DET KONGELIGE INDUSTRI-, HÅNDVERK-
OG SKIPSFARTSDEPARTEMENT

NORSK POLARINSTITUTT

SKRIFTER

Nr. 104

TIDAL OBSERVATIONS IN THE ARCTIC 1946—52

BY

HELGE HORNBÆK

I KOMMISJON HOS
BRØGGERS BOKTRYKKERIS FORLAG
OSLO 1954

NORSK POLARINSTITUTT
(Formerly Norges Svalbard- og Ishavs-undersøkelser.)
Observatoriegaten 1, Oslo

SKRIFTER

Skrifter 1—50, see numbers of Skrifter previous to No. 100.

Resultater av De Norske statsundersiøttede Spitsbergenekspeditioner.

Nr. 51. BIRKELAND, B. J. et GEORG SCHOU, *Le climat de l'Eirik-Raudes-Land.* 1932. Kr. 2,00
„ 52. KIÆR, J. †, *The Downtonian and Devonian Vertebr. of Spitsb.* IV. Suborder *Cyathaspida.* 1932. Kr. 5,50.
„ 53. 1. MALAISE, R., *Eine neue Blattwespe.* 2. A. ROMAN, *Schlupfwespen.* 3. O. RINGDAHL, *Tachiniden und Musciden.* 4. M. GOETGHEBUER, *Chironomides du Groenland oriental, du Svalbard et de la Terre de François Joseph. — Zool. Res. Norw. Sc. Exp. to East-Greenland. II.* 1933. Kr. 4,00.
„ 54. VARTDAL, H., *Bibliographie des ouvrages norvégiens relatifs au Grœnland (Y compris les ouvrages islandais antérieurs à l'an 1814).* 1935. Kr. 12,00.
„ 55. OMANG, S. O. F., *Übersicht über die Hieraciumflora Ost-Grönlands.* 1933. Kr. 2,50.
„ 56. DEVOLD, J. and P. F. SCHOLANDER, *Flowering Plants and Ferns of Southeast Greenland.* 1933. Kr. 20,00.
„ 57. ORVIN, A. K., *Geology of The Kings Bay Region, Spitsbergen.* 1934. Kr. 20,00.
„ 58. JELSTRUP, H. S., *Détermination astronomique à Sabine-Øya.* 1933. Kr. 2,50.
„ 59. LYNGE, B. *On Dufourea and Dactylina. Three Arctic Lichens.* 1933. Kr. 5,00.
„ 60. VOGT, TH., *Late-Quaternary Oscillations of Level in S. E. Greenland.* 1933. Kr. 5,00.
„ 61. 1. BURTON, M., M. SC., *Report on the Sponges.* 2. ZIMMER, C., *Die Cumaceen. — Zool. Res. Norw. Sc. Exp. to East-Greenland. III.* 1934. Kr. 2,50.
„ 62. SCHOLANDER, P. F., *Vascular Plants from Northern Svalbard.* 1934. Kr. 15,00.
„ 63. RICHTER, S, *A Contr. to the Archæology of North-East Greenland* 1934. Kr. 25,00.
„ 64. SOLLE, G., *Die devonischen Ostracoden Spitzbergens.* 1935. Kr. 5,50.
„ 65. 1. FRIESE, H., *Apiden.* 2. LINDBERG, H., *Hemiptera.* 3. LINNANIEMI, W. M., *Collembolen. Zool. Res. Norw. Sc. Exp. to East-Greenland. IV.* 1935. Kr. 2,50.
„ 66. 1. NORDENSTAM, Å., *The Isopoda.* 2. SCHELLENBERG, A., *Die Amphipoden.* 3. SIVERTSEN, E., *Crustacea Decapoda, Auphausidacea, and Mysidacea. Zool. Res. Norw. Sc. Exp. to East-Greenland. V.* 1935. Kr. 5,00.
„ 67. JAKHELLN, A., *Oceanographic Investigations in East Greenland Waters in the Summers of 1930—1932.* 1936. Kr. 7,00.
„ 68. FREBOLD, H. und E. STOLL, *Das Festungsprofil auf Spitzbergen.* III. *Stratigraphie und Fauna des Jura und der Unterkreide.* 1937. Kr. 5,50.
„ 69. FREBOLD, HANS, *Das Festungsprofil auf Spitzbergen.* IV. *Die Brachiopoden- und Lamellibranchiatenfauna des Oberkarbons und Unterperms.* 1937. Kr. 10,00.
„ 70. DAHL, EILIF, B. LYNGE, and P. F. SCHOLANDER, *Lichens from Southeast Greenland.* 1937. Kr. 4,50.
„ 71. 1. KNABEN, NILS, *Makrolepidopteren aus Nordostgrönland.* 2. BARCA, EMIL, *Mikrolepidopteren aus Nordostgrönland. Zool. Res. Norw. Sc. Exp. to East-Greenland. VI.* 1937. Kr. 3,50.
„ 72. HEINTZ, A., *Die Downtonischen und Devonischen Vertebraten von Spitzbergen. VI. Lunaspis-Arten aus dem Devon Spitzbergens.* 1937. Kr. 2,00.
„ 73. *Report on the Activities of Norges Svalbard- og Ishavs-undersøkelser 1927—1936.* 1937. Kr. 10,00.
„ 74. HØYGAARD, ARNE, *Some Investigations into the Physiology and Nosology of Eskimos from Angmagssalik in Greenland.* 1937. Kr. 1,50.
„ 75. DAHL, EILIF, *On the Vascular Plants of Eastern Svalbard.* 1937. Kr. 3,50.
„ 76. LYNGE, B., *Lichens from Jan Mayen.* 1939. Kr. 4,50.
„ 77. FREBOLD, HANS, *Das Festungsprofil auf Spitzbergen. V. Stratigraphie und Invertebratenfauna der älteren Eotrias.* 1939. Kr. 5,00.

DET KONGELIGE INDUSTRI-, HÅNDVERK-
OG SKIPSFARTSDEPARTEMENT

NORSK POLARINSTITUTT

SKRIFTER

Nr. 104

TIDAL OBSERVATIONS IN THE ARCTIC 1946—52

BY

HELGE HORNBÆK

I KOMMISJON HOS
BRØGGERS BOKTRYKKERIS FORLAG
OSLO 1954

A. W. BRØGGERS BOKTRYKKERI A/S

Preface.

The tidal observations dealt with in the present paper have been carried out by Norsk Polarinstitutt on expeditions to Jan Mayen and Svalbard in the years 1946—52.

H. H.

Svalbard.

Hopen 1947.

In 1947 the tidal observations were carried out on Hopen by the topographer Th. Askheim in connection with his surveying of the island.

For practical reasons he mounted the automatic tide-gauge in a well close to the sea shore. The well communicated with the sea through a pipe working like a siphon.

The geographical co-ordinates of the observation point are:

76° 30′.1 Lat. N. 25° 04′.1 Long. E. Gr.

