities. The filtrate from the calcium oxalate was evaporated with sulphuric and glowed for some time. The residue was weighed and from an examination of the acidity of the solution of the residue in water (indicator: methyl-orange) it was determined, that neutral sulphates of potassium, sodium and magnesium had been formed. Thus, on determining the magnesium as magnesium-pyrophosphate in one portion of the solution and in another portion the potassium as potassium-platinum-chloride (after removal of sulphuric acid, lead acetate and hydrogen sulphide), the sodium could be found as difference.

The density determination was carried out by means of a pycnometer of ca. 10 cc. (Sprengel-Ostwald model) and the determinations reduced to vacuum, the density of the air being taken as 0.0012. Instead of the density s the dimension $\rho = (s - 1) \times 1000$ is noted.

The average composition of sea-water is known from Forchhammer's work in the "Indbydelsesskrift" of Copenhagen of 1859: "Om Søvandets Bestanddele og deres Fordeling i Havet". Using his average, we may estimate from the chlorine determinations, how much there must be of other substances. In this way we obtain the quantities noted in the Table as "calculated". The calculated ρ value is found by means of Knudsen's hydrographical tables.

Samples	Series LV, 115¾ m.		Series LII, 68 m.	
	found	calculated	found	calculated
Cl	15.67 ‰	—	15.23 ‰	
SO	1.96 -	2.23 ‰	2.03 -	2.17 ‰
Ca	0.36 -	0.33 -	0.34 -	0.32 -
Mg	1.10 -	1.05 -	1.06 -	1.02 -
K	0.25 -	0.26 -	0.24 -	0.25 -
Na	8.60 -	8.75 -	8.46 -	8.49 -
	21.16 at 13.0°	21.24 -	20.52 at 13.5°	20.54 -

The agreement between the observed and calculated values may be said with full certainty to show, that the water-samples possess the character of ordinary sea-water. On going through Forchhammer's results, we find many analyses, which differ more from the average composition of sea-water than these lake samples analysed here. And similarly, the agreement between observed and calculated ρ may be said to be quite satisfactory, for the chlorine titration, density determination and the factor ρ : Cl calculated from the hydrographical tables may give rise to differences in the 2nd decimal of ρ.

The sulphate determination is the one which differs most. This is probably connected with the fact, that the water-samples had a

smell of hydrogen sulphide when taken up, as this hydrogen sulphide must come from the reduction of sulphates. When I obtained the samples, however, this smell had disappeared.

Copenhagen, February 1910.

(Sign.) Niels Bjerrum.

The result of the investigation is, that the water was certainly sea-water. As it smelt strongly of hydrogen sulphide when taken up, it must have been for some time at the bottom of the lake. But how long? Had the land risen and thus converted a fjord into an inland lake?

This is indicated by a great resemblance of the gravel plain, through which the river flowed, to a raised sea-bottom, the occurrence of bivalve shells etc. Further, drift-wood was found along the bank of the lake and a fossil skeleton of a whale on the southern bank.

Closer consideration shows, however, that the salt water must have arisen from a much later period than that, when the lake possibly was at a level with the sea.

Diffusion between the salt bottom-layer and the fresh surface-layer will, namely, constantly tend to reduce the salinity in the under layer and this process goes on with a rapidity which is expressed in the following formula:

$dS = -k \frac{dc}{dx} dt$, where $\frac{dc}{dx}$ = the difference per cm. in S p. m. when $\frac{dc}{dx}$ is greatest; t is the time in days, dS is the quantity of salt in gm., which passes through a section of 1 cm^2 in unit of time.

In Sælsø this will amount to 0.4 gm. in the course of a year.

If we take the thickness of the salt layer to be on an average 60 m. and the salinity as 28 p. m., a cylinder of this height and of 1 cm^2 in diameter will contain 168 gm. of salt.

If the diffusion process continued with unchanged rapidity of 0.4 gm. salt through each cm^2 per year, all the salt would thus be washed out of the bottom-water in the course of ca. 400 years.

$\frac{dc}{dx}$ will decrease, however, as the salinity decreases in the lower layer, whereas the upper layer will always remain nearly fresh, owing to the downflow from the glacier, and will flow out through the river.

These calculations show, that the salt bottom-water cannot possibly be of the same age as the time when the lake was presumably an arm of the sea and when the drift-wood and the whale's skeleton were deposited there. The average salinity of the bottom-layer is 28 p. m. and if we take the average salinity of the sea-water outside to be 32 p. m., it can only have been ca. 50 years since the sea-water filled the lake.

How then can we explain the relatively high temperature of the bottom-water, which is considerably higher than the average temperature of the sea-water outside?

The heat can scarcely have been carried down to the lower layer from above, as there is always a downflow from a glacier here, and it is hardly probable, that the heat of summer, during the short time the lake is not covered with ice, can penetrate down through the whole layer. Even if we imagine the surface-layer to be considerably warmed up in summer, however, this heat will nevertheless not be able to penetrate down to the lower layer, as it cannot lead to convection currents, the uppermost salt layer on being heated only becoming lighter. In such a case the heat must be propagated further downwards by direct conduction, but this is such a long process, that it must be left quite out of consideration.

There is still the possibility, that the water became heated when it flowed into the lake.

The most probable explanation of the origin of the warm and salt bottom-layer in the lake is, in my opinion, that it flowed in during exceptionally high water in the summer some 50 years ago at most. The inflowing sea-water may be considered to have passed comparatively slowly over the plain between the sea and the lake and become heated by the atmosphere on the way. The lake has in this way become filled with warm water of nearly homogenous salinity. Later the downflow from the glacier, which may be considered to reach down to a depth of ca. 45¾ m. below the level of the lake, has affected the water down to this depth, whilst the bottom-layer, which does not take part in the circulation, has kept its temperature and salinity almost unchanged.

As the salinity in the surface layer is ca. 0.35 p. m. and this salinity comes for the most part from diffusion with the lower layer, the influence of which is known, we may thus form some estimate of the rapidity with which the circulation in the upper layer takes place. If we assume, namely, that the conditions have been stationary, when the investigations were undertaken, we may make the following calculations.

The average salinity in the uppermost 50 m. of Sælsøen was 0.35 p. m. Of this amount 0.07 p. m. seems to have other causes than the diffusion, as a salinity of 0.07 was found in freshwater lakes (see series LV and LVII), where there was no salt bottom-water.

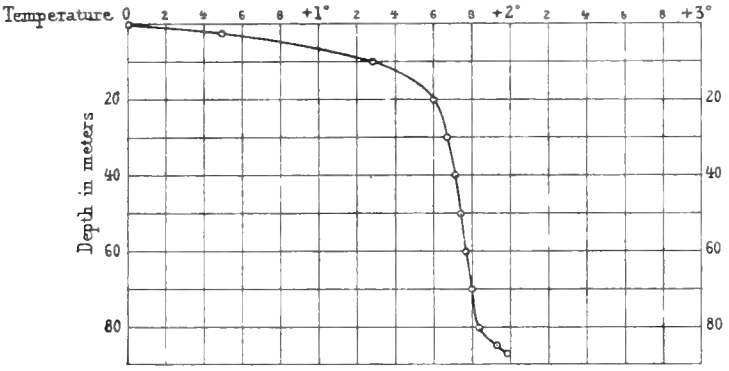
If we calculate that a salinity of 0.28 p. m. was caused by diffusion, a cylinder of 50 m. height and 1 cm^2 in diameter would consequently contain ca. 1.5 gm. salt But we know (as already shown), that 0.4 gm. salt is separated from the lower layer in 1 year by diffusion; consequently, the upper layer is renewed in ca. 3¾ years.

Anneks Sø (Series LIV).

This lake lay at a height of 40 m. above the level of the sea in the neighbourhood of Sælsøen. There was no salt bottom-water here, however, though there was quite a small quantity of salt (0.07 p. m.) dissolved in the fresh water throughout the whole layer.

The temperature curve shows a temperature of almost $+1\frac{3}{4}°$ from 20—80 m. Towards the bottom the temperature rose a little, whilst it decreased to 0° in the uppermost 20 m.

The lake has presumably been heated up to ca. 2° in the summer of 1907. Then in the course of the winter the layer from 0 to 20 m. becomes cooled to nearly 0°, probably because there has been a downflow of cold water from a glacier down to this depth. The cause of the low temperature cannot be the winter cold, as this has scarcely



Station LIV. Anneks Sø.

produced any cooling beyond the uppermost layers of the lake. On cooling below + 4° C. freshwater becomes lighter, so that no convection currents can arise, and the series from the lake at Skibshavn (series LVII) shows, that the cold in this case does not reach down into deep water in calm lakes with no wave-movement of importance.

The greater thickness of ice in the lake (ca. $2\frac{1}{2}$ m.) than in the sea (ca. $1\frac{1}{4}$ m.) was probably connected in part with this absence of convection currents, these in the sea constantly bringing up warmer water from the deeper layers to the surface.

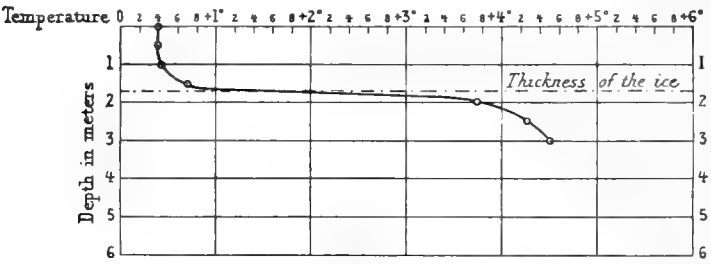
The lake at Skibshavn (Series LVII).

This lake lay on a plain in the neighbourhood of Skibshavn; it received afferents from a small local glacier from the surrounding hills and had outlet through a river, which flowed out near to the anchorage of the ship. The depth of the lake in the summer was ca. $5\frac{1}{2}$ m. in the middle, in winter ca. 4 m.

On June 3rd 1908, when the investigation was made, the air temperature was negative and the ice had not begun to melt. The thickness of the ice was ca. 1¾ m. and it covered the whole lake.

There could be no question at this time of heat penetrating from the atmosphere through the ice, as the air-temperature had not yet been positive and the temperatures in the lake should therefore be unchanged the same as in winter. The temperature diagram shows now, that the temperature of the lake from immediately below the ice down to the bottom was ca. + 4° C.

We may picture the following course of events:



Station LVII.

In the course of the summer 1907 the lake was heated up to about 10° C. (we have no direct observations in the lake, but the river in its immediate neighbourhood had this temperature) and then in the course of the autumn it became cooled down to + 4° C. (this cooling process has probably proceeded with great rapidity, as it gave rise to convection currents in the lake). After the lake had reached + 4° and the water had reached its greatest density, the convection currents ceased and, as the weather was quite calm, only the surface layer was cooled any further. An ice-covering was formed, but just under the ice the temperature was constantly + 4° and this condition persisted throughout the whole winter.

Calm freshwater lakes such as that mentioned here thus act as a kind of heat reservoir, storing up a part of the summer heat. The effect of this was, for example, that the lake became earlier free of ice in the spring than the sea and fjords in the neighbourhood.

Simultaneous measurements of the thickness of the ice and salinity of the surface water in Danmarks Havn 1906—1908. (Table 6).

Date	Salinity	Thickness of ice	Mean monthly temperature	Date	Salinity	Thickness of ice	Mean monthly temperature	Date	Salinity	Thickness of ice	Mean monthly temperature
		cm.				cm.				cm.	
19/VIII 06	29.3			2/I 07	32.3			7/II 08		87	
20/VIII -	29.6		— 3.7	28/I -	32.3		—23.0	19/II -		100	—28.9
13/IX -	29.6			8/II -		148		20/II -	31.5		
21/IX -	30.2	0		15/II -	32.5		—26.0	27/II -		105	
1/X -	30.7			28/IV -	32.6		—19.4	11/III -	32.0	99	—21.1
5/X -	30.8			5/V -		176	— 8.2	31/III -	32.0	99	
11/X -	31.1			28/VI -	1.0	176	+ 1.1	14/IV -	32.4	96	
15/X -	31.3		—14.5	6/VII -		0	+ 3.1	21/IV -		96	—19.6
20/X -	31.3			13/IX -	28.8			23/IV -		94	
24/X -	31.3			14/IX -	29.4	10	— 4.4	5/V -		92	
29/X -		72		22/X -		26	—14.6	12/V -		86	
1/XI -	31.4			1/XI -	30.3			15/V -	32.2		— 6.4
5/XI -	31.5			3/XI -		33	—19.7	19/V -		80	
21/XI -	31.5	100	—21.0	28/XI -		54		26/V -		77	
27/XI -	31.5			1/XII -	31.0			3/VI -		73	
3/XII -	31.7	105		28/XII -		61	—17.2	10/VI -		62	
5/XII -	31.8			14/I 08	31.3			11/VI -	32.2		+ 1.1
19/XII -	32.0		—24.6	16/I -		74	—20.8	18/VI -	1.0	44	
27/XII -	32.0			26/I -		81		4/VII -		0	+ 5.4

Mean monthly temperature of the air	1906	1907	1908	Remarks
January	....	— 23.0	— 20.8	Data received from the meteorologist of the Expedition Dr. phil. A. Wegener; calculated from the ordinary formula $t_m = \frac{2\times 8^a + 2\times 2^p + 5\times 9^p}{9}$.
February	....	— 26.0	— 28.9	
March	..	— 23.7	— 21.1	
April	...	— 19.4	— 19.6	
May	...	— 8.2	— 6.4	
June	....	+ 1.1	+ 1.1	
July	...	+ 3.3	+ 5.4	
August	— 2.1	+ 2.3		
September	— 3.7	— 4.4		
October	— 14.5	— 14.6		
November	— 21.0	— 19.7		
December	— 24.6	— 17.2		

Remarks: In the course of the winters 1906—07 and 1907—08 a series of measurements were made of the thickness of the ice, and at the same time samples of surface water were collected for the determination of the salinity.

The measurements of the thickness of the ice were made in the so-called fire-hole (a hole always kept open for access to water in case of fire).

For measuring, a divided rod with a small projecting angle of iron below was used, the projecting arm being passed under the lower edge of the ice and the distance between this and the surface

of the water being then read off on the rod. This measurement was dependent, however, on how much ice had been pressed down by the weight of snow etc. on the surface of the ice, and it would have been more exact to measure the distance between the upper and under surface of the ice. This could not be done, however, as several layers of frozen snow were formed above the ice in the course of the winter.

When the sample of water was taken, great care had to be used to prevent snowflakes and powder in the water from accompanying the latter into the bottle. This could not be prevented always and irregularities in the values of the salinity are certainly often due to the presence of this fine snow in the bottles.

For the sake of control, samples from 8 and 16 m. were collected with Ekmann's water-bottle a few times during the winter.

In spring the samples were taken from a depth which was equal to the thickness of the ice, as the salinity at the surface itself was then far too irregular, owing to the presence of water from the melting snow and ice. The observations are shown in curves in Pl. XXIII.

The curves display a distinct connection between increase in the surface salinity and the increasing thickness of the ice in the course of the winter. The following was the sequence of events.

On September 21st 1906 ice formed round about the ship and then rapidly increased in thickness. The autumn was clear with but little snow. The new ice was, as usual, very plastic and gradually became harder, the salt crystals being separated out on the upper side of the ice.

The ice increased most in thickness in the autumn and the first part of winter, and at the same time the increase in salinity was greatest (see Pl. XXIII).

From middle of February till end of May both the thickness of the ice and the salinity remained almost unchanged. The air temperature reached its minimum in the middle of February. At the end of May the air-temperature became higher than the freezing point of the sea-water (— 1.7°) and the ice must then have begun to melt. Nevertheless, the thickness of the ice increased just at this time, new layers being formed on the under side of the winter ice, as the water from the melting snow and ice became frozen where it came into contact with the sea-water, which had a temperature of about — 1.7°.

On June 28th the rivers began to break up on land and let the warm water flow out (the river water had a temperature of + 10 —+ 14° C.). The ice now rapidly decreased in thickness. On July 6th 1907 the ship was free of ice. In the fjords, however, the ice still remained and the thickness of the ice measured in the mouth of the fjord at Maroussia in the middle of July was 188 cm., at the end of July 155 cm.

On September 10th 1907 the rivers again became frozen over and on September 13th new ice formed round about the ship. This increased regularly in thickness, but less than in 1906.

The surface salinity increased in a similar manner as in 1906, comparatively most in the autumn.

The thickness of the ice reached its maximum in the middle of February and thereafter decreased evenly in contrast to what occurred in the preceding winter, when the thickness of the ice had remained unchanged for a long time. The salinity, however, continued to increase until the beginning of June, when the air temperature became positive and the water from the melting snow and ice came down from the land.

Fig. 9. Stern of the "Danmark". Tidal fissure seen below; C. B. Thostrup phot.

On June 18th 1908 the rivers broke up and on July 4th the ice had melted round about the ship.

The differences in the thickness of the ice in the two winters and in the rapidity with which it melted in the two following summers were due to the following causes.

1. Different heat conditions in the sea outside the coast.
2. Difference in the amount of warmed water from the melting snow and ice in the spring.
3. Difference in the meteorological conditions, snowfall and the like in the autumn which affected especially the structure of the ice.

The heat conditions in the deeper parts of the sea outside the coast had the following influence on the formation of the ice.

When the tidal wave passed in over the barrier at the mouth of the fjord, mixing processes were started which as a rule led to transport of heat and chlorides from the deeper to the upper layers and this heat was led by convection currents and mixing to the surface and counteracted the formation of the ice.

In this we may seek for the explanation of the striking difference between the steadily ascending course of the curve of ice thickness in 1907 and its course in 1908, when it began to lessen already in the month of February (see Pl. XXIII).

The cause cannot lie in the difference in the air temperature, as the air was on an average colder in the spring months of 1908, when the thickness of the ice was decreasing, than in the corresponding months of 1907, when it was increasing. But we can find the cause in this, that the sea in the spring of 1907 was cold and of uniform salinity almost to the bottom and no heat, therefore, was carried to the surface from the bottom-layers, (nor was there any transport of chlorides), whereas in 1908 the sea possessed a comparatively considerable amount of heat in the deeper layers, which was carried up to the upper layers.

The rapidity with which the ice melted in the summer was dependent, however, not only on this transport of heat, but also on the internal structure of the ice, which again was influenced by the prevailing, local, meteorological conditions when the ice was formed, especially by the fall of snow. There was but little snow-fall in the autumn of 1906 and the ice formed was typical sea-ice, produced by the direct freezing of the sea-water. This ice was very hard, little porous, with a veined structure, and melted but slowly.

In the autumn of 1907 there was abundant snowfall, which weighted the ice down and sea-water flowed over it, a mixed layer of snow and water was formed, freezing later to ice. The ice was stratified with veins of very salt water, of a granular structure, and was much softer and much more porous than that of the previous year and melted much more rapidly

In the spring of 1908 we observed bubbles forming in the pools on the ice, at some places even like fountains. These were air bubbles, which had been inclosed in the ice when it froze and now were set free owing to the heat and rose upwards, carrying ice particles with them. In this way the ice became spongy and brittle.

In addition, the soft ice on the under edge was steadily eaten into by the flowing water, which carried away ice particles. Lastly, the horizontal veins with high salinity, which had been formed in winter by the freezing of the snow mush, already became fluid at a temperature varying from — 2 to — 3°.

This explains, why the ice everywhere melted more rapidly in the summer of 1908 than in the summer of 1907, though the average air temperature was nearly the same in both summers.

To show the rapidity with which the stratified snow-ice melted, I may give the following measurements of the thickness of the ice taken in four holes at 100, 200, 300 m. from the ship and close to the latter.

	Hole I close to ship	Hole II 100 m. from ship	Hole III 200 m. from ship	Hole IV 300 m. from ship.
23/VI 08.....	130 cm.	136 cm.	138 cm.	115 cm.
26/VI -	118 -	130 -	123 -	83 -
1/VII -	44 -	42 -	0 -	0 -

Simultaneous measurements of the thickness of ice, thickness of snow and surface salinity in the fjords and inland lakes 1908. (Table 7 p. 396).

Remarks: In the winter of 1906—07 it was found, that the thickness of ice in the fjords was very different at stations which lay quite close together. In March 1908, therefore, a series of measurements was made of the thickness of ice at stations, which lay in a line across the fjords and sounds; at the same time measurements were made of the height of the snow above the ice and some measurements of the surface temperature and salinity.

At this time (March 1908) the ice in Danmarks Havn had reached its maximum thickness and decreased thereafter but little in thickness during the two following months. We may assume, therefore, that the ice in the fjords had likewise nearly attained its maximum thickness after the winter.

It appears from the observations that the thickness of the ice was on an average least in the eastern part (mouth) of the fjords and increased in towards the inland ice, due in part presumably to the fact, that the transport of heat from the deeper layers in the sea was greatest in the neighbourhood of the sea.

On the inland lakes the thickness of the ice was even greater than in the western part of the fjords, which is probably to be ascribed in part to the fact, that the cooling from the atmosphere in the course of the winter did not give rise to convection currents in the freshwater lakes, when their temperature became + 4° C. or less, whereas these were produced in the sea and here, in the course of the winter, constantly brought up deeper, warmer layers to the surface.

Conversely, the surface salinity was greatest in the eastern part and decreased westwards, in part probably because the transport of chlorides to the surface from the deeper layers in the sea was greatest in the eastern part, and in part owing to the downflow of melting snow and ice water from the inland ice in the west.

Table 7.

Date	Position N. L.	Position W L.	Air temp.	Thickness of snow	Thickness of ice[1]	Surf. temp. of water	Surf. salin. of water	Depth	Remarks
				cm.	cm.			m.	
17/III 08	76°44'.8	18°51'	— 32°	20	..	...	..	..	Journey from Danmarks Havn past C. Helgoland and over Store Belt. Ice wet on the surface.
—	Øresund		—	20	..	...	..	..	—
—	Lille-Belt		—	36	..	...	..	..	—
—	—		—	34	..	...	..	..	—
—	—		—	35					
—	—		—	50					
18/III -	76°43'	19°13'	— 22°	64					
—	Off C. Helgoland		—	82					
—	c. 100 m. from land		—	67					
—	Store Belt		—	64					
—	—		—	83					
—	—		—	89					
—	—		—	82					
—	—		—	98					
—	—		—	70					
—	—		—	54					
—	—		—	92					
19/III -	76°36'	19°14'	— 19°	50	175	...	..	306	The water rises 1 cm above edge of ice. In the ice a vein with salt water.
20/III -	Off Bergs Fjord		— 18°	102	—	...	..	..	The snow blown hard.
—	Store Belt		—	40	—	...	..	..	—
—	—		—	28	—	...	..	..	—
—	—		—	43	—	...	..	..	—
—	—		—	25	—	...	..	..	—
—	—		—	32	—	...	..	..	—
—	76°28'	19°20'	—	10	145	...	31.62	300	The water 1 cm below edge of ice has a turbid appearance. Ice to 113 cm consisted of whitish, frozen snow; at a depth of 113 cm a vein with salt water, then darker and harder ice.
21/III -	Store Belt		—	—	—	...	—	—	
—	—		— 30°	25	—	...	—	—	The snow blown hard.
—	—		—	39	—	...	—	—	—
—	—		—	15	—	...	—	—	—
—	—		—	35	—	...	—	—	—
—	—		—	63	—	...	—	—	—
—	—		—	93	—	...	—	—	—
—	—		—	79	—	...	—	—	—
	76°27'	19°29'		80	156		21.65	287	The water rises to 17 cm above edge of ice. On the ice a layer of water

—	—	—	83	—	...	—	—	—	
—	—	—	59	—	...	—	—	—	
—	—	—	60	—	...	—	—	—	
—	—	—	73	—	...	—	—	—	
—	—	—	84	—	...	—	—	—	
—	76°26′ | 19°44′	—	0	197	...	—	355	Water rises to 15 cm below edge of ice.	
23/III -	Store Belt	— 24°	78	—	...	—	—	Snow fairly loose.	
—	—	—	80	—	...	—	—	—	
—	76°25′ | 20°03′	—	50	145	...	31.44	121	Water rises to 3 cm above edge of ice.	
24/III -	Off Teufelkap	— 23°	47	—	...	—	—	Snow fairly loose.	
—	Store Belt	—	82	—	...	—	—	Water on ice 1 to 2 cm deep — "mush".	
—	—	—	99	—	...	—	—	29 cm water on the ice.	
—	—	—	82	—	...	—	—	Loose snow.	
—	—	—	77	—	...	—	—	—	
—	—	—	73	—	...	—	—	—	
25/III -	—	— 8°	82	—	...	—	—	—	
—	76°36′ | 19°47′	—	60	114	...	31.62	256	Water rises to 11 cm above edge of ice. Ice down to 55 cm whitish, then becoming darker and darker.	
26/III -	S. of Orienterings Isl.	— 16°	81	—	...	—	—	The snow blown hard above, nearest the ice a layer of compressed snow.	
—	Store Belt	—	85	—	...	—	—	Snow fairly loose.	
—	—	—	62	—	...	—	—	—	
—	—	—	82	—	...	—	—	— 22 cm compressed snow.	
—	—	—	60	—	...	—	—	— —	
—	76°39′ | 19°38′	—	70	157	...	—	193	Water rises to 1 cm above edge of ice. Ice to 39 cm light, grained snow-ice, then darker and veined.	
	Store Belt								
27/III -	—	— 13°	83	—	...	—	—	Snow blown hard above, nearest the ice a layer of frozen, compressed snow, 20 cm thick.	
—	—	—	58	—	...	—	—	— — — — 36 - —	
—	—	—	66	—	...	—	—	— — — — 41 - —	
—	—	—	84	—	...	—	—	— — — — 27 - —	
—	—	—	49	—	...	—	—	— — — — 37 - —	
—	—	—	65	—	...	—	—	— — — — 17 - —	
28/III -	76°44′ 19°08′	— 2°	28	87	...	—	62	Ice to 40 cm consisted of light, grained snow-ice, then a sharp boundary towards darker and veined saltwater ice.	
29/III -	Off C. Helgoland ca. 1 km from land	— 15°	30	—	...	—	—	Snow blown hard.	
—	—	—	16	—	...	—	—	Clear ice along the land.	
17/IV -	76°46′ 19°00′	—	76	—	...	—	—	Journey in towards the inland ice from Danmarks Havn past Stormkap and Snenæs.	
—	Off Stormkap	—	47	—	...	—	—	Snow hard blown down to 32 cm, then a hard crust of 2—3 cm and under this a layer of 42 cm of snow and water.	
—	- Snenæs	—	20	—	...	—	—	Snow blown hard.	
—	- Lille Snenæs	—	55	—	...	—	—	—	

[1] N. B. The measurements for the thickness of ice mean the distance from the lower edge of the ice *to the upper edge* (*not* as in Danmark-Havn to the surface of the water).

Date	Position N. L.	Position W. L.	Air temp.	Thickness of snow	Thickness for ice[1]	Surf. temp. of water	Surf. salin. of water	Depth	Remarks
				cm.	cm.			m.	
17/IV 08	Off Hvalrosodden		—	40	—	...	—	—	Snow blown hard.
—	Between Rypefjeld and Kalven		—	44	—	...	—	—	—
23/IV -	76°56′	21°00′	— 28°	36	143	...	—	24	Loose snow. Water rises to 2 cm below edge of ice. Upper 55 cm of ice whitish.
24/IV -	Mörkefjord		— 20°	35	—	...	—	—	Loose snow.
—	—		—	37	—	...	—	—	Fairly hard snow.
—	—		—	50	—	...	—	—	Hard upper layer and under this loose snow.
—	76°56′	20°52′	—	50	183	...	—	66	Water rises to 3 cm below edge of ice. Upper 50 cm of ice whitish.
26/IV -	76°57′	20°58′	—	1	160	— 1.70	—	1.5	Water rises to 10 cm below edge of ice. Upper 68 cm of ice whitish.
27/IV -	76°57′.5	21°02′	—	0—3	193	— 1.72	—	24.5	Water rises to 20 cm below edge of ice. Ice throughout white.
28/IV -	76°57′.2	21°07′	— 19°	0—3	197	— 1.72	31.4	14	— 21 - — — —
3/V -	76°57′.0	21°13′	— 10°	0—1	205	—	—	15.5	— 25 - — — —
10-11/V -	77°02′.3	20°23′	— 10°	15	212	+ 0.22	0.4	69	— 12 - — — Upper 50 cm of ice light (milkwhite), then ice very dark with lighter streaks and air-bubbles. Ice very hard.
20/V -	77°15′.2	21°00′	— 5°	0—5	250	+ 0.28	0.04	90	Water rises to 17 cm below edge of ice. Upper 75 cm of ice light, then darker.
22/V -	Anneks Sø		—	64	—	—	—	—	Loose snow.
—	—		—	45	—	—	—	—	Snow blown hard.
—	—		—	1	—	—	—	83	Water rises to 8 cm. below edge of ice. Upper 74 cm of ice light, then darker.
24/V -	77°04′.8	20°47′	— 1°	39	176	+ 0.03	0.4	117	Water rises to 2 cm above edge of ice. Water taken from the surface and used for tea, thick skum formed on surface on sugar being added.
24/V -	76°51′	19°51′	—0.5°	60	190	— 1.72	32.0	217	Water rises to 6 cm below edge of ice.
2/VI -	76°46′.5	18°47′	— 3.0	—	175	+ 0.4	—	4	— 14 - — —
6/VI -	Store Belt		—	94	—	—	—	—	Loose snow. (The snow layer does not seem to have decreased in thickness since 19/III. A quantity of new snow has fallen, which must have replaced the snow, which has evaporated).
—	—		—	75	—	—	—	—	Loose snow.
7/VI -	76°29′	19°28′	—0.2°	22	128	— 1.7	32.0	357	The water rises to 8 cm below edge of ice. Ice very soft, on cutting into it, salt-water oozing through it.
8/VI -	Store Belt		—	45	163	—	—	—	The water rises to a level with the edge of ice.
11/VI -	76°46′	19°00′	— 0.8	—	106	— 1.7	32.2	212	The water rises to 14 cm above edge of ice. Ice very soft. Below the snow a 14 cm layer of water, with a temperature of — 2.1.° Temp. of snow 0.0.
17/VI -	Øresund		+ 2°	40	75	— 1.7	—	175	Below the snow a 30 cm. layer of water, with a temperature of — 2.0.°
18/VI -	76°39′	18°37′	+ 7°	65	75	— 1.7	32.4	208	The water rises to 33 cm above edge of ice. Ice throughout porous and spongy.

[1] See Note p. 397.

The great differences in the thickness of ice, found on quite adjacent stations, show that the underside of the ice must have been very uneven.

The thickness of snow was very irregular and dependent on local conditions. As the direction of the wind, when the snow fell, was mainly N. W., the snow was heaped up as a rule on the west side of the islands. At such places the ice was pressed down by the weight of the masses of snow and sea-water flowed up over the ice through cracks and thus formed a layer of snow-mush, which might be over 1 m. in depth.

In the spring of 1908 ice on the fjords was everywhere granular snow-ice with single layers of hard sea-ice and at several places there were veins of salt-water among the ice layers (a sample from one of these had a salinity of 65.4 p. m.).

The melting of this ice proceeded more rapidly, just as in Danmarks Havn, than the ice of the previous year which had been throughout distinctly sea-ice (i. e. frozen sea-water).

On July 18th 1908 already the ice had broken up everywhere in the fjords, thus at a time when the ice in 1907 still had an average thickness of 1½ m. In 1907 the ice in Øresund broke up first on August 13th and in Dovebugt it did not break up at all.

The ice on the freshwater lakes, in contrast to the sea-ice, was extremely hard and of a different darker colour.

Observations on the thawing of the fjord-ice in Øresund in 1908. (Table 8 p. 400).

Remarks: On June 18th 1908 the winter-ice still lay quite unbroken everywhere in Øresund and the pack-ice out to sea lay immovable, frozen solidly to the outer fringe of rocks and islands. Above the fjord-ice was a layer of "mush" (mixed snow and water) with a temperature of — 2° C., whilst the snow temperature varied in the course of the day between + 0.1 and + 0.3. Thus, the snow and strongly saline mush were about to melt. On the under side of the fast ice there was a layer of water ca. 25 m. thick which was cooled down to freezing point (— 1.76°) (Series LX A).

The fjord-ice was much thinner than in the previous year at the same time (ca. ¾ m. against 1¾ m.) and of a different structure. (In 1907 the ice was hard and solid, in 1908 soft and porous).

Further, there was more snow on the ice than in 1907 and the melting of the snow seemed scarcely so far advanced as in the year previously. The temperature of the air and surface-water was nearly the same in the two years.

From the 24th to 26th June the fjord-ice decreased greatly in thickness, following on a warm wind (temperature about + 6° and

Table 8.

Date	Position N. L.	Position W. L.	Thickness of ice	Surf. temp. of water	Surf. S ‰	Air temp.	Remarks
23/VI 08	76°46′.2	18°46′	130				Channels of melting ice and snow water ½ m. deep in the ice. Upper ¾ m. of ice quite soft, then tougher ice.
26/VI -	Danmarks Havn		118				
1/VII -	—	Hole I	44				
23/VI -			136				
26/VI -	—	Hole II	130				
1/VII -			42				
23/VI -			138				
26/VI -	—	Hole III	123				
1/VII -			0				
23/VI -			115				
26/VI -	—	Hole IV	88				
1/VII -							
23/VI -			139				
26/VI -	—	Hole V	121				
1/VII -							
24/VI -	76°39′.3	18°35′	70	−1.7			Snow temperature +0.3°. The snow wet. Below the snow a crust of ice and then water on the ice.
25/VI -	76°40′.2	18°51′	58	−0.2	32.4	+3°	A hole cut at a spot which looks to be solid ice, proves this to be compressed snow. Below the snow there is water on the ice with a temperature of +0.1° and salinity of 9.6 ‰ at a depth of 50 cm.
26/VI -	76°42′.6	18°47′	44	+0.2			The thickness of ice measured in 3 natural holes and 1 hole cut in the ice.
	Øresund		32				
			36				
			40				
26/VI -	—	—	44	+0.1	32.4	+5°	Hole cut through porous and rotten ice. Bubbles of air rising up in pools of water. When the current is strong, particles of ice are carried away from the under side of the ice so that the water becomes turbid. When the current is slack, the water is clear.
26/VI -	—	—	67	−1.7	32.3	+6°	Ice porous and soft.
27-28/VI -							A quantity of melting ice and snow has run off the ice, which has risen.
28/VI -	76°39′.3	18°35′	68	0.0			Water and "mush" on the ice 24 cm.
29/VI -			59	+1.6			
30/VI -			48	+0.3			
2/VII -	—	Hole I	47	+0.3			Ice becomes more and more rotten. Many vertical channels, which gradually increase in extent.
3/VII -			44	+1.3			
4/VII -			38	+1.1			Air-bubbles rising in the thawing openings.
7/VII -			18				
28/VI -			55				Water and "mush" on the ice 10 cm. deep.
29/VI -			52				
30/VI -			51				
2/VII -	—	Hole II	51				
3/VII -			48				
4/VII -			45				
7/VII -			24				
28/VI -			60				Water and "mush" on the ice 12 cm. deep.
29/VI -			58				
30/VI -			59				
2/VII -	—	Hole III	57				
3/VII -			52				
4/VII -			49				
7/VII -			30				In a pool on the ice a spring of water observed coming up from a small hole in the ice and caused by air-bubbles rising in such large numbers and so rapidly, that the water was carried up with them and rose 5—6 cm. above the surface of the water in the pool.
18/VII -			breaking up				

+ 7°) which blew on those days. On June 23rd there were channels about ½ m. deep in the ice round the ship, which were formed by the outflowing, warm river-water. The temperature of the melting snow and ice water in the channels varied between 0.0 and + 3.0° C. In a few deeper holes — 0.3° C. was measured at the bottom. In other holes in the ice, containing dark excrement of dogs, the temperature was + 2° C. decreasing upwards to + 0.3° C. at the surface.

On June 26th the thickness of the ice had decreased somewhat and on July 8th already the ice was breaking up. Below the winter ice there were at that time several layers of newly frozen freshwater ice, which indicated the various lower boundaries for the freshwater layers when they froze to ice on coming into contact with the ice-cold sea-water. The lowermost of these layers was at a depth of ca. 165 cm.

In the uppermost layers the ice was almost rotten, so that a single blow of an iron lever broke through it; the lower layers were somewhat tougher.

Whilst the ice in the harbour was decreasing so greatly in thickness, chiefly owing to the warm river-water, it only decreased ca. 5 cm. out in the mouth of Øresund at Maroussia. It was not until the following days, 28th June—7th July, that the warmer melting water reached out there and the ice was then attacked from above by the atmosphere (after the snow and snow-layer had melted), from below by the heated melting water and in a vertical direction by the particles of air set free, which forced their way up through the porous ice. On July 18th the ice was breaking up.

There was a great contrast between the rapid thawing of the ice in July 1908 and the quite unchanged thickness of the ice in July 1907; as the air and surface-water temperatures were nearly the same in the two years, the cause of this great difference must be sought for essentially in the different structure of the ice, due to the special conditions of precipitation when the ice was being formed.

In both summers openings in the ice appeared in Øresund at the same places, namely:

(1) off the large rivers,
(2) along the east side of Koldewey Island,
(3) from Cape Bornholm towards Baadskær,
(4) in the sounds between Cape Bismarck and Renskær (see Pl. XIV).

At these places (with exception of 1) the tidal current was running strongest and, owing to mixing processes, heat was here carried up from deeper layers in the sea.

Openings appeared finally round about grounded icebergs, where the fjord-ice was broken up owing to its rise and fall with the tides.

