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PART 3.

SOUNDINGS

BY

JOHN K. DAVIS (Extra Master), F.R.G.S.

[A.A.E. Reports, Series A, Vol II, Part 3, Pages 87–102.
Plates VII–VIII.]

Issued December, 1939.

*48530—A

CONTENTS.

SOUNDINGS.

By

John King Davis (Extra Master), F.R.G.S., Captain of S.Y. "Aurora."
Second in Command of the Expedition.

INTRODUCTORY REMARKS.

The party who carried out the deep-sea work under my direction was headed by the Chief Officer. I shall always remember the "sounding party" on the "Aurora" as a small band of cheerful and energetic enthusiasts, ever ready for action, and reliable under the most trying conditions.

Owing to the crowded state of the decks when the "Aurora" sailed from Hobart in December, 1911, deep-sea work had to be postponed.

The first sounding recorded in the tabular list herewith was taken nearing Antarctic land on the 3rd January, 1912. Thereafter, an active sounding programme was pursued. The soundings listed in this report do not include numbers of very shallow records made with the Kelvin machine close to the various islands and Antarctic mainland visited. Some of these appear on maps published in other sections of these reports; but many such were taken hurriedly for navigational purposes without opportunity to fix the locations in relation to known features of the nearby land. The total number of soundings listed aggregates 225.

The depth of the sea was obtained by one or other of two types of machine; for deepwater to depths of 6,000 fathoms a Lucas sounding machine was employed; for depths up to about 200 fathoms the Kelvin sounder was employed.

There were two Lucas machines provided, one mounted on the port side of the forecastle head, the other on the starboard side. A brass steam winding engine loaned by Dr. W. S. Bruce was used to wind in the wire on the port sounder which was the machine normally employed, the other Lucas machine was held in reserve in case of emergency.

The general appearance of the Lucas machine employed is illustrated in Plate VII, Fig. 1. The drum on the left holds the sounding wire and is designed to take up to 6,000 fathoms tightly coiled around the central drum. The wire, a very fine single strand has a diameter of ·028 of an inch, and a tensile strength of 240 lb. Each 1,000 fathoms of this wire weighs 12½ lb (in air). The wire as it is paid out passes over the measuring wheel on the right, the length of wire out, and therefore the depth, being recorded directly on the clock-faced dial, seen in the illustration to be mounted on the axle of the measuring wheel.

An essential feature is an ingenious spring brake which is kept out of action by the tension of the wire when running out, but when the sinker strikes the bottom and the tension on the wire is thereby relaxed, the brake immediately comes into action and automatically stops the further unwinding of the reel. In order to act satisfactorily the brake must be set at correct tension which varies somewhat with the length of wire out. The operator adjusts this by giving the handle, seen in the illustration above the drum, a few turns occasionally as the wire goes out. The tightly coiled spring on the end of the brake handle bar is also easily recognisable in the illustration.

As it is usually desirable, on occasions when soundings are being taken, to secure a sample of the material composing the sea-floor, what is known as a driver, a hollow steel tube about 2 feet in length, is attached to a piece of hempline spliced on to the end of the sounding wire (see Plate VII, Fig. 2).

Iron weights cast in ring form to allow the driver to pass through them are attached to the driver by a slip cord which automatically lets them go when the driver strikes the sea floor. With the weights thus detached, the winding in of the wire with attached driver is facilitated. The driver on impact with the bottom is driven into the ooze which enters the hollow interior and is there retained by the action of a butterfly valve which closes after entry of the mud and allows the sample to be brought safely to the surface.

The annular weights each weighed 25 lb. As the depth increases a heavier weight is required to overcome the greater frictional resistance of the long length of wire ploughing its way down through the water. Therefore, one or more of the sinker weights was attached as needed in each case.

A wire of very small cross-section is adopted in order to reduce frictional resistance in the water, but this necessitates the casting off of the sinker weights on reaching the bottom in order that the load to be brought back to the surface on rewinding the wire shall not exceed the strength of the wire. Thus in the case of deep soundings, should the weights fail to be detached on striking the bottom, there is a large probability that the wire will snap during rewinding with the loss of the driver and bottom sample.

When sounding in 2,452 fathoms on 28th May, 1912, the release failed to act and the weights, driver and all were wound up without loss; but the resulting accumulated compressional stress on the boss of the winding drum was so excessive that it burst.