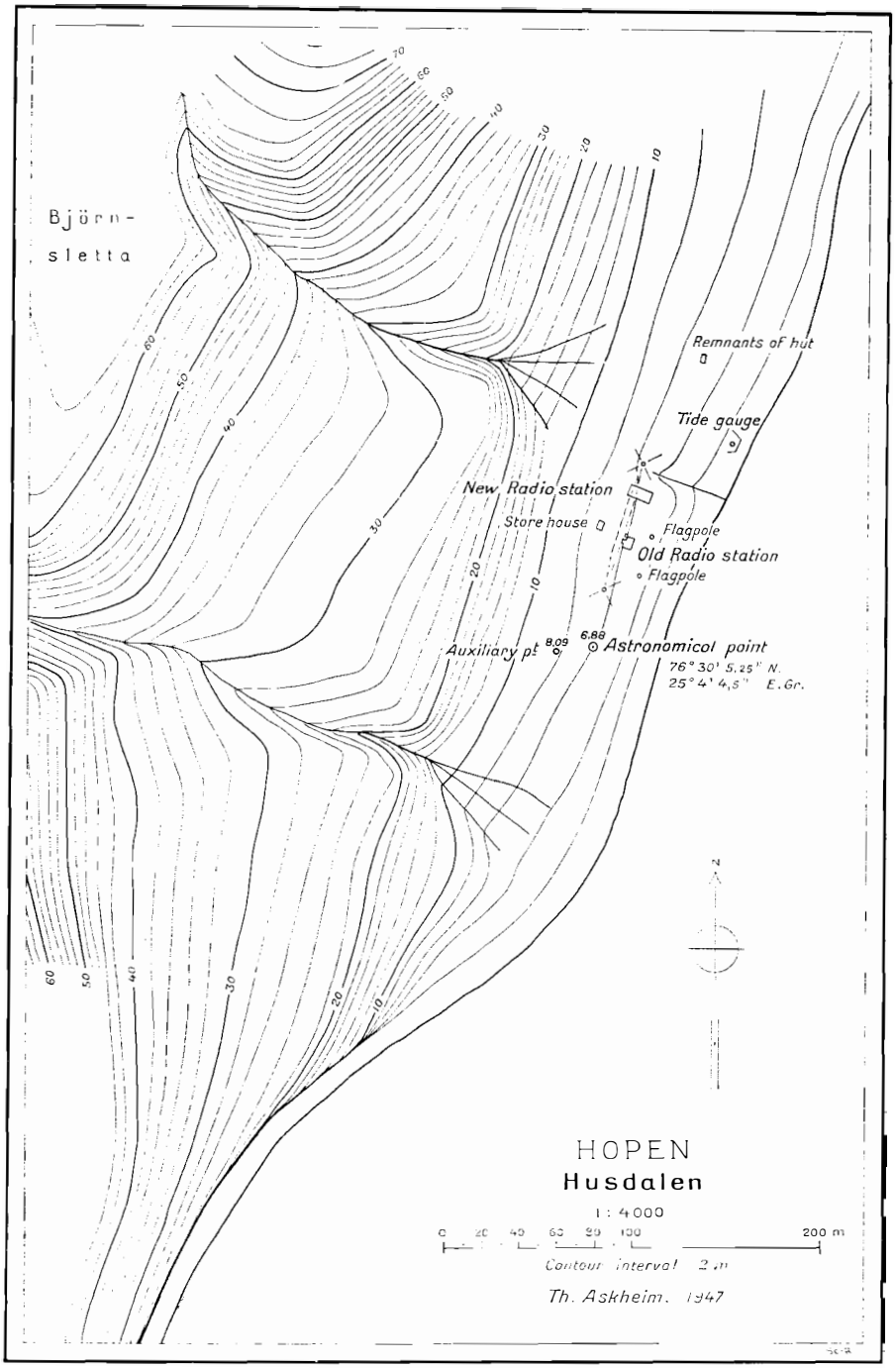
The scale of the gauge was 1: 11 1/4.

The weather was rough during the observation period. The force of the wind was often strong breeze and the direction was generally off-shore.

Two copper bolts were fastened in two concrete blocks in the neighbourhood, from which Dr. Hans Henie in the same period made an astronomical determination of position. The bolts were levelled in relation to the tide-gauge. They are 6.88 m and 8.09 m above the mean sea-level, respectively.

The tide-gauge was in operation from Aug. 2 to Sept. 12. The period Aug. 3 0000—Aug. 31 2300 was chosen for the harmonic analysis.

Fig. 1. Hopen. Position of tide-gauge. Th. Askheim phot. 1947.


Björn-
sletta
Remnants of hut
Tide gauge
New Radio station
Store house
Flagpole
Old Radio station
Flagpole
Auxiliary pt
8.09
6.88
Astronomical point
76° 30' 5,25" N.
25° 4' 4,5" E.Gr.
HOPEN
Husdalen
1 : 4000
0 20 40 60 80 100 200 m
Contour interval 2 m
Th. Askheim. 1947

Kvalvågen 1952.

The geodesist S. Helle carried out tidal observations in connection with astronomical determination. For that purpose he used an automatic tide-gauge which he succeeded in mounting on a steep cliff close to the hut which he occupied.

The geographical co-ordinates of the observation point are:

77° 30′ Lat. N. 18° 12′ Long. E. Gr.

The scale of the gauge was 1: 11 1/4.

The weather and sea conditions were favourable during the observation period.

Two brass bolts were levelled in relation to the tide-gauge. One is driven into the rock about 30 m from the sea shore. Close to the bolt the letters F. M. are carved in the rock. The other one is set in the rock 3.5 m to the north of the astronomical point from 1952. The bolts are 4.52 and 4.80 m above the mean sea-level, respectively.

The tide-gauge was in operation from Aug. 3 to Sept. 5. For the harmonic analysis the period Aug. 5 0000—Sept. 2 2300 was chosen.