When the openings had become sufficiently large, and the fjord-ice further was loosened along land, it broke up into large floes, which were gradually broken into smaller and smaller pieces. In a similar manner the sea-ice broke up during an offshore wind, after a high tide had loosened it from rocks and skerries.

Observations on the ice conditions in the Greenland Sea and in the fjords and sounds at ca. 76° N. L. in North-East Greenland 1906—1908.

The ice conditions in the Greenland Sea during the summers of 1906—08 have been mentioned under the description of the voyage.

In both summers the drift-ice lay in the main in three zones, namely, from east to west:

(1) the outer zone with comparatively scattered pack-ice, which was met with out over the Greenland Sea and in over the steep slope of the Continental Shelf.

(2) the central zone, with the main mass of polar pack-ice in over the Greenland Shelf from its eastern, steeply descending margin towards the west as far as an imaginary line connecting approximately Greenland N. E. Runding to Shannon Isl.,

(3) the inner zone, called the region of the coastal water, with comparatively scattered, polar pack-ice and winter fjord-ice.

This disposition seems to be typical; it is mentioned by earlier expeditions and is certainly caused by the currents.

The polar drift-ice very seldom came into the fjords inside the outermost skerries, even if there was depth and breadth enough in the mouth of the fjord, in summer because the surface water in there was fresher and had a tendency to go eastwards, and in autumn owing to the presence of the fjord-ice.

The boundary between the drift-ice and the fast fjord-ice followed approximately the connecting line between the outermost skerries off the coast and in the mouths of the fjords; the skerries thus acted as a kind of bulwark to keep the heavy drift-ice away from the coast.

In the summer of 1906 the drift-ice was over 14 km. from the coast until September 19th, when it came close in to land.

Here it lay closely packed together and frozen solid, and a tidal fissure, which was open most of the winter and which went from Maroussia to Sonja Havn in the mouth of Øresund, marked the boundary between it and the fast fjord-ice. Sometimes it broke adrift after strong offshore storms and the drift was then always southwards.

Such a drift was observed on September 29th 1906, when an open channel ran from the line between the outermost skerries and ca. 2 km. to sea and as far north and south as one could see from the place of observation, top of Maroussia (26 m. high).

On January 20th 1907 there was an opening ca. 2 km. broad at the same place. On March 11th 1907 thick fog was observed, which indicated open water ca. 20 km. east of Maroussia. On April 30th 1907 large open spaces and banks of fog were observed ca. 20 km. east of Maroussia.

Later, in May and June, when the weather became calmer, there were no openings or movements to be noticed in the pack-ice, which lay close to land. Not until July 30th 1907 were any openings observed and these lay ca. 10 km. east of Maroussia. These openings in the ice gradually approached the land, but on August 13th, when the fjord-ice broke up, the pack-ice still lay immovable in a belt of ca. 7 km. in breadth, presumably bound to the coast by some grounded and frozen-in icebergs. In the latter half of August offshore winds and rain-storms were frequent, but the pack-ice still remained immovable.

It was not until September, when the new ice had again begun to form in the harbour and fjords, that some open rifts in the drift-ice reached right in to Maroussia, but they were only of small extent. There was no open coastal water as in the previous summer. On September 21st 1907 a heavy N. W. swell drove all the drift-ice ca. 1½ km. out to sea.

The new ice then lay everywhere in the fjords. The westerly, heavy swell continuing, the pack-ice was kept away from the coast until October 5th and the new ice in the fjords was partially broken up. This process began round about the icebergs, which under pressure of the wind were forced through the still insufficiently resistant ice, and also at the places where the tidal currents, owing to the narrowing of the waters, ran with greater rapidity (e. g. in Øresund between Baadskær and C. Bornholm).

On October 24th the outer fjords again froze completely, but in the mouth of Mørkefjord, where the tidal current was specially strong, this did not occur until so late as November 28th.

During the winter of 1907—08 there was somewhat more movement in the drift-ice than in the previous winter. On November 10th 1907 large open spaces were observed ca. 7 km. east of Maroussia after a four days storm from the N. W. and on December 20th 1907 again large openings close to the coast. Thereafter no openings were observed until May 14th 1908, when there was open water ca. 4 km. east of Maroussia.

The openings then became frequent and on June 26th 1908 the drift-ice was detached from the coast, the ice-fields which were to

the east of the tidal fissure Maroussia—Sonja Havn moving quite slowly eastwards, so that the channel became broader. In this way a land-opening was formed, which grew from a breadth of some hundred meters to several kilometers and later became a coastal water similar to that found in August 1906.

In Øresund the first opening was formed where the current ran between Baadskær and C. Bornholm on June 20th, even before the rivers had begun to flow. On July 13th the harbour was open and on July 18th the ice had broken up everywhere in the sound.

The ice conditions along the coast north and south of Skibshavn were at my request observed on various sledge journeys. It was noticed, that the pack-ice lay as a rule almost as far in as the line between the outermost skerries. At the following places open spots in the pack-ice were repeatedly noticed at a time, when it lay solid elsewhere.

1. South of Ile de France.

On October 15th 1906 large openings and spaces with thin ice were observed here.

On May 1st 1907 B. Thostrup, while on a sledge journey, observed a large opening with new ice of ca. 10 cm. in thickness, which was drifting southwards.

On March 26th 1908 P. Koch, while on a sledge journey, observed a broad, open space south of Ile de France; the opening was broadest nearest to the island.

Thus, there seems to be a constant tendency here towards the formation of openings; probably the south-going current is comparatively strong and the island thus acts to dam up the ice-masses.

2. Mallemukfjæld and N. E. Runding (see: Pl. IV Medd. om Grønl. XLVI Nr. 2).

On the sledge journey northwards in the spring of 1907 Koch made the following observations (extracts from Capt. Koch's diary):

On the stretch from C. Bismarck to C. Marie Valdemar the screw-ice lay close up to the coast. Then no screw-ice was observed until Jøkelbugt was passed. In the mouth of the fjord north of Lamberts Land, Nioghalvfjerds Fjorden, there was a good deal of screw-ice. Along the coast of Hovgaards Isl. the screw-ice lay close to land.

The sea-ice north of Mallemukfjæld (80°09′ N. L.) was very much screwed, almost pulverized. Openings ran slantwise in towards land and right to the land in the direction almost S. E. to N. W.

The snow on the beach north of Mallemukfjæld (G. Holms Land) had the character of ice and bore distinct signs, that the sea had

washed up over it. The opening in the sea-ice extended almost parallel to the land, but with an inclination in to the land (direction almost N.—S.). All the openings were covered with thin ice. The sea-ice was screwed towards land, but hardly so much screwed as at 80°09′. About ½ km. from land a number of large hummocks (probably the remains of earlier pack-ice screwed up by the tides) stood on the ground and formed a kind of sheltering belt towards the land, a belt in which the ice was but little screwed and could thus be traversed with the sledge.

Ingolfs Fjord (80°25′ N. L.—80°43′). The screwed sea-ice lay almost up to the mouth of the fjord on its east side. In the northern part of the mouth of the fjord the screw-ice retreated further to the east, east of some skerries off the coast, so that there was a belt of quite even ice along the coast on the north of the fjord.

80°43′ to 80°58′ N. L. North of the skerries (off Amdrups Land) the screw-ice lay close to the land; it seemed greatly pulverized and was broken by many openings parallel to the land. Open water was observed ca. 7 km. out to sea (26.—27. April 1907).

80°58′ N. L. to 81°30′ N. L. The margin of the screw-ice lay parallel with the margin of the inland ice at a distance of ca. 2 km. from the latter. No open water could be seen.

The screw-ice now steadily followed the margin of the land-ice until the coast turned due west (at Nakkehoved). The screw-ice then retreated further out and the margin lay in a curve a little to the west of the line Greenland N. E. Runding—Cape Henry Parish. Thereafter it ran parallel with the east coast of Peary Land at a distance, which varied between ca. 15 km. in the southern part, where the coast ran out very flat, to ca. 3 km. in the northern part, where the coast had a steeper slope.

At a few places there was smooth ice along the coast, which pointed to open water here in the summer, but no openings were observed in the screw-ice.

On June 3rd 1907 it was observed at N. E. Runding, that an opening was forming immediately to the south of the easternmost point of Gerenland; it continued due south as far as the eye could see, to judge from the water-sky for many miles. In the northernmost part the opening was quite narrow, but it rapidly widened southward to 10 to 20 km. This opening was observed continuously in the following days — it went close in to land and was still so broad, that one could not see the screw-ice on its easternmost side. It penetrated some distance into the fjord north of Mallemukfjæld (Ingolf Fjord) and close in to the latter. The Mallemukfjæld was passed on June 9th 1907 on a snow-slope and from a height of 70 m. no outer boundary could be seen for the open water.

In the fjords south of Mallemukfjæld, on the other hand, there

was a good deal of screw-ice, which had not yet broken up, and also along the east side of Hovgaards Island. No open water was observed here but heavy banks of fog were noticed out over the sea, which indicated its presence.

At the end of October 1907 G. Thostrup observed, that open water again went close in to Mallemukfjæld.

It thus seems, as if there was a tendency to the formation of openings on the stretch from Greenland N. E. Runding on to Mallemukfjæld, and, in my opinion, the reason for this is, that the southgoing Polar Current is contracted or hemmed in at the passage by N. E. Runding, as there are probably currents here both from the N. W. and N. E.

South of N. E. Runding the main current takes the direction towards Shannon Isl., that is, out from the land and the main portion of the pack-ice follows with it. Then, eddies and whirlpools are probably formed in under the land, and the part of the drift-ice which comes in here is probably set in irregular movement, therefore, and becomes greatly compressed and screwed. As it is a comparatively small part of the drift-ice, however, which comes in here, there is a tendency to the formation of openings.

3. S. E. of Shannon Island and E. of Bass Rock.

In December 1906 it was observed on a sledge journey to Shannon and Pendulum Isls., that there was open water south of Sabine Isl. as also in the eastern part of Freeden Bugt on Shannon and a water-sky was noticed to the S. E. of Shannon Isl.

On a sledge-journey to Shannon Isl. and Bass Rock in January 1908 open water was observed from Bass Rock (ca. 10 m. above the sea). The opening went ca. 2 km. east of this and as far to the south-east as one could see. Dense fogs were often present over the sea towards the N. E. and S. E. Further, open water observed in the eastern part of Freeden Bugt and water-sky east of Shannon Isl.

These openings were not found only on one day, like those off Maroussia after a storm, but they were observed daily during all the time the sledges were in that district (ca. 10 days) and at the same time the pack-ice lay dense and immovable off Øresund.

Thus, there seems to be a tendency to the formation of openings S. E. of Shannon Isl. and south of Sabine Isl.; and this condition is also mentioned by the Germania Expedition, which overwintered there.

The reason for this, in my opinion, is to be sought for in the current conditions; as already mentioned the main part of the south-going Polar Current, after passing N. E. Runding, only

comes close in to the Greenland coast again at Shannon Island and as the depth of the current is reduced at the same time the rate of flow is increased, so that the ice tends to move southwards from there more rapidly than the ice arrives from the north, which means a tendency towards the formation of openings.

The difference between the conditions S. E. of Shannon Isl. and the conditions N. of this island along the coast as far as Mallemukfjæld (80°13′ N. L.) is, therefore, that on the latter stretch there is a part of the Polar Current, where the current conditions are comparatively calmer (region of the coastal water) and where the drift-ice, therefore, can freeze, whilst S. E. of Shannon Isl. even the main current reaches in to the land with a relatively sudden increase in the rate of flow, so that there is more movement in the ice here and a tendency to the formation of openings.

Observations on the currents.

A. Greenland Sea at ca. 75°—78° N. L.

1. Direct current measurements could not be made on the voyage to and from Danmarks Havn as the vessel was not at any time anchored to the bottom. During soundings, however, it was observed, that the lead-line indicated a strong current running almost due S. S. W., in the eastern part of the waters over the Continental Shelf, and a weaker current in the same direction in the western part of the same water, whilst in the coastal water near to land it indicated irregular currents from different directions, mainly however either from the north or south.

The set of the current had therefore to be calculated from the difference between the daily observed and calculated positions.

Calculation of the direction and rapidity of the current from the difference between observed and calculated positions in the Greenland Sea 1906—08. (Table 9 p. 408).

Remarks: It appears from this table that the set of the current southwards was strongest at a Longitude of ca. 11°—13° W. from Greenwich, and that there was a trend to the north at ca. 9°—10° W. close to the east of the margin of the Continental Shelf as also out in the coastal water at ca. 16½ W. L. close to the west of the western edge of the dense pack-ice.

It must be remarked, however, that the wind was southerly in the days the set was towards the north, though so faint, that, in my opinion, it can only have influenced the drift to a very slight degree.

From Aug. 5th—6th 1906 the vessel was quite surrounded by

Table 9.

Date	Calc. position Lat.	Calc. position Long.	Obser. position Lat.	Obser. position Long.	Diff. in lat.	Diff. in long.	Difference	K	Dist.	No. of hours	Dir. of current	Rapidity of current	Mean dir. of wind	Mean force of wind	Remarks
1/VIII 06	75°34′ N	8°32′ W	75°14′ N	8°40′ N	20′ s.	8′ w.	2.1w.	6°	20.0	117	S ½ W	0.2	...	..	In scattered drift-ice.
2/VIII -	75°33′ N	9°48′ W	75°36′ N	10°40′ N	3′ n.	52′ w.	13.0w.	77°	13.0	24	W t. N	0.5			
3/VIII -	75°51′ N	10°28′ W	75°56′ N	10°10′ W	5′ n.	18′ e.	4.4 e.	41°	7.0	24	NE¼N	0.3			
4/VIII -	76°08′ N	10°59′ W	7°07′ N	.....	1′ s.	..	...	..	...	48	E½S	0.2	SV½V	0.8	In dense polar pack-ice.
5/VIII -	76°01′ N	13°02′ W	.....	12°27′ W	..	35′ e.	8.5 e.	..	...						— —
6/VIII -	76°01′ N	12°27′ N	75°42′ N	12°35′ W	19′ s.	8′ w.	1.9w.	5°	19	24	S½W	0.8	SW	0.2	Ship fast in the ice.
7/VIII -	76°08′ N	13°35′ W	75°56′ N	14°05′ W	12′ s.	30′ w.	7.3w.	32°	14	24	SWbS	0.6	Calm		
8/VIII -	75°59′ N	15°09′ W	76°01′ N	14°30′ W	2′ n.	39′ e.	9.4 e.	78°	9.6	24	EbN	0.4	SSW	0.2	
9/VIII -	76°03′ N	14°30′ W	.....	14°44′ W	..	14′ w.	...	..	...	48	WbN½N	0.1	SEbS	0.7	
10/VIII -	76°07′ N	15°46′ W	76°06′ N	.....	1′ s.	..	3.4w.	..	...				Calm		
11/VIII -	76°08′ N	15°49′ W	76°02′ N	16°14′ W	6′ s.	25′ w.	6.0w.	45°	8.5	24	SV	0.4	NEbN	0.9	
12/VIII -	76°03′ N	16°51′ W	11′	17°05′ W	..	14′ w.	...	..	...	48	NbW¾W	0.2	NNE	0.5	In scattered drift-ice.
13/VIII -	76°10′ N	17°30′ W	76°20′ N	.....	10′ n.	..	3.4w.	19°	11				SbE	0.6	— —
14/VIII -	76°20′ N	18°01′ W	76°35′ N	18°36′ W	15′ n.	35′ w.	8.2w.	29°	17	24	NWbN½N	0.7	SSW	0.9	In ice-free coastal water.
							Return voyage.								
23/VII -	.....	.....	77°27′ N	16°00′ W	..	..	...	..	...	72	S	0.1	SW	0.6	In scattered drift-ice and in part open coastal water.
24/VII -	78°04′ N	14°05′ N	.....	.....	..	..	...	..	...				NNE	0.2	
25/VII -	77°46′ N	14°17′ W	77°36′ W	.....	10′ s.	..	...	..	...				S½E	0.9	
26/VII -	77°21′ N	15°26′ W	.....	.....	..	..	...	..	...	96	S¼E	0.2	S	0.1	— —
27/VII -	77°08′ N	16°06′ W	.....	.....	..	..	...	..	...				E	0.2	— —
28/VII -	76°06′ N	13°26′ W	.....	.....	..	..	...	..	...				SWbS	1.0	In denser drift-ice.
29/VII -	75°58′ N	11°12′ W	75°40′ N	11°10′ W	18′ s.	2′ e.	0.5	2°	18				SW½S	1.3	— —
30/VII -	75°26′ N	9°34′ W	.....	.....	..	..	...	..	...	48	S	0.3	SWbS	3.4	In scattered drift-ice.
31/VII -	75°14′ N	8°05′ W	74°58′ N	.....	16′ s.	..	...	..	16				E½N	0.4	— —
1/VIII -	74°08′ N	6°13′ W	.....	.....	..	..	...	..	...	48	NWbW	0.6	Calm		4 p. m. passed the outermost edge of ice.
2/VIII -	73°22′ N	4°29′ W	73°39′ N	6°00′ W	17′ n.	91′ w.	25.1	56°	30				WSW	1.1	
3/VIII -	72°48′ N	6°12′ W	73°04′ N	6°00′ N	16′ n.	12′ e.	3.5	12°	17	24	NbE	0.7	SEbS	1.7	In ice-free water.
4/VIII -	72°16′ N	6°42′ W	.....	.....	..	..	...	..	...	72	SSE	0.1	SE	1.2	
5/VIII -	71°45′ N	5°32′ W	.....	.....	..	..	...	..	...				SW½W	0.8	
6/VIII -	70°59′ N	2°12′ W	70°50′ N	2°20′ W	9′ s.	8′ w.	2.6	16°	9				SWbW	4.3	9 p. m. Surface salinity = 35.05 p. m.
7/VIII -	69°45′ N	0°42′ W	69°39′ N	0°50′ W	6′ s.	8′ w.	29	26°	7	24	SSW	0.3	WSW	2.3	
8/VIII -	68°34′ N	0°21′ E	68°34′ N	0°44′ E	0	23′ e.	8.6	..	8.6	24	E	0.4	SW	2.0	
9/VIII -	68°10′ N	1°32′ E	68°07′ N	1°44′ E	3′ s.	12′ e.	4.5	56°	54	24	SEbE	0.2	SW	0.8	
10/VIII -	67°27′ N	3°45′ E	.....	.....	..	..	...	..	...	48	N½W	0.1	SWbW	2.8	Surface salinity = 35.05 p. m.
11/VIII -	66°25′ N	2°30′ E	66°38′ N	2°27′ E	13′ n.	3′ w.	1.2	5°	3						
12/VIII -	64°56′ N	2°47′ E	65°04′ N	2°45′ E	8′ n.	2′ w.	0.8	6°	8	24	N½W	0.3	NWbN	1.5	
13/VIII -	62°31′ N	2°41′ E	62°43′ N	2°37′ E	12′ n.	4′ w.	1.9	9°	12	24	N¾W	0.5	NE	4.6	
14/VIII -	61°26′ N	3°40′ E	61°27′ N	3°18′ E	1′ n.	22′ w.	10.7	85°	10.8	24	W½N	0.4	N	0.5	

drift-ice at ca. 12½ W. L. and drifted at that time due S. ½ W. at an average speed of 0.8 miles per hour, though the wind was S. W. and thus opposed the drift southwards. From 10—11 Aug. 1906 the vessel was again quite enclosed in the drift-ice at 15°—16° W. L. and drifted mainly S. W. at a somewhat less speed, namely on an average 0.4 miles per hour. The wind was N. N. E. and thus rather tended to aid the drift southwards.

Judging from the Table the directions of the current are very irregular, but this irregularity is certainly in some part due to inexactness in the reckoning during the days when the vessel was manoeuvred forward in winding channels among the fields of drift-ice. In consequence we can hardly conclude from these calculated directions of the currents other than that the current at ca. 75°—77° N. L. seems to set most strongly southwards at 10½°—16° W. L. and to be weaker and more irregular to the east and west of this. The effects of the tidal current were noticeable in the coastal water, the flood setting towards north, the ebb to the south. Even in the drift-ice further from land the influence of the tidal wave could be detected, changes often occurring in the mutual positions of the ice-floes about the changing of the tides.

The south-going current of water over the Continental Shelf was probably stronger in winter than in summer; it is difficult to find any other explanation of some of the changes in the mouth of Øresund in the course of the winter 1906—07 and 1907—08.

In latitudes more southerly than those investigated by the "Danmark", it seems as if the strong south-going current reached closer in towards land; at 75° N. L. off Shannon Island there was a strong movement in the drift-ice and large openings in it, whereas the ice lay fast and immovable at ca. 76°—77° N. L. off Koldewey Isl. The reason for this must presumably be sought for in the fact, that the current mainly follows the Continental Shelf and that its eastern edge comes nearest the coast off Shannon Island (see Pl. XII); the cross-section of the current is thus reduced and it is then probable, that the rapidity of flow is at the same time increased.

It is quite natural, indeed, that there should be a close connection between the ice and current conditions and that conclusions may be drawn with regard to the one from our knowledge of the other. Thus, it can be seen from the chart of the ice boundary in the earlier mentioned work, Duc d'Orléans, Croisiére océanographique, that the eastern ice-boundary runs nearly parallel with the coast-line later discovered by the Danmark Expedition (and thus that, even before the departure of the Danmark Expedition, from knowing the position of this ice-boundary, one might have suspected, that the coast line in N. E. Greenland north of 75° N. L. would have a direction east of north).

Table 10.

No.	Bottles thrown out			Bottles recovered			Duration days	Calc. distance approx. miles	Miles per day approx. at least	Remarks
	Date	N. L.	W. L.	Date	N. L.	W. L.				
					Vestfinmarken					
101	14/VII 06	62°53′	9°05′	4/III 07	71°06′	24°40′ E	233	c. 1100	4.3	
					Lofoten					
102	15/VII -	63°43′	9°33′	7/II -	68°18′	13°43′ E	207	800	3.9	
					Iceland					
103	16/VII -	64°12′	9°53′	14/IX -	64°15′	14°55′ W	60	130	2.2	Bottle found on land.
					Iceland					
104	17/VII -	64°52′	11°29′	25/IX -	63°50′	22°25′ W	70	320	4.6	
					Iceland					
106	24/VII -	66°02′	11°56′	17/X -	66°24′	15°39′ W	85	850	10.0	Hydrographic series II.
					Iceland					
108	26/VII -	68°03′	10°10′	27/V 07	66°15′	22°00′ W	305	850	2.8	
					Kvænangen, Norway					
115	28/VII -	71°28′	5°08′	26/VI -	70°12′	21°04′ E	332	1400	4.2	
					Iceland					
127	30/VII -	74°18′	2°46′	3/V 08	64°17′	14°52′ W	643	650	1.0?	
					Soroen, Norway					
129	—	74°45′	3°23′	19/IV 07	70°51′	23°20′ E	263	1700	6.5	The vessel was in the eastern edge of drift-ice belt, when bottle thrown out.
					Iceland					
130	—	—	—	28/VIII 10	65°26′	13°36′ W	1490	600	—	The vessel was in the eastern edge of drift-ice belt, when bottle thrown out.
					Oksefjord, Norway					
135	31/VII -	75°16′	6°38′	30/VI 07	71°02′	27°20′ E	334	800	5.4	In drift-ice when bottle thrown out.
					Shetland					— — —
141	1/VIII -	75°25′	9°31′	19/IX 09	60°20′	1°45′ W	1145	?	?	
					Hebrides					
177	25/VII -	77°42′	14°30′	28/II 11	57°05′	7°17′ W	948	?	?	In coastal water at western edge of drift-ice belt when bottle thrown out.
					Godthaab					
188	27/VII -	77°12′	16°00′	18/VIII 09	64°11′	51°45′ W	343	?	?	
					Kristiansund, Norway					
208	30/VII -	75°21′	9°08′	2/X 09	63°10′	7°52, E	429	200	2.8	In eastern part of drift-ice belt when bottle thrown out.
					Soroen, Norway					
212	31/VII -	75°04′	8°20′	18/IX -	70°50′	22°30′ E	414	1700	4.1	— — — — ,
					Iceland					bottle drifting in sea when found.
218	1/VIII -	74°08′	6°13′	21/V -	65°55′	14°34′ W	293	500	1.7	In ice-free water, when bottle thrown out.
					Frøgerne, Norway					
221	2/VIII -	73°42′	6°05′	4/XI -	64°09′	9°20′ E	459	1100	2.4	Bottle driven on shore when found.
					Lofoten					

As a rule the drift-ice off the coast lay fast and immovable, but places where the current was strong with openings in the ice throughout the winter were found — in addition to at Shannon Isl. — south of Orleans Island, off Mallemukfjæld at ca. 80° N. L. and probably on the whole stretch from Mallemukfjæld to N. E. Runding.

At the places last-mentioned I did not make any observations myself, but I think that the formation of openings was here influenced by strong, irregular currents (eddies and tidal currents) in the neighbourhood of the land, as the water here is very probably in the lea of the main current, which is imagined to move in the direction from N. E. Runding towards Shannon Island. This may perhaps seem a remarkable conclusion, since the water-masses owing to the deflective power of the earth's rotation have a tendency to move westwards, but we know, on the one hand, that the currents are irregular in the waters at the latitude where we entered (ca. 76° N. L.) and, on the other hand, similar conditions are known off the Norwegian coast, where the main current runs northwards at a distance from land of 30—60 miles, whilst in under land the currents are irregular and eddies are formed here and there (see Norway Pilot p. 16).

2. Indirect information regarding the current conditions in the Norwegian and Greenland Seas was obtained by throwing bottles overboard from the "Danmark", both on the outward and homeward voyage. Altogether 59 bottles were thrown out and of these 22 have been recovered (see Tabel 10 and P. XI).

The drift-bottles were thrown overboard daily to the north of 62° N. L. both going and returning.

Drift-bottles from the Danmark Expedition 1906—08. (Table 10).

Remarks: The bottles 101, 102, 103, 104, 106 and 108 were thrown out in the waters south-east and east of Iceland in the East-Icelandic Polar Current and were carried by this to Iceland or further north towards the Færoes and Shetland Isles and northwards along the Norwegian coast.

Bottle 106, which was recovered in Thistil Fjord, has certainly drifted round the whole of Iceland, following the same route as the bottles 103, 104 and 108, which were recovered respectively on the S. E., S. and N. W. coast of Iceland, and must therefore have drifted with an average rapidity of at least 10 miles per day.

The bottles 115 and 127 were thrown overboard with an interval of two days in ice-free water in the central part of the Norwegian Sea, and as No. 127 was recovered on the S. E. coast of Iceland, we may conclude, that No. 115 has drifted the same way, but has been carried by the East Icelandic Current past Iceland and further north round the Færoes and the Shetlands towards the Norwegian coast.

230	4/VIII	-	72°22′	6°36′	3/VI	09	71°08′	27°40′ E	303	1600	6.3	Bottle found on land.
236	6/VIII	-	70°50′	2°20′	30/IX	-	Seiland, Norway 70°26′	22°50′ E	420	1400	3.3	
237	7/VIII	-	69°39′	0°50′	3/VIII	-	Vardö 70°25′	31°05′ E	361	1500	4.2	

As No. 127 was found more than a year later than No. 115, which was carried a much further distance, we may conclude that it has lain some time unobserved on or near the beach.

The bottles 129, 130 and 135 were thrown out on 3 successive days at places with some scattered drift-ice east of the main body of the south-going, ice-carrying Polar Current. Two of the bottles were recovered on the north coast of Norway and one on Iceland and the drift must therefore be considered to have been, first southward with the eastern part of the Polar Current and then with the East-Icelandic Polar Current along the same route as those mentioned earlier.

The bottle 141 was thrown overboard in the eastern edge of the dense drift-ice belt, which accompanied the main body of the Polar Current. It was recovered ca. 3 years later on one of the Shetland Islands.

No. 177 was thrown out in the western edge of the dense drift-ice belt and was recovered ca. 2½ years later on one of the Hebrides.

Whilst these two bottles, which were both thrown out in the main body of the south-going Polar Current off the Greenland coast, have thus both ended their drift to the east of Iceland, one bottle No. 188, which was also thrown out in the western edge of the dense drift-ice, though perhaps a little more to the west than No. 177, has been carried with the Polar Current round Cape Farewell and thereafter northwards along the west coast of Greenland to Godthaab, where it was found floating among the drift-ice about 1 year after it had been thrown out by the Danmark.

If we assume, that the bottles 141 and 177 have drifted east round Iceland and thereafter southwards under the influence of northerly winds, it may be considered, that it is only the westernmost part of the south-going Polar Current, which continues round Cape Farewell, whilst the main body forms the East-Icelandic Polar Current and thus a closed circuit in the Norwegian Sea itself.

But the possibility is not excluded, that the bottles 141 and 177 have drifted first along the same route as No. 188 and thereafter further in the large circuit in the Atlantic, in the end coming up from the south with the Gulf Stream to the west of Ireland and Scotland. Two facts point in this direction, namely, that these two bottles were the only ones which were recovered south of the Færoes and also the long time (2½ to 3 years) both have been drifting. As the bottles might possibly have lain some time on the beach before they were found, the finders of the bottles were asked regarding this possibility and the following answers were received.

No. 141. "Papa Stour. Shetland. 27th Dec. 1911. Sir. In reply to your letter just to hand regarding the paper I found in 1909, I beg to state that I found it ashore, and as the beach on which it

had landed is a place where children often go to play, I have every belief it had been landed with the "Flood Tide", the day on which I picked it up. (Sign.) C. HENDERSON. D. J. R.".

No. 177. "Eriskay. So. Uist. Hebrides. Jan. 9th 1912. Dear Sir. In reply to your letter I have to say that the bottle found by me here, and forwarded to you, must have reached Eriskay that same day! It landed just under my house, and could not have been there very long without being observed; I would say that it could not have landed before the day on which it was discovered by me. — It landed on a sandy beach, about high tide and I am confident that that was the first place it touched (here at least) since being cast into the sea. With apologies for delay in replying. (Sign.) RODERICK MC. INNIS".

These letters show, that it must be taken as extremely probable, that the bottles were found almost on the same day that they drifted on land and, consequently, that they must have been drifting about 2½ to 3 years.

Bottles 208, 212 were thrown out on the return voyage, only some days later than 177 and 188, but in the eastern part of the Polar Current and both were found on the Norwegian coast at respectively Kristianssund and Hammerfest. These bottles have certainly drifted along the ordinary route, southwards with the Polar Current and thereafter eastwards round Iceland with the East-Icelandic Current.

The bottles 218, 221, 226, 230, 236 and 237 were thrown overboard in ice-free water in the Norwegian Sea on the voyage from N. E. Greenland to Bergen. No. 218 was recovered on Iceland after a drift of 293 days, the others after a longer drift along the Norwegian coast from Trondhjem to Hammerfest.

This drift of the bottles seems to show, that the current in this part of the Norwegian Sea forms a similar circuit as near to the Greenland coast, that is, first to the south, thereafter east past Iceland, north round the Færoes and further along the Norwegian coast.

B. Current measurements in the waters in the neighbourhood of Danmarks Havn. (Table 11 p. 414).

Remarks: Simultaneously with the salinity and temperature observations a number of current measurements were made in the fjords and sounds in the neighbourhood of Danmarks Havn and all showed, that the currents west of the line between the outermost skerries were exclusively caused by the tides.

The measurements were carried out by means of an ordinary bag of canvas, which was made to sink quite slowly by weights, so that it reached down below the edge of the ice. (The net sank ca. 1—2 m. per minute). Inside the bag a thin line of hemp was attached and for 1 minute after the bag had passed the lower edge of the ice the

Table 11.

Date	Time	Position	Current: Direction true	Current: Speed cm. p. sec.	Highwater Maroussia	Remarks
8/VI 08	10.18 a. m.	Store Belt	North	..	...	The measurements were made through a hole in the ice.
—	11.10 —	76°28′ N 19°28′ W	NE	14	...	8/VI. ☾ Moon culm. mean time 7.02 a. m.; tidal period*) for Maroussia c. 10 h. 6 m. Highwater Maroussia 5.08 p. m. mean time 5.09 p. m. true time.
—	12.05 p. m.	hydrogr. series	NNE	16		
—	1.05 —	LVIII	NNE	13		
—	2.05 —	....	NNE	11	...	Current-bag sinks ca. 3 m. in 1 minute.
—	3.00 —	....	slack water		...	— — ca. 4 - —
—	4.10 —	....	—		c. 5.09 p. m.	
—	5.30 —	....	SW	10		
—	6.30 —	....	SW	9		
—	7.45 —	....	....	....	...	Current not felt in uppermost few meters.
12/VI 08	11.50 a. m.	Stormbugt	WSW	9	...	Current-bag sinks ca. ½ m. per minute.
—	1.20 p. m.	76°46′ N 19°00′ W	SW	9	c. 2.00 p. m. loww. at Mar.	— — - —
—	2.10 —	hydr. series LIX	SE	10	...	12/VI. ☾ Moon culm. m. t. 10.06 a. m. Tidal period for Maroussia ca. 10 h. 6 m. Highwater Maroussia 8.12 p. m. mean time, 8.12 p. m. true time. Lowwater 2.00 p. m.
—	3.10 —	....	E	8		
—	4.25 —	....	ENE	9		
—	5.10 —	....	NE	12		
—	6.40 —	....	NNW	11		
—	7.55 —	....	W	16	8.12 p. m.	
—	8.35 —	....	WSW	10		
18/VI 08	5.10 a. m.	Øresund	SSE	30	...	Current-bag sinks 1 m. per minute.
—	11.45 —	76°39′ N 18°37′ W	NNW	35	...	— — 3 m. per minute.
—	1.00 p. m.	hydr. series LX	—	33	1.38 p. m.	The water rises and falls in the hole.
—	2.05 —	....	—	23		
—	3.05 —	....	NW	10	...	18/VI. ☾ Moon culm. 3.33 a. m. Tidal period Maroussia 10 h. 6 m. Highwater Maroussia 1.39 p. m. mean time, 1.38 p. m. true time
—	4.10 —	....	SW	13		
—	4.45 —	....	SSE	21		
—	6.15 —	....	SSE	20		
—	7.15 —	....	SSE	21		
19/VI 08	7.30 p. m.	....	SSE	17	...	Current-bag sinks 1 m. per minute.
—	9.15 —	....	—	23	c. 8.47 p. m.	9.45 current changes in 200 m. (observed from plankton-net).
—	10.35 —	....	—	18	lowwater	
—	11.10 —	....	E	9	at Mar.	Current-bag sinks 4 m. per minute. Current about to change.
—	11.35 —	....	W	10	...	19/VI. ☾ Moon culm. 4.30 a. m. Tidal period Maroussia ca. 10 h. 6 m. Highwater Maroussia 2.36 p. m. mean time, 2.35 p. m. true time. Lowwater 8.48 p. m. mean time, 8.47 p. m. true time.
20/VI 08	12.15 a. m.	....	WNW	12		
—	1.15 —	....	NbE	12		
—	2.15 —	....	ENE	11	3.00 a. m.	Current irregular at the surface. Running in in the deeper layers (ob-

—	10.09 —	76°40′.2 N 18°51′ W	WSW	8	. . .	— — 3 - —
—	11.06 —	hydr. series LXI	WNW	10	. . .	☾ Moon culm. 9.25 a. m. Tidal period Maroussia 10 h. 6 m.
—	12.16 p. m.	. . . .	slack water		1.17 p. m.	Highwater Maroussia 7.31 p. m. mean, 7.29 p. m. true time.
—	1.14 —	. . . .	E		lowwater	Lowwater — 1.19 - — 1.17 - —
—	2.16 —	. . . .	NW	9	at Mar.	
26/vi 08	10.19 a. m.	Øresund	SE	15	. . .	Current-bag sinks 2 m. per minute.
—	11.02 —	76°42′.6 N. 18°47′ W	SE	25	. . .	— — 3 - —
—	12.10 —	hydr. series LXII	SSE	23	. . .	— — 4 - —
6/vi 08	2.40 p. m.	76°44′.1 N 18°48′ W	E	11	c. 2.05 p. m.	Current-bag sinks 4 m. per minute.
—	3.50 —	hydr. series LXIII	SSW	9	lowwater	26/vi. ☾ Moon culm. 10.14 a. m. Tidal period Maroussia 10 h. 6 m.
—	4.55 —	. . . .	NNE	8	at Mar.	Highwater Maroussia 8.20 p. m. mean, 8.17 p. m. true time.
—	5.48 —	. . . .	N	8		Lowwater — 2.08 — — 2.05 — —

Phases of the moon:

June 6.	☽ First quarter.	June 20.	☾ Last quarter.
— 4.	○ Full moon.	— 28.	● New moon.

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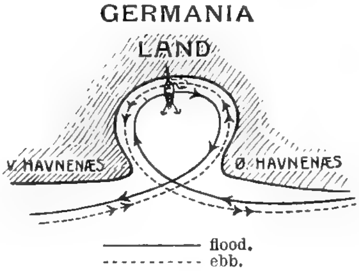
*) Tidal period (nearly the same as establishment of port) means difference in time between the meridian passage of the moon and next highwater at the place in the period mentioned. The average tidal period at Maroussia in the days 30/vi-6/vii 08 was 10 h. 6 m. (see Table 13) and the same period is used here.

line was allowed to run out freely; the amount of line run out in one minute thus indicated the rate of flow of the current in the layer from 0—2 meters in depth. At the same time the direction of the bag was ascertained by bearings.