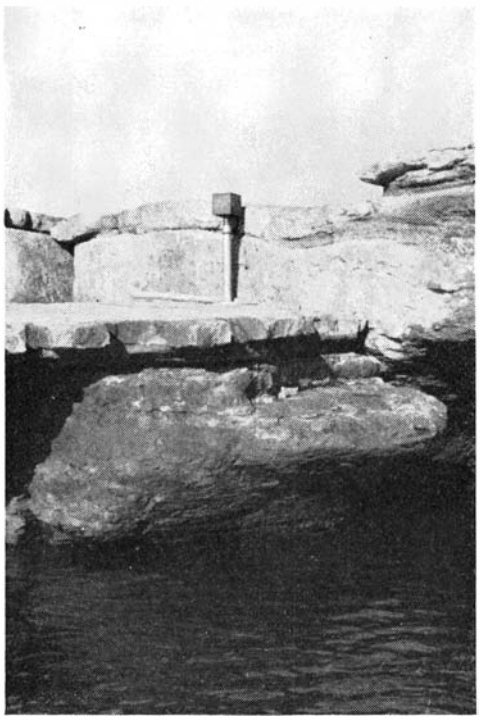
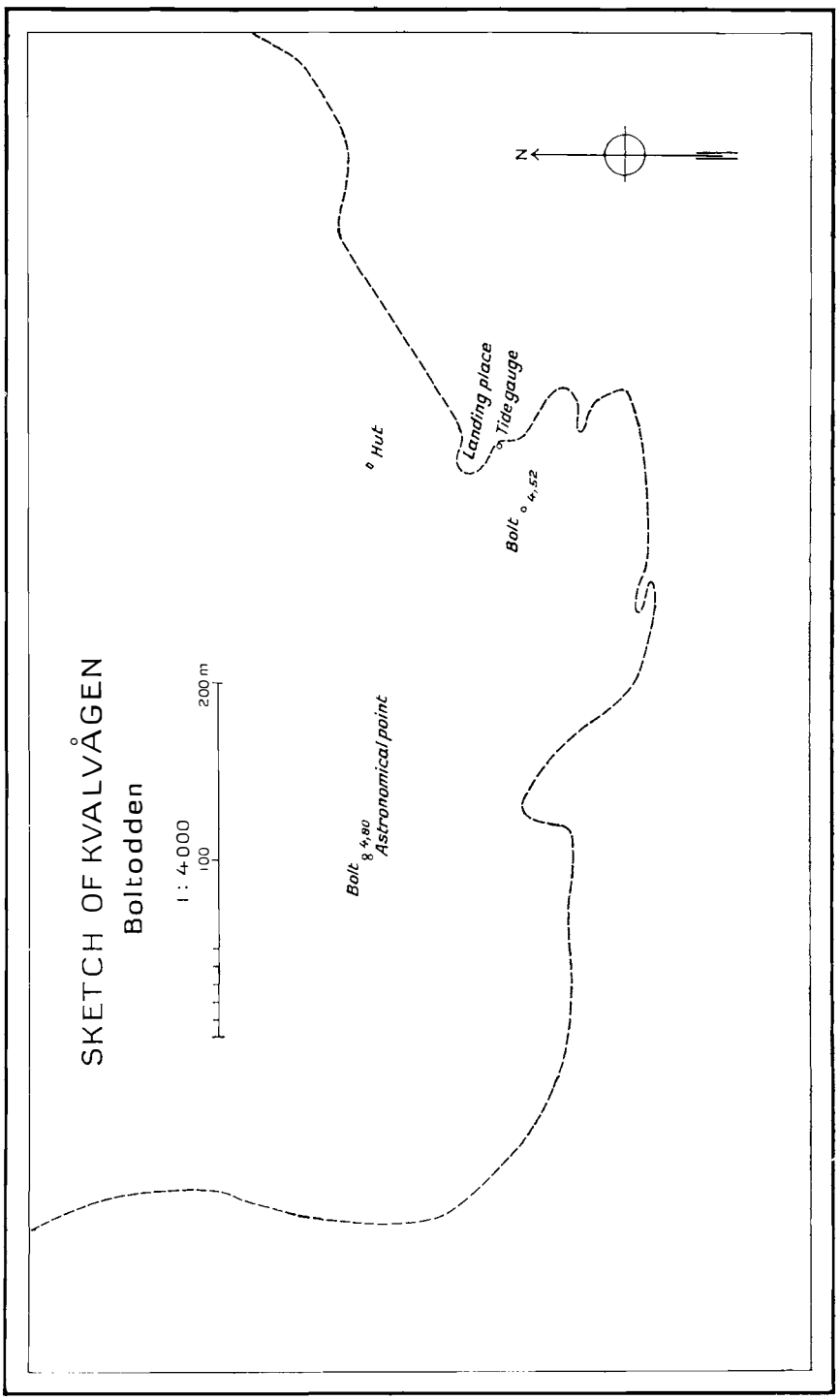


Fig. 2. Kvalvågen.
Position of tide-gauge.
S. Helle phot. 1952.


SKETCH OF KVALVÅGEN
Boltodden
1 : 4000
100
200 m
Bolt 8 4,80
Astronomical point
Hut
Landing place
Tide gauge
Bolt 4,52
N

Sveagruva 1946.

In connection with his survey of the area around Sveagruva the topographer W. Solheim had opportunity to pay some attention to the tide. He had no automatic tide-gauge at disposal, but took staff readings around high and low water. The tide-water staff was placed near the dam of Susesjøen.

The geographical co-ordinates of the observation point are:

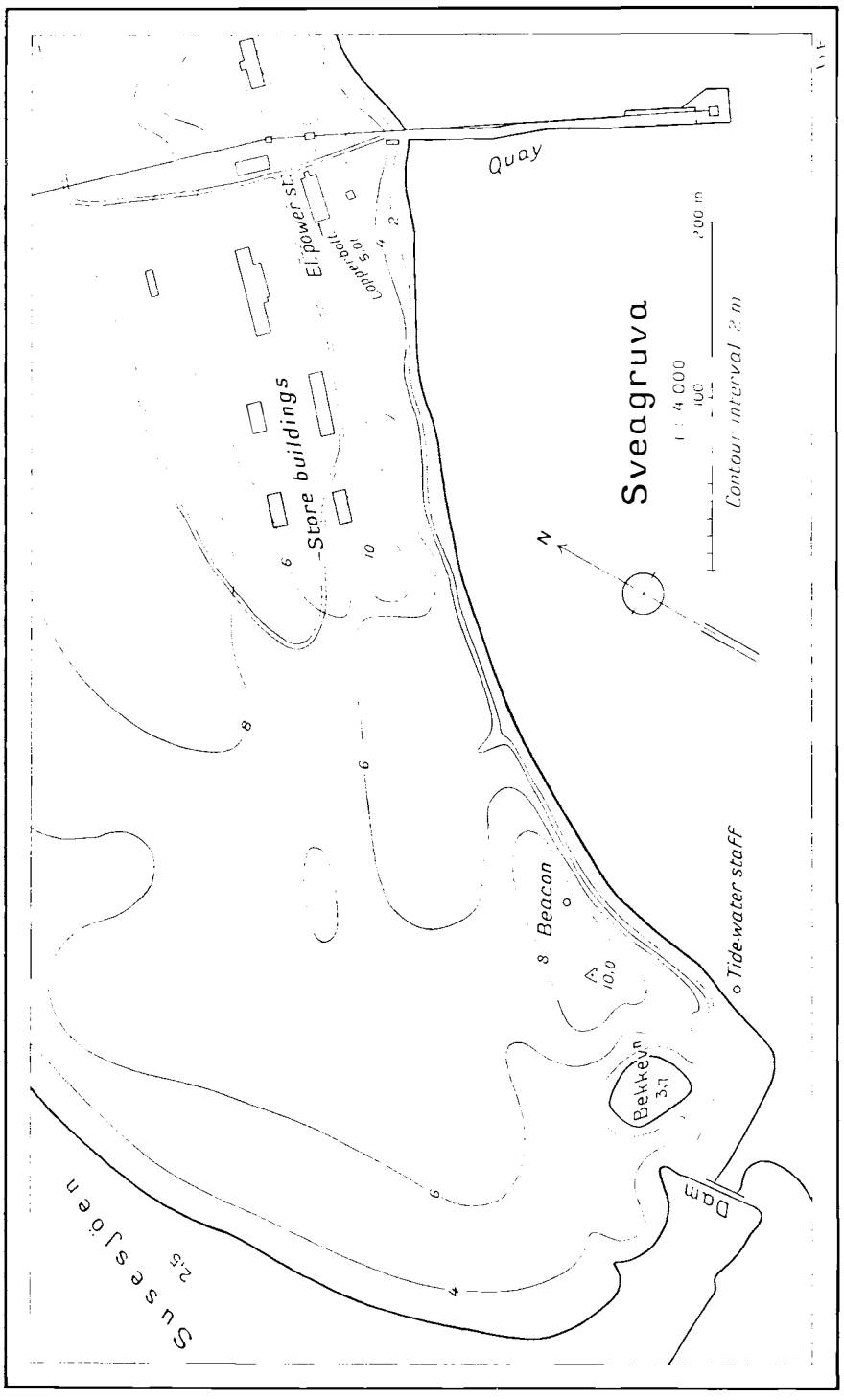
77° 53′ Lat. N. 16° 43′ Long. E. Gr

At that time an electric power station was being built at Sveagruva. A copper bolt was placed in the southern wall of this station about 0.5 m from the ground. The bolt was levelled in relation to the tide-water staff and was found to be 5.01 m above the calculated mean sea-level. The wall, however, may have been displaced owing to frost and thaw in the ground.

The weather conditions during the observation period were generally favourable.

The readings started Aug. 19 0000 and were closed Sept. 2 1730. During this period some interruptions occurred: Aug. 24 0800—Aug. 25 0900, Aug. 29 1800—Aug. 30 0800, Sept. 1 0000—Sept. 1 0900, and Sept. 2 1800—Sept. 2 2300.

For the harmonic analysis the period Aug. 19 0000—Sept. 2 2300 was chosen. The lacking readings were interpolated graphically.


Quay
El.power st.
Loddarbolig
Store buildings
Sveagruva
1 : 4 000
100
200 m
Contour interval 2 m
N
Beacon
Tide-water staff
Bekkevatn
Dam
Susesjoen
10.0
2.5

Kapp Linné 1946.

In connection with the rebuilding of Isfjord Fyr og Radio the hydrographer, Ltn. Commander R. Lyngaas, carried out tidal observations. He made use of an automatic tide-gauge which was mounted on the steep cliff on the northern side of the boat creek.

The geographical co-ordinates of the observation point are:

78° 03′.4 Lat. N. 13° 38′.3 Long. E. Gr.

The scale of the tide-gauge was 1: 16 7/8. During the observation period the weather and sea conditions were favourable.

A copper bolt was set in the bluff on the southern side of the boat creek and levelled in relation to the tide-gauge. The height of the bolt above mean sea-level is 3.10 m.

The observations cover the period July 26—Aug. 12. From Aug. 2 8000 to Aug. 4 1800, however, the recorder was out of action, and for this interval the data were determined by graphical interpolation. The period July 27 0000—Aug. 10 2300 was chosen for the harmonic analysis.

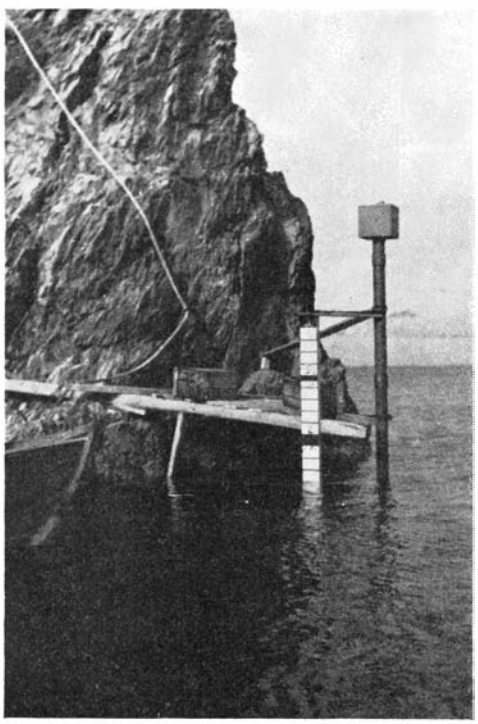
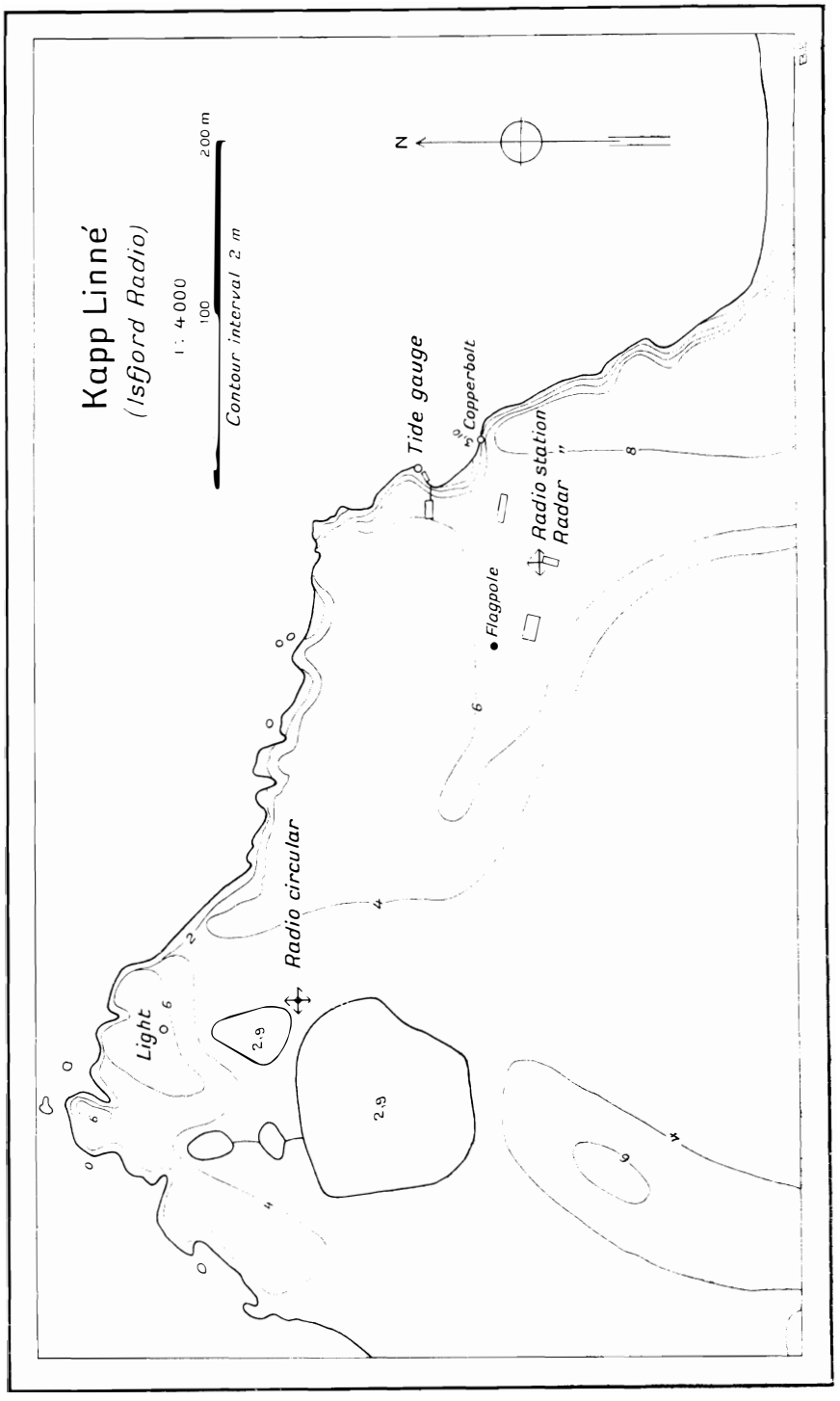


Fig. 3. Kapp Linné.
Position of tide-gauge.
R. Lyngaas phot. 1946.


Kapp Linné
(Isfjord Radio)
1 : 4000
100
200 m
Contour interval 2 m
N
Tide gauge
Copperbolt
Radio station
Radar
Flagpole
Radio circular
Light
2.9
2.9

Ny-Ålesund 1949.

The tidal observations at Ny-Ålesund were carried out in 1949 by the hydrographers Ltn. Commander K. Z. Lundquist and H. Hornbæk, in connection with the surveying of the harbour areas. They had at disposal an automatic tide-gauge which was mounted on the quay.

The geographical co-ordinates of the observation point are:

78° 55′.7 Lat. N. 11° 57′.3 Long. E. Gr.

The scale of the tide-gauge was 1: 16 7/8.

The weather and sea conditions during the observation period were not always the best.

The tide-gauge was in operation from July 9 to Aug. 27. Initially it was difficult to make the gauge work regularly, and interruptions occurred. The period July 24 0000—Aug. 31 2300 was chosen for the harmonic analysis. During this period some short breaks occurred, and in such cases graphical interpolation was applied.

Jan Mayen.

Kvalrossbukta 1950.

Besides the surveying work the topographer Th. Askheim also carried out tidal observations by means of an automatic tide-gauge. Close to the shore he dug a well where the tide-gauge was mounted. Communication with the sea was obtained through a pipe that worked like a siphon. Unfortunately he had not made the well sufficiently deep, where the floater touched the bottom at some of the lowest low-waters, causing gaps in the records. In such cases staff readings were made on a tide-water staff in the sea. On those occations there was always an off-shore wind and calm sea.

The geographical co-ordinates of the observation point are:

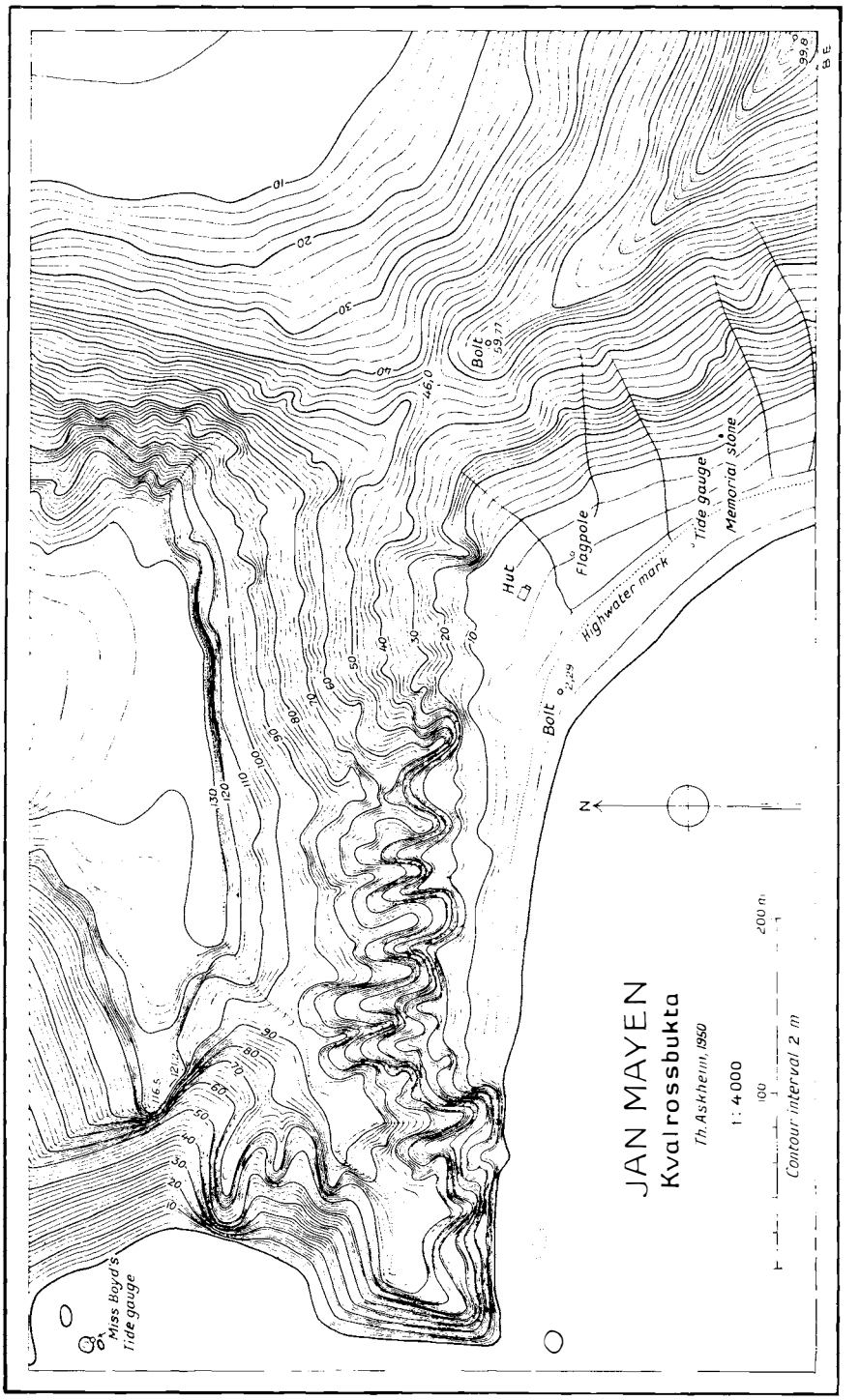
70° 58′.3 Lat. N. 8° 41′.2 Long. W. Gr.