The measurements show, that the flood-tide in the mouth of Øresund and Store Belt ran in a northerly direction, whilst the ebb flowed in the opposite direction and the stream changed at the surface very nearly at the same time as the period of highest and lowest water. Further out in Øresund and Lille Belt the tidal streams met through the 3 entrances and the currents here were irregular. In Stormbugt in the course of a change of tide the current gradually turned round the compass.

In Danmarks Havn the tidal current flowed as shown in the following diagram:



In summer, after the rivers had been running for some time, it was observed, that the ebb was stronger than the flood at the surface and continued until somewhat after lowwater, due to fresh water flowing out at the surface.

In the deeper layers no direct current measurements were undertaken owing to there being no available instruments of the kind onboard, nor could these be constructed with the comparatively primitive means at disposal; but some idea, approximately correct, of the currents there could be obtained from the observations on the mode of swinging of the water-bottle and plankton-net, when

Simultaneous observations on the tides, temperature and salinity at a depth of 100 m. and on the current at different depths in Øresund July 1908. (Table 12).

Date	Time	Depth	Temp.	Salin.	Current in 200 m.		Current in 100 m.		Current at surface		Tide	Remarks
					direction	strength	direction	strength	direction	strength		
29/VI 08	12.49 p. m.	100 m	—1.33	33.84	...	...	out	weak	in	weak	falling	Strength of current weak 0—12 cm. per sec. moderate 12—24 - — strong 24—36 - —
Series	2.01 —	— —	—1.39	73	out	weak	...	.....	out			
LXIV	3.30 —	— —	—1.52	35	...	strong	...	increasing	...	moder.		
A	5.00 —	— —	—1.53	35	...	...	...	weak	...	weak	...	Lowwater obs. at Maroussia 5.40 p. m.
—	6.34 —	— —	—1.57	26	none		none		in	weak	rising	Current changing at the surface 6.00 —
—	7.40 —	— —	—1.56	21	...	...	...	.....	...	moder.	...	— — 100 m. 6.30 —
—	9.10 —	— —	—1.50	42	...	...	...	.....	...	strong	...	— — - 200 - 5.40 —
30/VI 08	5.30 —	— —	—1.55	33.26	...	...	out	strong	out	weak	falling	
LXIV	6.00 —	— —	—1.58	...	out	weak	...	decreasing	...	...	...	Lowwater obs. at Maroussia 6.30 —
B	7.00 —	— —	—1.58	31	in	...	...	weak	...	...	rising	Current changing at the surface 7.45 —
—	8.00 —	— —	—1.59	30	...	...	none		in	...	...	— — - 100 m. 7.40 —
—	9.00 —	— —	—1.53	40	...	...	in	weak	...	moder.	...	— — - 200 - 6.00 —
—	10.00 —	— —	—1.52	39	...	...	...	moder.	...	weak	...	Highwater obs. at Maroussia 12.10 a. m.
—	11.02 p. m.	— —	—1.42	62	none		...	moder.	...	strong	...	Current changing at the surface 12.00 m. n.
—	12.00 mn.	— —	—1.46	53	out	weak	none		none		...	— — - 100 m. 11.30 p. m.
1/VII 08	1.10 a. m.	— —	—1.50	49	...	...	out	weak	out	strong	falling	— — - 200 - 11.00 —
1/VII 08	11.40 p. m.	— —	—1.49	33.44	...	...	in	moder.	out	weak	rising	
2/VII -	12.23 a. m.	— —	—1.49	57	out	weak	...	weak	...	moder.	still	Highwater obs. at Maroussia 12.20 a. m.
LXIV	1.25 —	— —	—1.57	44	...	...	out	.....	...	strong	falling	Current changing at the surface 11.40 p. m.
C	2.05 —	— —	—1.53	37	...	...	...	.....	...	...	...	— — - 100 m. 1.08 a. m.
—	2.35 —	— —	—1.57	31	...	...	...	strong	...	...	...	— — - 200 - 12.35 —
—	3.00 —	— —	—1.58	19	...	...	...	.....	...	...	...	
—	4.00 —	— —	—1.61	12	...	...	...	.....	...	...	...	Lowwater obs. at Maroussia 6.40 a. m.
—	5.00 —	— —	—1.64	32.90	...	...	...	.....	...	...	...	Current changing at the surface 7.50 —
—	6.00 —	— —	—1.65	84	in	weak	...	moder.	...	...	...	— — - 100 m. ca. 6.40 —
—	7.35 —	— —	—1.61	33.10	...	...	in	weak	...	weak	rising	— — - 200 - - 6.40 —
3/VII 08	6.30 a. m.	— —	—1.66	32.92	...	...	out	strong	out	strong	falling	Lowwater obs. at Maroussia 7.15 a. m.
LXIV	8.10 —	— —	—1.62	33.17	in	strong	in	weak	...	weak	rising	Current changing at the surface 8.20 —
D	9.10 —	— —	—1.64	12	...	...	...	.....	in	...	...	— — - 100 m. 7.40 —
—	11.00 a. m.	— —	—1.62	33	...	moder.	...	strong	...	moder.	...	— — - 200 - 7.15 —
—	12.10 p. m.	— —	—1.58	37	...	strong	...	.....	...	strong	...	Highwater obs. at Maroussia 1.40 p. m.
.	3.00 —	— —	1.34	87	none		...	.....	...	weak	falling	Current changing at the surface 3.50 —
—	4.15 —	— —	—1.44	62	...	...	out	weak	none		...	— — - 100 m. 3.15 —
												— — - 200 - 3.45 —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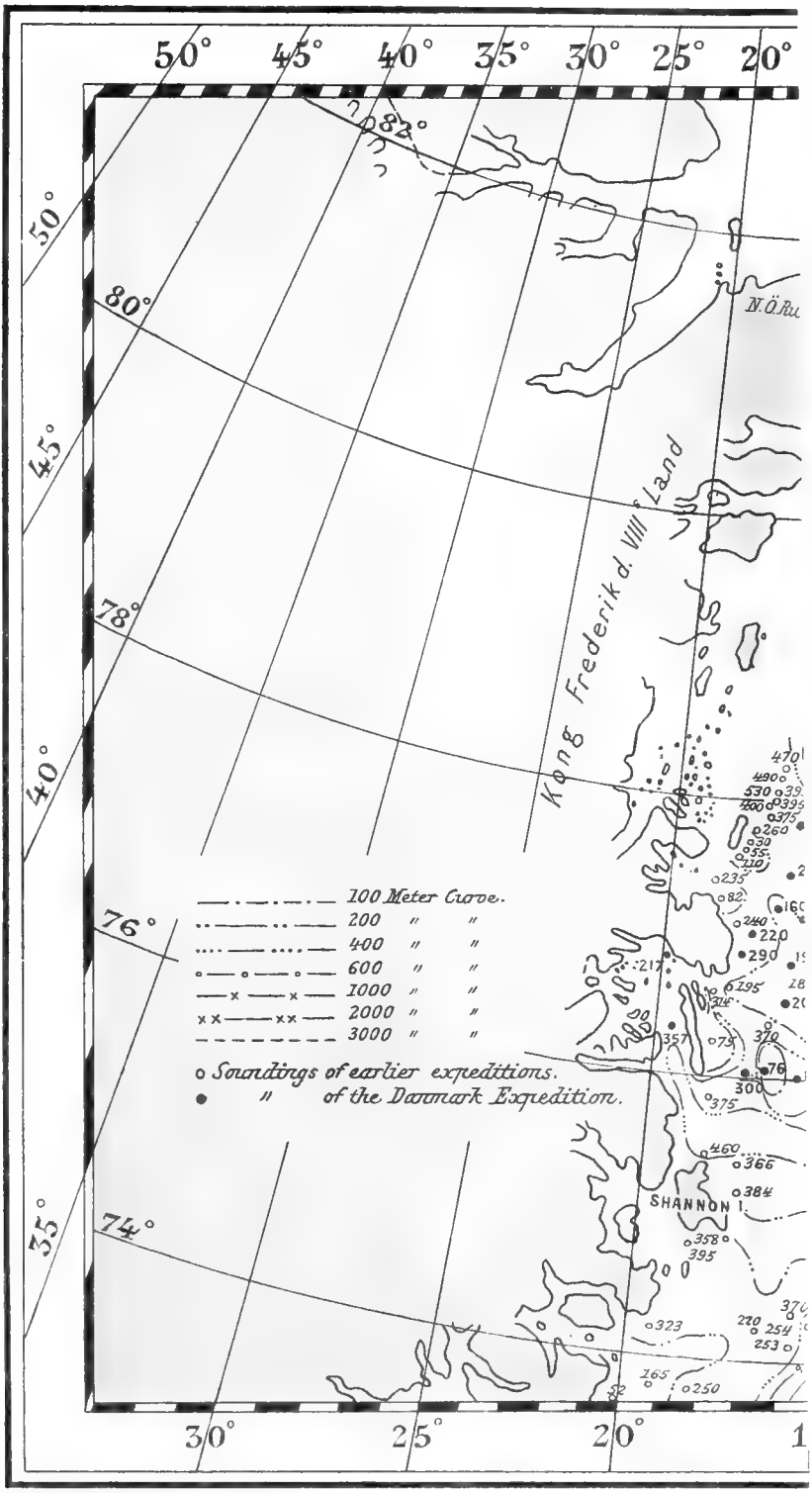
—	4.10	—	—	—	1.44	62	...	...	out	weak	none	...	—	—	- 100 m.	3.15 —
													—	—	- 200 -	3.45 —

Bathymetric Chart of the Greenlar

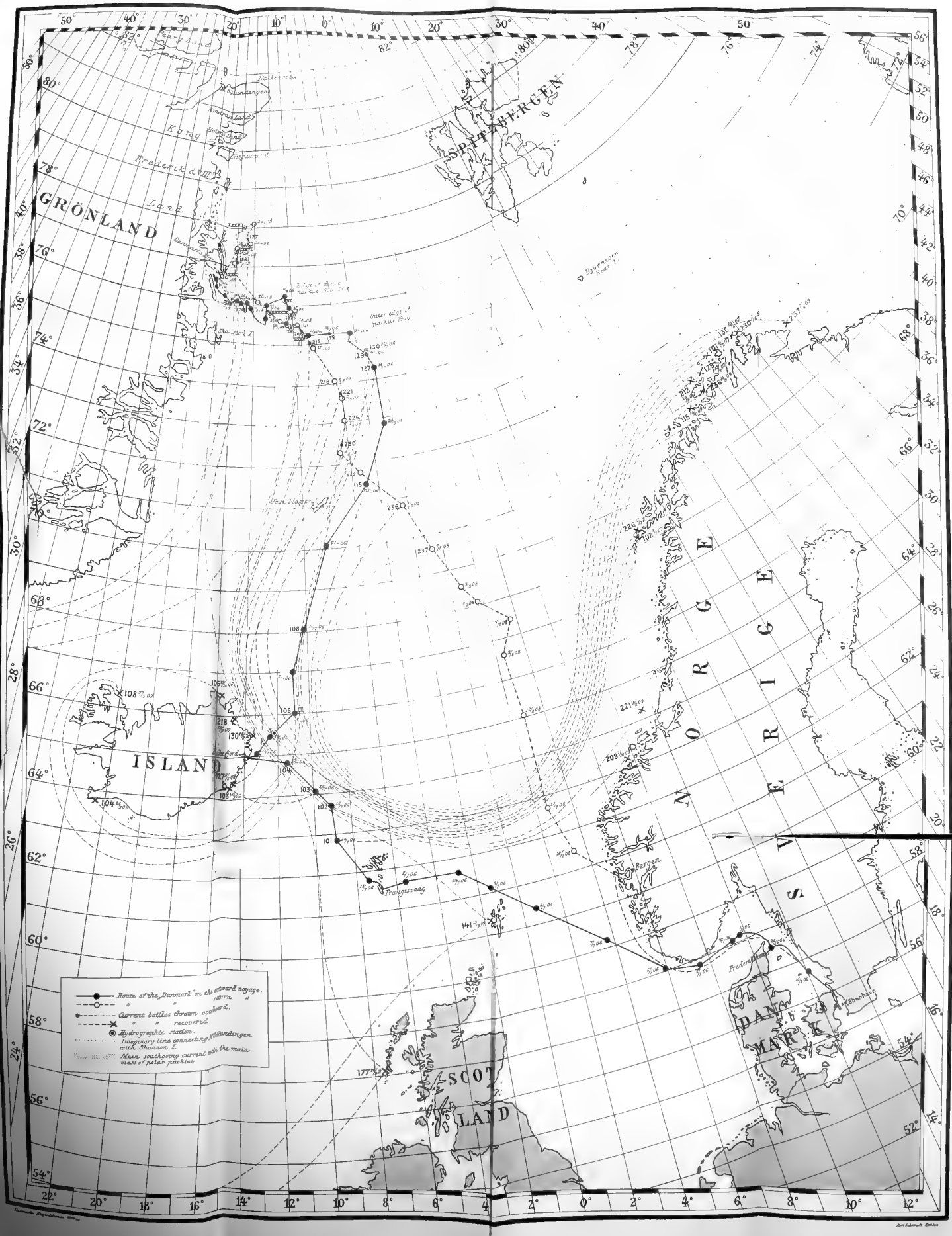
partly from F. Nansen and B. Helland Hanse
with a few additions by Alf Trolle from soundings made o
in 190



Danmark-Ekspeditionen 1906-08

Chart showing the route of the „Danmark" 1906-08,

the current-bottles thrown overboard from the „Danmark" and their supposed drift and some of the hydrographic stations.



Bathymetric Chart of the Greenland Sea between 74° and 82° N. L.,

partly from F. Nansen and B. Helland Hansen's bathymetric Chart of the Norwegian Sea,
with a few additions by Alf Trolle from soundings made on the Danmark Expedition to the N. E. coast of Greenland
in 1906—08.

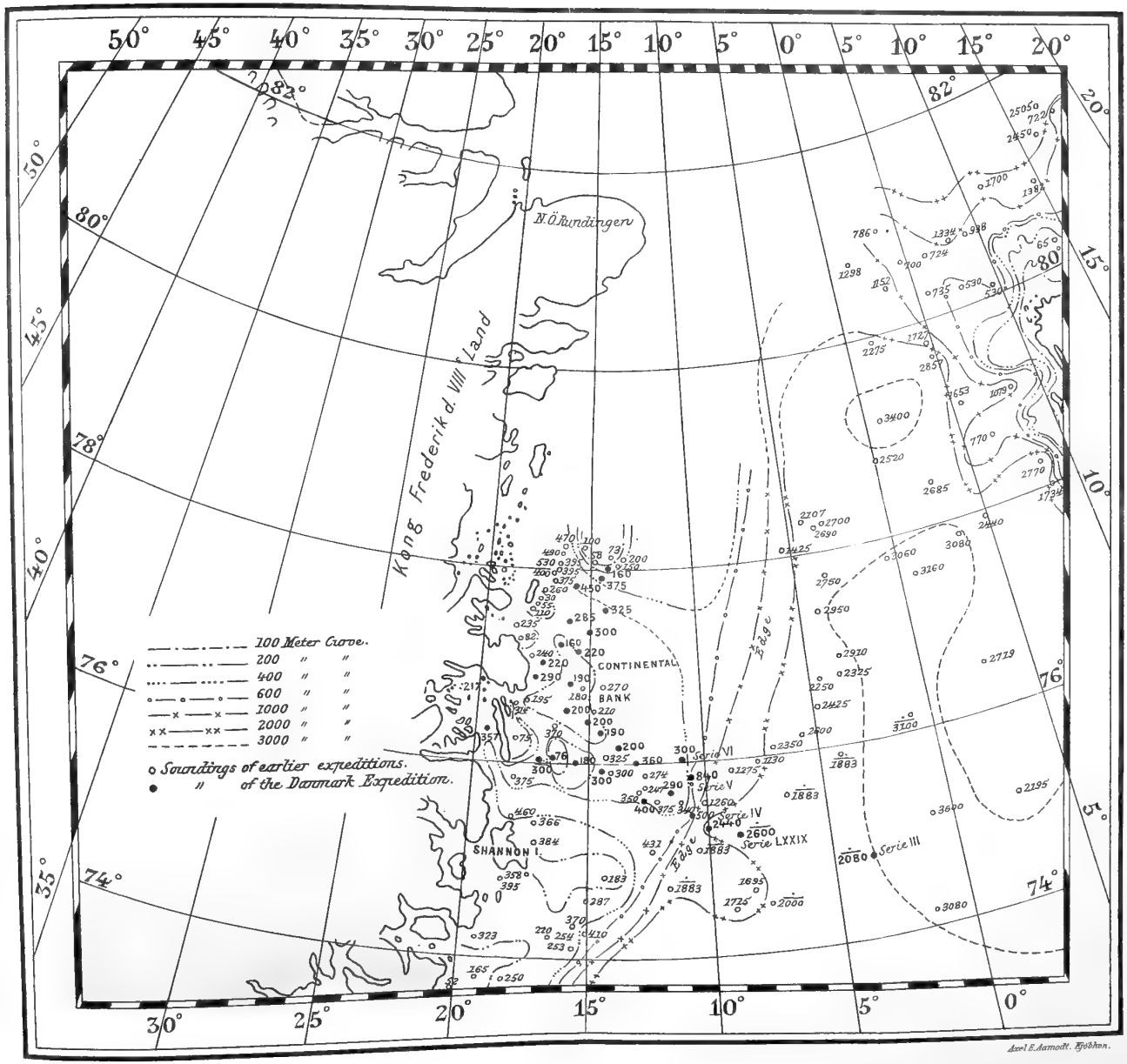
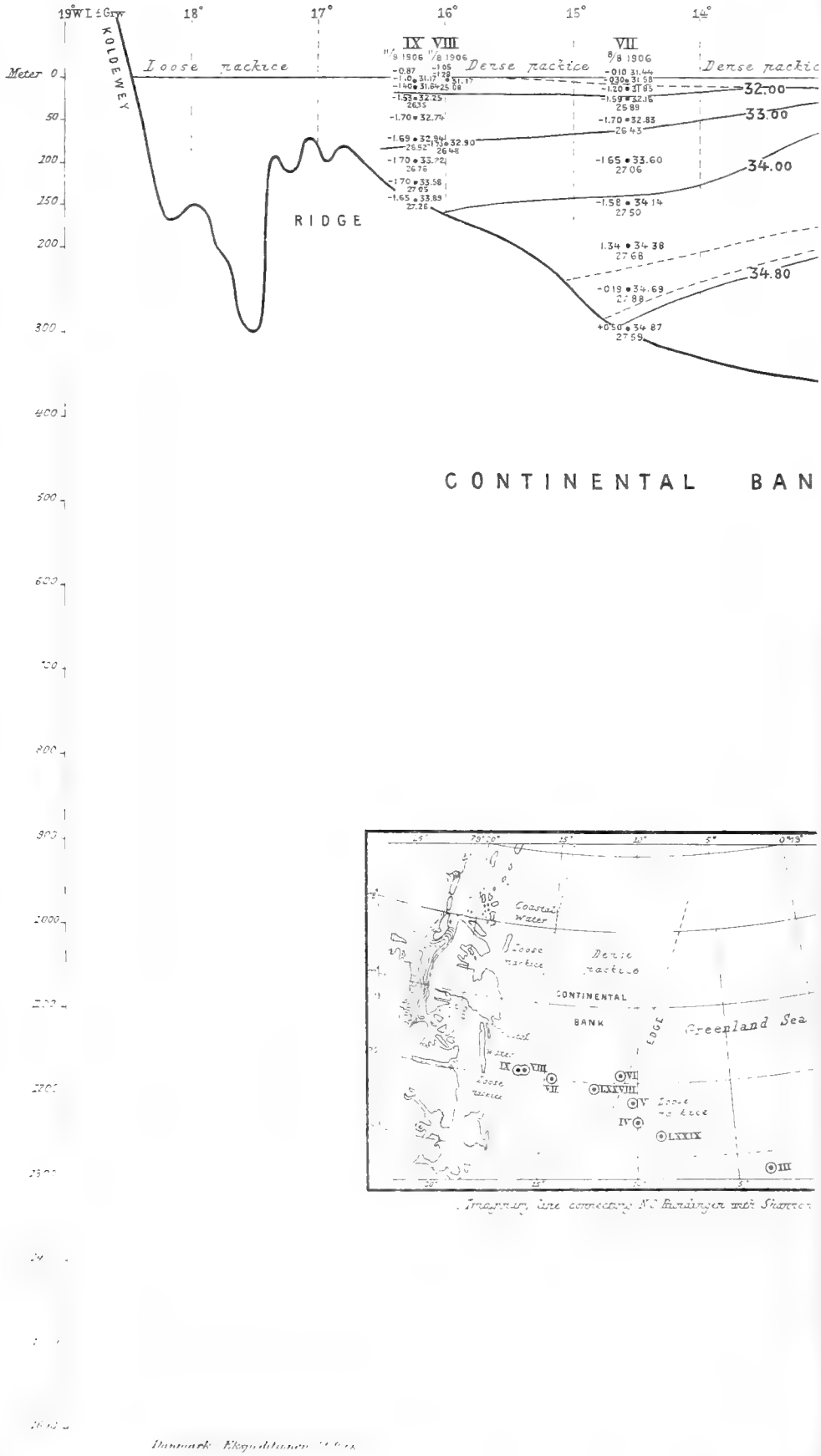


Chart of the Greenland Sea between 76°—78° N. L. and 13°—22° W. L.,

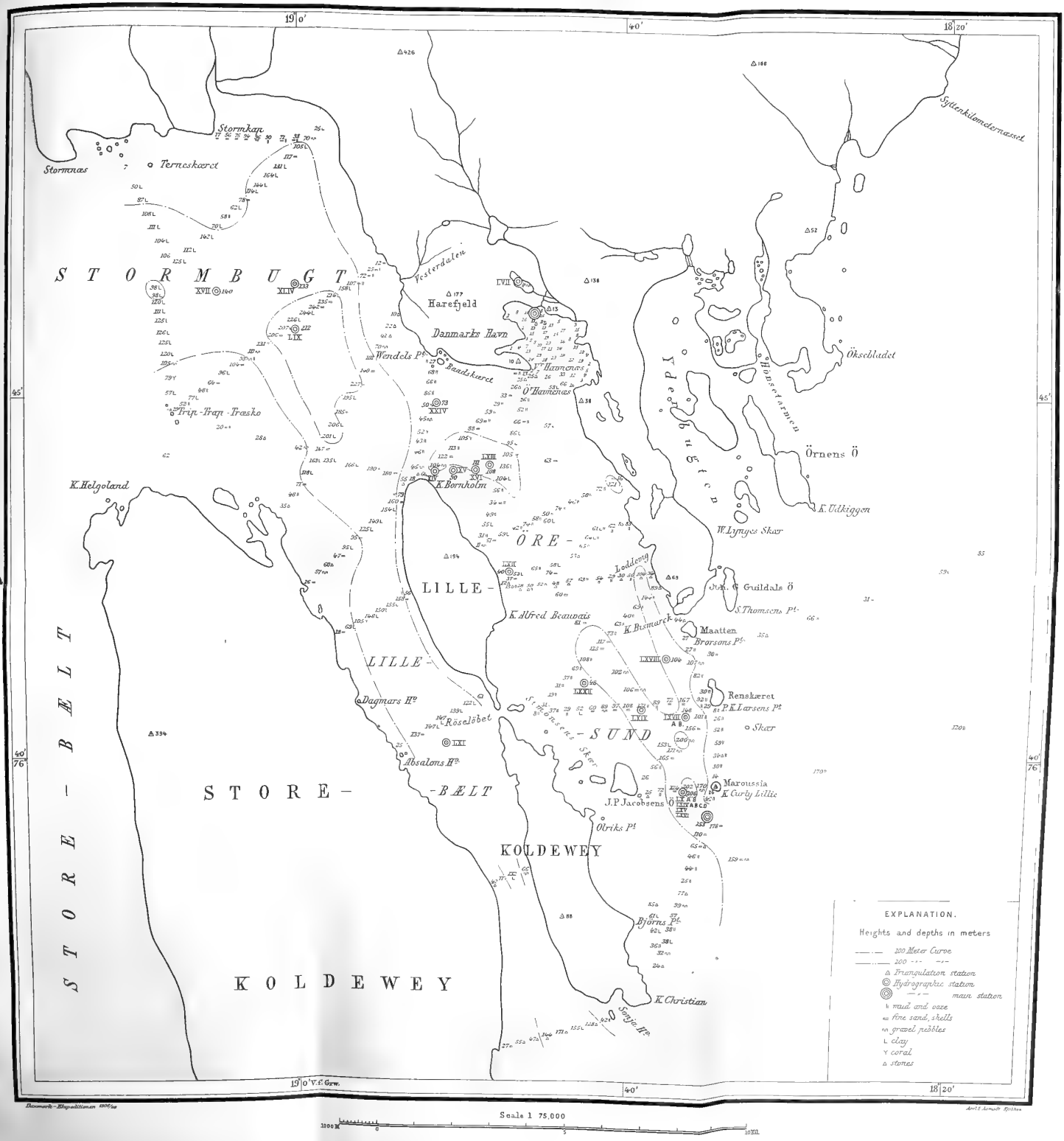
showing soundings made on the Danmark Expedition.



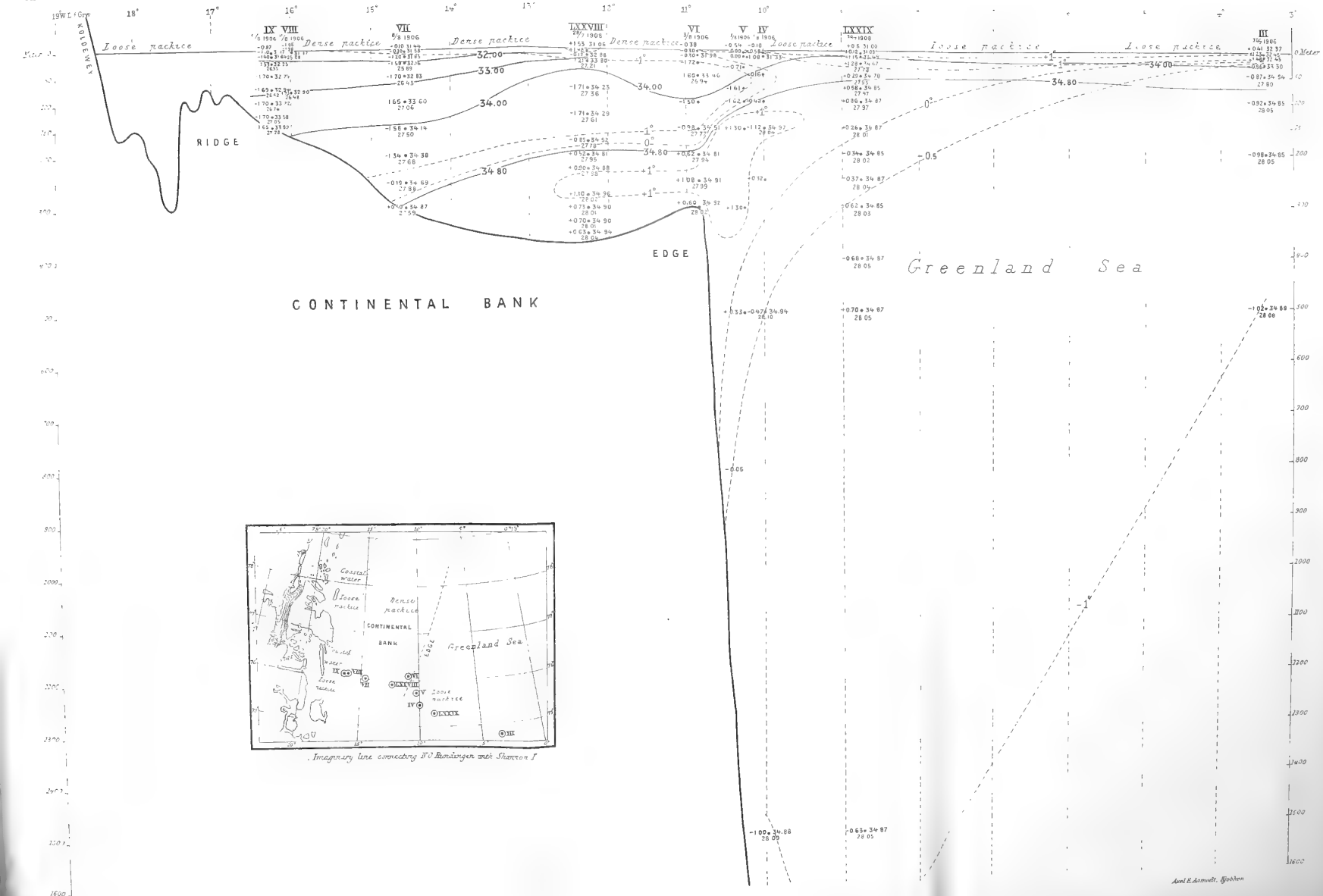
Imaginary line connecting N° Kuruingen with Shannon

Danmark Ekspeditionen

DANMARKS HAVN AND ENVIRONS



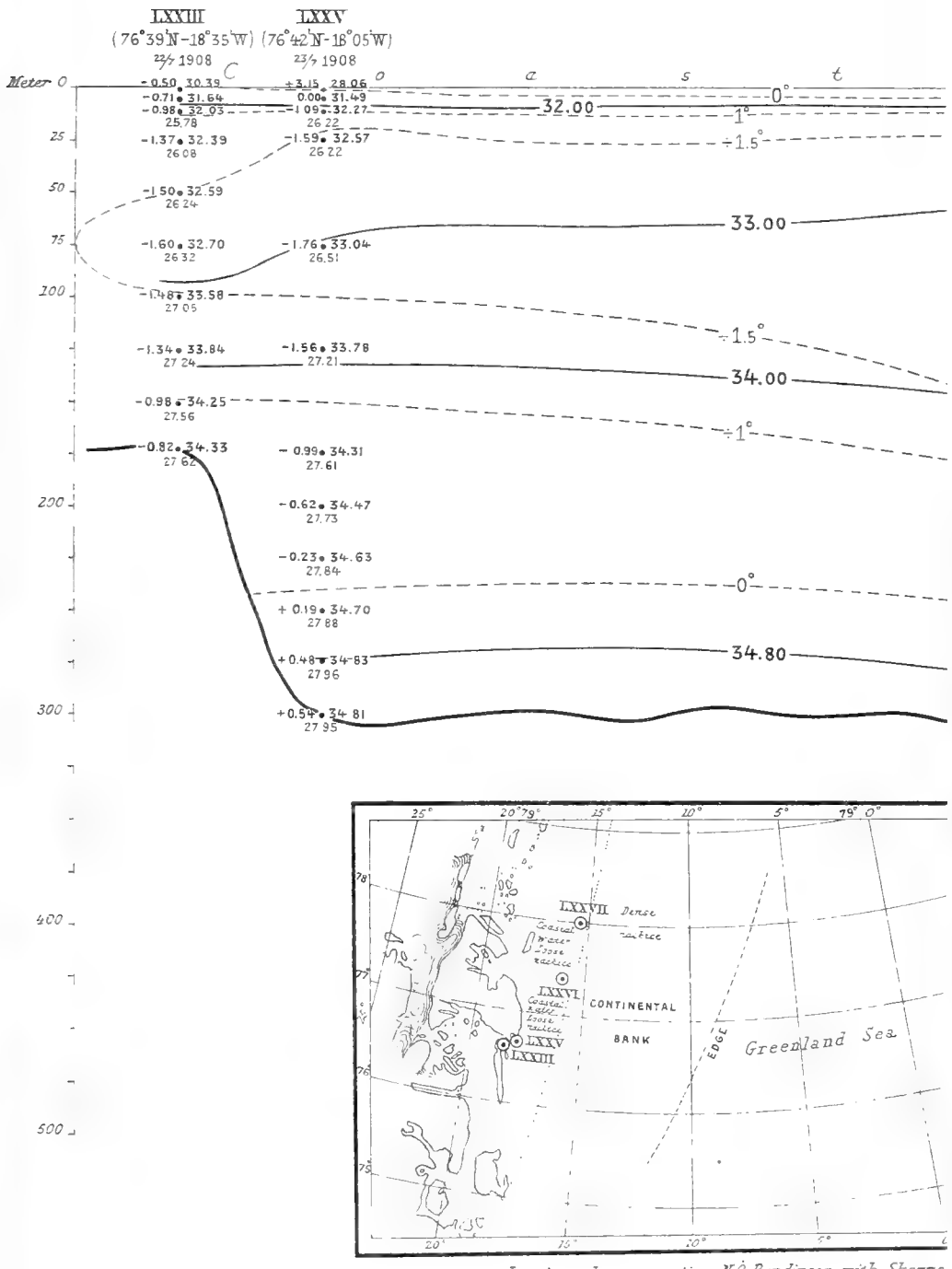
SECTION I.



Imaginary line connecting SO Storsinger with Shannon I

Axel E. Aamundt, Kjøbhvn

Danmark-Ekspeditionen 1906-08



Imaginary line connecting N Ò Rundinger with Shanno.

Danmark Ekspeditionen 1906/08.

SECTION II.

LXXIII (76°39'N-18°35'W) 17/9 1908

LXXV (76°42'N-18°05'W) 23/9 1908

LXXVI (77°24'N 16°00W) 23/9 1908

LXXVII (78°00'N-15°18'W) 24/9 1908

Meter

0 Meter

25

50

75

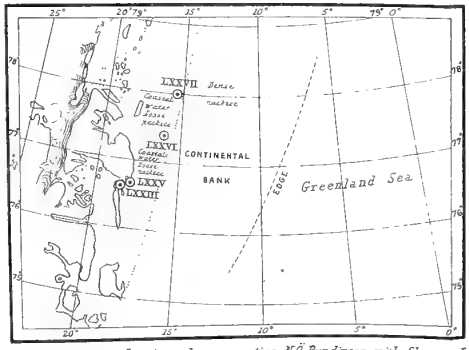
100

200

300

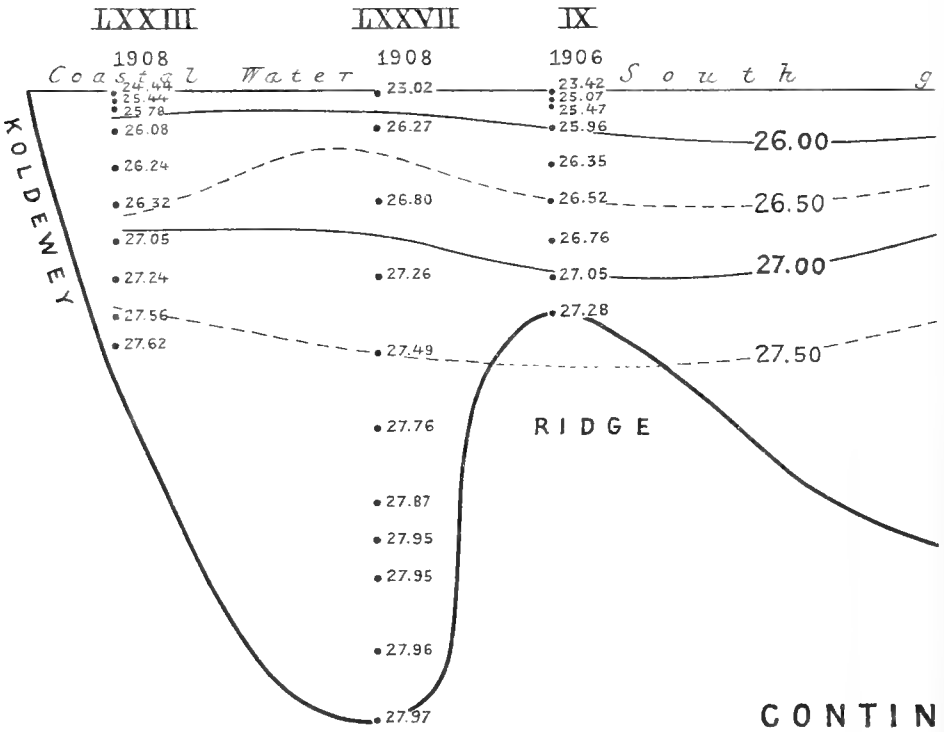
400

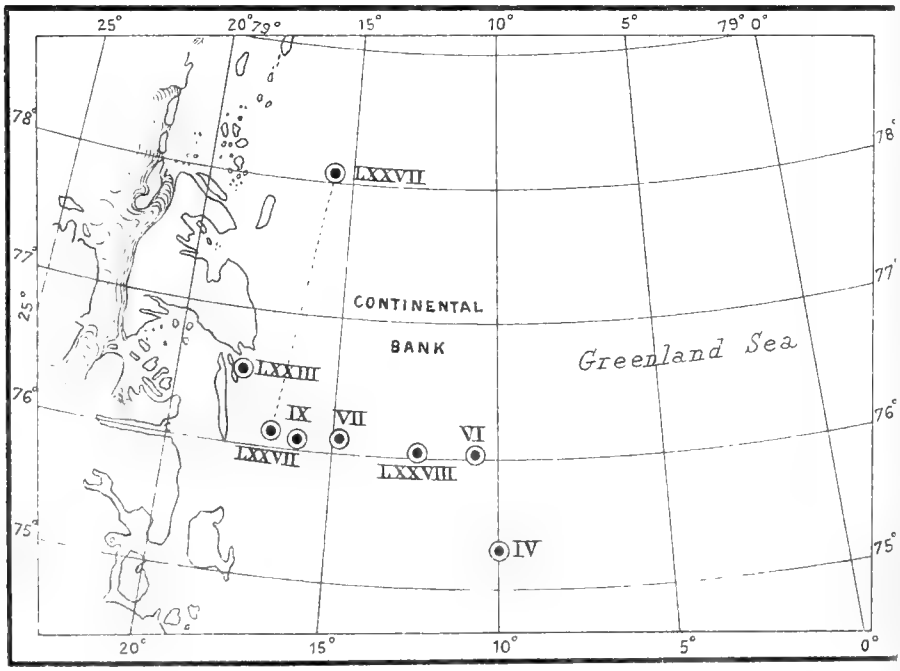
500



. . . . . Imaginary line connecting NÖ Rundinger with Shannon I

Depths in Meters	Average salinity	Average density	Average temperature
0 – 50	32.05	25.80	– 1.21
0 – 75	32.33	26.04	– 1.38
0 – 150	33.00	26.55	– 1.37
75 – 150	33.66	27.06	– 1.37
100 – 150	33.88	27.27	– 1.28





Dannark-Ekspeditionen 1906 08.