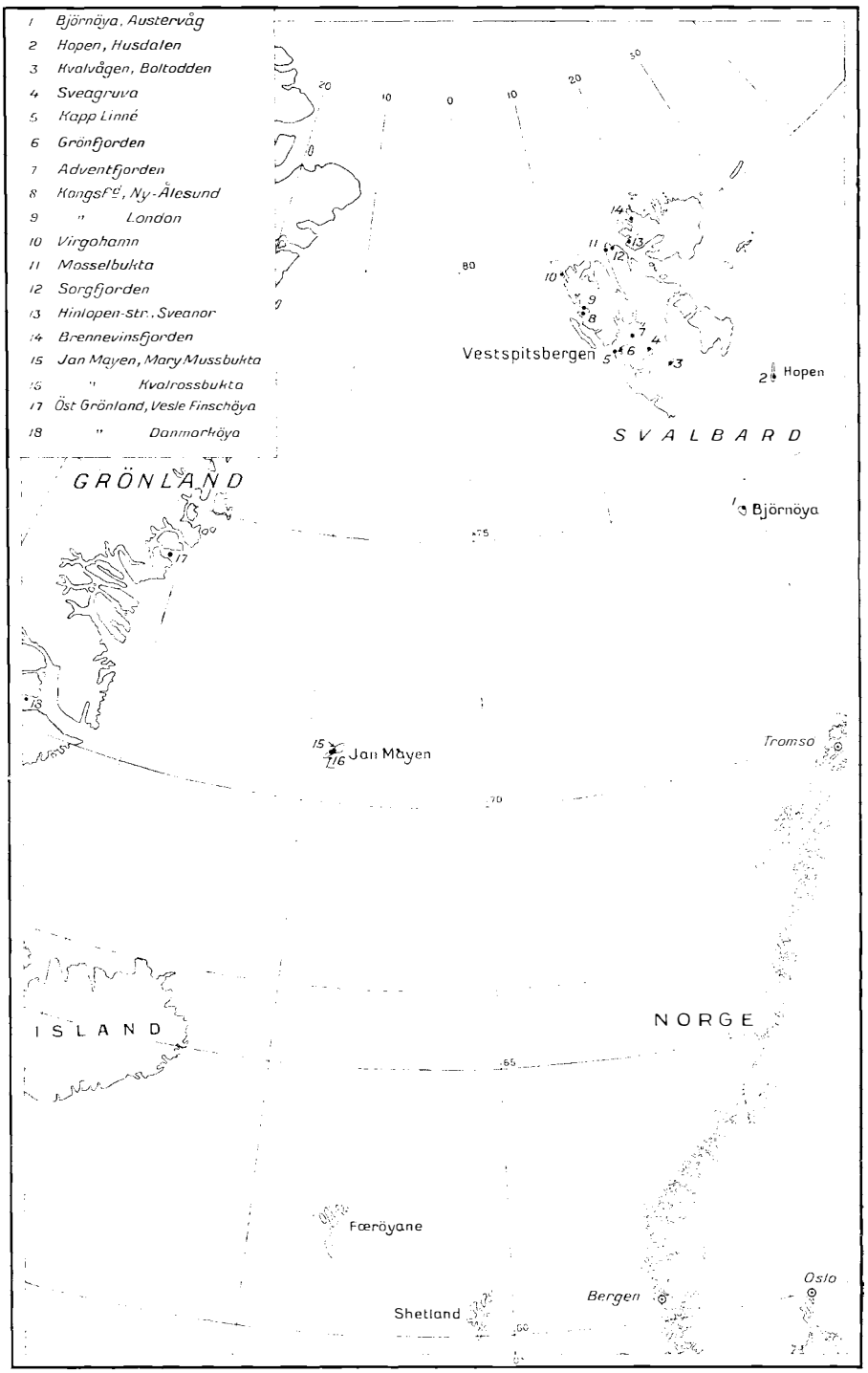
The scale of the gauge was 1: 7 2/3.

The weather and sea conditions throughout the observation period were generally satisfactory, owing to off-shore winds.

Two bolts were levelled in relation to the tide-gauge. One was placed in a large stone on the beach, and another in the rocks of the hill behind the hut. The bolts are 2.29 m and 59.77 m above the mean sea-level, respectively.

The observations cover the period July 13—Sept. 2, but at first Askheim had some trouble with the gauge, resulting in breaks. During the last 30 days the observations were consecutive, and the period Aug. 4 0000—Sept. 1 2300 was chosen for the harmonic analysis.


JAN MAYEN
Kvalrossbukta
Th. Askheim, 1950
1 : 4.000
100
200 m
Contour interval 2 m
N
Miss Boyd's tide gauge
Hut
Flagpole
Tide gauge
Memorial stone
Highwater mark
Bolt
Bolt
Bolt


1 Björnöya, Austervåg
2 Hopen, Husdalen
3 Kvalvågen, Boltodden
4 Sveagruva
5 Kapp Linné
6 Grönfjorden
7 Adventfjorden
8 Kongsfj., Ny-Ålesund
9 " London
10 Virgohamn
11 Mosselbukta
12 Sorgfjorden
13 Hinlopen-str., Sveanor
14 Brennevinsfjorden
15 Jan Mayen, Mary Mussbukta
16 " Kvalrossbukta
17 Öst Grönland, Vesle Finschöya
18 " Danmarköya
GRÖNLAND
SVALBARD
Vestspitsbergen
Hopen
Björnöya
Jan Mayen
Tromsø
ISLAND
NORGE
Færöyane
Shetland
Bergen
Oslo

Results.

The harmonic analyses of the tidal observations have been worked out according to the method of Dr. Doodson (Admiralty Tide Tables, part III). The analyses of Hopen and Kapp Linné have been made by Prof. Dr. J. Fjeldstad, the others by the hydrographer H. Hornbæk.

All observations except two were carried out by means of an automatic tide-gauge of American type. At Jan Mayen an automatic tide-gauge of Norwegian make was used, and at Sveagruva staff readings only.

The harmonic analyses for Sveagruva and Kapp Linné are based on observation periods of 15 days, the others on periods of 29 days.