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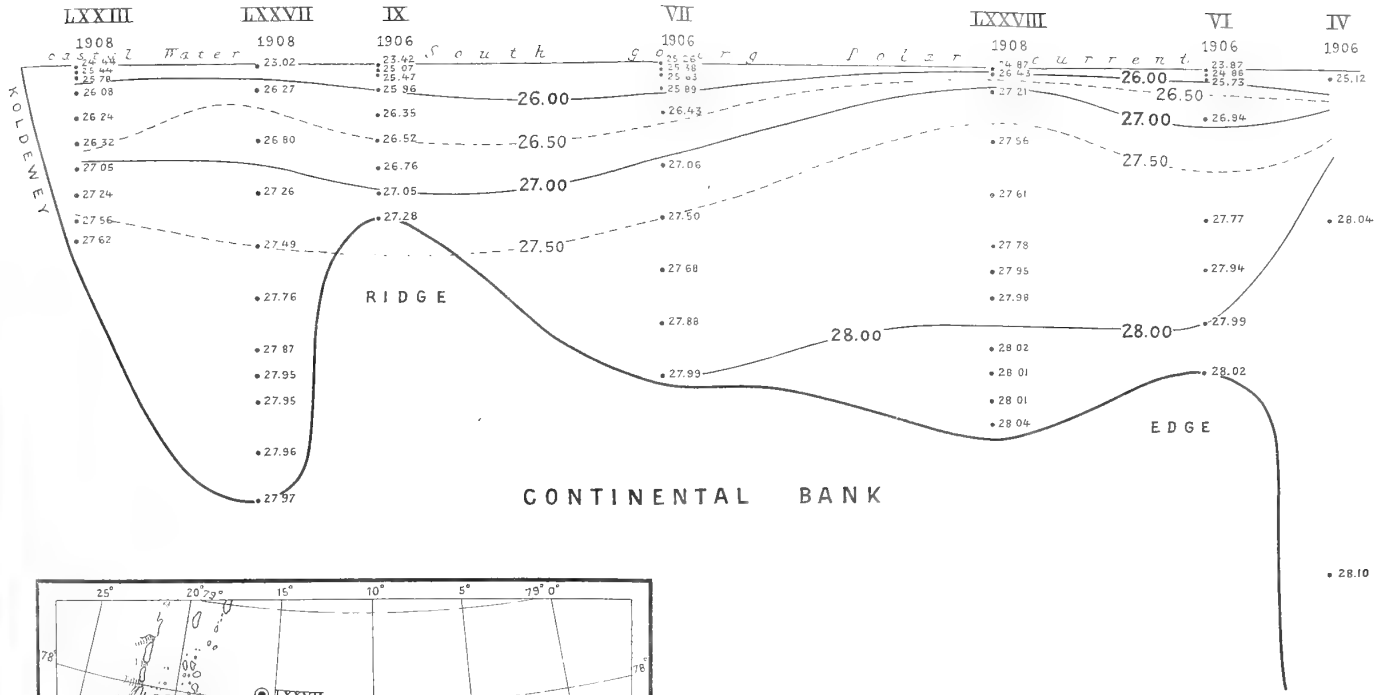
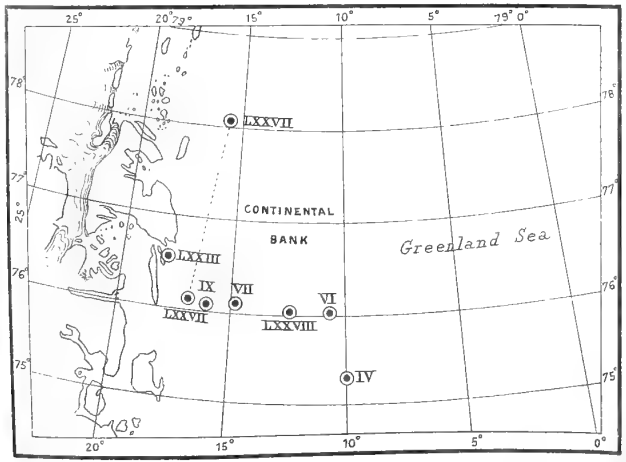
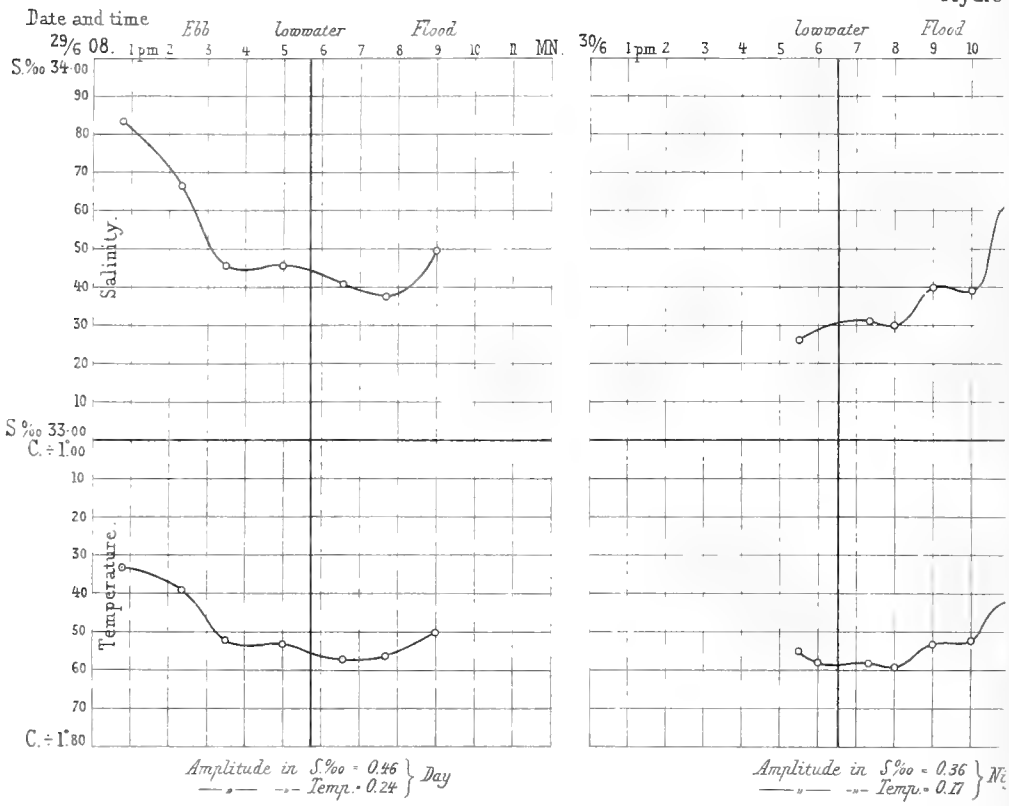




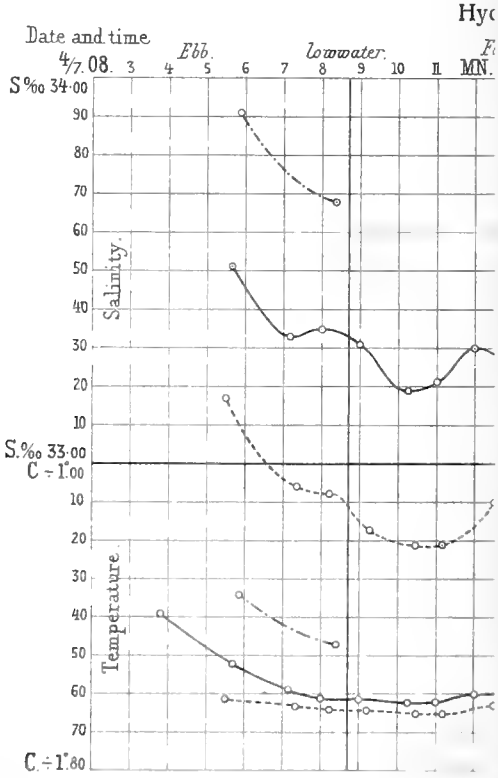
Danmark-Ekspeditionen 1906/08.

Axel E. Arnoldt Hjohnen

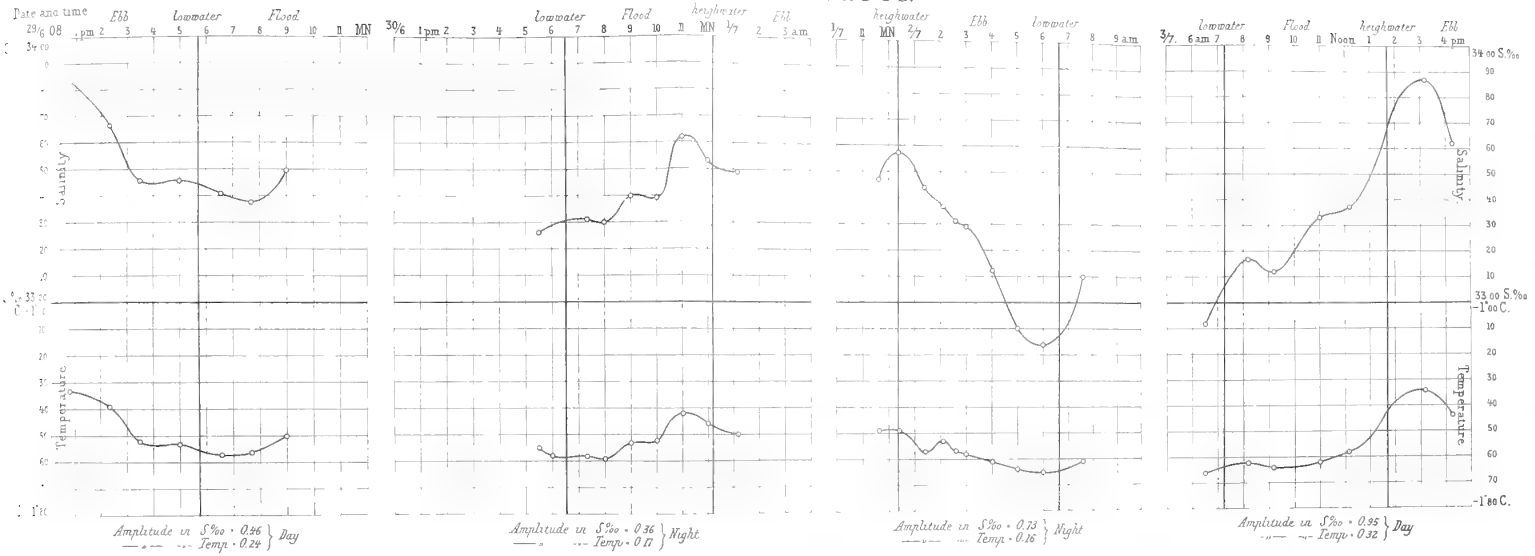
Variation of the
in the mouth
Hydro



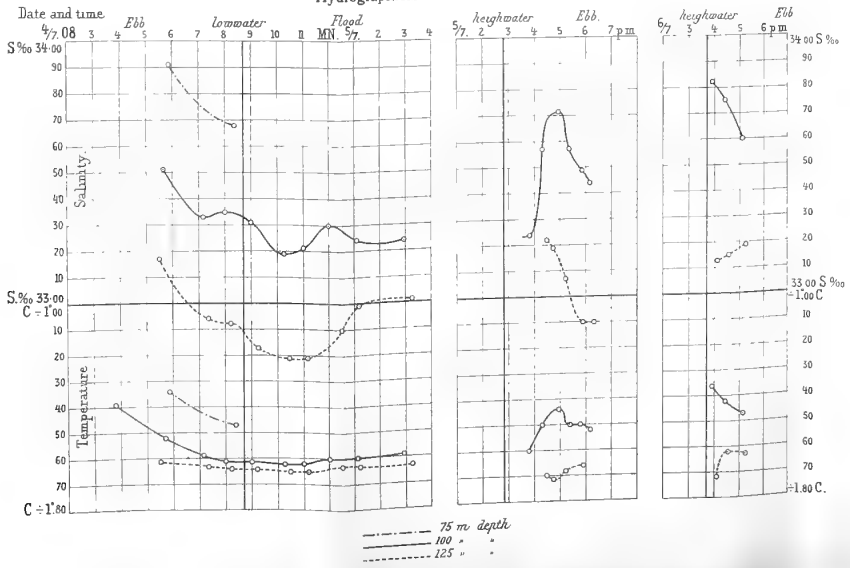
Variation of the salinity and
in
Hyc



Variation of the salinity and temperature at 100 m
in the mouth of Øresund between $^{29}/_{6}$ — $^{3}/_{7}$ 1908.
Hydrographical Series LXIV A B C D.

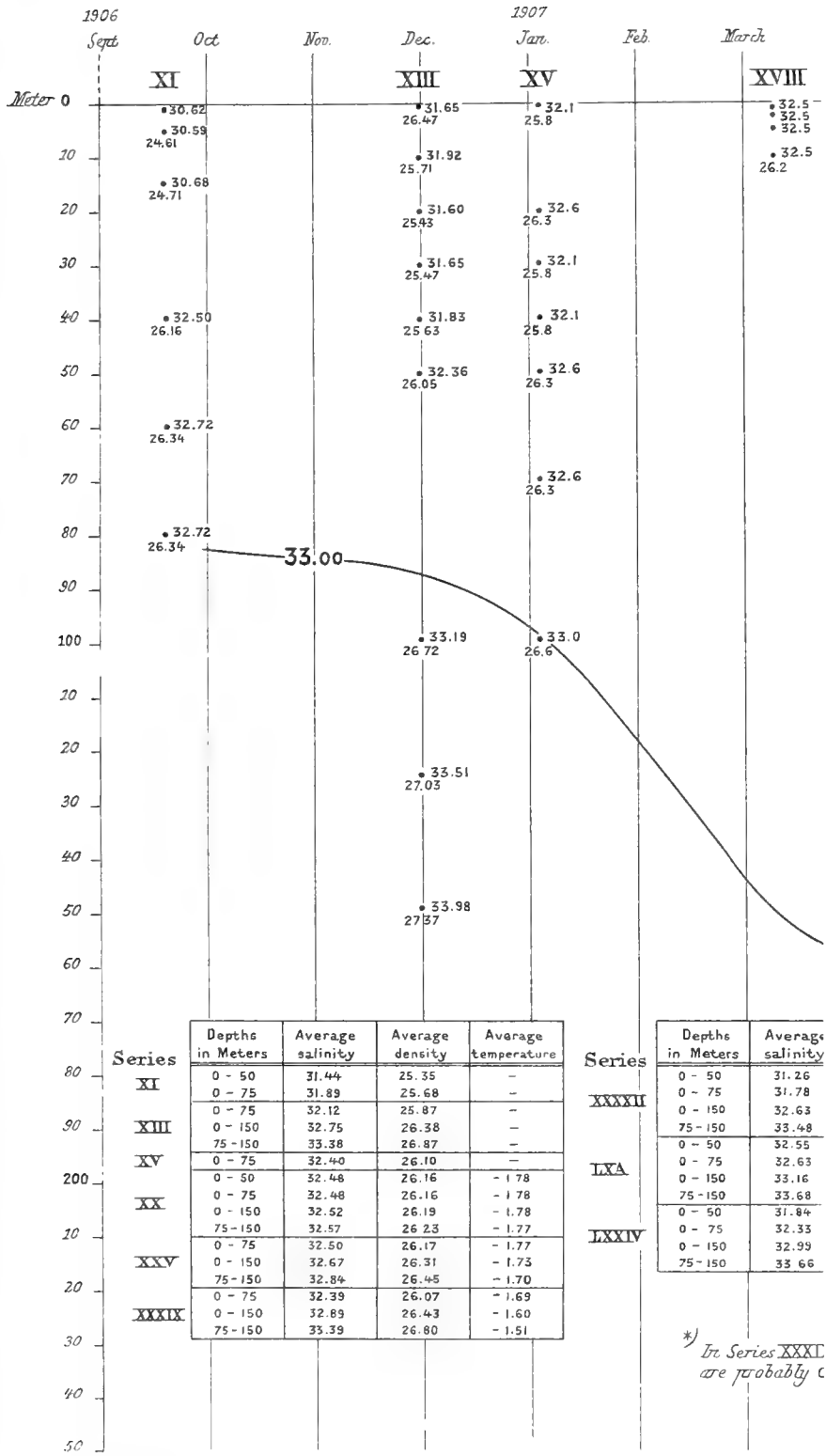


Variation of the salinity and temperature at depths of 75, 100 and 125 m
in the mouth of Øresund.
Hydrographical Series LXVII A B.



Danmark-Ekspeditionen 1906/08.

Axel E. Arnoldi. Kjøbhvn

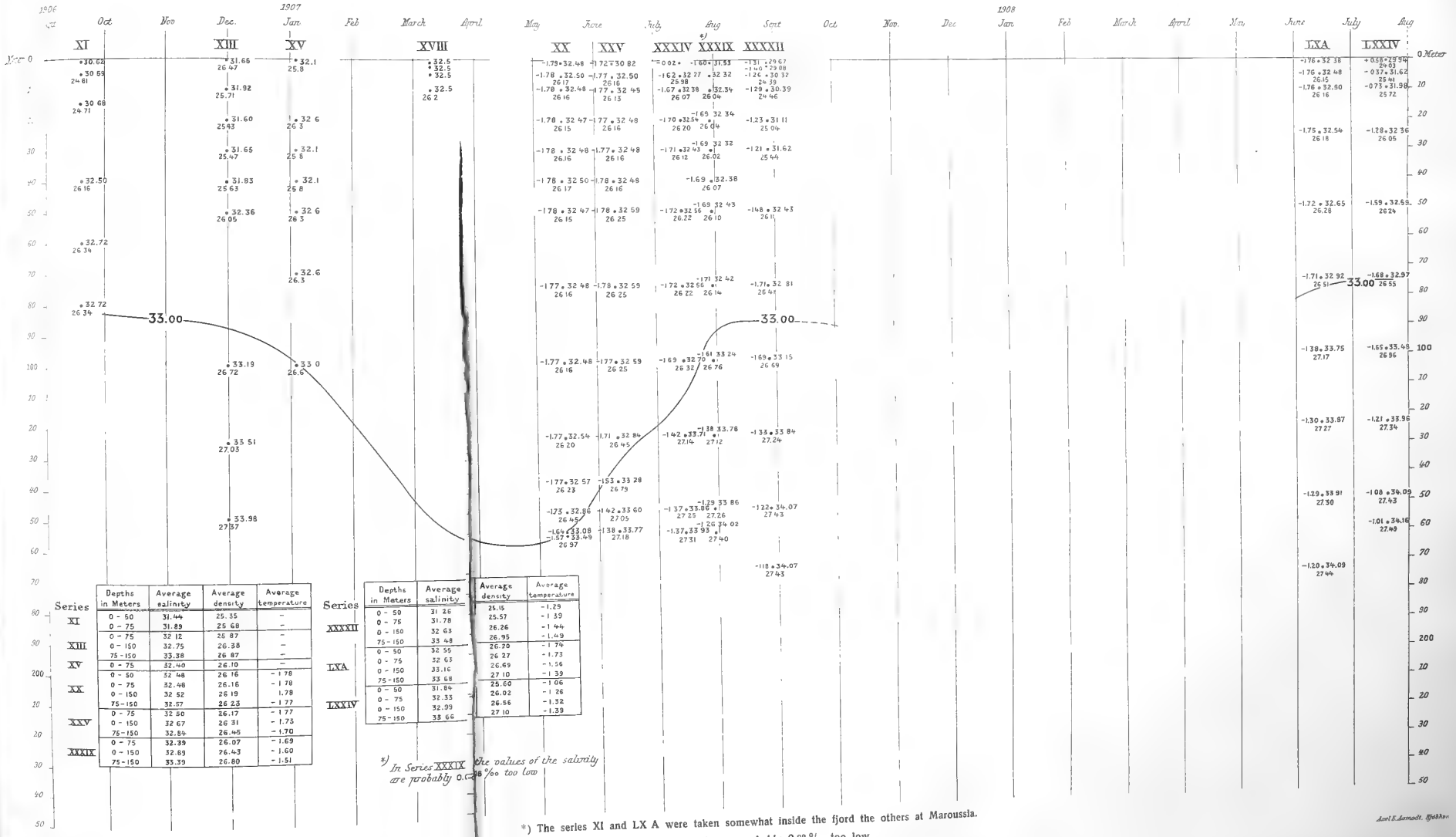


Series	Depths in Meters	Average salinity	Average density	Average temperature
XI	0 - 50	31.44	25.35	–
	0 - 75	31.89	25.68	–
XIII	0 - 75	32.12	25.87	–
	0 - 150	32.75	26.38	–
	75 - 150	33.38	26.87	–
XV	0 - 75	32.40	26.10	–
XX	0 - 50	32.48	26.16	- 1.78
	0 - 75	32.48	26.16	- 1.78
	0 - 150	32.52	26.19	- 1.78
	75 - 150	32.57	26.23	- 1.77
XXV	0 - 75	32.50	26.17	- 1.77
	0 - 150	32.67	26.31	- 1.73
	75 - 150	32.84	26.45	- 1.70
XXXIX	0 - 75	32.39	26.07	- 1.69
	0 - 150	32.89	26.43	- 1.60
	75 - 150	33.39	26.80	- 1.51

Series	Depths in Meters	Average salinity
XXXII	0 - 50	31.26
	0 - 75	31.78
	0 - 150	32.63
	75 - 150	33.48
LXA	0 - 50	32.55
	0 - 75	32.63
	0 - 150	33.16
	75 - 150	33.68
LXXIV	0 - 50	31.84
	0 - 75	32.33
	0 - 150	32.99
	75 - 150	33.66

*) In Series XXXI
are probably c

Various series taken in the mouth of Øresund 1906 - 08. *) **)



Series	Depths in Meters	Average salinity	Average density	Average temperature
XI	0 - 50	31.44	25.35	–
	0 - 75	31.89	25.68	–
XIII	0 - 75	32.12	25.87	–
	0 - 150	32.75	26.38	–
	75 - 150	33.38	26.87	–
XV	0 - 75	32.40	26.10	–
XX	0 - 50	32.48	26.16	- 1.78
	0 - 75	32.48	26.16	- 1.78
	0 - 150	32.52	26.19	1.78
	75 - 150	32.57	26.23	- 1.77
XXV	0 - 75	32.50	26.17	- 1.77
	0 - 150	32.67	26.31	- 1.73
	75 - 150	32.84	26.45	- 1.70
XXXIX	0 - 75	32.39	26.07	- 1.69
	0 - 150	32.89	26.43	- 1.60
	75 - 150	33.39	26.80	- 1.51

Series	Depths in Meters	Average salinity	Average density	Average temperature
XXXII	0 - 50	31.26	25.15	- 1.29
	0 - 75	31.78	25.57	- 1.39
	0 - 150	32.63	26.26	- 1.44
	75 - 150	33.48	26.95	- 1.49
LXA	0 - 50	32.55	26.20	- 1.79
	0 - 75	32.63	26.27	- 1.73
	0 - 150	33.16	26.69	- 1.56
	75 - 150	33.68	27.10	- 1.39
LXXIV	0 - 50	31.84	25.60	- 1.06
	0 - 75	32.33	26.02	- 1.26
	0 - 150	32.99	26.56	- 1.32
	75 - 150	33.66	27.10	- 1.39

*) In Series XXXIX the values of the salinity are probably 0.08 ‰ too low

*) The series XI and LX A were taken somewhat inside the fjord the others at Maroussia.

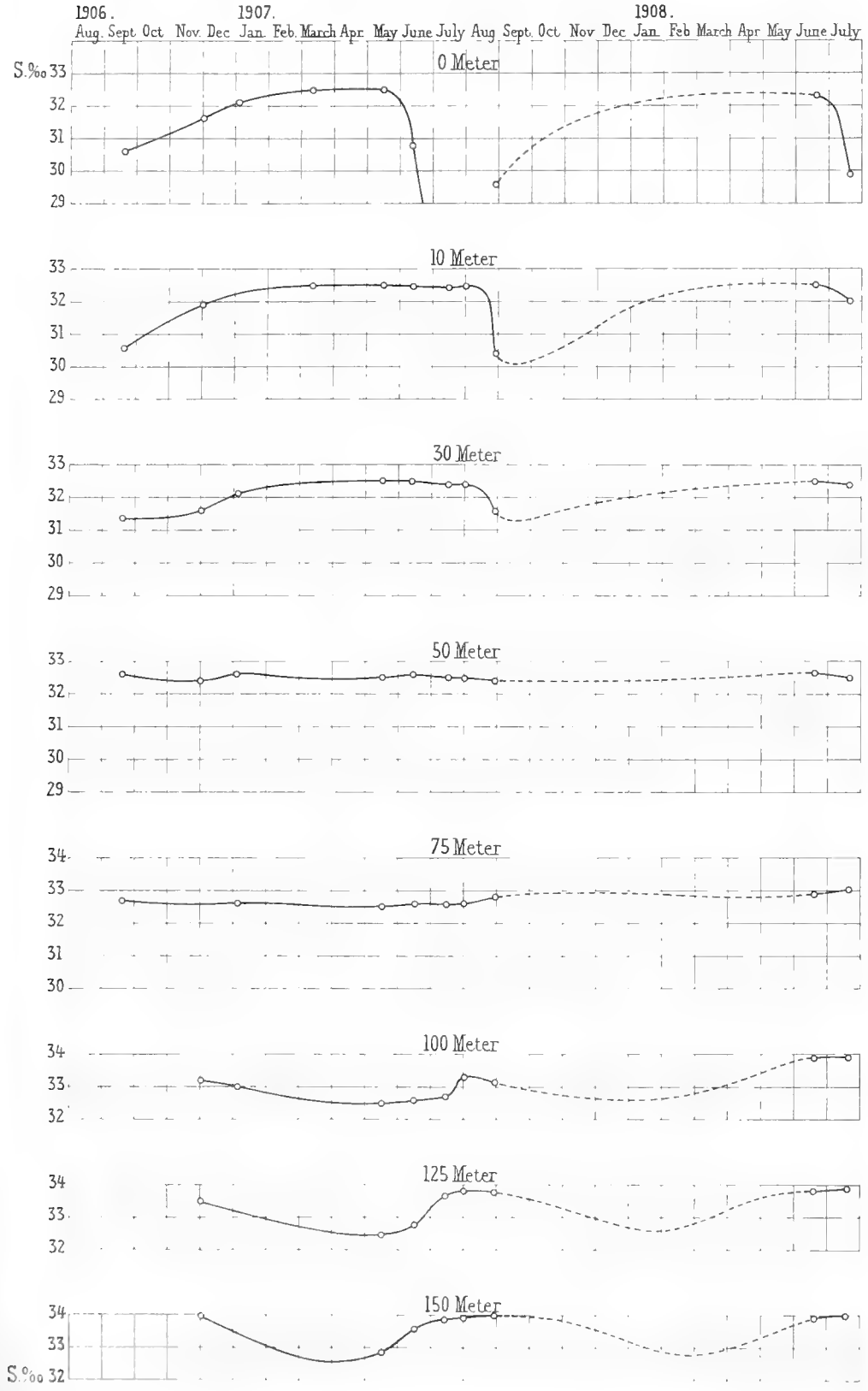
**) Series XXXIX the values of salinity are probably 0.08 ‰ too low.

Danmark Ekspeditionen 1906/08.

Axel E. Arnoldt. Tegnet.

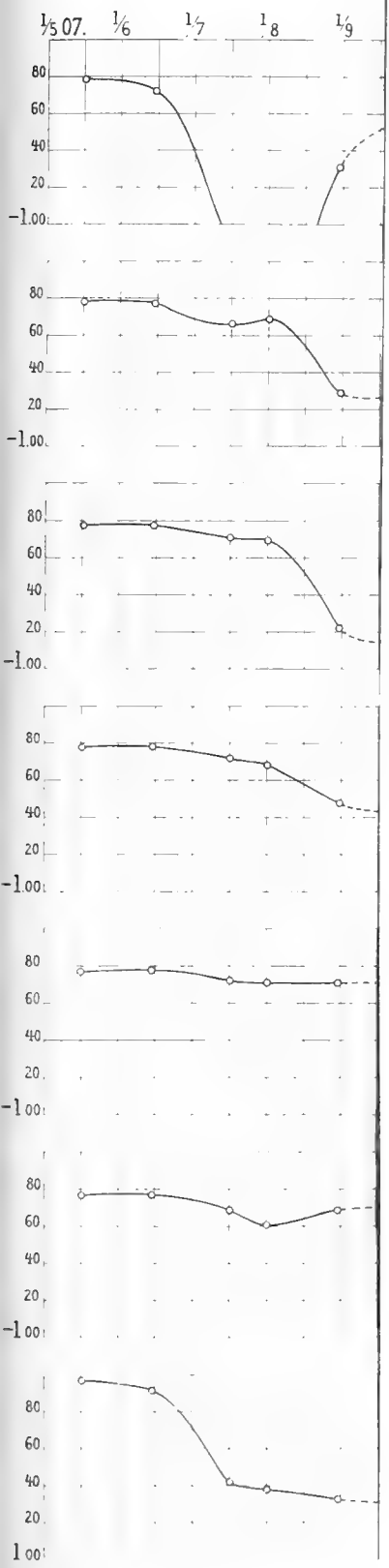
Variation of the salinity at different depths in the mouth of Øresund 1906-08.

(Series XI, XIII, XV, XVIII, XX, XXV, XXXIV, XXXIX, XXXXII, LX A, LXXIV).



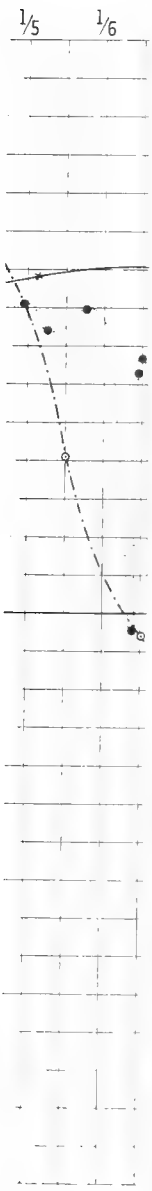
Variation of the

(Series



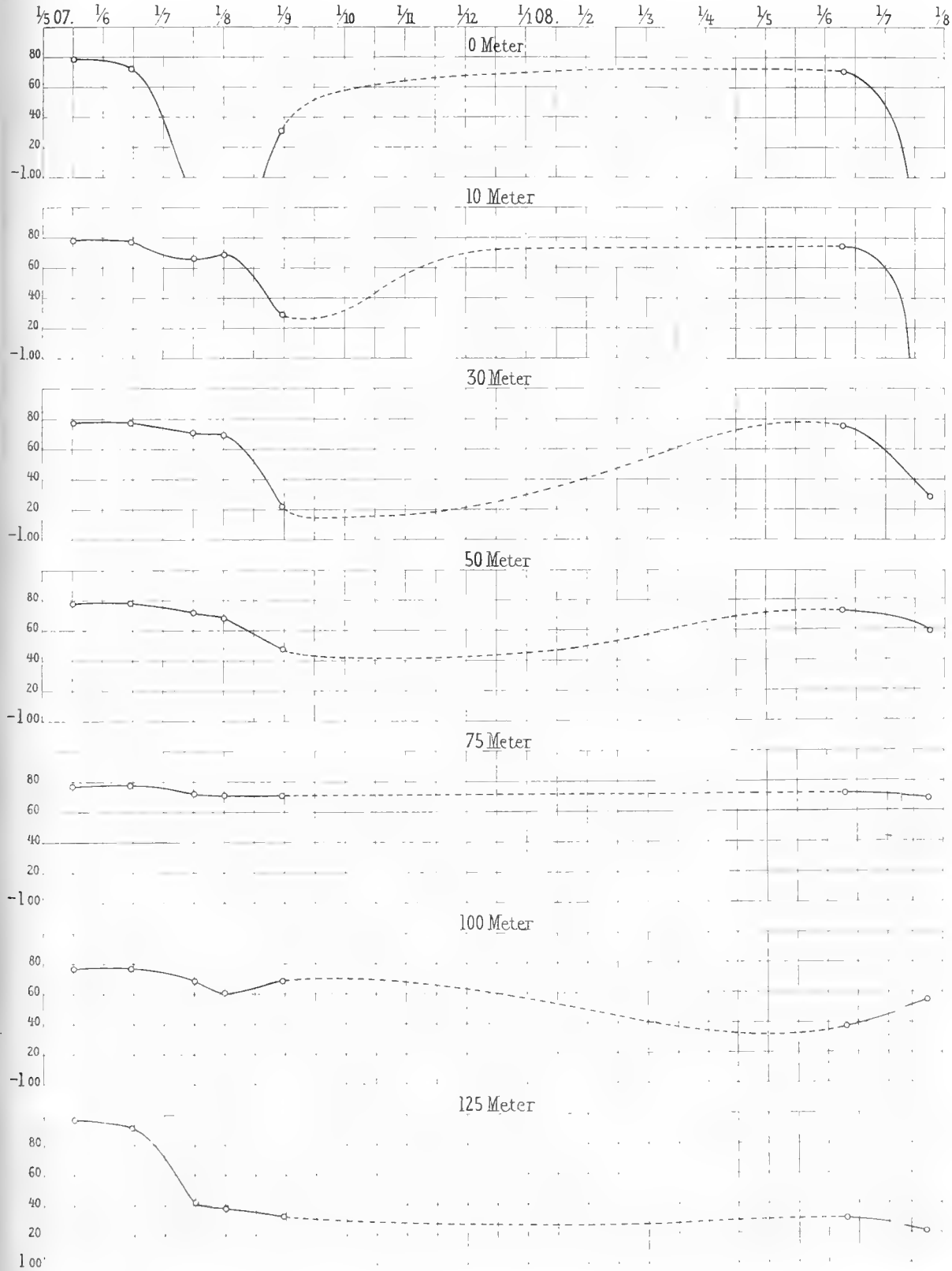
the surf

1906 – (

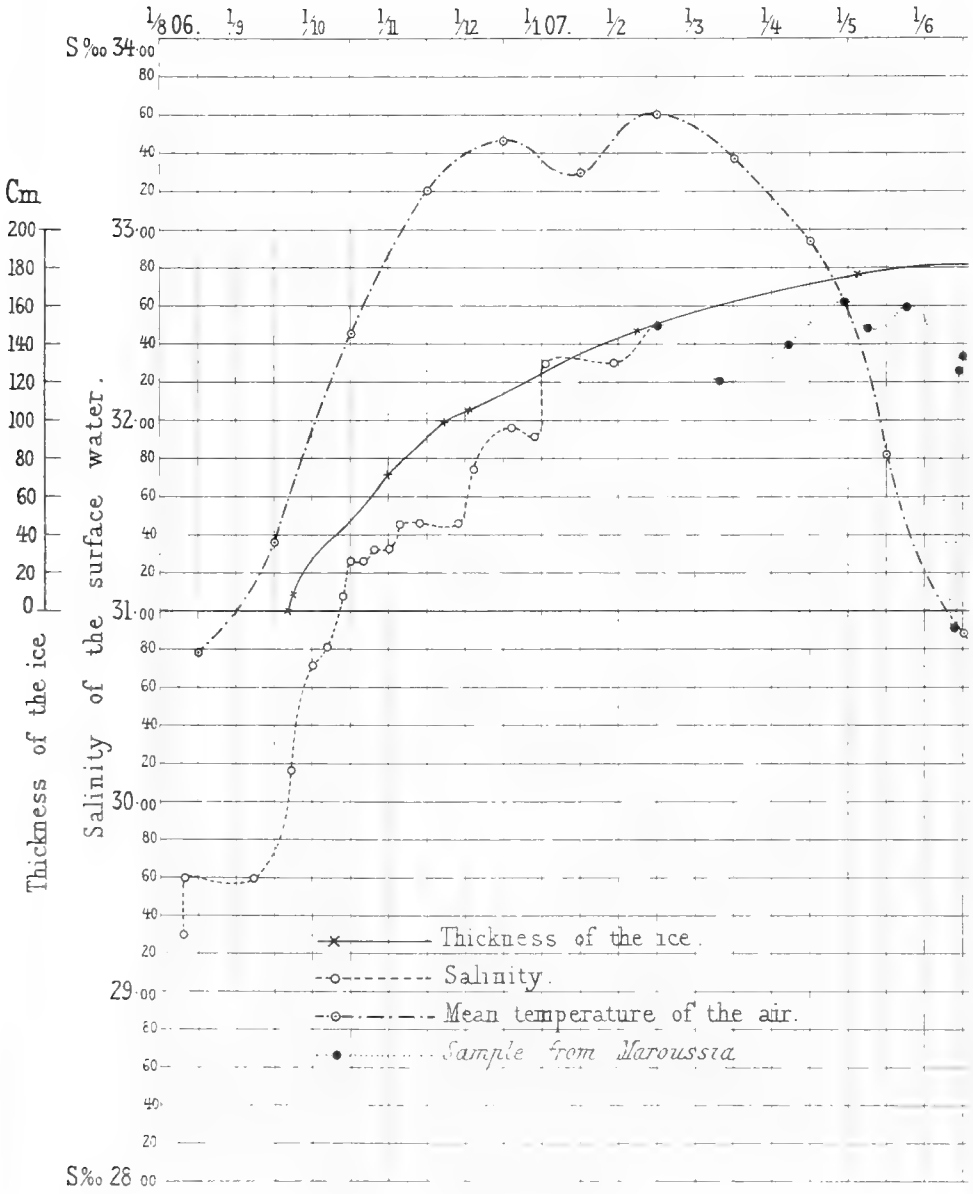


Variation of the temperature at different depths in the mouth of Øresund 1907-08.

(Series XX, XXV, XXXIV, XXXIX, XLII, LX A, LXXIV).

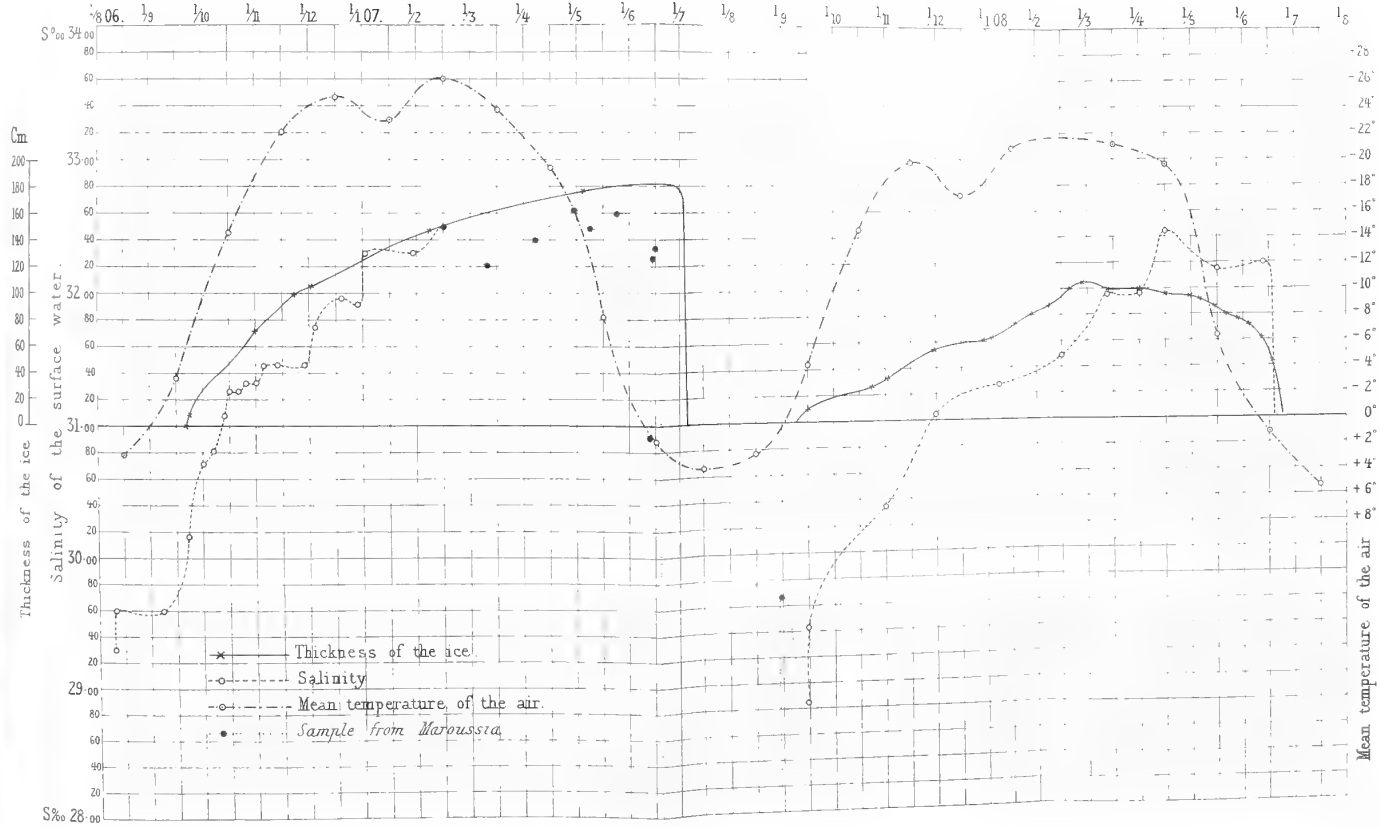


Variation of the salinity at the surf
the ice in Danmark Havn 1906 – (



Danmark-Ekspeditionen 1906 og

Variation of the salinity at the surface and down to 1[illegible] m and of the thickness of the ice in Danmark Havn 1906 – 08, along with the meantemperature of the air.



Danmark-Ekspeditionen 1906/08.

Axel E. Aamodt. Kjøbhavn.

these instruments were let down into different depths. Further, some large cylinders (petroleum barrels without bottom) were suspended in the depths 100 m. and 200 m. by means of thin piano wire, so that the influence of the current on this wire might practically be excluded; the movements of the cylinder would thus be an indication of both the direction and strength of the current in the respective depths.

It was found in this way, that the rapidity of the current was as a rule greatest at a depth of 20 meters below the surface and least at the surface and near the bottom, probably as a result of friction, on the one hand against the ice and on the other against the bottom, as also that the current ran as a rule in the same direction throughout the whole layer from surface to bottom and likewise changed simultaneously; but sometimes the current ran in in the deepest layers, whilst running out at the surface, and waves could thus arise.

Table 12 shows the result of these simultaneous measurements.

Tidal observations.

Continuous series of tidal observations were made in Danmarks Havn in both winter half-years 1906—07 and 1907—08 by First-lieut. Bistrup. In addition to these, a number of tidal observations were made by myself on the outer coast at Maroussia in the spring of 1908 and also ca. 70 km. further west in one of the inner fjords (Mørkefjord) in the neighbourhood of the inland ice.

The measurements were carried out by means of a divided, wooden rod with a piece of iron at the lower end; through a hole in the ice this was made fast to a stone on the bottom in the neighbourhood of land where the depth was ca. 3 m.

1. Tidal observations at Maroussia. (Table 13 p. 418—20.)

Remarks: The observations were made between 30/VI 08 and 6/VII 08 and gave as result, that the difference in the height of the tidal wave varied during these days between 111 cm. and 81 cm. The tidal period*) varied between 10 hours 38 minutes and 9 hours 39 minutes and was thus on an average 10 hours 6 minutes.

The moon was new moon on 28/VI and in its first quarter on 6/VII. Highwater in the day-time during this period was higher than night highwater, as the following Table shows:

Day highwater	Night highwater
1/VII 12.33 p. m. height of water 194 cm.	30/VI 12 midnight, height 182 cm.
3/VII 1.40 — — - — 202 -	3/VII 12.45 a. m. height 189 cm.
4/VII 2.15 — — - — 195 -	5/VII 2 a. m. height 171 cm.

*) Tidal period see: foot-note Table 11 p. 415.

Table 13.

Date	True Time	Height of water cm.	Remarks
30/VI 08	4.46 p. m.	98	
—	6.25 -	88	
—	6.30 -	87.5	30/VI. 6.30 p. m. Lowwater. Height of water means distance of surface from a 0 point on the measuring rod.
—	6.35 -	88	
—	6.40 -	89	
—	6.45 -	89.5	
30/VI -	11.45 p. m.	181.5	
1/VII -	12.10 a. m.	182	1/VII. 12.10 a. m. Highwater. 30/VI. ☾ culmination 1.32 p. m. true time. Tidal period 10 h. 38 m.
—	12.30 -	179	
—	12.40 -	177	
—	12.50 -	175	
1/VII -	11.40 a. m.	190	
—	11.45 -	190.5	
—	11.50 -	191	
—	11.55 -	191.5	
—	12.00 noon	192	
—	12.05 p. m.	192.5	
—	12.10 -	193	
—	12.15 -	193.5	
—	12.20 -	193.5	
—	12.25 -	193.5	
—	12.30 -	193.5	1/VII. 12.33 p. m. Highwater. 1/VII. ☾ culm. 1.57 a. m. tr. t. Tidal period 10 h. 36 m.
—	12.35 -	193.5	
—	12.40 -	193.5	
—	12.45 -	193.5	
—	12.50 -	193.5	
—	12.55 -	193	
—	1.00 -	192.5	
—	1.10 -	191.5	
—	1.20 -	190	
—	2.00 -	179	
—	3.00 -	158	
—	4.00 -	140.5	
—	5.00 -	107	
—	6.00 -	93	
—	6.45 -	91	1/VII. 6.45 p. m. Lowwater. At 6.50 p. m. immediately after lowwater loud noises and cracking heard in the drift-ice, which was pressed with great force in towards the edge of the fast fjord-ice.
—	6.50 -	91	
—	6.55 -	91	
—	7.00 -	91	
—	7.05 -	91.5	
—	7.10 -	92	
—	7.20 -	93.5	
—	9.00 -	124	
—	10.00 -	150	
—	11.04 -	174	2/VII. 12.20 a. m. Highwater. 1/VII. ☾ culm. 2.21 p. m. tr. t. Tidal period 9 h. 59 m.
2/VII -	12.40 a. m.	183.5	
—	12.45 -	183.5	
—	12.50 -	183	
—	1.00 -	182	
—	2.00 -	164.5	
—	3.30 -	126	
—	6.30 -	72.5	
—	6.40 -	72.5	2/VII. 6.40 a. m. Lowwater. Current changing in the deeper layers simultaneously with lowwater but at the surface the water runs out till 7.50 a. m.
—	6.50 -	72.5	
—	7.00 -	73.5	
—	7.05 -	74	
—	8.10 -	89	
3/VII -	12.20 a. m.	187.5	
—	12.30 -	189	
—	12.40 -	189	

Date	True Time	Height of water cm.	Remarks
3/VII 08	12.45 a. m.	189	3/VII. 12.45 a. m. Highwater. 2/VII. ☾ culm. 3.06 a. m.
—	12.50 -	189	tr. t. Tidal period 9 h. 39 m.
—	1.00 -	189	
—	1.10 -	188	
—	1.20 -	188	
—	1.30 -	187.5	
—	2.00 -	182	
—	3.00 -	163.5	
—	4.00 -	138	
—	5.00 -	116	
—	6.00 -	98	
—	6.45 -	96	
—	6.50 -	95.5	
—	7.00 -	95.5	
—	7.10 -	95	3/VII. 7—7.10. Violent screwing in pack-ice.
—	7.15 -	95	3/VII. 7.15 a. m. Lowwater. Current changing in the
—	7.20 -	95	deeper layers almost at same time as lowwater,
—	7.30 -	95.5	but at surface running out till 8.20 a. m.
—	7.40 -	96	
—	10.30 -	153	
—	12.50 p. m.	200	
—	1.00 -	200.5	
—	1.10 -	200.5	
—	1.20 -	201	
—	1.30 -	201.5	
—	1.40 -	201.5	3/VII. Highwater 1.40 p. m. 3/VII. ☾ culm. 3.29 a. m.
—	1.50 -	201.5	tr. t. Tidal period 10 h. 11 m.
—	2.00 -	201.5	
—	2.10 -	201	
—	2.20 -	200.5	
—	2.30 -	199.5	
—	4.50 -	152	3/VII. Lowwater 7.50 p. m.
—	7.45 -	107	
—	7.50 -	107	
—	7.55	107	
—	8.00 -	107	
—	8.05 -	107.5	
—	8.15 -	108	
4/VII -	12.20 p. m.	176	
—	1.20 -	191.5	
—	1.30 -	192.5	
—	1.40 -	193.5	
—	1.50 -	194.5	
—	2.00 -	195	
—	2.10 -	195	
—	2.15 -	195	4/VII. Highwater 2.15 p. m. 4/VII. ☾ culm. 4.12 a. m.
—	2.20 -	195	tr. t. Tidal period 10 h. 03 m.
—	2.30 -	194.5	
—	2.40 -	193	
5/VII -	2.00 a. m.	171	5/VII. Highwater 2.00 a. m.
—	2.10 -	171	
—	2.20 -	171	
—	2.30 -	170	
—	4.20 -	147.5	
5/VII -	1.55 p. m.	178	
—	2.50 -	181	5/VII. Highwater 2.50 p. m. 5/VII. ☾ culm. 4.54 a. m.
—	2.55 -	181	tr. t. Tidal period 9 h. 56 m.
—	3.00 -	181	
—	3.05 -	181	
—	3.10 -	180.5	
—	3.40 -	178	

Date	True Time	Height of water cm.	Remarks
5/VII 08	8.30 p. m.	100.5	
—	8.40 -	100	
—	8.50 -	99.5	
—	9.00 -	99.5	5/VII. Lowwater 9.00 p. m.
—	9.10 -	99.5	
—	9.20 -	100	
—	10.10 -	103	
6/VII -	2.35 a. m.	173	
—	2.40 -	173	
—	2.50 -	174	
—	3.00 -	174	6/VII. Highwater 3.00 a. m. 5/VII. ☾ culm. 5.15 p. m.
—	3.10 -	174	tr. t. Tidal period 9 h. 45 m.
—	3.20 -	173.5	
—	3.30 -	173	
—	3.40 -	172.5	
—	6.30 -	134	

Average tidal period at Maroussia from 30/VI—6/VII 08 10 h. 6 m.
Moon's phases: 28/VI ● New moon. 6/VII ☽ First quarter.

During the same period the temperature and salinity at a depth of 100 m. were higher in the day than at night.

	Day highwater 100 m.			Night highwater 100 m.	
	temp.	salin.		temp.	salin.
29/VI	+1.33	33.84	30/VI	+1.42	33.62
3/VII	+1.34	33.84	1—2/VII	+1.49	33.57
4/VII	+1.39				

The currents caused by the tides have already been discussed. Table 12 shows, that during the period dealt with the *surface current changed direction* at highwater, with a single exception somewhat before the time of highest water, but the current in the deeper layers nearly at that time, and that the change at lowwater at the surface during the same period took place at a somewhat later time than the lowest height of the water, but in the deeper layers almost at that time.

This condition was caused by the fresh water which flowed out from the rivers at the surface during the summer.

To make these measurements comparable with those taken by First-lieut. BISTRUP in Danmarks Havn in the winter half-year, a series of simultaneous tidal measurements were made at Maroussia and in Danmarks Havn on 18/VII 1908 from 10 a. m. to 12 midnight, which gave the result, that the time for highwater and lowwater was exactly the same at both places, whilst the *difference* in the height of the tidal wave at Maroussia amounted to 131 cm. and in Danmarks Havn to 137 cm.

2. Tidal observations in the mouth of Mørkefjord (Table 14).

Date	True Time	Height of water cm.	Current: Direction	Current: Rapidity cm. pr. sec.	Remarks
30/IV 08	11.15 p. m.	318	..	..	Highwater just passed.
—	11.20 -	318			
—	11.30 -	313			
—	11.40 -	309			
—	11.50 -	303			
1/V -	10.50 a. m.	332.5			
—	11.00 -	333			
—	11.10 -	333	..	..	1/v. Highwater 11.05 a. m. 1/v. ☾ culm.
—	11.20 -	332.5			0.36 a. m. tr. t. Tidal period 10 h. 29 m.
—	11.30 -	331			
—	11.40 -	328			
—	10.50 p. m.	317			
—	11.00 -	319			
—	11.10 -	321			
—	11.20 -	321	..	..	1/v. Highwater 11.20 p. m. 1/v. ☾ culm.
—	11.30 -	319.5			0.50 p. m. tr. t. Tidal period 10 h. 30 m.
—	11.40 -	318			
2/V -	4.50 a. m.	137			
—	5.00 -	135			
—	5.10 -	133			
—	5.20 -	131			
—	5.30 -	129			
—	5.40 -	127			
—	5.50 -	127			
—	6.00 -	126			
—	6.10 -	125			
—	6.20 -	125	..	..	2/v. Lowwater 6.20 a. m.
—	6.30 -	125			
—	6.40 -	126			
—	11.20 p. m.	313	in		
—	11.30 -	316	—		
—	11.40 -	318	—		
—	11.50 -	319	—	..	2/v. Highwater 11.55 p. m. 2/v. ☾ culm.
—	12.00 m. n.	319	out		1.40 p. m. tr. t. Tidal period 10 h. 15 m.
3/V -	12.10 a. m.	318	—		Current changing at same time as high-
—	12.20 -	313	—		water.
4/V -	12.35 p. m.	270			
—	12.45 -	271	in		
—	12.50 -	272	—		
—	12.56 -	273	—	..	4/v. Highwater 12.56 p. m. 4/v. ☾ culm.
—	1.02 -	272.5	slack		2.57 p. m. tr. t. Tidal period 9 h. 59 m.
—	1.10 -	272.5	—		
—	1.15 -	272	—		
—	1.20 -	271.5	—		
—	1.30 -	269	out		
—	1.42 -	264.5	—		
—	2.10 -	255	—		
5/V -	1.05 p. m.	255	in		
—	1.10 -	260.5	—		
—	1.20 -	265	—		
—	1.30 -	267	—		
—	1.40 -	269	—	..	5/v. Highwater 1.40 p. m. 5/v. ☾ culm.
—	1.45 -	269	—		3.49 p. m. tr. t. Tidal period 9 h. 51 m.
—	1.50 -	268.5	out		
—	2.00 -	267.5	—		
—	2.10 -	267	—		
—	2.20 -	265.5	—		

Date	True Time	Height of water cm.	Current		Remarks
			Direction	Rapidity cm. pr. sec.	
6/v 08	9.35 a. m.	155			
—	9.40 -	157			
—	9.50 -	159			
—	10.00 -	162			
—	10.10 -	164			
—	10.20 -	166			
—	11.15 -	191			
—	11.40 -	201	in	20	
—	12.40 p. m.	217	—	37	
—	1.55 -	254			
—	2.10 -	256	—	7	
—	2.20 -	256	slack	..	Strong movement downward (suction) of water in the measuring hole from 2.20—2.40 p. m.
—	2.30 -	253	—		
—	2.40 -	256	—		
—	2.45 -	254	..	..	6/v. 2.20—2.40 p. m. Highwater. 6/v. ☾ culm. 4.39 a. m. tr. t. Tidal period 9 h. 41 m.—10 h. 01 m., average 9 h. 51 m.
—	2.50 -	253.5			
—	3.00 -	251			
—	3.10 -	249			
—	3.40 -	245	out	7	
—	4.40 -	230	—	11	
—	5.40 -	212	—	17	
—	6.40 -	196			
—	7.40 -	180			
—	8.10 -	177			
—	8.20 -	174			
—	8.30 -	171			
—	8.35 -	170			
—	8.40 -	172			
—	8.45 -	171			
—	8.50 -	170			
—	8.55 -	171			
—	9.00 -	169.5	..	..	6/v. 8.35—9.00 p. m. Lowwater.
—	9.05 -	173.5			
—	9.15 -	177			
7/v -	12.45 p. m.	216	in	18	
—	1.00 -	225			
—	1.40 -	232			
—	2.10 -	234	—	3	
—	2.40 -	251	—	4	
—	2.55 -	254			
—	3.05 -	254			
—	3.10 -	255	..	..	7/v. 3.10 p. m. Highwater. 6/v. ☾ culm. 5.28 a. m. tr. t. Tidal period 9 h. 42 m.
—	3.20 -	253			
—	3.30 -	252			
—	3.40 -	251			
—	3.50 -	250			
—	4.00 -	249			
—	4.10 -	248			
—	4.20 -	247			

Average tidal period in mouth of Mörkefjord from 30/IV—7/v 08 10 h. 5 m.
Moon's plases: 30/IV ● New moon. 7/v ☽ First quarter.

Remarks: The observations were made during the period 30/IV 08—7/v 08 and gave as result, that the difference between high and low water varied at that time between 196 and 86, and the tidal

period varied between 10.30 and 9.42, thus on an average 10 hours 5 minutes.

On 30/IV the moon was new and on 7/V in its first quarter.

The tidal measurements at Mørkefjord and at Maroussia were carried out at an interval of 2 months, but the moon was in the same phase during both periods.

The observations made show, that the tidal period at Maroussia, Danmarks Havn and in Mørkefjord was nearly the same (ca. 10 hours), whilst the height of the tidal wave increases from 1 meter on the outer coast (Maroussia) to 2 meters in the inner fjords.

Remarks on some harbours in N. E. Greenland.

Our winter-harbour proved to be very good and satisfied the following conditions of a good harbour for overwintering in N. E. Greenland.

1. It was sheltered against invasion and pressure of the drift-ice. The mouth of the harbour opened towards the south, which was a good thing, on the one hand, because the current outside the coast runs mainly towards the south and on the other, because the sun had thus the best chance of affecting the ice in the harbour.

2. It possessed a water-course opening at the head of the harbour, so that the heated water from the melting snow and ice greatly helped in loosening the harbour ice from the land.

3. At the entrance the harbour was so shallow that large ice-fields and icebergs could not get in.

4. Lastly, the harbour lay close to the outer coast, so that it was easy to slip out into the current and escape being trapped by the fjord-ice.

The following harbours were examined (see Pl. XIV):

1. Danmarks Havn — 76°46′.2 N. L., 18°45′.5 W. L.
2. Sonja Havn — 76°36′.6 N. L., 18°40′.5 W. L.
3. Absalon Havn — 76°39.8 N. L., 18°53′.5 W. L.
4. Dagmar Havn — 76°40′.7 N. L., 18°56′.4 W. L.

In Danmarks Havn the "Danmark" lay anchored for nearly two years without being exposed to pressure from ice, (with the stem facing southwards, both anchors out and with wire hauser moorings aft to large stones and a heavy anchor on the land).

Inside the harbour the water became ice-free in the beginning of July in both years (1907 and 1908), but the fjord-ice in 1907 did not break up until August 6th and a belt of drift-ice (ca. 4—5 km. broad) then lay fast to the land and remained there into the beginning of September, so that it is doubtful whether we should have succeeded in getting out that year.

In 1908, on the other hand, we could sail out for home in the beginning of July.

The harbour is deepest in the eastern part — the depth is here from 30—60 m. — and deep close to Østre Havnenæs; from Vestre Havnenæs a reef extends out from land with 2 m. of water ca. 100 m. from shore and 7 m. at 200 m. and then the depth increases to 26 m. about 400 m. from land.

The anchors of the "Danmark" lay in 13 and 11 m. of water south of the outlet from the western water-course. The bottom here gave good holding ground. Inside the anchors it first became deeper (16 m.) and then shallowed, so that at the stern of the "Danmark", ca. 50 m. from land, there was a depth of 10—5 m., sloping rapidly up to the beach.

Sonja Havn lies on the S. E. side of Lille Koldewey Island. It is considerably smaller than Danmarks Havn and but little water from the melting snow and ice flows into it, but it became ice-free almost at the same time and may be considered as a good harbour.

Absalon Havn and Dagmar Havn lie on the N. E. side of Store Koldewey Island. They are excellent and safe harbours to approach, but as they face towards the north they are more risky as wintering harbours. — They were free of ice, however, in both summers, 1907 and 1908.

CONTENTS

Illustrations.

Misprint.

p. 302 line 10 from below: for observation read observations.
Pl. XI. text, for current-bottles read drift-bottles.

III.

TIDAL OBSERVATIONS IN DANMARKS HAVN OCTOBER 3RD 1906—MARCH 2ND 1907

BY

H. A. Ø. BISTRUP

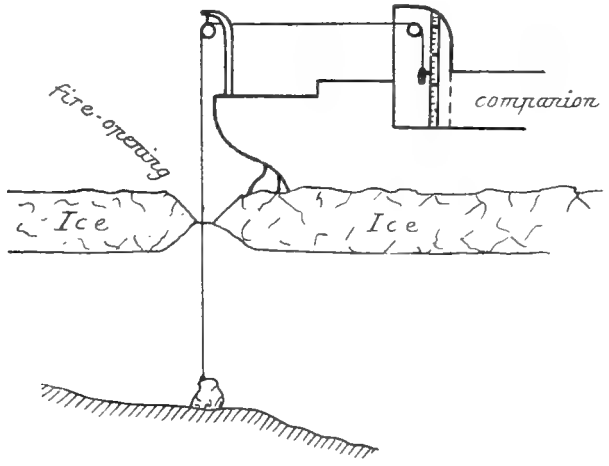
1913

The tidal observations in Danmarks Havn were begun by the Captain of the vessel, First-lieutenant Alf Trolle, later the leader of the Expedition.

The observations were started on October 3rd under the supervision of First-lieutenant Trolle, he himself or the watchman noting down the height of the water. This was observed on a long pole divided into meters and centimeters, which was let down through the fire-hole in the ice at the stern, so that the distance of the surface from the bottom could be read off directly. This method of determining the height of the water proved, however, to be primitive and inexact and the director of the observations was thus obliged to find a more systematic and reliable apparatus.

With the assistance of the engineer Weinschenck and the boatswain G. Thostrup the following arrangement was fixed up.

A davit with pulley was set up at the stern of the ship; over this passed a thin steel wire with a heavy sack full of stones at the



one end, which, led down through the opening to the bottom, formed the fixed point of the apparatus. From the pulley on the davit the wire was led through a hole in the door of the companion, built in

the upper-structure on the quarter-deck, and from there over a second pulley down alongside a measuring board divided into meters and centimeters. Here at the free end of the wire was a heavy lead-weight with a pointer, which could move up and down the scale.

The readings of the scale gave directly the height of the surface above the fixed point. Now and then the reading was controlled by a simultaneous reading of the height of water on a pole passed down through the fire-hole alongside the wire. When the wire broke, which happened fairly frequently, such control was necessary and then by shortening or lengthening the wire agreement between the two readings was reestablished. If the difference was very small, no change was made in the wire, but a correction was then determined which was at once applied to the reading.

Thus, when the apparatus was in good working order, the vertical movements of the ship could be constantly followed, hence the course of the tidal wave, from centimeter to centimeter, and even at high and low water, when the movements were small, the slightest change reflected itself in the position of the pointer.

The daily observations from October 3rd 1906 until the series concluded on March 2nd 1907 are recorded in the accompanying tables. Though the readings are given in centimeters, that does not mean, that the fluctuations in the height of the water could be determined with an accuracy of 1 cm., for the ship itself, however fixed it seemed to be in the ice, has certainly had some amount of independent movement in its bed. Similarly, we may assume, that the ship has also had a slight amount of freedom in horizontal direction, which, from the mode of construction of the apparatus, has also had some influence on the up and down movements of the pointer.

During the observations special attention had to be paid to the following conditions.

When the vertical movement of the ship was very slight at low and high water, it very frequently happened, that the wire became frozen in the ice in the fire-opening and thus the pointer remained standing at the same spot. It was thought in the beginning, that this indicated a maximum or minimum point in the height of the tidal wave, but the source of irregularity was soon discovered and it was found necessary to test now and then whether the wire ran freely through the fire-opening. When the wire became fast in the ice, the reason was as a rule, that the fire-opening had not been cut through that day, so that the funnel-shaped opening — as shown in the sketch — had closed. But there was also a second reason. For some time we used a wire composed of several strands. If one or several of these sprung, they acted like drags and were more apt

to become frozen in the ice. The advantage of the wire with several strands was, that it was considerably stronger than a single line, whereas the latter had the advantage of being more able to cut through the ice. I am inclined to believe, however, that the wire with several strands is the best in the long run, but it should be examined frequently.

When my participation in the sledge journeys of the first autumn came to an end in November, First-lieutenant TROLLE asked me to share with him the work of recording the tidal observations.

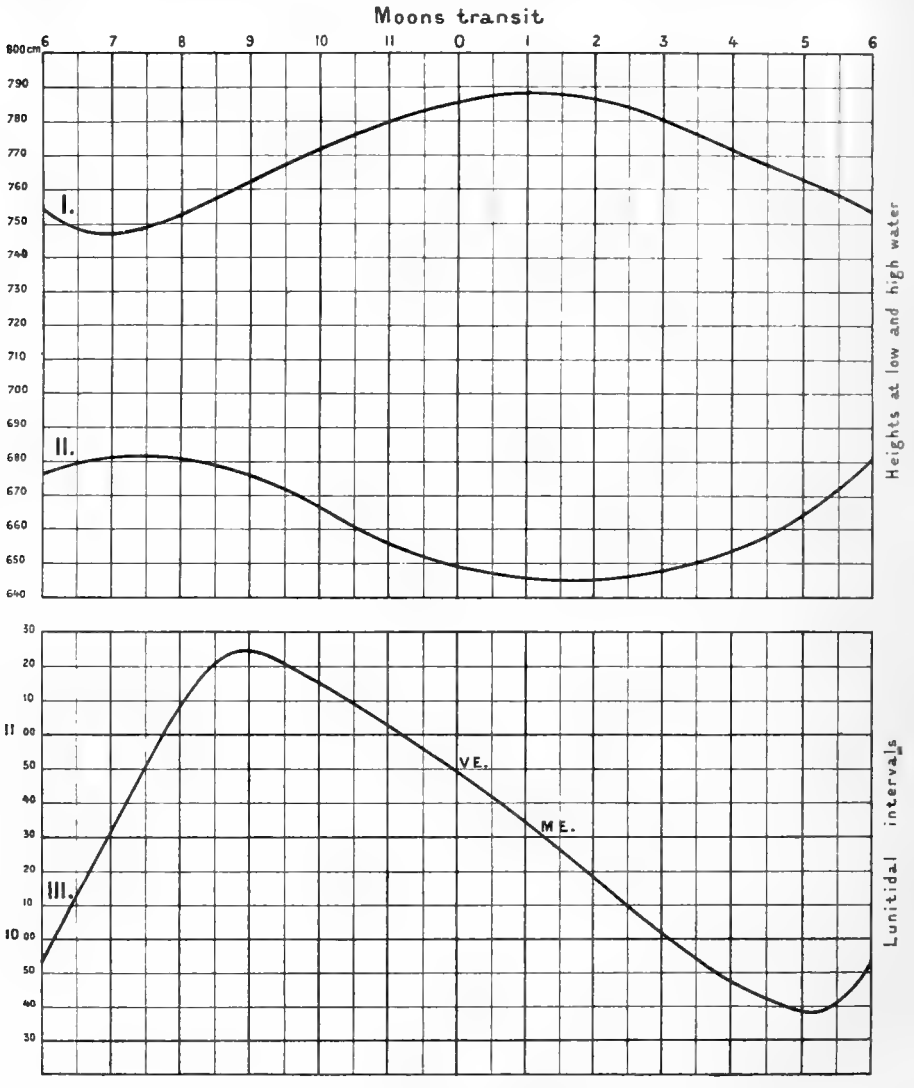
The frequency of these will be seen from the Table, where all the observations taken during the four months are recorded. The time noted is the mean time of the locality and the height of the water is given in centimeters.

The daily observations are included, so as to be readily accessible for any one who may desire to calculate the constants of the tidal movement in Danmarks Havn by a different method from that used by me. In my calculations I have made use of the method indicated by the Rev. Dr. WHEWELL in his "Treatise on Tides" in the "Tide tables" for 1906.

The method given in that work has been followed throughout, the time and height of water being noted on coordinate paper so as to give a curve representing the course of the tidal wave; in this way the times of high and low water with the corresponding heights of the water are determined. The difference between the mean time for high water found in this way and the preceding mean time for the culmination of the moon, upper or lower, is the lunitidal interval, corresponding to the true time of the moon's transit. All these intervals have been arranged in groups, which, relative to the moon, extended from the first or last quarter through full or new moon to the last or first quarter, or, put in another way, in groups where the intervals lay in the period from the moon's transit VI o'cl. through O o'cl. to VI o'cl. Each group gave a curve for the semimensual inequality. On calculating the mathematical means for these curves — the values for every ten minutes of the moon's transit being taken — we obtain a curve, which, smoothed by the graphic method, is the accompanying curve III, which is therefore the curve for the semimensual inequality of the establishment.

The same method was used in calculating the curves I and II and these curves thus represent respectively the semimensual inequality of the height of the tidal wave at high water and at low water.

From the curves I and III it is seen, that the "mean establishment of the place", i. e. the mean of the tidal intervals or the tidal interval corresponding to the highest high water after the moon's



V E means Vulgar establishment.
M E — Mean establishment.

transit at Oh. Om., is Xh. 32 m. The vulgar establishment is Xh. 49 m. From curve I and III it is seen, that the age of the tide is ca. $1^1/_2$ days.

In Appendix I to his "Treatise on tides" p. XVIII, the Rev. Dr. WHEWELL has given a table "Correction of the vulgar Establishment to find the Lunitidal Interval". The same dimensions have been taken from curve III and for comparison noted down in the following table. — The curve p. XVIII corresponds to a tidal wave, whose age is $1^1/_4$ days.

Hour of moon's transit (true time)	0	1	2	3	4	5	6	7	8	9	10	11
	m	m	m	m	m	m	m	m	m	m	m	m
Correction (Dr. WHEWELL)	0	—16	—32	—47	—57	—60	—47	—16	+15	+28	+25	+15
Correction-curve III	0	—15	—30	—47	—61	—71	—55	—18	+19	+35	+26	+14

On p. XIX a correction is given for the "mean establishment" and if from this and curve III here we calculate the times of high water corresponding to the whole hours, we obtain the following table for comparison.

Hour of moon's transit (true time)	0	1	2	3	4	5	6	7	8	9	10	11
	h m	h m	h m	h m	h	h m	h m	h m	h m	h m	h m	h m
Time of high water (Dr. WHEWELL)	10 47	11 31	12 15	13 00	13 50	14 47	16 00	17 31	19 02	20 15	21 12	22 02
— - — — from curve III	10 49	11 34	12 19	13 02	13 48	14 38	15 54	17 31	19 08	20 24	21 15	22 03

In conclusion, I desire to express my best thanks to Captain H. RAVN for the kindness and assistance he has shown me during the preparation of this work.

Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms
					October 1906.						
3. pm.	4.30	650		4.25	693		10.10	705	14.	mn.	685
	6.00	655		6.00	660	noon	12.15	728		2.00	680
	8.00	705		6.30	654		2.00	742		4.00	713
	10.00	783		8.00	670		4.00	735		6.00	735
	11.00	795		10.00	725		5.00	725		8.00	753
	11.30	800	7.	mn.	780		6.00	712		9.00	750
4.	mn.	799		2.00	775		8.00	687		10.00	740
	2.00	755		4.00	728		8.30	680		11.00	720
	400.	675		6.00	675		10.00	680	noon	1.00	685
	6.00	655		6.30	668	11.	mn.	705		2.00	688
	6.30	655		8.00	674		2.00	725		4.00	705
	8.00	690		10.00	730		4.00	742		6.00	732
	10.00	761		noon	758		6.00	735		8.00	750
	11.00	785		12.30	782		7.00	725		10.00	735
	11.30	799		2.00	758		8.00	714	15.	mn.	695
	noon	799		4.00	710		9.00	705		2.00	695
	0.30	780		6.00	675		9.45	700		4.00	715
	2.00	735		7.40	658		10.30	697		6.00	735
	2.40	730		8.00	660		noon	700		8.00	765
	3.00	710		10.00	705		1.30	715		10.00	755
	4.00	675	8.	mn.	768		2.00	720		noon	715
	5.00	654		2.00	770		2.30	723		2.00	665
	6.00	645		4.00	735		4.00	735		4.00	683
	8.00	690		6.00	692		6.00	715		6.00	718
	10.00	757		7.45	670		8.00	700		8.00	760
5.	mn.	795		9.45	700		10.00	685		10.00	760
	0.15	797		noon	748	12.	mn.	684	16.	mn.	715
	1.00	793		2.15	760		2.00	710		2.00	665
	2.00	757		4.30	713		4.00	734		4.30	670
	4.00	692		6.30	675		6.00	740		6.30	720
	6.00	658		7.55	665		8.00	727		8.30	769
	8.00	690		8.40	670		10.00	705		10.00	770
	10.15	760		10.00	690		noon	695		noon	726
	11.00	781	9.	mn.	735		2.00	700		1.00	695
noon	12,15	791		2.00	740		4.00	716		2.00	656
	1.45	769		4.00	750		6.00	725		4.00	650
	2.20	748		6.00	716		8.00	713		6.00	702
	4.00	697		8.00	673		10.00	690		8.00	760
	6.00	654		10.00	705	13.	mn.	677		10.00	780
	6.15	650		noon	735		2.00	685	17.	mn.	756
	8.00	685		2.00	765		4.00	711		2.00	677
	10.00	751		4.00	740		6.00	735		4.00	650
6.	mn.	795		7.00	695		8.00	734		6.00	688
	2.00	772		8.00	685		10.00	715		8.45	778
	4.00	705		10.00	705		noon	690		10.15	792
	6.00	664	10.	mn.	760		2.00	686		10.40	790
	8.00	675		2.00	760		4.15	710		11.00	783
	10.00	740		4.00	757		6.00	725		noon	760
	noon	779		6.00	730		8.00	735		2.00	715
	2.15	758		8.00	704		10.00	715		4.15	660

Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.
	4.45	650		10.15	755		8.05	705		8.00	780
	6.00	665	noon	12.55	770		noon	725		9.20	775
	8.00	715		1.05	765		2.10	783		9.40	770
	10.00	775		5.45	610		4.00	755		10.20	760
18.	mn.	804		6.00	613		8.05	680	noon	1.45	683
	2.00	730		8.00	649		10.05	671		4.00	688
	4.00	655		9.00	695	25.	mn.	750		6.10	734
	6.00	685		10.00	740		2.00	781		8.00	765
	8.00	760	21.	mn.			4.00	760		10.00	752
	10.00	796		12.10	796		6.00	745	29.	mn.	705
	10.30	812		2.00	773		8.00	705		2.00	665
	11.00	805		4.00	710		10.00	687		4.00	655
	noon	793		6.00	645		11.00	687		6.00	725
	2.00	738		—	—		noon	700		8.17	756
	4.30	645		noon			2.45	730	noon	4.25	658
	5.00	643		—	—		3.45	738		6.00	693
	7.00	692		8.00	665		8.00	698		8.00	745
	8.00	727		10.00	729		10.10	670		10.05	748
	10.00	795	22.	mn.	804	26.	mn.		30.	mn.	
	11.00	807		2.00	790		12.05	675		12.45	684
19.	mn.	798		4.00	710		2.30	715		2.00	655
	2.00	725		6.45	675		4.00	737		4.00	646
	4.00	655		—	—		6.00	749		6.05	693
	6.00	640		noon			8.00	731		8.00	744
	7.45	692		—	—		10.15	705		10.30	748
	8.15	710		3.30	740		10.45	686		noon	715
	10.15	778		6.00	660	noon	2.00	689		2.00	660
	11.15	792		8.00	645		6.10	745		4.14	643
	noon	770		10.00	690		8.05	735		5.58	678
	2.00	710	23.	mn.	773		10.00	705		10.00	772
	4.10	634		2.00	788	27.	mn.	700	31.	mn.	738
	4.20	626		4.00	755		2.00	714		2.00	680
	4.30	623		6.00	690		4.00	733		4.00	637
	4.45	620		8.00	671		6.00	750		6.00	697
	5.10	615		10.00	698		10.10	760		8.00	752
	5.25	610	noon	12.05	755		10.55	748		8.50	772
	5.35	613		2.00	775	noon	12.05	725		10.08	782
	8.00	685		6.00	700		2.00	711	noon	1.10	713
	10.00	760		8.05	666		3.02	726		2.25	678
20.	mn.	790		10.05	688		8.00	780		3.00	665
	2.00	742	24.	mn.			10.00	754		3.55	658
	4.00	663		12.35	758	28.	mn.	714		6.05	688
	6.00	629		2.03	788		2.00	698		8.17	765
	8.00	670		4.02	784		4.00	725		10.02	795
	8.20	680		6.00	746		6.00	760			

November 1906.