Harmonic

No.	Station	Lat.	Long.	M_2cm	M_2 °	S_2cm	S_2 °	N_2cm	N_2 °	K_1cm	K_1 °	O_1cm	O_1 °	S_2-M_2	M_2-N_2
	Svalbard														
1.	Bjørnøya, Austervåg	74° 29′ N	19°12′ E	34.2	50	13.0	83	6.7	35	5.4	230	4.4	66	33°	15°
2.	*Hopen, Husdalen*	76 30.1	25 04.1	25.3	265	11.7	336	4.4	228	11.8	11	3.2	51	71	37
3.	*Kvalvågen, Boltodden*	77 30	18 12	26.0	355	20.4	25	7.3	307	6.8	352	1.4	47	30	48
4.	*Sveagruva*	77 53	16 43	48.4	46	21.6	101	13.0	30	7.3	233	1.2	144	55	16
5.	*Kapp Linné*	78 03.4	13 38.3	50.2	26	15.5	70	8.4	359	6.8	208	3.4	128	44	27
6.	Grønfjorden	78 04	14 15	50.7	21	18.3	63	9.8	356	6.7	232	3.3	96	42	25
7.	Adventfjorden	78 15	15 42	48.1	34	18.1	72	9.6	36	7.5	161	3.5	132	38	358
8.	*Kongsfjorden, Ny-Ålesund*	78 55.7	11 57.3	42.5	32	16.8	78	8.7	2	6.7	295	2.1	128	46	30
9. a	Kongsfjorden, London	78 57.8	12 03	44.4	26	15.0	68	7.5	5	5.4	255	2.1	92	42	21
9. b	— —	78 57.8	12 03	44.9	26	14.9	74	7.2	5	5.4	253	2.0	92	48	21
10.	Virgohamn	79 43	10 44	41.4	38	14.3	70	7.6	13	2.7	225	1.2	12	32	25
11.	Mosselbukta	79 53	16 04	35.0	87	13.1	121	6.7	61	7.0	245	2.7	72	34	26
12.	Sorgfjorden	80 00	16 52	28.0	99	10.7	150	7.0	71	7.3	270	2.1	70	51	28
13.	Hinlopen, Sveanor	79 56	18 18	25.1	92	11.1	138	4.9	57	8.7	271	1.8	78	46	35
14.	Brennevinsfjorden	80 23	19 29	28.0	83	10.0	135	8.0	44	4.0	273	—	—	52	39
	Jan Mayen														
15.	Mary Mussbukta	71 00	8 28 W	40.2	328	13.1	18	8.5	300	3.4	97	6.1	49	50	28
16.	*Kvalrossbukta*	70 58.3	8 41.2	41.1	327	14.9	10	7.6	293	6.0	107	6.4	60	43	34
	Øst Grønland														
17.	Vesle Finschøya	73 59	21 08	44.9	315	19.5	0	11.9	289	11.8	75	7.6	25	45	26
18.	Danmarkøya	70 27	26 12	35.0	337	16.1	28	7.6	312	8.7	65	9.3	35	51	25
19.	Finnsbu	63 24	41 17	85.1	127	36.6	158	15.0	126	13.2	93	4.4	46	31	1

Notes to the table.

The harmonic constants have been derived from the following sources:

No. 1, 17, and 19 — from Kjær, Rolf, and Fjeldstad, J. E.: Tidal Observations in the Arctic. Skrifter om Svalbard og Ishavet. Nr. 14. Oslo 1934.

» 2, 3, 4, 5, 8, and 16 — from the present paper.

» 6 — from Davydov, L. K.: Tides in Green Harbor Bay on Spitsbergen Island. Problemy Arktiki 1938, no. 5—6. Leningrad 1938. Pp. 33—37.

» 7 — from Dmitriev, S.: Zapiski po Hydrographi No. 4. Leningrad 1932. Cit. from International Hydrographic Bureau's Special Publication No. 26. Sheet No. 2094.

» 9 a — from Tenani, M.: Contributo alla conoscenza delle maree dell'Oceano artico. Atti Acad. Naz. d. Lincei Ser. 6, Vol. XIII, Roma 1931. Pp. 879—81.

» 9 b — from International Hydrographic Bureau's Special Publication No. 26. Sheet No. 161.

Constants, etc.

K_1-O_1	S_2/M_2	N_2/M_2	O_1/K_1	Tidal hours M_2	Tidal hours K_1	Tidal hours O_1	Duration in days	Year	Expedition
164°	0.38	0.20	0.82	0.40	14.05	3.12	29*	1930	Norges Svalbard- og Ishavs-undersøkelser
320	0.46	0.17	0.27	7.16	23.06	1.73	29*	1947	—»—
305	0.78	0.28	0.21	10.63	22.24	1.94	29*	1952	Norsk Polarinstitutt
89	0.45	0.27	0.16	0.42	14.42	8.49	15	1946	Norges Svalbard- og Ishavs-undersøkelser
80	0.31	0.17	0.50	11.96	12.96	7.62	14*	1946	—»—
136	0.36	0.19	0.49	11.75	14.52	5.45	360*	1934—35	Barentsburg Polar Station
29	0.33	0.20	0.47	0.09	9.69	7.75	15	1931	Store Norske Spitsbergen Kulkompani A S
167	0.40	0.20	0 31	0.27	18.87	7.74	29*	1949	Norsk Polarinstitutt
163	0.34	0.17	0.39	0.06	16.20	5.33	58*	1928	Italian Exp. in the »Citta di Milano«
161	0.33	0.16	0.37	0.06	16.06	5.33	58*	1928	—»—
213	0.35	0.18	0.44	0.55	13.62	0.08	29	1897	Andrée Exp.
173	0.37	0.18	0.39	1.82	15.26	3.73	104	1872—73	Nordenskiöld
200	0.38	0.25	0.29	2.16	16.88	3.54	104.5	1900	Swedish-Russian Arc-of Meridian Measurement. Swedish (sec)
193	0.44	0.19	0.20	1.85	16.85	3.98	—	1931	Swedish-Norwegian Spitsbergen Exp.
—	0.36	0.29	—	1.47	16.90	—	14*	1936	Oxford University Arctic Exp. 1936
48	0.33	0.21	1.86	11.51	7.00	3.85	104.5	1883	Austrian Exp. 1882—83
47	0.36	0.18	1.07	11.48	7.71	4.06	29*	1950	Norsk Polarinstitutt
50	0.44	0.27	0.65	11.92	6.41	3.08	29*	1933	Norges Svalbard- og Ishavs-undersøkelser
30	0.46	0.22	1.07	12.98	6.08	4.08	120	1906—07	»Danmark« Eksp. 06—08
47	0.43	0.18	0.33	6.98	8.95	5.82	29	1932	Norges Svalbard- og Ishavs-undersøkelser

* Automatic tide-gauge

No. 10, 11, 12, 15, and 18. from Harris, R. A.: Arctic Tides. Cit. from Fjeldstad, J. E.: Results of Tidal Observations. Bergen 1936. Norw. North Polar Exp. with the "Maud" 1918—25. Scient. res. Vol. 4, no. 4.

» 13 from Fjeldstad, J. E.: Results of Tidal Observations at Sveanor. Scient. Res. of the Swedish-Norwegian Expedition in the Summer 1931 (Not yet published). Cit. from Fjeldstad, J. E.: Results of Tidal Observations. Bergen 1936.

» 14 from Fjeldstad, J. E.: Results of Tidal Observations at Brandy Bay, North East Land. Norsk geogr. tidsskr. Vol. 7, Oslo 1939. Pp. 369—376.