1.	mn.	768		2.00	720		2.00	735		12.40	754
	2.00	700		4.00	665		4.00	671		12.45	751
	4.00	655		6.00	655		6.00	652		2.00	735
	6.05	675		8.00	700		8.00	694		4.00	683
	8.15	740		8.45	724		10.00	755		6.00	644
	9.55	770		10.20	770		noon	788		8.00	656
noon	12.20	740		11.35	765		2.00	745		—	—
	2.45	666	noon	1.30	706		4.00	685		noon	
	3.24	650		2.15	696		6.00	655		—	—
	3.50	640		3.15	668		8.00	685	5.	mn.	
	7.30	698		5.15	636		10.00	737		—	—
	8.00	719		8.00	697	4.	mn.	753		noon	
	10.00	773		10.00	762		12.10	753		—	—
2.	mn.	770	3.	mn.	780		12.25	754		8.00	644

Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.
	8.30	652		2.00	730		10.00	785		6.00	661
6.	mn.	732		4.00	740	15.	mn.	710		8.00	643
	1.00	750		6.00	745		2.00	675		10.00	678
	1.10	742		8.00	720		4.00	640	20.	mn.	777
	1.20	750		10.00	702		6.00	710		2.00	785
	1.30	749		noon	702		8.00	770		4.00	779
	1.40	748		1.00	710		10.00	795		6.00	679
	1.50	750		2.00	722		noon	740		8.00	651
	2.00	748		4.00	742		2.00	686		9.00	664
	2.10	747		6.00	738		4.00	662		10.00	693
	2.20	741		8.00	735		6.00	750		noon	753
	4.00	725		10.00	700		8.00	710		1.00	768
	6.00	687	11.	mn.	685		10.00	710		2.00	776
	8.00	662		2.00	680	16.	nm.	785		2.30	743
	—	—		4.00	730		2.00	730		6.20	630
	noon			6.15	750		5.00	700		8.00	628
	—	—		8.00	735		8.00	780		8.30	638
	3.18	729		10.00	711		9.00	795		10.00	686
	4.00	715		noon	695		10.00	795	21.	mn.	
	5.02	689		2.00	695		noon	760		12.10	753
	6.07	667		4.00	720		2.00	716		12.45	765
	8.00	657		6.00	742		4.00	695		1.00	765
	—	—		8.00	735		6.00	703		1.15	770
7.	mn.			9.40	716		8.00	760		1.30	773
	—	—	12.	mn.	693		10.00	810		1.50	772
	noon			2.00	695		11.30	810		2.00	774
	—	—		4.00	725	17.	mn.			2.20	772
	8.00	653		6.00	750		2.00	740		3.00	763
	10.00	666		8.00	760		4.00	680		4.00	743
8.	mn.	695		10.00	725		6.00	670		—	—
	1.30	698		noon	691		8.00	745		noon	
	1.40	699		2.00	682		10.00	808		—	—
	1.50	699		3.00	690		noon	785		8.00	656
	2.10	700		4.00	705		2.00	735		10.00	672
	2.20	700		6.00	740		4.00	680	22.	mn.	733
	2.30	700		8.00	755		6.00	668		2.00	774
	4.00	705		10.00	735		8.00	685		4.00	770
	6.00	730	13.	mn.	693		10.00	685		6.00	728
	10.00	708		2.10	680	18.	mn.	700		8.00	680
	noon	730		4.00	700		2.00	720		10.32	690
	12.30	745		6.00	744		4.00	685		noon	720
	2.00	750		8.00	770		6.00	670		1.18	750
	4.00	750		10.00	748		8.00	690		7.00	695
	6.00	720		11.30	705		10.00	762		8.00	676
	8.00	693	noon	2.00	670		11.00	778		9.15	669
	10.00	695		4.00	685		noon	777		10.00	672
9.	mn.	723		6.00	735		2.00	728	23.	mn.	707
	2.00	738		8.00	772		4.00	645		2.00	765
	4.00	738		10.00	764		5.00	618		3.00	768
	6.00	740	14.	mn.	710		6.00	615		4.00	775
	8.00	710		2.00	676		8.00	665		8.00	750
	10.00	712		4.00	685		9.45	790		9.00	695
	noon	723		6.00	730	19.	mn.	795		9.50	693
	1.30	735		8.00	774		2.00	760		10.00	690
	2.15	740		9.00	778		4.00	690	noon	12.35	715
	3.00	745		10.00	775		6.40	640		1.40	730
	4.00	745		noon	710		8.55	690		2.00	737
	6.00	746		2.00	665		—	—		4.00	766
	9.00	735		2.30	658		noon			6.00	770
	10.00	710		4.00	660		—	—		—	—
	11.00	695		6.00	710		2.00	755	24.	mn.	
10.	mn.	700		8.00	780		4.00	680		—	—

Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.
	noon			—	—		4.00	705		10.00	780
	—	—		8.00	783		6.00	745	30.	mn.	775
25.	mn.			10.00	762		—	—		12.45	750
	—	—	27.	mn.	720		noon			2.45	675
	10.00	725		2.00	697		8.00	781		4.00	665
	noon	695		4.00	716		10.15	785		6.00	690
	2.00	705		6.00	757	29.	mn.	757		8.20	670
	8.00	743		8.00	785		2.00	706		10.00	768
	10.20	707		—	—		4.00	586	noon	12.15	736
26.	mn.	678		noon			6.00	617		2.15	681
	2.00	698		—	—		8.00	666		3.30	656
	4.00	728		8.00	785		—	—		6.30	691
	6.00	765		10.00	778		noon			8.10	735
	—	—	28.	mn.	736		—	—		10.15	784
	noon			2.00	698		8.10	760			

December 1906.

1.	mn.	768		9.45	715		9.50	688		noon	684
	2.00	720	noon	12.35	765		11.45	694		12.45	674
	4.00	690		2.45	735	noon	2.30	728		1.15	673
	6.00	675		3.40	718		2.50	733		2.05	674
	8.00	736		4.35	691		3.37	737		4.00	709
	10.00	766		5.55	666		4.12	742		5.00	733
	noon	763		6.50	656		7.15	710		6.00	760
	2.45	743		10.15	712		9.00	690		8.00	780
	5.00	657	6.	mn.	756		10.00	678		10.00	757
	6.15	667		2.00	765	10.	mn.	683	13.	mn.	707
	8.00	725		4.00	740		2.00	719		2.00	680
	10.00	785		6.00	690		3.30	743		4.00	699
2.	mn.	800		8.05	680		4.45	751		6.00	745
	2.00	775	noon	1.07	760		5.50	749		8.15	770
	4.00	705		3.30	733		6.40	743		8.45	765
	6.00	685		5.50	707		9.13	707		11.30	705
	8.00	730		7.30	666		10.45	692	noon	12.15	688
	10.00	755		8.00	665	noon	1.20	708		2.10	654
	noon	788		10 00	691		4.30	754		3.10	657
	2.00	738	7.	mn.	744		5.50	758		4.45	688
	4.15	737		2.00	775		8.00	739		6.00	724
	6.00	668		10.20	718		10.00	710		7.45	778
	8.00	718		11.48	754	11.	mn.	697		8.00	778
	10.00	781	noon	12.50	773		2.00	717		10.00	770
3.	mn.	804		4.30	765		4.00	750	14.	mn.	720
	2.00	762		6.00	737		6.00	782		2.00	670
	4.00	663		8.20	685		8.00	755		4.00	670
	6.00	661		10.20	725		9.15	735		6.00	716
	8.00	714	8.	mn.	757		9.40	728		9.15	770
	—	—		2.00	792		11.15	698		10.00	758
	noon			4.00	797	noon	12.30	690		10.40	745
	—	—		9.35	717		1.35	698		noon	707
	8.00	722	noon	12.10	743		2.45	715		1.00	677
	10.00	770		1.05	754		5.05	762		3.00	633
4.	mn.	810		3.20	760		5.50	773		4.15	637
	2.00	805		4.30	752		8.00	772		5.00	660
	4.00	749		5.00	743		10.00	740		6.15	715
	6.00	715		6.00	726	12.	mn.	702		8.00	768
	8.00	729		8.00	685		2.00	704		9.00	785
	—	—		10.00	680		4.00	732		10.00	787
	noon		9.	mn.	710		6.00	782	15.	mn.	
	—	—		2.00	745		9.15	744		12.45	720
5.	mn.			4.00	757		10.05	728		2.00	680
	—	—		6.15	740		11.15	705		4.00	656

Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.
	6.35	715		4.50	678		7.00	725	28.	mn.	700
	8.05	768		6.50	642		8.00	705		2.00	663
	10.00	786		8.05	632		10.00	683		4.00	656
	noon	745		9.30	675	24.	mn.	680		6.00	695
	1.13	713		10.05	694		2.00	704		8.00	732
	2.55	660		11.00	728		4.00	736		9.50	737
	4.10	645	20.	mn.			6.00	747	noon	2.50	645
	8.15	776		12.15	770		8.00	725		4.30	645
	8.30	783		2.05	790		10.30	672		5.00	655
	10.20	820		4.00	753		—	—		6.00	676
16.	mn.	795		6.00	683		noon			7.30	725
	2.00	732		8.00	651		—	—		8.00	735
	4.00	670		10.00	686		8.00	717		8.50	752
	6.00	685		noon	744		10.00	703		10.00	755
	8.00	745		2.00	765	25.	mn.	665	29.	mn.	735
	11.45	790		4.00	729		2.00	675		2.00	685
noon	1.10	738		6.00	677		4.00	705		4.00	664
	3.00	665		8.20	646		6.00	725		6.00	687
	4.45	628		9.00	649		8.00	720		8.00	732
	9.00	730		10.10	677		10.00	685		10.00	755
	10.00	790	21.	mn.	749		—	—		10.50	742
17.	mn.	804		2.00	775		noon			11.50	723
	2.00	750		4.00	760		—	—	noon	1.00	700
	4.00	675		6.00	710		8.00	720		3.00	656
	6.00	660		8.55	669		10.00	700		3.50	644
	8.00	705		11.00	700	26.	mn.	670		6.00	668
	8.30	725	noon	1.00	758		2.00	655		8.30	742
	9.05	750		2.30	765		4.00	680		10.00	775
	10.10	785		5.00	725		6.00	713	30.	mn.	758
noon	4.00	668		5.50	707		8.00	720		2.00	708
	6.00	633		10.00	667		10.00	695		4.00	673
	8.00	690	22.	mn.	717		11.40	670		6.00	684
	10.05	780		2.00	760	noon	2.10	640		10.00	760
18.	mn.	820		4.00	765		3.30	650		noon	740
	2.00	787		6.00	727		5.00	680		4.00	658
	4.00	708		8.00	685		5.50	704		6.00	660
	6.00	658		9.10	665		8.05	735		8.00	744
	8.00	667		11.30	682		10.09	722		10.00	766
	8.45	689	noon	1.00	715	27.	mn.		31.	mn.	767
noon	12.30	780		6.00	726		12.35	704		2.00	713
	4.15	665		8.15	676		2.10	655		4.00	665
	5.30	620		10.30	669		4.00	660		6.00	675
	8.00	645	23.	mn.	686		6.00	692		8.00	705
	10.00	720		2.00	731		8.30	715		noon	757
19.	mn.	775		4.00	754	noon	12.10	664		3.30	654
	2.00	770		6.00	756		1.30	634		4.30	636
	4.00	710		8.00	711		2.00	625		7.00	656
	6.00	681		10.00	675		3.00	622		8.20	702
	8.00	648		noon	678		5.30	665		10.00	753
	11.45	758		1.45	706		6.00	680		11.00	770
noon	1.45	760		2.50	725		8.00	724			
	2.50	734		5.20	741		10.00	740			

Januar 1907.

1.	mn.	768		8.00	657		8.00	665	3.	mn.	
	2.00	729		8.20	667		10.00	715		12.30	757
	4.00	675		10.00	730	noon	12,15	744		2.00	744
	6.00	655	2.	mn.	763		1.00	744		4.00	695
	8.00	685		2.00	752		2.00	726		6.00	651
	10.20	744		4.00	690		4.15	650		8.00	655
noon	6.30	626		6.00	650		10.00	711		10.00	695

Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.
noon	12.15	738		5.00	754		noon	744		8.00	670
	2.00	728		8.00	746		3.00	650		9.00	672
	4.00	675		10.25	678		4.20	626		10.00	684
	8.00	631	noon	12.10	670		6.00	641	noon	12.50	770
	10.00	685		2.10	694		8.30	742		1.30	780
4.	mn.	740		4.00	730		9.35	775		2.20	784
	2.00	751		6.00	753		11.10	797		3.50	769
	4.00	714		8.00	751	15.	mn.	790		7.40	672
	6.00	661		9.15	720		12.55	772		10.30	686
	8.15	651		10.15	710		4.30	650	20.	mn.	735
	10.10	693	10.	mn.	685		5.00	648		2.45	777
	noon	734		1.20	685		6.50	670		4.00	770
	2.10	739		4.45	745		8.20	724		6.00	730
	4.00	701		5.50	755		9.30	752	noon	2.10	752
	6.00	653		9.40	711		10.30	772		4.00	744
	8.00	645		noon	667		noon	770		9.00	644
	10.00	673		2.00	666		2.50	682		10.00	643
5.	mn.	726		4.00	715		4.50	618	21.	mn.	677
	2.00	755		6.00	750		6.50	624		2.00	727
	4.00	730		8.00	764		8.05	670		4.00	737
	6.00	687		9.50	740		10.00	758		6.00	715
	8.15	656	11.	mn.		16.	mn.	790		8.00	707
	10.00	678		12.15	687		4.30	670		8.44	658
	noon	727		3.00	686		6.00	644		8.54	655
	2.10	751		8.20	754		9.50	748		9.04	656
	6.30	675		9.30	735		11.00	790		9.14	655
	8.00	660		10.30	723	noon	1.00	792		9.24	654
	10.00	685		noon	675		6.00	688		9.34	654
6.	mn.			2.25	647		8.00	698		9.44	652
	12.30	746		4.00	668		11.30	817		9.54	651
	3.00	769		6.30	738	17.	mn.	822		10.04	652
	4.00	760		8.00	763		1.05	840		10.14	655
	7.00	697		9.30	763		1.20	852		10.24	654
	10.20	684		10.15	745		1.30	858		10.34	655
	noon	723	12.	mn.	706		1.55	855		10.44	656
	2.30	756		6.00	728		4.30	750		10.54	657
	4.00	746		9.15	760		6.05	692		11.04	660
	6.00	708		10.15	746		9.00	702		11.44	673
7.	mn.			noon	693		10.00	736	noon	12.44	693
	1.00	738		2.25	647		11.10	787		1.44	716
	3.00	760		4.05	652	noon	12.30	807		2.44	736
	5.15	722		6.00	708		2.00	780		2.54	741
	8.00	684		8.30	770		2.30	762		3.04	736
	10.00	672	13.	mn.			5.30	663		3.14	741
noon	12.30	707		4.00	668		8.00	646		3.24	743
	2.00	736		5.00	678		10.05	708		3.34	743
	4.00	748		8.45	773	18.	mn.	781		3.44	746
	6.00	744		10.00	773		2.00	790		3.54	744
8.	mn.	672		noon	728		4.00	730		4.04	744
	2.00	712		2.45	646		6.20	635		4.14	744
	4.00	748		4.05	634		9.25	677		4.24	742
	6.00	742		6.00	674		11.15	736		4.34	741
	8.00	737		8.00	745	noon	1.00	777		4.44	742
	9.30	688		9.10	785		2.00	769		4.54	741
	10.40	737		11.00	792		4.00	715		5.04	739
	noon	677	14.	mn.	775		7.20	620		5.14	734
	2.00	713		1.00	755		10.00	670		5.44	729
	4.00	747		2.20	696	19.	mn.			6.44	715
	6.00	741		4.20	658		12.05	750		7.44	702
	8.00	746		7.30	724		2.00	786		8.44	683
9.	mn.			8.20	742		4.00	764		8.54	680
	12.30	693		10.00	777		6.00	728		9.04	681

Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.
	9.14	679		2.44	736		11.09	685		1.24	689
	9.24	675		3.44	754		11.19	683		1.34	691
	9.34	678		4.04	753		11.29	683		1.44	693
	9.44	673		4.14	752		11.34	682		1.54	692
	9.54	763		4.24	756		11.44	681		2.04	695
	10.08	670		4.34	755		11.54	680		2.14	696
	10.14	673		4.44	756	noon	12.04	678		2.24	696
	10.34	675		4.54	762		12.14	678		2.34	698
	10.44	675		5.04	759		12.24	678		2.44	702
	10.54	676		5.14	756		12.34	680		3.44	715
	11.05	678		5.24	763		12.44	677		4.44	726
	11.14	677		5.34	760		12.54	680		5.44	732
	11.24	680		5.44	757		1.04	679		5.54	734
	11.36	684		5.54	759		1.14	679		6.09	733
	11.44	685		6.14	753		1.24	685		6.14	732
	11.54	688		6.44	754		1.34	686		6.24	733
22.	mn.			6.54	748		1.44	688		6.34	735
	12.14	692		7.04	749		1.54	689		6.44	732
	12.49	706		7.44	738		2.04	693		6.54	732
	1.44	730		8.44	720		2.14	696		7.04	732
	2.44	745		9.44	706		2.44	703		7.19	729
	3.14	753		10.44	701		3.19	714		7.28	727
	3.24	754		10.54	701		3.44	721		7.34	730
	3.34	756		11.05	696		4.14	725		7.49	725
	3.46	758		11.14	700		4.44	734		7.56	724
	3.59	754		11.24	701		4.54	732		8.04	724
	4.04	761		11.34	701		5.04	732		8.24	718
	4.15	758		11.44	700		5.14	736		8.44	718
	4.27	758		11.54	701		5.24	737		8.54	715
	4.34	756	23.	mn.			5.34	738		9.44	706
	4.44	754		12.04	704		5.44	737		10.45	688
	4.59	753		12.14	705		5.54	739		11.14	681
	5.04	759		12.27	708		6.04	739		11.36	676
	5.14	747		12.34	707		6.14	741		11.44	675
	5.24	753		12.44	705		6.24	741		11.54	674
	5.34	752		12.54	714		6.34	740	noon	12.04	671
	5.44	741		1.04	710		6.44	739		12.14	669
	5.54	744		1.19	710		6.54	741		12.24	670
	6.04	741		1.34	715		7.04	741		12.34	667
	6.44	735		1.44	715		7.14	738		12.59	665
	7.44	721		2.44	730		7.24	738		1.09	666
	8.44	704		3.44	743		7.34	740		1.14	666
	9.44	687		4.44	753		7.44	739		1.34	667
	9.54	689		4.54	753		7.54	737		1.44	666
	10.04	689		5.07	755		8.04	735		1.54	670
	10.14	687		5.24	753		8.14	735		2.04	669
	10.24	685		5.34	754		8.24	733		2.14	670
	10.34	682		5.44	753		8.33	730		2.24	672
	10.44	683		5.54	753		8.44	728		2.34	674
	10.54	682		6.04	750		9.53	711		2.44	675
	11.04	682		6.16	749		10.53	699		2.54	676
	11.14	682		6.25	745		11.44	691		3.04	677
	11.24	686		6.34	745		11.54	691		3.14	681
	11.34	682		6.44	747	24.	mn.			3.45	687
	11.44	686		8.03	729		12.04	690		4.45	704
	11.54	690		8.44	716		12.14	689		5.34	721
noon	12.04	691		9.44	703		12.24	689		6.44	734
	12.14	690		10.14	697		12.34	689		6.54	736
	12.24	691		10.29	695		12.44	690		7.06	737
	12.34	696		10.34	694		12.58	689		7.14	737
	12.44	700		10.47	689		1.04	690		7.24	738
	1.44	719		10.59	688		1.14	688		7.34	740

Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.
	7.44	741		1.14	665		7.44	733		1.54	689
	7.54	739		1.25	665		8.04	737		2.04	686
	8.05	741		1.34	663		8.14	738		2.14	685
	8.14	742		1.44	659		8.24	735		2.24	684
	8.24	738		1.54	659		8.34	737		2.34	680
	8.35	740		2.04	659		8.44	738		2.44	679
	8.44	738		2.14	660		8.54	736		2.54	676
	8.54	737		2.24	657		9.04	737		3.04	677
	9.05	737		2.34	658		9.14	735		3.19	677
	9.15	736		2.44	659		9.24	733		3.24	675
	9.24	732		2.54	660		9.34	735		3.34	675
	9.34	731		3.04	661		9.44	730		3.44	674
	9.44	728		3.14	661		10.44	719		3.54	674
	10.44	714		3.24	663		11.44	700		4.04	675
	11.44	699		3.34	665	noon	12.44	681		4.14	678
25.	mn.			3.44	666		12.59	677		4.24	677
	12.44	688		4.45	685		1.04	676		4.34	679
	12.54	690		6.05	711		1.14	671		4.44	684
	1.04	685		6.44	723		1.24	667		4.54	680
	1.14	685		7.44	735		1.34	666		5.08	684
	1.24	684		7.57	741		1.44	666		5.18	688
	1.36	683		8.07	745		1.54	659		5.24	686
	1.44	681		8.34	746		2.04	657		5.34	693
	1.54	681		8.44	746		2.14	657		5.44	697
	2.04	681		8.54	746		2.24	654		6.44	714
	2.14	681		9.04	747		2.34	654		8.04	740
	2.24	681		9.14	746		2.44	654		8.49	747
	2.34	681		9.24	744		2.54	655		8.54	747
	2.44	680		9.34	743		3.04	651		9.04	748
	2.54	683		9.44	747		3.14	654		9.14	749
	3.04	682		10.04	738		3.24	654		9.24	749
	3.14	687		10.14	738		3.34	655		9.34	748
	3.24	685		10.24	735		3.44	656		9.44	750
	3.34	687		10.34	732		3.54	659		9.58	749
	3.44	688		10.44	730		4.04	659		10.04	746
	3.54	690		10.54	727		4.14	660		10.14	745
	4.04	692		11.06	724		4.24	664		10.24	742
	4.14	696		11.14	724		4.34	666		10.34	741
	4.24	699		11.24	717		4.44	667		10.45	739
	4.34	700		11.34	716		5.44	689		11.44	722
	4.44	703		11.44	715		6.44	716	noon	12.44	705
	4.54	705	26.	mn.			7.44	742		1.44	679
	5.04	708		12.44	697		7.54	743		1.55	675
	5.14	709		1.44	683		8.04	745		2.04	673
	5.44	718		2.44	677		8.14	748		2.14	667
	6.44	729		2.54	678		8.24	752		2.24	666
	7.44	731		3.04	677		8.34	753		2.34	661
	7.54	728		3.14	677		8.54	755		2.44	661
	8.04	730		3.24	677		9.04	756		2.54	659
	8.14	725		3.34	679		9.14	756		3.04	657
	8.24	726		3.44	678		9.24	756		3.14	654
	8.34	722		3.54	679		9.34	760		3.24	654
	8.44	724		4.04	681		9.44	758		3.34	654
	8.54	722		4.14	683		9.59	756		3.44	654
	9.04	720		4.24	684		10.04	756		3.54	652
	9.14	716		4.34	686		10.14	756		4.04	653
	9.44	710		4.44	688		10.34	750		4.14	654
	10.44	698		4.54	690		10.44	749		4.24	654
	11.44	682		5.06	694		11.44	733		4.34	656
noon	12.49	668		5.14	694	27.	mn.			4.44	657
	1.00	665		5.44	701		12.44	713		4.54	658
	1.04	667		6.44	718		1.44	691		5.04	662

Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.
	5.14	665		11.44	736		5.44	655	30.	mn.	
	5.24	667	noon	12.44	707		5.54	655		12.04	753
	5.34	669		1.44	679		6.04	656		12.14	750
	5.44	675		2.46	655		6.14	660		12.24	747
	6.54	703		2.54	651		6.24	664		12.44	740
	7.44	730		3.04	648		6.34	664		1.46	715
	8.44	754		3.14	646		6.44	669		2.44	685
	8.54	758		3.25	643		7.44	693		3.44	656
	9.04	756		3.34	641		8.49	716		3.54	653
	9.14	762		3.44	639		9.44	736		4.04	650
	9.24	763		3.54	639		9.54	737		4.14	646
	9.34	763		4.04	636		10.04	738		4.24	644
	9.44	764		4.14	636		10.14	736		4.34	641
	9.54	767		4.24	635		10.24	739		4.44	636
	10.04	766		4.34	637		10.38	740		4.54	635
	10.14	766		4.44	638		10.44	740		5.04	635
	10.29	766		4.54	638		10.54	736		5.14	635
	10.34	765		5.04	638		11.08	736		5.24	635
	10.44	765		5.14	640		11.14	732		5.34	636
	10.58	762		5.24	642		11.24	735		5.44	636
	11.04	761		5.34	645		11.36	729		5.54	635
	11.14	759		5.44	648		11.44	728		6.04	639
	11.24	757		5.54	651		11.56	725		6.14	640
	11.44	750		6.04	655	noon	12.08	722		6.24	641
28.	mn.			6.14	659		12.18	715		6.34	644
	12.44	735		6.24	665		12.24	717		6.44	646
	1.44	707		6.34	666		12.34	709		7.44	671
	2.51	683		6.44	670		12.44	707		8.47	704
	2.54	681		7.44	701		1.50	676		9.47	733
	3.04	679		8.44	731		2.44	651		10.49	740
	3.14	677		9.44	750		2.57	647		10.54	740
	3.24	673		9.54	755		3.04	645		11.14	745
	3.34	672		10.04	756		3.14	641		11.24	742
	3.44	670		10.14	758		3.27	635		11.37	739
	3.54	668		10.24	758		3.34	633		11.44	743
	4.04	668		10.34	760		3.44	630		11.54	737
	4.14	670		10.44	759		3.54	626	noon	12.04	736
	4.24	665		10.54	761		4.04	625		12.18	735
	4.44	670		11.04	758		4.19	620		12.44	728
	4.54	670		11.14	758		4.25	619		1.48	700
	5.04	671		11.24	755		4.34	618		2.48	668
	5.14	675		11.34	750		4.44	618		3.44	639
	5.24	676		11.44	749		4.54	617		3.54	636
	5.34	680	29.	mn.			5.04	616		4.04	635
	5.44	680		12.45	732		5.19	617		4.14	629
	6.44	699		1.44	710		5.38	620		4.24	626
	7.50	725		2.44	681		5.44	621		4.39	627
	8.44	745		3.15	678		5.54	622		4.44	624
	8.54	745		3.24	665		6.09	626		4.54	620
	9.14	748		3.34	662		6.24	633		5.04	619
	9.24	749		3.44	662		6.44	640		5.24	618
	9.34	750		3.54	653		7.44	671		5.44	620
	9.44	752		4.04	653		8.44	709		6.14	625
	9.54	752		4.14	651		9.44	737		6.44	632
	10.04	753		4.24	651		10.44	754		7.56	664
	10.14	751		4.34	649		10.54	756		8.46	700
	10.24	750		4.44	649		11.04	756		9.44	734
	10.34	752		4.54	649		11.14	755		10.44	757
	10.44	752		5.04	650		11.24	758		10.54	761
	10.54	747		5.14	650		11.34	756		11.04	765
	11.04	746		5.24	650		11.44	754		11.14	763
	11.14	743		5.34	652		11.54	752		11.24	767

Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.
	11.34	770		6.04	644	noon	12.04	760		6.14	633
	11.44	770		6.14	646		12.24	757		6.24	633
	11.54	770		6.24	647		12.49	753		6.34	634
31.	mn.			6.34	649		1.44	735		6.44	636
	12.04	768		6.44	650		2.44	705		6.54	636
	12.14	769		6.54	650		3.45	669		7.04	641
	12.24	770		7.04	655		3.54	662		7.18	645
	12.34	763		7.14	660		4.05	659		7.24	646
	12.44	664		7.24	662		4.14	654		7.34	652
	12.54	762		7.34	668		4.24	654		7.48	656
	1.04	753		7.44	671		4.34	648		8.44	687
	1.44	741		8.44	702		4.44	645		9.54	733
	2.44	712		10.00	739		4.54	644		10.44	760
	3.44	680		10.44	755		5.04	641		10.54	766
	4.44	654		10.54	754		5.14	641		11.04	768
	5.14	649		11.04	759		5.24	638		11.14	773
	5.24	650		11.14	758		5.34	637		11.24	776
	5.34	647		11.24	760		5.44	634		11.34	774
	5.44	646		11.34	764		5.54	630		11.44	780
	5.54	644		11.46	761		6.04	630		11.54	786

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1.	mn.			8.10	680		10.54	765		8.04	667
	12.04	786		8.14	681		11.04	772		8.14	670
	12.14	783		8.19	684		11.14	780		8.24	672
	12.24	782		8.24	685		11.24	782		8.34	676
	12.34	782		8.34	690		11.36	790		8.44	679
	12.44	777		8.44	693		11.44	786		9.44	708
	12.54	780		10.00	733		11.54	792		10.51	741
	1.04	778		10.44	756	2.	mn.			11.44	761
	1.14	775		11.26	770		12.04	800		11.55	768
	1.24	773		11.44	776		12.14	796	noon	12.04	769
	1.34	766		11.54	776		12.24	800		12.16	771
	1.54	762	noon	12.04	774		12.34	800		12.30	775
	2.04	757		12.14	777		12.44	802		12.34	776
	2.14	753		12.30	779		12.54	798		12.44	776
	2.24	752		12.38	775		1.04	800		1.04	777
	2.34	746		12.44	772		1.14	797		1.14	780
	2.44	740		12.54	778		1.24	796		1.24	771
	3.44	710		1.04	770		1.34	795		1.35	779
	4.44	683		1.24	766		1.44	792		1.44	773
	5.44	663		1.46	759		2.44	770		1.54	768
	6.14	658		2.47	729		3.44	740		2.44	752
	6.24	656		3.46	700		4.44	700		3.44	720
	6.34	658		4.44	672		5.16	686		4.46	692
	6.44	663		4.59	670		5.31	682		4.56	687
	6.49	661		5.14	661		5.45	676		5.04	685
	6.54	655		5.44	655		5.59	672		5.14	680
	6.59	661		5.59	652		6.05	669		5.24	676
	7.04	658		6.04	651		6.15	667		5.34	670
	7.09	660		6.14	650		6.24	664		5.44	666
	7.14	664		6.26	651		6.34	664		5.59	661
	7.19	660		6.34	650		6.44	662		6.09	658
	7.24	665		6.44	648		6.54	664		6.14	655
	7.29	669		7.04	654		7.04	661		6.24	654
	7.34	663		7.24	654		7.14	661		6.34	655
	7.39	664		7.44	660		7.24	664		6.44	653
	7.44	670		8.44	687		7.34	666		6.54	648
	7.54	678		9.44	724		7.44	666		7.04	650
	8.04	675		10.44	764		7.54	666		7.24	649

Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.
	7.34	650		4.04	726		9.57	672		7.14	668
	7.44	652		4.49	705		10.16	678		7.44	660
	7.54	651		5.44	677		10.44	690		7.59	657
	8.14	658		6.09	665		11.48	721		8.06	651
	9.02	675		6.29	660	noon	12.44	745		8.14	650
	9.39	690		6.39	660		12.54	746		8.24	648
	9.44	693		6.44	657		1.08	751		8.34	647
	10.44	728		6.56	655		1.14	753		8.44	649
	11.46	759		7.04	652		1.24	756		8.55	648
3.	mn.			7.14	652		1.34	756		9.04	645
	12.44	775		7.24	650		1.48	761		9.14	646
	12.54	776		7.34	650		1.57	756		9.24	648
	1.04	780		7.44	649		2.06	763		9.44	649
	1.14	779		7.54	650		2.14	759		9.54	653
	1.24	779		8.08	650		2.24	761		10.04	654
	1.34	777		8.18	650		2.34	760		10.16	656
	1.44	773		8.24	651		2.46	758		10.24	657
	1.56	772		8.37	655		2.54	755		10.34	661
	2.04	774		8.46	656		3.14	752		10.44	662
	2.14	770		8.54	659		3.44	744		10.54	665
	2.24	766		9.06	662		4.18	731		11.04	671
	2.34	765		9.48	676		4.48	720		11.16	670
	2.44	762		10.44	708		5.59	690		11.24	678
	3.44	739		11.44	741		6.14	685		11.34	682
	4.44	708	4.	mn.			7.04	664		11.44	686
	5.44	679		12.44	763		7.24	660		11.59	691
	6.14	665		12.54	765		7.40	654	noon	12.14	701
	6.24	662		1.04	770		7.44	651		12.29	705
	6.34	667		1.14	768		7.54	650		12.44	713
	6.44	655		1.24	770		8.09	650		1.01	720
	6.54	653		1.34	773		8.19	649		1.14	722
	7.04	650		1.44	772		8.24	648		1.44	740
	7.14	650		1.54	775		8.34	648		2.14	738
	7.24	650		2.04	777		8.50	647		2.26	751
	7.34	648		2.14	774		9.00	650		2.34	744
	7.44	648		2.24	774		9.14	651		2.40	751
	7.54	648		2.34	770		9.24	651		2.44	746
	8.04	651		2.44	773		9.37	655		2.49	748
	8.14	651		2.54	770		9.44	656		2.58	750
	8.24	653		3.04	766		9.59	661		3.05	748
	8.34	656		3.14	765		10.44	678		3.10	754
	8.44	656		3.24	763		11.44	706		3.14	742
	8.54	660		3.44	754	5.	mn.			3.25	751
	9.04	666		4.44	729		12.44	733		5.44	715
	9.44	680		5.44	698		1.44	750		6.44	698
	10.48	714		6.44	675		1.59	754		7.04	690
noon	12.29	754		7.14	664		2.07	757		7.19	680
	12.45	762		7.24	661		2.14	753		7.44	675
	12.54	764		7.34	659		2.24	759		8.44	666
	1.09	765		7.44	659		2.34	756		8.55	665
	1.14	765		7.54	658		2.44	759		9.04	669
	1.28	765		8.04	657		2.54	758		9.16	667
	1.34	765		8.14	657		3.04	758		9.26	661
	1.44	765		8.24	658		3.14	754		9.36	668
	1.54	765		8.34	656		3.24	756		9.44	667
	2.14	761		8.44	657		3.34	753		9.59	669
	2.28	760		8.54	659		3.44	749		10.09	671
	2.34	756		9.09	661		3.59	744		10.14	673
	2.44	755		9.14	660		4.14	740		10.29	674
	2.54	754		9.26	663		4.44	732		10.44	681
	3.19	743		9.34	668		5.44	706		11.44	698
	3.34	737		9.47	669		6.44	681			

Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.
6.	mn.			4.44	755		11.46	647		6.14	737
	12.44	718		4.56	755		11.57	654		6.24	736
	1.44	744		5.04	746	noon	12.07	654		6.34	737
	1.54	747		6.08	737		12.22	657		6.44	734
	2.04	751		6.44	726		12.30	657		6.54	734
	2.14	755		7.46	705		12.37	660		7.04	732
	2.24	759		8.44	687		12.44	662		7.14	730
	2.34	758		8.54	686		1.04	665		7.29	727
	2.44	763		9.04	685		1.37	675		7.44	723
	2.54	760		9.10	684		1.44	678		8.44	708
	3.04	762		9.14	680		2.14	690		9.44	689
	3.14	765		9.26	676		2.59	715		10.44	670
	3.24	763		9.30	677		3.44	720		10.54	667
	3.34	763		9.34	679		4.50	735		11.08	666
	3.44	764		9.41	677		4.54	736		11.24	663
	3.54	764		9.44	676		5.09	735		11.34	663
	4.04	763		9.54	676		5.15	739		11.44	661
	4.14	761		10.04	675		5.34	740		11.54	661
	4.24	757		10.14	672		5.44	740	noon	12.04	659
	4.29	759		10.26	673		6.00	740		12.14	658
	4.34	758		10.36	673		6.07	737		12.24	658
	4.44	756		10.44	675		6.17	736		12.34	660
	4.54	752		10.54	673		6.26	736		12.44	660
	5.04	750		11.04	672		6.34	739		12.54	660
	5.14	746		11.14	676		6.44	736		1.04	660
	5.29	744		11.24	678		6.54	731		1.14	661
	5.44	739		11.34	677		7.07	727		1.24	665
	6.44	716		11.46	673		7.16	731		1.34	665
	7.44	695		11.56	682		7.24	723		1.44	666
	8.49	675	7.	mn.			7.35	725		1.54	668
	8.54	673		12.14	690		7.44	721		2.07	671
	9.04	675		12.44	692		8.44	705		2.29	678
	9.14	671		1.44	715		9.44	687		2.44	685
	9.24	668		2.44	729		10.44	679		3.44	706
	9.34	670		3.44	740		10.59	678		4.17	720
	9.44	670		3.59	745		11.08	677		4.44	731
	9.54	669		4.14	745		11.14	676		4.56	735
	10.04	669		4.24	744		11.24	676		5.44	750
	10.14	670		4.34	744		11.34	677		5.59	750
	10.26	670		4.44	743		11.44	676		6.09	750
	10.35	670		4.54	741		11.54	676		6.20	751
	10.44	671		5.04	740	8.	mn.			6.24	752
	10.55	676		5.24	737		12.04	676		6.34	755
	11.05	676		5.34	735		12.14	677		6.44	755
	11.14	677		5.44	737		12.24	678		6.57	757
	11.25	683		5.54	731		12.34	679		7.16	756
	11.34	685		6.14	728		12.44	679		7.24	755
	11.44	688		6.44	718		12.54	684		7.34	755
noon	12.50	707		7.44	697		1.04	684		7.48	755
	1.44	731		8.44	677		1.14	682		7.59	755
	2.48	750		9.14	666		1.24	687		8.06	753
	2.58	756		9.59	655		1.34	689		8.14	751
	3.06	753		10.04	655		1.44	691		8.28	749
	3.16	754		10.16	652		1.59	693		8.41	745
	3.26	756		10.24	651		2.20	697		8.44	746
	3.34	756		10.37	650		2.44	706		9.44	730
	3.44	759		10.44	650		3.44	723		10.46	710
	3.58	760		10.54	650		4.44	734		11.05	703
	4.04	759		11.04	650		5.20	738	9.	mn.	
	4.14	757		11.14	650		5.44	739		12.04	691
	4.24	755		11.24	650		5.54	737		12.24	689
	4.36	753		11.34	650		6.04	737		12.34	688

Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.
	12.44	687		6.44	757		1.20	667		7.45	753
	12.54	686		6.54	761		1.34	662		8.44	768
	1.04	687		7.04	760		1.44	657		8.54	770
	1.14	687		7.14	765		1.54	652		9.04	772
	1.24	685		7.26	766		2.06	651		9.14	770
	1.34	688		7.36	766		2.16	652		9.24	772
	1.44	688		7.46	768		2.26	651		9.39	770
	1.54	688		7.54	770		2.35	650		9.49	767
	2.04	689		8.04	771		2.46	650		9.54	767
	2.14	690		8.14	770		2.57	651		10.04	766
	2.29	692		8.24	770		3.09	651		10.09	766
	2.44	696		8.34	770		3.24	654		10.14	761
	3.44	714		8.46	768		3.34	655		10.24	761
	4.44	731		8.54	768		3.46	656		10.34	757
	5.44	743		9.06	766		3.56	660		10.50	751
	5.59	748		9.14	765		4.46	676		11.06	746
	6.14	748		9.29	763		6.02	716		11.17	740
	6.24	753		9.50	756		6.44	740		11.24	739
	6.34	753		10.14	750		7.00	746		11.39	732
	6.44	752		10.45	740		7.06	751		11.44	728
	6.54	754		11.44	718		7.14	754	noon	12.44	697
	7.04	756	10.	mn.			7.24	758		1.44	667
	7.14	755		12.44	698		7.37	763		1.54	665
	7.24	755		1.14	691		7.44	766		2.06	660
	7.34	755		1.24	687		7.54	770		2.14	654
	7.44	753		1.34	686		8.07	775		2.24	651
	7.56	751		1.44	685		8.15	776		2.38	648
	8.04	751		1.54	683		8.24	776		2.44	646
	8.14	750		2.04	682		8.38	783		2.56	644
	8.24	748		2.14	682		8.44	781		3.04	642
	8.34	746		2.24	680		8.54	785		3.14	640
	8.45	745		2.34	681		9.05	784		3.24	640
	8.59	741		2.44	681		9.14	786		3.34	639
	9.14	735		2.54	682		9.24	785		3.44	639
	9.44	727		3.04	682		9.34	785		3.54	640
	10.44	704		3.14	683		9.44	783		4.09	640
	11.44	682		3.24	683		9.54	783		4.14	641
	11.59	677		3.34	687		10.14	780		4.24	641
noon	12.14	673		3.44	689		10.34	775		4.34	645
	12.29	670		3.59	693		10.44	772		4.44	648
	12.44	669		4.14	695		11.44	749		4.54	650
	12.54	668		4.44	703	11.	mn.			5.09	655
	1.04	665		5.44	726		12.44	720		5.24	660
	1.14	664		6.44	745		1.44	695		5.44	668
	1.24	664		7.14	753		2.14	684		6.44	704
	1.34	662		7.29	755		2.29	683		7.44	740
	1.44	662		7.46	758		2.44	680		8.44	773
	1.54	663		7.56	758		2.54	678		8.54	775
	2.04	662		8.05	762		3.04	676		9.04	781
	2.14	663		8.14	759		3.14	677		9.14	781
	2.24	663		8.24	762		3.24	675		9.28	788
	2.34	665		8.34	757		3.34	675		9.34	785
	2.45	668		8.44	757		3.44	676		9.44	789
	2.54	669		8.54	757		3.54	676		9.56	790
	3.04	668		9.06	755		4.04	676		10.07	791
	3.14	670		9.14	753		4.14	677		10.14	789
	3.24	673		9.24	752		4.24	678		10.24	787
	3.34	678		9.44	746		4.34	681		10.34	787
	3.44	683		11.44	701		4.44	683		10.44	787
	3.59	688	noon	12.46	676		4.59	687		10.54	785
	4.52	714		12.57	672		5.44	703		11.04	779
	5.46	736		1.04	670		6.49	732		11.17	779

Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.
	11.24	777		6.44	666		4.16	631		11.25	786
	11.34	774		7.50	714		4.24	630		11.35	786
	11.44	768		8.44	751		4.35	627		11.46	786
12.	mn.			9.17	770		4.46	625		11.54	787
	12.44	741		9.30	776		4.54	624	noon	12.04	785
	1.55	702		9.44	780		5.09	622		12.14	784
	2.44	682		9.54	783		5.21	622		12.24	781
	3.14	671		10.04	786		5.30	622		12.41	777
	3.29	666		10.14	790		5.46	624		12.52	775
	3.44	663		10.24	790		5.56	626		12.55	770
	3.54	662		10.34	793		6.14	630		1.04	768
	4.04	661		10.44	792		6.29	636		1.14	761
	4.14	659		10.54	792		6.44	640		1.44	745
	4.24	660		11.04	795		7.15	656		2.44	707
	4.34	660		11.14	790		7.44	675		3.44	670
	4.44	662		11.24	789		8.44	722		4.14	654
	4.54	667		11.34	789		9.44	762		4.44	637
	5.04	663		11.44	784		9.56	766		4.54	635
	5.14	665		11.54	781		10.07	775		5.06	632
	5.24	666	13.	mn.			10.14	778		5.19	626
	5.34	669		12.14	775		10.24	781		5.29	625
	5.44	672		12.44	762		10.34	784		5.47	623
	6.44	700		1.44	728		10.44	789		5.54	622
	7.44	732		2.44	692		10.56	792		6.04	624
	8.44	762		3.44	664		11.04	794		6.14	625
	8.59	765		3.59	657		11.14	795		6.26	625
	9.14	770		4.14	652		11.25	795		6.34	626
	9.29	775		4.24	652		11.34	795		6.44	628
	9.46	777		4.34	649		11.44	795		6.57	631
	9.54	778		4.44	647		11.55	793		7.06	632
	10.10	780		4.54	646	14.	mn.			7.15	637
	10.20	780		5.04	645		12.04	792		7.24	641
	10.26	778		5.14	646		12.14	789		7.35	646
	10.35	777		5.24	646		12.29	786		7.45	653
	10.45	776		5.46	650		12.44	781		8.14	671
	10.56	772		5.54	651		1.44	754		8.44	692
	11.06	770		6.04	651		2.44	718		9.49	742
	11.15	766		6.14	656		3.51	676		10.44	775
	11.29	761		6.29	653		4.15	667		10.56	781
	11.35	759		6.44	666		4.29	657		11.06	786
	11.45	756		7.44	700		4.44	652		11.14	788
	11.54	751		9.04	750		4.54	650		11.24	793
noon	12.49	721		9.54	770		5.04	646		11.34	796
	1.44	690		10.04	773		5.14	643		11.44	795
	2.44	655		10.15	777		5.24	643		11.54	800
	3.02	647		10.24	776		5.34	642	15.	mn.	
	3.15	641		10.36	779		5.44	640		12.04	801
	3.31	637		10.45	779		5.54	640		12.14	800
	3.46	632		10.56	780		6.04	641		12.24	800
	3.54	630		11.04	778		6.14	643		12.34	798
	4.04	628		11.16	777		6.24	646		12.44	797
	4.16	625		11.24	778		6.34	648		12.54	795
	4.26	626		11.35	775		6.44	650		1.04	795
	4.35	625		11.45	773		7.00	654		1.14	789
	4.44	626		11.55	771		7.52	682		1.29	785
	4.54	626	noon	12.05	767		8.44	713		1.44	778
	5.02	626		12.44	750		9.01	727		2.44	747
	5.14	630		1.54	708		9.46	752		3.47	707
	5.49	640		2.44	677		10.44	778		4.54	671
	5.59	641		3.44	645		10.54	784		5.29	654
	6.15	650		3.54	640		11.06	784		5.32	649
	6.29	658		4.04	636		11.17	785		5.58	647

Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.
	6.05	645		12.44	795		6.34	649		1.29	766
	6.14	642		12.54	795		6.44	647		1.37	766
	6.24	642		1.04	794		6.54	646		1.48	766
	6.34	642		1.14	793		7.07	645		1.56	765
	6.44	643		1.24	791		7.14	644		2.04	765
	6.54	644		1.34	789		7.28	644		2.14	763
	7.07	646		1.44	786		7.36	645		2.24	764
	7.14	647		1.59	781		7.44	642		2.34	759
	7.24	650		2.29	770		7.55	645		2.55	757
	7.34	653		2.44	765		8.06	646		3.00	751
	7.44	656		3.46	730		8.16	650		3.14	749
	8.14	671		4.47	694		8.27	651		3.32	742
	8.44	686		5.44	668		8.34	653		3.44	738
	9.45	730		6.14	655		8.44	656		4.44	707
	10.44	766		6.29	654		8.54	660		5.44	678
	11.16	779		6.44	648		9.07	665		5.58	673
	11.25	781		6.54	648		9.19	674		6.15	665
	11.34	785		7.04	647		9.37	680		6.30	659
	11.44	787		7.14	648		9.52	689		6.50	651
	11.54	788		7.24	649		9.59	695		7.04	646
noon	12.04	788		7.34	650		10.16	702		7.14	645
	12.16	790		7.44	651		10.44	723		7.29	641
	12.24	790		7.54	652		11.44	753		7.35	642
	12.37	789		8.04	653	17.	mn.			7.43	641
	12.49	789		8.14	656		12.44	773		7.49	640
	12.54	786		8.34	666		1.44	779		7.54	641
	1.04	784		8.44	668		1.59	776		8.03	641
	1.18	780		9.44	703		2.14	774		8.11	641
	1.29	778		10.15	721		2.24	772		8.24	641
	2.20	754		10 49	745		2.34	769		8.34	644
	2.44	741		10.57	751		2.44	764		8.42	645
	3.48	700		11.05	754		3.44	739		8.54	646
	4.44	667		11.16	759		4.44	706		9.06	649
	4.56	661		11.27	765		5.44	675		9.17	653
	5.04	656		11.35	769		6.14	665		9.32	656
	5.14	650		11.44	774		6.25	659		9.48	665
	6.01	636	noon	12.04	778		6.44	652		10.44	691
	6.30	632		12.18	780		6.54	650		11.44	725
	6.34	633		12.26	784		7.06	646	18.	mn.	
	6.45	633		12.35	783		7.14	645		12.44	750
	6.57	634		12.42	788		7.24	644		1.14	756
	7.07	636		12.53	785		7.34	642		1.24	761
	7.24	638		1.04	788		7.44	641		1.34	761
	7.37	643		1.14	785		7.54	640		1.44	761
	7.44	645		1.24	785		8.06	640		1.55	762
	8.14	657		1.36	781		8.14	640		2.04	762
	8.47	675		1.45	781		8.24	641		2.14	760
	9.47	715		2.00	777		8.34	644		2.24	760
	10.17	739		2.23	770		8.44	646		2.34	758
	10.44	754		2.55	755		8.54	647		2.44	756
	10.57	764		3.49	727		9.04	650		3.00	755
	11.06	766		4.14	711		9.14	653		3.14	752
	11.14	772		4.45	695		9.24	657		3.44	740
	11.24	767		4.55	691		9.44	666		4.44	715
	11.34	781		5.03	683		10.44	715		5.44	693
	11.44	782		5.15	679		11.49	737		6.14	680
	11.55	785		5.27	673	noon	12.01	743		6.29	673
16.	mn.			5.34	670		12.16	750		6.44	670
	12.04	788		5.44	665		12.46	759		6.54	665
	12.14	792		6.05	658		12.57	760		7.04	662
	12.24	792		6.16	654		1.10	762		7.14	661
	12.34	795		6.25	650		1.23	766		7.27	658

Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.
	7.36	656		10.14	669		3.32	742		9.44	646
	7.45	652		10.44	677		3.44	741		9.56	646
	7.54	650		11.44	700		3.54	741		10.09	646
	8.04	650	19.	mn.			4.14	737		10.19	649
	8.14	648		12.44	723		4.32	734		10.34	650
	8.24	649		1.44	741		4.46	731		10.47	651
	8.34	650		1.54	746		5.51	716		10.54	651
	8.44	649		2.04	747		6.44	696		11.06	655
	8.54	649		2.14	746		7.44	676	noon	12.21	673
	9.14	652		2.24	749		7.59	672		1.29	696
	9.28	654		2.34	749		8.16	667		1.47	703
	9.35	656		2.44	748		8.36	665		2.14	709
	9.44	659		2.55	751		8.44	664		2.54	718
	9.55	661		3.04	745		8.51	664		3.06	720
	10.07	664		3.14	747		8.57	661		3.18	721
	10.14	667		3.24	746		9.06	662		3.28	722
	10.32	674		3.34	745		9.12	661		3.36	722
	10.44	680		3.44	740		9.16	661		3.40	720
	11.44	711		3.54	742		9.21	662		3.48	722
noon	12.44	736		4.04	736		9.26	661		3.54	720
	1.15	748		4.14	735		9.34	663		4.04	722
	1.25	749		4.34	729		9.44	661		4.16	723
	1.35	750		4.44	724		9.54	661		4.34	720
	1.44	751		5.44	703		10.04	665		4.44	720
	1.57	753		6.44	680		10.16	665		4.55	720
	2.07	755		7.44	663		10.28	666		5.04	719
	2.14	754		7.59	660		10.34	669		5.14	716
	2.28	754		8.14	656		10.44	670		5.34	715
	2.34	753		8.24	654		10.59	673		5.42	716
	2.43	752		8.34	654		11.14	676		6.12	711
	2.54	751		8.48	651		11.44	684		7.02	702
	3.02	750		8.54	651	20.	mn.			7.44	695
	3.21	746		9.02	652		12.44	702		8.29	686
	3.30	745		9.14	650		1.44	721		8.44	682
	3.54	739		9.20	651		2.14	726		8.54	682
	4.19	730		9.24	651		2.32	730		9.14	678
	4.47	720		9.29	651		2.44	732		9.25	678
	5.48	697		9.35	652		2.54	730		9.29	677
	6.19	684		9.39	651		3.04	734		9.34	676
	6.30	679		9.47	655		3.14	732		9.39	676
	6.44	675		9.55	654		3.24	730		9.44	676
	6.57	670		10.06	655		3.34	731		9.51	675
	7.09	665		10.14	659		3.44	734		9.58	675
	7.24	661		10.24	660		3.54	728		10.04	675
	7.29	661		10.38	661		4.04	730		10.09	674
	7.38	659		10.48	665		4.14	726		10.14	675
	7.44	660		10.57	669		4.24	724		10.20	675
	7.56	655		11.14	675		4.34	724		10.26	674
	8.06	652		11.44	687		4.44	718		10.29	675
	8.09	654	noon	12.50	715		4.59	716		10.34	675
	8.20	652		1.15	724		5.14	712		10.39	674
	8.27	854		1.48	735		5.44	702		10.44	675
	8.32	653		1.57	737		6.50	680		10.49	675
	8.38	655		2.06	739		7.44	664		10.59	676
	8.47	651		2.14	736		8.24	654		11.04	674
	8.54	654		2.24	741		8.34	653		11.10	676
	9.04	655		2.36	745		8.45	651		11.19	676
	9.14	655		2.44	741		8.54	650		11.24	676
	9.25	656		2.54	742		9.04	649		11.29	677
	9.35	658		3.03	746		9.14	645		11.34	679
	9.44	661		3.09	744		9.24	645		11.39	680
	10.03	665		3.21	745		9.35	645		11.44	681

Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.
	11.59	679		3.45	721		2.09	703		7.34	715
21.	mn.			3.59	724		2.20	705		7.39	716
	12.04	680		4.20	729		2.24	705		7.44	715
	12.14	683		4.29	727		2.29	706		7.49	711
	12.29	687		4.48	731		2.34	705		7.54	711
	12.44	688		4.54	730		2.39	705		7.59	711
	1.44	705		5.00	729		2.44	707		8.04	709
	2.44	720		5.05	733		2.49	706		8.09	710
	3.44	728		5.09	732		2.54	709		8.14	707
	3.59	729		5.14	732		2.59	710		8.19	707
	4.14	728		5.20	734		3.04	708		8.24	710
	4.20	729		5.29	731		3.09	710		8.29	708
	4.24	725		5.40	731		3.14	712		8.34	705
	4.29	726		5.50	732		3.19	710		8.39	704
	4.34	729		5.59	732		3.24	713		8.44	705
	4.39	726		6.10	732		3.29	714		8.50	702
	4.44	725		6.19	730		3.34	711		9.00	701
	4.49	727		6.30	729		3.39	713		9.04	702
	4.54	724		6.44	728		3.44	716		9.09	702
	4.59	721		6.54	726		3.54	719		9.23	697
	5.04	724		7.06	725		3.59	719		9.30	695
	5.09	721		7.26	720		4.04	716		9.38	695
	5.14	722		7.44	720		4.09	717		9.42	690
	5.19	723		8.44	708		4.14	720		9.48	693
	5.24	720		9.44	700		4.19	720		9.56	691
	5.29	719		10.47	694		4.24	723		10.02	691
	5.34	721		10.53	692		4.29	720		10.07	690
	5.44	715		11.04	693		4.34	720		10.12	688
	5.59	715		11.21	692		4.44	721		10.18	688
	6.14	711		11.30	693		4.49	721		10.30	682
	6.44	706		11.34	692		4.54	723		10.42	684
	7.52	694		11.39	692		4.59	721		10.52	686
	8.44	685		11.44	694		5.04	724		10.59	681
	9.14	679		11.49	694		5.09	725		11.09	679
	9.29	676		11.54	693		5.14	722		11.20	679
	9.44	675		11.59	695		5.19	725		11.24	680
	9.54	672	22.	mn.			5.24	727		11.30	680
	10.04	671		12.05	693		5.29	724		11.34	677
	10.14	668		12.09	695		5.34	723		11.39	676
	10.24	670		12.14	696		5.39	725		11.44	679
	10.29	670		12.19	695		5.44	724		11.49	680
	10.34	669		12.24	695		5.49	726		11.54	676
	10.40	667		12.29	696		5.54	725		11.59	676
	10.44	669		12.34	695		5.59	724	noon	12.04	677
	10.54	667		12.39	696		6.04	727		12.09	676
	10.59	669		12.44	696		6.09	725		12.14	678
	11.04	668		12.49	695		6.14	723		12.29	677
	11.10	669		12.54	695		6.19	722		12.44	676
	11.14	670		12.59	697		6.24	722		12.50	676
	11.20	666		1.04	698		6.29	724		12.54	676
	11.26	668		1.09	697		6.34	724		12.59	677
	11.33	668		1.14	699		6.39	720		1.07	679
	11.40	669		1.19	698		6.44	720		1.14	678
	11.46	669		1.24	696		6.49	720		1.21	680
	11.49	669		1.29	702		6.54	718		1.36	682
	11.56	670		1.34	700		6.59	718		1.44	682
noon	12.18	671		1.39	700		7.04	717		1.50	685
	12.29	675		1.44	701		7.09	717		1.54	684
	12.46	676		1.49	699		7.14	719		1.59	684
	1.14	681		1.54	700		7.19	715		2.04	685
	1.45	691		1.59	702		7.24	715		2.10	686
	3.20	718		2.04	702		7.29	714		2.19	689

Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.
	2.24	690		12.54	700		6.04	737		11.15	704
	2.34	691		12.59	703		6.09	737		11.19	703
	2.44	693		1.04	699		6.14	737		11.24	703
	2.51	695		1.09	696		6.19	739		11.29	703
	2.55	695		1.14	701		6.24	735		11.34	699
	3.07	697		1.19	700		6.29	739		11.39	698
	3.14	699		1.24	699		6.34	739		11.44	699
	3.20	702		1.29	700		6.39	738		11.49	697
	3.25	705		1.34	700		6.45	740		11.54	696
	3.30	703		1.39	696		6.49	742		11.59	696
	3.38	705		1.44	702		6.54	739	noon	12.04	695
	3.44	706		1.50	699		6.59	738		12.14	694
	3.54	711		1.54	700		7.04	740		12.24	691
	4.04	712		1.59	703		7.09	741		12.34	690
	4.14	715		2.04	700		7.14	743		12.44	686
	4.24	718		2.09	702		7.19	741		12.50	687
	4.34	721		2.14	702		7.24	740		12.59	688
	4.44	724		2.19	703		7.29	739		1.04	688
	4.49	724		2.24	703		7.34	740		1.14	686
	4.54	725		2.30	706		7.39	740		1.24	686
	5.00	725		2.34	706		7.44	737		1.29	686
	5.10	730		2.39	705		7.49	740		1.34	686
	5.14	730		2.44	705		7.54	739		1.39	686
	5.19	730		2.49	705		7.59	739		1.44	686
	5.24	730		2.54	707		8.04	741		1.54	686
	5.29	731		2.59	707		8.09	738		2.04	689
	5.34	731		3.04	706		8.14	740		2.14	690
	5.39	733		3.09	711		8.19	740		2.19	690
	5.44	734		3.14	710		8.24	736		2.24	691
	5.51	731		3.19	712		8.29	739		2.29	691
	6.01	736		3.24	716		8.34	738		2.34	695
	6.11	737		3.29	710		8.39	736		2.39	695
	6.17	737		3.34	715		8.44	735		2.44	696
	6.24	737		3.39	713		8.49	735		2.49	697
	6.34	736		3.44	713		8.54	732		2.54	698
	6.39	736		3.49	715		8.59	735		3.04	699
	6.44	738		3.54	717		9.04	735		3.14	701
	6.54	740		3.59	718		9.09	730		3.19	701
	6.59	741		4.04	721		9.14	731		3.24	701
	7.06	740		4.10	716		9.19	729		3.29	703
	7.14	740		4.14	720		9.26	727		3.34	706
	7.24	740		4.21	722		9.29	727		3.39	705
	7.34	739		4.24	720		9.34	726		3.44	706
	7.39	738		4.29	721		9.39	724		3.59	709
	7.44	737		4.34	724		9.44	725		4.14	715
	7.54	737		4.39	722		9.49	721		4.30	718
	7.59	737		4.44	722		9.54	720		4.44	722
	8.04	740		4.49	725		9.59	721		4.59	726
	8.09	736		4.54	725		10.04	719		5.14	731
	8.19	740		4.59	727		10.09	719		5.32	736
	8.29	734		5.04	732		10.14	720		5.44	739
	8.34	737		5.09	730		10.19	714		5.59	742
	8.44	735		5.14	729		10.24	714		6.14	746
	8.49	735		5.19	733		10.29	716		6.29	751
	8.59	729		5.24	730		10.34	713		6.44	754
	9.44	722		5.29	731		10.39	710		7.04	760
	10.14	719		5.34	733		10.44	711		7.10	758
	10.44	715		5.39	730		10.49	709		7.14	760
	11.14	708		5.44	730		10.54	707		7.19	760
	11.44	701		5.49	735		10.59	709		7.24	761
23	mn.			5.54	734		11.04	705		7.36	762
	12.44	701		5.59	736		11.09	705		7.46	762

Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.
	7.54	763		3.29	707		8.47	750		8.50	777
	7.59	764		3.34	711		8.49	751		8.54	779
	8.06	765		3.39	709		8.54	750		8.59	776
	8.11	766		3.44	710		8.59	754		9.05	779
	8.14	765		3.49	710		9.04	750		9.10	774
	8.20	765		3.54	712		9.09	745		9.14	772
	8.29	765		3.59	713		9.14	745		9.21	774
	8.34	766		4.04	713		9.19	751		9.29	775
	8.40	766		4.09	713		9.24	749		9.34	775
	8.44	765		4.14	713		9.34	748		9.39	774
	8.50	765		4.20	716		9.44	744		9.46	776
	8.54	765		4.24	715		9.54	740		9.49	775
	9.00	765		4.29	717		10.04	745		9.54	774
	9.07	762		4.34	720		10.14	740		9.59	772
	9.15	762		4.41	719		10.26	738		10.05	776
	9.20	761		4.44	718		10.34	736		10.09	780
	9.24	762		4.49	722		10.44	729		10.17	771
	9.30	760		4.54	720		11.44	711		10.24	775
	9.35	759		4.59	722	noon	12.44	700		10.29	766
	9.39	761		5.04	725		1.00	694		10.44	770
	9.44	760		5.07	724		1.14	693		11.01	767
	9.49	756		5.14	726		1.24	696		11.44	754
	10.04	756		5.19	730		1.29	687	25.	mn.	
	10.14	755		5.24	729		1.34	690		12.44	740
	10.24	754		5.29	728		1.39	686		1.14	734
	10.44	746		5.34	730		1.44	690		1.19	729
	11.02	741		5.39	731		1.49	692		1.24	730
	11.44	731		5.44	734		1.54	692		1.29	726
24.	mn.			5.49	734		1.59	685		1.34	724
	12.44	718		5.54	734		2.05	685		1.39	725
	12.49	719		5.59	733		2.14	685		1.44	721
	12.55	715		6.04	736		2.19	685		1.49	720
	12.59	713		6.09	736		2.24	681		1.54	722
	1.04	715		6.14	736		2.34	688		1.59	719
	1.09	713		6.20	739		2.40	686		2.04	719
	1.16	715		6.24	738		2.46	680		2.09	720
	1.19	713		6.29	740		2.50	681		2.14	720
	1.24	716		6.34	742		2.54	682		2.19	718
	1.29	715		6.39	742		3.00	680		2.24	716
	1.34	716		6.44	745		3.04	690		2.29	714
	1.40	711		6.49	645		3.10	685		2.34	716
	1.44	709		6.54	745		3.14	681		2.39	716
	1.49	710		7.04	746		3.24	685		2.44	716
	1.54	709		7.09	749		3.39	695		2.49	717
	1.59	708		7.14	748		3.44	689		2.54	715
	2.04	708		7.19	747		3.54	692		2.59	715
	2.09	707		7.24	748		4.04	699		3.04	714
	2.14	708		7.29	749		4.16	691		3.09	713
	2.19	706		7.34	750		4.24	699		3.14	712
	2.24	705		7.39	750		4.44	700		3.19	712
	2.29	705		7.44	751		5.04	713		3.24	713
	2.34	709		7.49	751		6.24	736		3.29	713
	2.39	708		7.54	753		6.44	747		3.34	713
	2.44	705		7.59	749		7.14	756		3.39	712
	2.49	705		8.04	750		7.29	763		3.44	713
	2.54	705		8.09	749		7.44	765		3.50	711
	2.59	707		8.14	754		7.56	767		3.54	712
	3.04	707		8.21	755		8.04	772		4.00	715
	3.09	707		8.25	753		8.14	771		4.04	715
	3.14	704		8.29	751		8.24	775		4.09	716
	3.19	706		8.34	751		8.36	775		4.14	714
	3.24	707		8.39	754		8.44	775		4.19	714

Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.
	4.24	715		9.44	783		1.14	746		6.24	723
	4.29	717		9.49	784		1.19	741		6.29	722
	4.34	721		9.54	782		1.24	738		6.34	725
	4.39	721		9.59	782		1.29	737		6.39	729
	4.44	720		10.04	781		1.34	734		6.44	729
	4.49	723		10.09	779		1.40	732		6.49	730
	4.54	723		10.14	776		1.44	730		6.54	732
	4.59	722		10.24	775		1.49	730		6.59	735
	5.04	725		10.34	776		1.54	727		7.04	737
	5.09	726		10.46	775		1.59	722		7.09	737
	5.14	726		10.54	770		2.04	722		7.14	740
	5.19	731		11.04	770		2.09	719		7.19	741
	5.24	734		11.14	764		2.14	719		7.24	742
	5.29	729		11.29	759		2.19	719		7.29	745
	5.34	732		11.44	756		2.24	715		7.34	746
	5.39	737	noon	12.44	735		2.29	714		7.39	750
	5.44	738		1.44	711		2.34	714		7.44	750
	5.49	740		2.16	705		2.39	713		7.49	750
	5.54	741		2.46	701		2.44	711		7.54	754
	5.59	740		2.50	701		2.49	710		8.44	766
	6.04	743		2.56	700		2.54	707		9.14	771
	6.09	745		3.04	701		2.59	706		9.19	770
	6.14	745		3.10	701		3.04	706		9.24	773
	6.19	748		3.19	702		3.09	705		9.34	772
	6.24	751		3.30	702		3.14	702		9.39	771
	6.29	754		3.39	700		3.19	702		9.44	771
	6.34	752		3.44	701		3.24	701		9.49	772
	6.39	752		3.50	701		3.29	701		9.54	774
	6.44	755		3.55	701		3.34	702		9.59	775
	6.49	757		4.04	702		3.39	698		10.05	774
	6.54	759		4.10	702		3.45	700		10.09	776
	6.59	760		4.15	703		3.49	700		10.15	773
	7.04	762		4.20	704		3.54	699		10.24	775
	7.14	761		4.30	706		3.59	700		10.34	770
	7.21	766		4.39	705		4.04	700		10.44	769
	7.24	770		4.44	706		4.09	700		10.54	768
	7.29	771		4.59	709		4.14	699		11.04	766
	7.34	771		5.59	731		4.20	700		11.14	766
	7.44	774		6.59	756		4.24	700		11.24	766
	7.49	774		7.44	774		4.29	700		11.34	766
	7.54	774		8.48	794		4.34	702		11.44	764
	7.59	779		8.56	796		4.39	701	noon	12.14	761
	8.04	780		9.06	797		4.44	701		12.59	721
	8.09	780		9.14	798		4.49	702		1.44	702
	8.14	782		9.26	801		4.54	701		2.44	685
	8.19	781		9.39	802		4.59	703		3.14	677
	8.24	783		9.45	801		5.04	704		3.24	676
	8.29	783		9.50	803		5.09	703		3.34	674
	8.34	780		9.56	804		5.14	706		3.44	675
	8.39	783		10.01	803		5.19	706		3.50	672
	8.44	785		10.09	802		5.24	706		3.56	672
	8.49	785		10.14	801		5.29	708		4.04	672
	8.54	783		10.20	800		5.34	708		4.10	672
	8.59	784		10.29	800		5.39	710		4.15	671
	9.04	785		10.34	800		5.44	711		4.24	671
	9.09	783		10.44	796		5.49	714		4.30	672
	9.14	784		11.44	780		5.54	711		4.39	672
	9.19	783	26.	mn.			5.59	713		4.44	672
	9.24	783		12.44	754		6.04	716		4.49	675
	9.29	783		12.59	750		6.10	717		4.54	675
	9.34	785		1.04	748		6.14	722		5.04	676
	9.39	781		1.09	748		6.20	724		5.36	684

Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.
	6.44	711		7.44	721		10.49	785		11.04	776
	7.44	741		8.44	750		10.54	785		11.09	772
	8.46	769		9.14	763		10.59	784		11.14	775
	9.14	779		9.19	765		11.04	786		11.19	775
	9.44	785		9.24	765		11.09	786		11.27	777
	9.54	787		9.29	767		11.14	781		11.34	768
	10.04	786		9.34	765		11.21	784		11.39	766
	10.14	786		9.39	769		11.25	785		11.44	767
	10.19	786		9.44	768		11.35	780		11.49	773
	10.25	790		9.49	771		11.45	780		11.54	766
	10.30	786		10.04	771		11.54	778		11.59	765
	10.35	785		10.09	771	28.	mn.		noon	12.09	762
	10.39	785		10.14	771		12.04	774		12.54	750
	10.44	783		10.19	771		12.44	759		1.44	735
	10.51	785		10.24	771		1.44	735		2.44	719
	10.55	784		10.34	771		2.52	719		4.24	650
	11.04	781		10.39	771		3.44	670		4.36	645
	11.15	773		10.44	771		3.55	670		4.39	648
	11.30	774		10.54	770		4.04	669		4.44	646
	11.44	773		10.59	768		4.09	667		4.54	646
27.	mn.			11.09	768		4.15	665		5.04	646
	12.44	750		11.18	764		4.19	664		5.14	645
	1.44	722		11.24	764		4.24	660		5.19	645
	1.49	720		11.34	760		4.29	660		5.24	646
	1.54	719		11.49	755		4.34	661		5.31	646
	1.59	719	noon	12.36	737		4.39	660		5.34	645
	2.04	718		12.44	736		4.44	660		5.39	649
	2.09	718		1.48	700		4.49	660		5.44	647
	2.14	718		3.07	670		4.54	655		5.49	649
	2.20	717		3.57	654		4.59	661		5.54	650
	2.25	716		4.16	650		5.05	657		6.04	651
	2.29	717		4.29	649		5.09	658		6.14	650
	2.34	717		4.34	649		5.14	659		7.59	710
	2.39	717		4.40	649		5.19	660		9.52	776
	2.44	716		4.44	649		5.24	661		10.44	794
	5.20	680		4.49	649		5.36	661		10.59	793
	5.24	682		4.59	649		5.39	663		11.04	799
	5.29	681		5.29	653		5.44	665		11.09	799
	5.34	684		6.06	650		5.49	663		11.14	800
	5.39	685		7.06	661		5.54	666		11.21	797
	5.44	684		7.44	710		5.59	667		11.25	793
	5.49	685		8.54	752		6.09	667		11.29	798
	5.54	689		9.44	773		6.14	671		11.35	800
	5.59	686		9.54	775		6.24	674		11.39	795
	6.04	689		10.16	780		6.34	675		11.44	796
	6.09	692		10.24	785		6.44	682		11.59	794
	6.14	692		10.34	782		7.44	705			
	6.29	695		10.39	785		8.44	735			
	6.43	700		10.44	785		10.04	773			

Marts 1907.

1.	mn.			12.54	772		4.54	666		5.59	671
	12.09	788		12.59	781		5.04	669		6.04	671
	12.14	789		1.04	781		5.14	671		6.09	672
	12.19	794		1.14	770		5.21	669		6.14	675
	12.24	787		1.24	766		5.29	668		6.24	675
	12.29	793		1.34	763		5.34	669		6.34	679
	12.34	788		1.44	761		5.39	668		6.44	680
	12.39	782		2.44	726		5.44	670		7.44	708
	12.44	781		3.44	695		5.49	670		8.45	744
	12.49	781		4.44	674		5.55	670		9.50	771

Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.	Date	Time	Height of water cms.
	11.00	799		3.44	694		10.54	796		12.44	790
	11.09	799		5.14	665		11.14	800		1.44	764
	11.19	801		5.24	665		11.24	801		2.44	730
	11.24	801		5.29	665		11.29	803		3.44	695
	11.30	801		5.44	665		11.34	802		3.54	689
	11.36	800		5.59	663		11.39	804		4.04	684
	11.44	798		6.04	664		11.44	802		4.14	677
	11.49	804		6.09	664		11.49	802		4.19	677
	11.59	800		6.14	666		11.54	802		4.24	674
noon	12.09	796		6.24	667		11.59	799		4.29	670
	12.14	796		6.47	671	2.	mn.			4.34	670
	12.24	794		7.44	693		12.04	803		4.39	668
	12.29	792		9.04	745		12.14	798			
	2.29	736		10.04	781		12.24	797			
	3.24	705		10.44	796		12.34	796			

IV.

HEALTH CONDITIONS ON THE DANMARK EXPEDITION

BY

J. LINDHARD

1913

The Expedition numbered 28 members on setting out; of these 3 were lost on a sledge journey in 1907, the remaining 25 returned home well and strong.

The health of the Expedition was excellent during the whole time; the cases of sickness occurring were all, with a single exception, light.

On the voyage to Greenland we had a number of cases of sea-sickness, but only two of these were obstinate.

A number of cases of acute g a s t r o - e n t e r i t i s with pains, much vomiting and severe diarrhoea occurred simultaneously twice on the voyage; the last and worst of these "series" occurred in the Polar Sea and was probably caused by the cold, foggy weather. The general character of the cases seemed definitely to exclude the idea of poisoning.

At the beginning of the expedition a no small number of s m a l l l e s i o n s especially of the hands occurred among the inexperienced. Almost all of these wounds quickly healed without any sign of infection. On the other hand, there were several cases of infection from wounds after we came amongst the drift-ice, at which time hunting began. I think it probable that the infection arose during the skinning and cutting up of the animals shot, the more so as I found bacteria in the intestines of these in all cases examined. Two cases of *panaritium* of relatively long duration, which I treated during the first winter in Greenland, occurred just in the persons who had been working with walrus flesh.

In the beginning of the winter, when the severe cold suddenly set in, r h e u m a t i c p a i n s were not uncommon especially in the nighttime, when we were exposed to draughts in the untight berths or troubled by the large quantities of ice in those better closed.

During the same period several of the members of the Expedition were troubled at nights by a frequently occurring d e s i r e t o m i c t u r a t e. In none of the cases examined was there anything pathological in the urine, nor was polyuria found; the mode of life was quite the same as during the rest of the Expedition. Similar cases have been observed on the Swedish South Polar Expedition. Dr. Ekelöf holds the view that they arose from improper food, but so far as our

cases are concerned this explanation seems improbable; I am much more inclined to believe that they were due to the direct influence of the cold on the region of the bladder, a view that might probably very well agree with Ekelöf's observations. The cases gradually disappeared without treatment as the men became accustomed to the cold or learned to make the berths warmer; they were much rarer also and less troublesome in the beginning of the following winter.

Cases of f r o s t - b i t e occurred rather frequently especially during the first winter. When going about in the open the head with exception of the central part of the face was as a rule covered by a camel's hair hood and wind-tight "anorak". To go about in the wind without wind-tight overcoat was to court punishment; in one case I saw widespread frost-bite with strong reddening and swelling as well as blistering of the skin on the head — the ears stood out like a pair of thick sausages — neck, shoulders and upper arms. The man was out for a walk without his wind-coat in —32° and was surprised by a storm.

The appearence of light frost bites on the skin of the face, chiefly on the nostrils, the ridge of the nose, cheek-bones and sometimes on the forehead, in fact, on all the places where the subcutaneous tissues are thin was quite a common thing, if one went out in a temperature lower than —20°, especially if there was also some wind. The skin attacked had the appearance of livid-white spots of irregular form, sharply marked-off from the surrounding, sound skin, quite resembling the spots produced by anaesthetising with aethylic chloride. The subjective sensation was that of a peculiarly fine but intense prickling, which lasted quite a short time and was then often unnoticed, so that the bite was only discovered when another caught sight of the white spot. These spots quickly disappeared with rubbing. The best way was to place the finger firmly on the spot and move the skin rapidly along with the subjacent layer, so as to avoid rubbing off the frozen epidermis. If the rubbing was postponed a blister quickly formed with serous or sanguinary contents; only in a few cases were real sores formed.

Fingers and toes were often much exposed; blisters were formed round the outermost phalanges, often with sanguinary exudation under the nails, which in such cases gradually broke off.

Some cases were more serious, as when a finger or toe became insensitive and painful; the colour of the skin was livid and the part attacked was bounded upwards towards the sound skin by a well-marked bluish red streak. Hard rubbing was always successful however in restoring the circulation; only in a single case did superficial gangrene occur on the big toe. The usual cause of these frost-bites was as a rule carelessness on the part of the sufferer.

The w i n t e r in itself, the shut-in life, the comparative inactivity and above all the dark, had a very considerable psychical influence on everybody. The sleep was for the majority less quiet; one was more

readily wakened than usually and kept awake by relatively little disturbance. Men who by no means worked too hard with their brains in the day-time often lay for hours without being able to sleep. In the morning one felt tired and heavy and disinclined to work. Brain-work especially was difficult. We could sit for a long time, slack and idle, staring listlessly in the air before coming to any decision to do this or that; but it took as a rule many resolutions and a very great effort before anything was actually begun. The temper was uncertain and irritable, though there was an undoubted tendency to depression of mind; in one case this developed towards the end of the winter into a very slight touch of melancholia.

Towards the spring two epidemics of p o i s o n i n g occurred. The first was due to whortle-berry soup which had stood for some hours in a copper kettle, the tin-layer of which had become very defective. The poisoning took the form of a light, quickly passing gastro-enteritis.

The second case, which in all probability was due to eating bear liver, was of a somewhat more serious character. As the question of the poisonous properties of bear liver has often been raised in the literature on the arctic, without any definite opinion being reached, and is not without interest for arctic travellers, I may discuss the matter in more detail.

On the 10/III/07 a bear was shot near the ship in the forenoon. It was thin but apparently sound, being more than usually lively and aggressive. On the following day we had a ragout for dinner prepared from the bear's heart, kidneys and liver. We had often previously eaten the heart and kidney of bears, but had never tried the liver, as we also were of the opinion that it was poisonous; we were now to try it however.

After the gall-bladder had been carefully removed, the liver was cut into squares and browned in a pan after the pieces had been washed in several lots of water; it was afterwards boiled long with the other ingredients of the meal. The result was quite a well-tasting dish and most of us ate considerable quantities.

The clinical features of the poisoning can only be given in the rough. The objective examination was in most cases rather defective, partly because the conditions were difficult, little room, bad light etc., partly owing to the relatively large number of patients and lastly because the physician himself was amongst the sufferers and therefore less capable of work.

The 19 men who partook of the dish were all sick. The symptoms however did not appear immediately after the meal, which was at 5—6 p. m. The first two patients got ill about 9 in the evening, and the majority of the cases followed in the course of the evening and night; 6 patients only found out that there was anything wrong when they

wakened in the morning; in one patient who obstinately denied all subjective symptoms, objective signs of sickness were observed on the 3rd day.

Amongst the first s y m p t o m s appearing were drowsiness, sluggishness, indisposition or irresistible desire to sleep; this was noted in 7 cases, of which however 2 must be regarded as doubtful. During the first night however the s l e e p of most was uneasy and broken; one patient had absolutely no sleep for the first two days.

One of the first and most constant symptoms, occurring in 18 of the 19 cases, was h e a d a c h e. It was described by almost all as deep-seated, hammering or boring pains, by a few as tension or pressure; it grew worse by moving the head, coughing, sneezing etc. — and the pain then spread sometimes to other regions. The pain was localized in 14 cases on the forehead as the primary and main locality; more closely restricted to the lower part of the forehead, the root of the nose and the part over the eyes; from here it spread out on the temples up to the top of the head or in a single case to the occipital region. In several cases this in the beginning strictly local pain gradually became more diffuse as it passed off. Pain only in the temples was noted in one case; the first pains on the top of the head spreading later also to the forehead in 3 cases. The pains were persistent, in no case paroxysmal; they seemed in all cases to culminate after about 12 hours, then decreasing regularly perhaps with a little accentuation in the evening. After the 3rd day only a few were still feeling pain with sudden movements of the head.

In a single case there was a very great s e n s i t i v e n e s s to pressure on the integuments of the head, in two cases sensitiveness on the muscles of the neck. There was likewise sensitiveness to pressure on the eyeballs (4 cases) or pain on moving these (6 cases).

In some of the patients disturbance of the senses occurred; in 1 case double sight, in 1 case flickering which made reading impossible, in 1 case a sensation of great clearness without definite colour, only that all objects were seen much more distinctly than usual; lastly in 2 cases reddish-yellow or yellowish flame-sensations, the one of these very strongly and troublesome, the attack lasting some minutes and accompanied likewise with some pain in the eyeballs (the patient (the surgeon) had experienced similar phenomena several times, but very much weaker and only momentarily, about a month before after hard use of the eyes in bad light).

Tonic and c l o n i c attacks of c r a m p occurred in 3 of the patients; in all 3 cases in the lower extremities and twice restricted to these; in the third case the musculature of the body and upper arm was also attacked in succession. The attacks occurred intermittently especially in the night, lasting variously from 10 minutes to half an hour and the patient was afterwards very tired.

Symptoms of disturbance in the digestive organs were but little in evidence. In half the cases the appetite was decreased, one had an increased appetite. Most of the patients complained of an indescribable bad taste in the mouth, in two casses only had the tongue a light greyish coating; 11 patients showed sickness to a more or less extent, only 4 also suffered from vomiting of slimy, usually yellowish material; these vomitings were very persistent and troublesome during the first 24 hours. Diarrhoea did not occur, but constipation in some cases. (It is perhaps worth mentioning that the dogs, which otherwise were always very glad to get any fresh "remains", showed in these days a distinct dislike to this delicacy).

The most suffering patient, who had eaten an unreasonable amount of the dangerous dish, showed evident signs of heart weakness. The heart dulness was increased in breadth, the first sound being everywhere prolonged, soft, the second accentuated at the base. The pulse was weak, undulating, intermittent, very irregular as well in rhythm as in strength. In several other cases the pulse was weak but regular; the frequency was in some cases increased, up to 90 per minute, in 1 case reduced, 49 instead of the usual 60—65.

In the two most severe cases the micturition was seldom and small in quantity, in another case it was remarkably frequent with much urine; otherwise the functions of the kidney seemed normal.

Several patients complained of feverish attacks, one of shivering; but in the cases where it was read the temperature proved to be rather subnormal.

In the course of the second 24 hours several of the patients showed peeling of the skin round the mouth. The peeling was scale-like, beginning in spots and gradually spreading over larger surfaces. In some the peeling was confined to the face; but in several it was universal and thus graver. In one case large flakes of skin were still peeling off from hands and feet on 9/IV. Altogether the peeling occurred in 10 out of the 19 patients; in one case it seemed to be the only symptom.

Whether there was any exanthema in the beginning could not be determined; it could not be recognized with certainty at any rate in the bad lamp-light; but one patient complained of heat sensations and of prickling of the skin; on the first afternoon he was somewhat red and puffy in the face, peeling a good deal later.

The two worst cases were "let out" on the 6th day.

The treatment was purely symptomatic, camphor against the asystolia which quickly improved and finally disappeared completely; small doses of opium in two cases of persistent vomiting; repeated doses of phenacetin had a good effect against headache. Laxantia was used in 2 cases.

I consider it as certain that this was an instance of poisoning due to eating the dish mentioned. That it was due to the liver cannot in itself be proved, as it was the first and only occasion we ate bear liver; but when it is considered that we had often eaten the heart and kidneys without being sick, as also that other polar travellers before us had found bear liver to be dangerous, it seems to me that this may with great probability be taken as the cause of the sickness. There can hardly be any talk of the organs mentioned being putrified at a time of year when the thermometer at nights stood about —40°.

The clergyman Jørgen Brønlund, who was not present on the occasion in question, told me later, that the Greenlanders never eat bear liver as they consider it poisonous; and they just as little touch the liver of the dog and fox. He considers this as a very old tradition. On the other hand, the liver of the sea-mammals is eaten (even the liver of walrus and narwhal) with exception of the liver of a seal (Phoca barbata), which is considered dangerous; the liver of the older animals especially is avoided. When the liver of this seal is eaten, peeling of the skin takes place in 2 to 3 days, beginning in the folds of skin, in the inguinal region, for example, and then spreads over the whole. Dogs will not eat the liver of carnivora unless absolutely forced to do so, but we do not know whether it makes them sick or not.

With regard to poisoning from other arctic animals Brønlund states that sickness follows on eating fresh shark meat (this has also been observed by Danes at Ivigtut); the result is "fullness" in the head; dogs experience the same fate on eating shark meat. This can however be used for human food, if it is boiled 3—4 times in water and the soup thrown away each time; the Greenlanders then freeze it in snow, by which means it becomes white and brittle like this. The Greenlanders also advise against eating deep-water fish, halibut, Norway haddock, for people who are sick or not quite strong, e. g. pregnant women. Eating these fish is said to give rise to heaviness and drowsiness and makes the sickness previously present still worse. The Greenlanders are also acquainted with mussel poisoning.

Mylius-Erichsen has narrated that the Cape York Esquimos never eat bear liver as a consequence of tradition.

Some scattered notes are also found in the arctic literature.

Kane[1] states that he had several times experimented with bear liver, in spite of the generally accepted view that it was poisonous; in some cases it went all right, but then suddenly poisoning appeared: "vertigo, diarrhoea and their concomitants". Kane was not frightened by this result, however, but continued to eat bear liver, sometimes but not always with the consequences mentioned. On one journey the whole company became sick after eating liver, and when they later in spite of this

[1] Arctic Exploration in the years 1853—54—55. Vol. I, pp. 392—93.

warning again ate the liver they were again all sick. In both cases the bears were old and fat. KANE's first case of poisoning occurred in the autumn, October. On the other hand, the dogs on KANE's expedition ate the bear liver without being sick.

HALL[1] writes with regard to a bear shot: "every part except the liver was good"; but whether he ate the liver or not is unknown.

PAYER[2] after describing a bear hunt says: "The dangerous liver was thrown into the water".

Later[3] he narrates regarding the BARENTZ Expedition: "Only once did we eat of the liver of such an animal (bear), and 3 men became sick; t h e i r s k i n c o u l d b e p e e l e d o f f f r o m t h e h e a d t o t h e f e e t". At the same place PAYER cites another author who writes: "When the polar bear has eaten half-rotten walrus or seal its flesh is said to be poisonous". Later[4] PAYER says again that both DAVIS and BARENTZ had experience of the poisonous nature of the bear's liver, as also that the experiment of eating it was repeated on his own expedition with the same unfortunate results; but I have not been able to find that he has given any description of the sickness.

SVERDRUP[5] has repeatedly noticed that the dogs would not eat bear liver unless they were very hungry. He adds that he had often eaten it himself without becoming sick, and he does not believe therefore that it is so very poisonous. He does not give any information however which could help to throw light on the question.

Nothing is said on this subject in the majority of the arctic explorations which have been at my disposal.

It appears from the available information that the bear liver has not always proved to be poisonous to human beings; on the other hand, there is no indication which would help us on to the track of the cause why it undoubtedly frequently occurs, that human beings are more or less seriously sick after eating this liver. The age and condition of the bear seem to be of just as little importance in this connection as the time of year; KANE's two bears were old, fat animals and his first case of poisoning fell in October; our bear was young and thin and was shot in March. What this bear had eaten I do not know, as its stomach was empty when it was shot, but it is hardly probable that it could have found anything at all rotten in the month of March. Nor do the symptoms of poisoning mentioned give any definite impression of whether it was always the same kind of symptoms as in our case. Yet peeling of the skin is mentioned by BARENTZ and the manner in which

[1] North Polar Expedition. U. S. Ship "Polaris". Washington 1876, p. 552.

[2] Den Osterrig-Ungarske Polarexpedition 1872—74 by JUL. PAYER. Danish Translation by GULDBERG, Copenhagen 1877, p. 124.

[3] l. c. p. 286.

[4] l. c. p. 508.

[5] Nyt Land. Kristiania, p. 401.

PEYER describes his cases would lead us to suppose that he has observed the same symptoms. The same symptoms are also given by BRØNLUND as characteristic of the illness which result from eating the liver of Phoca barbata.

It may be remarked further that 5 of the members of the "Danmark Expedition" suffered from severe headache in the following winter after eating seal liver. In several respects the pains resembled those resulting from the poisoning by the bear liver.

During the "l i g h t p e r i o d" we also made acquaintance with one of the usual plagues of polar travellers, the s n o w - b l i n d n e s s or l i g h t - c o n j u n c t i v i t i s. The snow-spectacles of the Expedition were bad and many did not use them therefore, a carelessness which was not long in being punished. The cases were numerous, but treatment with cocaine and exclusion of the light soon cured them all in a relatively short time. It was remarkable how most found it difficult to recognise the first symptoms; it was thought as a rule that a reindeer hair, which were abundant everywhere, had got into the eye. The eyes were rubbed therefore and the attempt made to take the supposed hair out; it was only when the eye could no longer be held open that recourse was had to the snow-spectacles.

On our journeys also we experienced the often spoken-of "p o l a r t h i r s t", an unpleasant experience which has an extremely different effect on different individuals but which certainly has a real basis, as one is exposed to a considerable loss of moisture through respiration in the relatively very dry air. To this must be added that the severe work on the sledge-journeys gives rise to a very considerable transpiration in addition to forcing the respiration.

During the long, northward sledge-journey in the summer of 1907 a case of sickness occurred, the nature of which is not quite clear to me and which I only know from a later description. It affected the two Danish members on the 2nd sledge-party during their stay on Peary Land; the symptoms were: soreness of the gums, constipation and great weakness, or perhaps more correctly, almost insurmountable feeling of tiredness. The symptoms began immediately after the goal of their journey had been reached; for a week they had lived chiefly on raw, frozen, musk-ox flesh, which was quite devoid of fat, perhaps also slightly gone bad; they had themselves the feeling that they wanted fat. When later they shot a seal, they drank eagerly of the running oil in large quantities and found themselves very much better for doing so. It is doubtful perhaps if the three symptoms mentioned belong to the same sickness. Sore gums are scarcely remarkable when one is living chiefly on frozen meat. And the state of "slackness" may readily be explained as a reaction after the severe tension in pushing on to their goal. There can scarcely be any talk of any considerable physical exhaustion; when they reached the ship 3 weeks later after a very forced return journey,

they had the same weight as when they started out. With regard lastly to the constipation, which in the worst of the cases was successfully overcome by a single injection of water, it is possible that this was due to the lack of fat in the food.

These same two men were attacked by p e d i c u l i on the return-journey, which then for the first time on the Expedition "appeared officially". They were infected by the Greenlander who accompanied them. On their return to the ship, however, we were successful in quickly ridding the two Danes of the pest; the worst of the clothes were burnt and the rest were dusted over with Tjaeder's insect powder. On a journey during the next winter in which the same Greenlander took part, there was a spell of unusually mild weather and the men lay in sheltered houses on the Shannon Island. This occasion also led to several of the Danes receiving pediculi. But this epidemic was nipped in the bud like the previous one by means of the insect powder. On the other hand, I myself lived in a tent for 6 weeks during the cold period of the year along with the same Greenlander, without noticing the least trace of the pediculi; the two slight epidemics mentioned were the only ones during the Expedition, though we did not succeed in cleansing the Greenlander.

The course of events during the last year of the Expedition may be discussed quite briefly. The earlier mentioned inconveniences arising from the cold and dark appeared anew but were undoubtedly less troublesome than during the first winter. Similarly the journey homewards was shorter and much easier than the outward journey. No cases of sickness of any importance occurred.

I have only to add some remarks on clothing and food. With regard to the first of these questions, I can in all essentials agree with the view put forward by Dr. Cavalli,[1] that wool is in reality the only efficient clothing for arctic regions; wool innermost and wool outermost, not too thick and not too closely woven; in the wind an overcoat of wind-tight linen. Skin is only a make-shift.

If one works in a coat made of dog-skin, for example, it soon becomes wet and then freezes stiff; it rubs in the arm-pits and on the neck and becomes difficult or impossible to get on or off; sometimes the frozen skin cracks over a shoulder and gives rise to unbearable currents of air. Wool on the other hand does not prevent evaporation and is therefore never so wet as a skin-coat, and again even in the severest cold it never becomes so stiff that it cracks.

Skin is necessary only for f o o t - w a r e. For our winter use on the Danmark Expedition we had either "Kamikker" or Lapland boots; in the summer we made good use of Norwegian ski-boots which were more durable than the "Kamikker" on stony ground. With

[1] Die Stella Polare im Eismeer. Leipzig 1903.

sedentary work during the winter straw-plaited shoes with kamik stockings form the warmest covering for the feet I know.

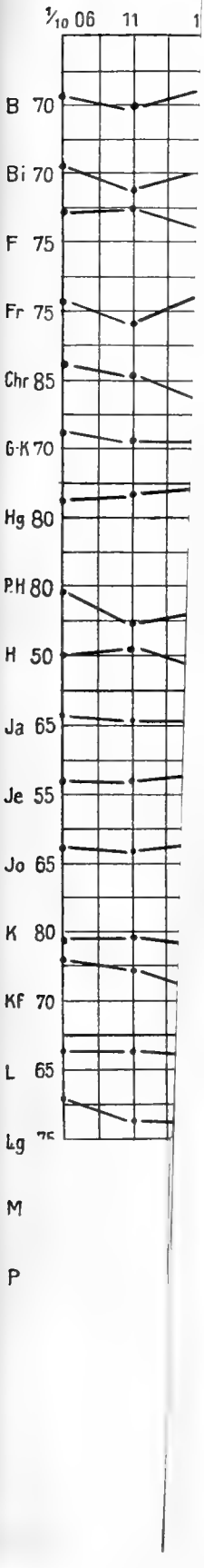
The variations in the state of nutrition in the course of the year are illustrated by the accompanying weight curves. The plan was to weigh all the members of the Expedition once a month; this could not be carried out entirely, as journeys prevented not seldom one or several from being present on the day of weighing; but the weighings were nevertheless made on so large a scale, that the curves give a useful impression of the variations in the weight. The exactness of the measurements can be placed at ± 0.5 kilo. As the food was not arranged according to any preconceived plan and as each one could eat ad libitum at the meals, the curves have only a limited interest; but they show certain common features, which give information on the influence of different conditions on the state of nutrition.

It seems to be the rule, that the weight is less in summer than in winter. This condition is readily seen in almost half of the curves; cf. the curves Kf., Chr., W., Tr., Bh., Lg. and L.; most of the others are more or less irregular but tend mostly in the same direction. Only two curves, K. and B., show a contrary type, the former especially being well-marked. These lost in weight during sedentary work, and increased under bodily exercise. The curve P. shows a steady rise; it refers to the youngest member of the Expedition, who was still in the period of growth. The curve Ja. on the other hand is constantly falling; but during the first three months of the Expedition the man in question had also increased ca. 15 kilos. in weight.

With regard to journeys the conditions were somewhat various. On those of short duration almost every one lost in weight, especially those who were in good condition beforehand (the curves B. Th. and Fr. in April 1907). On the longer journeys the loss of weight was usually inconsiderable or there was an increase (the curves K. and B. in June 1907, T. and P. in January 1908); after the journey the original weight at any rate was quickly regained, in some even increased (the curves W., G. Th. and P. in Jan. 1908, F. in June 1907, L. in Novr. 1907). The most probable reason for this condition is, that the men in the beginning of the journey were not able to eat so much as the increased work demanded, especially as the number of the meals was simultaneously restricted. But they gradually learnt to take in the necessary quantities and their greedy appetites were retained some time after the return home to relative inactivity.

These peculiarities in the weight curves are found well-marked in the curves published of the Swedish South Polar Expedition.[1]

[1] l. c. pp. 22—23.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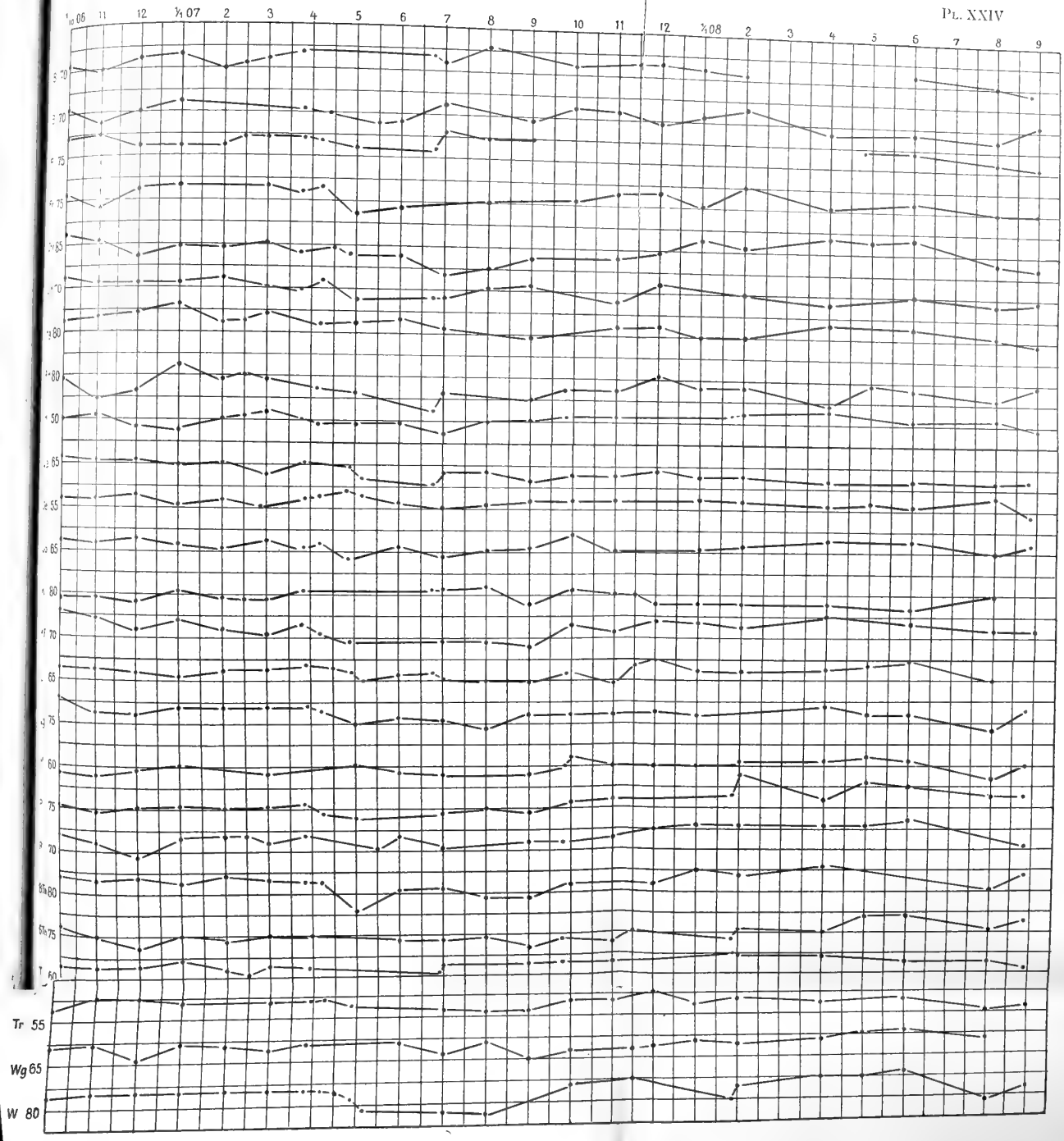
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V.

MYLIUS-ERICHSEN'S REPORT ON THE NON-EXISTENCE OF THE PEARY CHANNEL; INFORMATION BROUGHT HOME BY EJNAR MIKKELSEN

BY

G. C. AMDRUP

1913

When the "Report on the Danmark Expedition to the north-east coast of Greenland 1906—1908", published in the present volume, was written, Captain Ejnar Mikkelsen had not yet returned from his Expedition to the north-east coast of Greenland and it was not known, therefore, that Mylius-Erichsen and his companions had made one more, great and interesting, geographical discovery in addition to the many others apparent from Høeg-Hagen's sketches. Thanks to Ejnar Mikkelsen, this discovery is now made known to the world.

The object of Mikkelsen's Expedition, as is well-known, was to find if possible the diaries and papers, which Mylius-Erichsen and Høeg-Hagen were believed to have deposited at some place or other on the coast (see p. 220), as also to clear up the question, whether the Peary Channel cut through the whole of Greenland or was only a fjord. At the same time scientific investigations were to be carried out to the greatest possible extent.

This is not the place to give an account of Mikkelsen's Expedition, which lasted more than three years and was carried out according to plan with unique, almost incredible energy. It may only be mentioned, that from March 3rd to November 25th 1910 Mikkelsen undertook a sledge-journey from the winter quarters on Shannon Island over Dove Bay to Brede Glacier, from there over the inland ice to the head of Danmarks Fjord, through the whole of this Fjord, north round Kronprins Christians Land and home again to Shannon Island along the outer coast.

In Danmarks Fjord Mikkelsen found two reports written by Mylius-Erichsen. The first was found in a cairn on Sjællands Slette (see Pl. II) and runs as follows:

Danmarks Fjord ca. 81°25′ N. lat., 12th September 1907.

Hagen, Brønlund and the undersigned — all well — leave to-day this place, called "Ulvebakkerne", with 1 sledge and 7 dogs, to begin the return journey to the ship on the new ice, which has to-day at last become safe. Since we left our summer camp, about 44 miles from here, on August 8th, we have been obliged to kill 7 dogs as food for ourselves and the remaining dogs, while we were 15 days out on the

sea ice, our passage stopped 2 miles from land by the water from the melting ice. At last, on August 25th we reached land and shot 4 hares. By short journeys day by day since then we have moved our camp altogether about 32 miles into Danmarks Fjord, constantly impeded in our advance to good hunting grounds by mild weather, impassable new ice and lastly by o p e n [1] water from coast to coast, Walked on foot over the hills, followed by the dogs, some 32 miles further into the Fjord to "Sjællands Slette", shot in all 15 young ptarmigan, 15 hares, 1 wolf and 8 musk-oxen (2 bulls, 3 cows and 3 calves). Camped for a week under open sky, cooked our food by means of drift-wood, of which we found quantities along the coast, fed up the dogs and transported the meat and tallow here to this place, which is the southernmost spot in the Fjord, we have been able to reach with the sledge. The ice further in still not safe, otherwise had considered the possibility of returning home via the inland ice from the head of Danmarks Fjord to the Fjord at ca. 79° N. lat. Imagine we have had down to 15° of cold (Centigrade) during the past week. Taking on the sledge drift-wood for 8 days' cooking, over 300 lbs. of meat, which is sufficient food for ourselves for 16 days and 8 days for the dogs. Will follow the Fjord eastwards the ca. 144 miles out to the outer coast and from there, with the help of the depots laid out there in the spring and bear hunting, we hope to be able to reach the ship safely in 5—6 weeks.

L. Mylius-Erichsen,
Leader of the "Danmark Expedition".

The second report was found on the summer camp (see Pl. II) and reads as follows:

First-lieutenant Hagen, the Greenlander Brønlund and the undersigned on May 28th 1907 at the North-east Naze of this land (ca. 82°04′ N. lat., ca. 22° W. long.) left the sledge party of First-lieutenant Koch, who had reached the north point of Greenland and were on their way back to the ship, at Cape Bismarck. We drove westward with 23 dogs until the 1st of June and reached Peary's Cape Glacier, discovered that the Peary Channel does n o t [1] exist; Navy Cliff is connected by fast land with Heilprinn Land. We renamed Independence Bay the Independence Fjord and built a cairn (with report) on a low point near Cape Glacier. On the way out through the Fjord we discovered and investigated two side fjords — "Brønlunds Fjord" towards the north-west and "Hagens Fjord" towards the south-east and built a cairn (with report) at the last-mentioned. Also discovered old tent-rings.

Mild weather suddenly set in, deep snow, melting ice-water on the ice, lack of big game and sickness and loss of energy among the dogs

[1] Underlined by Mylius-Erichsen. Note by editor.

made our journey out difficult and delayed us so much, that we only arrived here on June 12th. Further advance by way of the ice was then impossible. Only 15 dogs were still living, one died later. Since then we have existed exclusively on the hunting (7 musk-oxen and 1 calf, 15 wild geese, 4 hares and 3 ptarmigan). Land surveying supplemented, the scientific collections added to, especially flowering plants and plant and animal fossils. Called the land Kronprins Christians Land.

Devoid of further food for ourselves and the dogs, having had no big game since July 16th, we must to-day — after ferrying across to the fast ice on an ice-floe — with 14 dogs, two sledges and all our goods seek better hunting grounds along the coast away from this perfectly desolate locality, which we have wandered over within an area of 20 miles. All three are quite well. Will endeavour to reach some miles further into the Fjord lying to the south-west from here, which we explored in May and called "Danmarks Fjord", where at that time we found good hunting of hares and musk-oxen. If we succeed in obtaining sufficient food, we intend, when the ice becomes passable probably towards the end of the present month, to undertake the ca. 500 miles journey back to the ship, which we hope to reach before the end of September with or without the dogs.

The cairns built in the neighbourhood of this cairn were set up by Hagen for trigonometric measurement of the land and contain no reports.

In one or more cairns further up in the Fjord we shall deposit reports on our later fate.

August 8th 1907.

L. Mylius-Erichsen,
Leader of the "Danmark Expedition to the north-east coast of Greenland" 1906—08.

From the last report it appears, that Mylius-Erichsen had already reached Cape Glacier on June 1st and not, as assumed by me, on the 7th or 8th (see p. 204, note 3). From this it follows, that Pl. IX is in reality a sketch of the head of Independence Bay, as stated by Høeg-Hagen (see p. 223). If we compare Jørgen Brønlund's diary (see pp. 204—205) with the report and assume, that Mylius-Erichsen on the return journey had passed Cape Grundloven[1] on June 5th, there is every probability, that Mylius-Erichsen and his companions remained at the head of Independence Fjord right to the 4th of June.

[1] Cape Grundloven was in all probability called by this name, because they passed this promontory on "Grundlovsdagen" (= Constitution Day), which is the 5th of June.

They have thus had plenty of time to survey the head of this Fjord. Consequently, as also appears from the report with all desirable clearness, Mylius-Erichsen and his companions have been able to make out, that the Peary Channel does not exist and that Navy Cliff is in fast connection with Heilprinn Land.

Mylius-Erichsen writes further, that they changed the name of Independence Bay to Independence Fjord, the name we also find on Hagen's chart-sketch Pl. IV.—Pl. V gives the bearings to the two large glaciers at the head of the Fjord, Marie Sophie Glacier and Academy Glacier (cf. Pl. IV).

The reason why the head of the Fjord was not shown on the chart-sketches was, presumably, because the size of the paper did not permit it. It has to be remembered, that these chart-sketches were drawn at the summer camping ground under the most primitive conditions and with the most primitive means, and Hagen has hardly imagined at that time, that they would come to form the basis of the final charts.

The first report confirms the view set forth by me on p. 216, that Mylius-Erichsen and his companions have commenced the return journey along the outer coast.

Further consideration of the interesting points suggested by the reports I leave to Mikkelsen, when he finds the opportunity some time to give an official account of his admirable Expedition, it is to be hoped, in the "Meddelelser om Grønland".

It will be seen from the foregoing, that the honour of discovering, that the Peary Channel does not exist, belongs to Mylius-Erichsen, and that the honour of making this discovery known to the world falls to Ejnar Mikkelsen.

efter Forfatterens Død ved Ad. S. Jensen. Med 2 Tavler. 1899. Kr. 4,50.
Ikke sluttet.

XXIV. Undersøgelser af Mineraler fra Julianehaab af **G. Flink, N. B. Boggild** og **Chr. Winther** med indledende Bemærkninger af **N. V. Ussing.** Untersuchungen an den eisenführenden Gesteine der Insel Disko von Dr. **Th. Nicolau.** Beretning om en Undersøgelsesrejse til Øen Disko 1898 af **K. J. V. Steenstrup.** Med 20 Tavler og et særskilt heftet Farvetryk. 1901. Kr. 6.50.

XXV. Om Bestemmelse af Lysstyrke og Lysmængde af **K. J. V. Steenstrup.** Fra en Vaccinationsrejse til Kap Farvel af **G. Meldorf.** On Ilvaite from Siorarsuit by **O. B. Bøggild.** Skildring af Vegetationen paa Disko af **M. Pedersen Porsild.** Med 6 Tavler. 1902. Kr. 6.

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2den Afdeling by **O. B. Bøggild, Knud Poulsen, Otto Nordenskjöld. G. Amdrup, W. Thalbitzer.** Med 7 Tavler og 1 Kort. 1909. Kr. 7,25.

XXIX. Carlsbergfondets Expedition til Øst-Grønland 1898—1900. Zoologi, 1ste Afdeling by **Søren Jensen, Th. Mortensen, J. P. J. Ravn, H. Deichmann, Victor Madsen, Ad. S. Jensen, Dr. E. Fraas.** Med 13 Tavler og 1 Kort. 1904. Kr. 5,50.

2den Afdeling by **Adolf Severin Jensen. J. C. Nielsen, Th. Becker, H. J. Hansen. William Lundbeck.** Med 1 Tavle. 1909. Kr. 4,50.

XXX. Carlsbergfondets Expedition til Øst-Grønland 1898—1900. Botanik, 1ste Afdeling by **Chr. Kruuse, Helgi Jónsson, E. Larsen. E. Rostrup, Edv. A. Wainio, C. Jensen.** 1907. Kr. 4.

2den Afdeling by **Aug. Hesselbo, N. Hartz** and **Chr. Kruuse.** 1911. Kr. 2.

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XXXVII. Ikke udkommen.

XXXVIII. Geology of the Country around Julianehaab, Greenland. By **N. V. Ussing.** Beretning om den geologiske Ekspedition til Julianehaab Distrikt i Sommeren 1900 **af N. V. Ussing.** Med 19 Tavler. 1912. Kr. 12.

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