Printed, November 1954.

Nr. 78. ORVIN, ANDERS K., *Outline of the Geological History of Spitsbergen.* 1940. Kr. 7,00.
„ 79. LYNGE, B., *Et bidrag til Spitsbergens lavflora.* 1940. Kr. 1.50.
„ 80. *The Place-Names of Svalbard.* 1942. Kr. 50,00.
„ 81. LYNGE, B., *Lichens from North East Greenland.* 1940. Kr. 14,00.

Norges Svalbard- og Ishavs-undersøkelser. Skrifter.

„ 82. NILSSON, TAGE, *The Downtonian and Devonian Vertebrates of Spitsbergen. VII. Order Antiarchi.* 1941. Kr. 11,50.
„ 83. HØEG, OVE ARBO, *The Downt. and Devonian Flora of Spitsbergen.* 1942. Kr. 33,00.
„ 84. FREBOLD, HANS, *Über die Productiden des Brachiopodenkalkes.* 1942. Kr. 6,00.
„ 85. FØYN, SVEN and ANATOL HEINTZ, *The Downtonian and Devonian Vertebrates of Spitsbergen. VIII.* 1943. Kr. 5,00.
„ 86. *The Survey of Bjørnøya (Bear Island) 1922—1931.* 1944. Kr. 9,00.
„ 87. HADAČ, EMIL, *Die Gefäßpflanzen des „Sassengebietes" Vestspitsbergen.* 1944. Kr. 6,00.
„ 88. *Report on the Activities of Norges Svalbard- og Ishavs-undersøkelser 1936—1944.* 1945. Kr. 6,50.
„ 89. ORVIN, ANDERS K., *Bibliography of Literature about the Geology, Physical Geography, Useful Minerals, and Mining of Svalbard.* 1947. Kr. 12,00.

Norsk Polarinstitutt. Skrifter.

„ 90. HENIE, HANS, *Astronomical Observations on Hopen.* 1948. Kr. 3,00.
„ 91. RODAHL, KÅRE, *Vitamin Sources in Arctic Regions.* 1949. Kr. 6,00.
„ 92. RODAHL, KÅRE, *The Toxic Effect of Polar Bear Liver.* 1949. Kr. 12,50.
„ 93. HAGEN, ASBJØRN, *Notes on Arctic Fungi. I. Fungi from Jan Mayen. II. Fungi collected by Dr. P. F. Scholander on the Swedish-Norwegian Arctic Expedition 1931.* 1950. Kr. 2,00.
„ 94. FEYLING-HANSSEN, ROLF W. and FINN A. JØRSTAD, *Quaternary Fossils.* 1950. Kr. 8,25.
„ 95. RODAHL, KÅRE, *Hypervitaminosis A.* 1950. Kr. 22,50.
„ 96. BUTLER J. R., *Geochemical Affinities of some Coals from Svalbard.* 1953. Kr. 3,00.
„ 97. WÄNGSJÖ, GUSTAV, *The Downtonian and Devonian Vertebrates of Spitsbergen.* Part IX. *Morphologic and Systematic Studies of the Spitsbergen Cephalaspids.* A. Text, and B. Plates. 1952. Kr. 75.00.
„ 98. FEYLING-HANSSEN, ROLF W., *The Barnacle Balanus Balanoides (Linné, 1766) in Spitsbergen.* 1953. Kr. 8,00.
„ 99. RODAHL, KÅRE, *Eskimo Metabolism.* 1954. Kr. 10,00.
„ 100. PADGET, PETER, *Notes on some Corals from Late Paleozoic Rocks of Inner Isfjorden, Spitsbergen.* 1954. Kr. 1,00.
„ 101. MATHISEN, TRYGVE, *Svalbard in International Politics 1871—1925.* 1954. Kr. 18,00.
„ 102. RODAHL, KÅRE, *Studies on the Blood and Blood Pressure in the Eskimo and the Significance of Ketosis under Arctic Conditions.* 1954. Kr. 10,00.
„ 103. LØVENSKIOLD, H. L., *Studies on the Avifauna of Spitsbergen.* 1954. Kr. 16,00.
„ 104. HORNBÆK, HELGE, *Tidal Observations in the Arctic* 1946—52. Kr. 2,50.

MAPS AND CHARTS

The following topographical maps and charts have been published separately:

Maps:

Bjørnøya. 1:25000. 1925. New edition 1944. Kr. 3,00.
Bjørnøya. 1:10000. [In six sheets.] 1925. Kr. 30,00.
Adventfjorden—Braganzavågen. 1:100000. 1941. Kr. 2.00.
Svalbard. 1:2000000. 1937. New edition 1944. Kr. 1,00.
Topografisk kart over Svalbard. Blad C 13. Sørkapp. 1:100000. 1947. Kr. 3,00.
Topografisk kart over Svalbard. Blad B 10. Van Mijenfjorden. 1:100000. 1948. Kr. 3,00.
Topografisk kart over Svalbard. Blad C 9. Adventdalen. 1:100000. 1950. Kr. 3,00.
Topografisk kart over Svalbard. Blad B 11. Van Keulenfjorden. 1:100000. 1952. Kr. 3,00.
Topografisk kart over Svalbard. Blad B 12. Torellbreen. 1:100000. 1953. Kr. 3,00.
Austgrønland. Eirik Raudes Land frå Sofiasund til Youngsund. 1:200000. 1932. Kr. 2,00.

Preliminary topographical maps [1:50000] covering claims to land in Svalbard and a preliminary map of Hopen 1:100000 may be obtained separately.

Charts

No. 501. Bjørnøya. 1:40000. 1932. Kr. 4,00.
" 502. Bjørnøyfarvatnet. 1:350000. 1937. Kr. 4,00.
" 503. Frå Bellsund til Forlandsrevet med Isfjorden. 1:200000. 1932. Kr. 5,00.
" 504. Frå Sørkapp til Bellsund. 1:200000. 1938. Kr. 5,00.
" 505. Norge—Svalbard, nordre blad. 1:750000. 1933. Kr. 4,00.
" 506. Norge—Svalbard, søre blad. 1:750000. 1933. Kr. 4,00.
" 507. Nordsvalbard. 1:600000. 1934. Kr. 4,00.
" 508. Kongsfjorden og Krossfjorden. 1:100000. 1934. Kr. 4,00.
" 509. Frå Storfjordrenna til Forlandsrevet med Isfjorden. 1:350000. 1946. Kr. 4,00.
" 510. Frå Kapp Linné med Isfjorden til Sorgfjorden. 1:350000. 1946. Kr. 4,00.
" 511. Austgrønland, frå Liverpoolkysten til Store Koldeweyøya. 1:600000. 1937. Kr. 4,00.

Prices above do not include purchase tax.

Norsk Polarinstitutt. Skrifter Nr. 104. Helge Hornbæk: Tidal Observations in the Arctic 1946—52.