With the fine wire used, the friction is slight and, in moderate weather, the vessel can be kept over the driver when sounding or will drift slowly to leeward of the wire. There is invariably a heavy swell in the Southern Ocean and it will be easily understood that the sudden strain imparted to the wire by the rolling of the ship sometimes results in the wire parting as it is being wound in. After some practice we learned how to handle the vessel and the sounding machine so as to impose the least possible strain on the wire during the operation.

In taking a sounding the engines are stopped and, when the weigh is off, the requisite number of weights (usually two), each 25 lb., are rove on to the driver; these are kept in position by a piece of line led over a trigger which upsets when the bottom is struck. With the weights thus left behind the recovery of the driver is easier. All being ready, the driver with weights attached is lowered carefully over the side. The hand brake is used to prevent the wire from running off the machine too rapidly, at first, but is thereafter gradually released. The automatic brake stops the wire from running out further when bottom is reached by the driver, the weights then disengaging.

The wire is then wound back on to the drum either by hand power or, as arranged on the "Aurora," by belting on to the steam-driven winder. As the wire is wound in it is oiled and guided by hand on to the drum.

In moderate weather for depths of from 2,000 to 3,000 fathoms, the time required from the moment that the driver was lowered into the water, until the ship resumed her course, was about 45 minutes for 2,000 fathoms and 95 minutes for 3,000 fathoms. On the 1st December, 1912, a sounding was taken in 2,610 fathoms and the time occupied was one hour only, but the weather conditions were ideal.

A Kelvin sounding machine was employed in the taking of soundings in coastal waters to depths of 200 fathoms. This was mounted on the after-deck near the stern rail, over which the wire passed.

Multi-ply wire was used, and the length of it paid out at any time was indicated on a graduated dial. The wire had then to be wound back on to the drum by hand power.

The advantage of the Kelvin sounder is in that it can be operated whilst the ship is steaming along. This is so, since the means adopted for recording depth is independent of the amount of stray on the wire.

The principle upon which this method of sounding is based is that of the progressive increase of pressure with increasing depth. An $\frac{1}{8}$-inch diameter glass tube about 24 inches long, sealed at one end but open at the other, coated inside with a film of silver chromate in gelatine is attached, closed end up, to a heavy sinker-rod at the end of the sounding wire. The sinker-rod is lowered overboard and the wire run out till bottom is struck. Then upon winding the sinker-rod on board the glass tube is recovered for examination.

The pressure encountered by the tube as it descends compresses the air column in it and the sea water rises in the tube progressively with depth. Just how far the sea water did enter the tube in this manner is indelibly recorded owing to the fact that the contact of sea water with the silver chromate converts it from reddish brown to milky white, owing to the formation of silver chloride. The length of tube still occupied by silver chromate is scaled off on to a rule, graduated in fathoms to correspond to the degrees of compression indicated.

Some indication of the form of this instrument is to be noted by reference to Plate VIII, Figs. 1 and 2.

Reverting to the tabulated list of soundings, it will be noted that in some cases bottom was not actually reached. Nevertheless in such cases there is value in recording the depth reached by the sinker. When plotting such "no bottom" soundings they are marked on the chart with the depth reached printed below the position spot and a horizontal line. Thus the entry $\overline{2000}$ refers to an observation where bottom was not reached notwithstanding 2,000 fathoms of wire having been run out.

The entry "rock" or "hard bottom" indicates that the driver failed to bring up any sample, when it is to be inferred that it struck rock and not ooze or other softer material. It is to be remembered, however, that in the case of the seas visited by the "Aurora," erratics dropped on the mud bottom by icebergs are very abundant. It may thus happen from time to time that the driver succeeds in descending directly upon such an isolated piece of loose rock, though the general deposit in the ice floor thereabouts is actually mud. In cases where the entry under "nature of the sea-bottom" is marked with an asterisk, the sea-floor sample has been examined in detail by F. Chapman and reported upon in Part 1, Vol. II, of Series A of this publication.

In the case of some soundings, the locations given in Chapman's report on the sea-floor deposits differ slightly from the latitude and longitude, relating to the same sounding, as stated in the table herewith. In all such cases that contained herein is the corrected figure, which has been arrived at by subsequently reworking up the said position upon the basis of more reliable observations or chronometer corrections. The positions quoted in Chapman's report were those inscribed on the containers of the respective samples at the time of collection.

The depths quoted in the table herewith are corrected figures, after making allowance for drift in all cases where the wire had strayed from a vertical position.

These soundings are plotted on the maps accompanying Part 4 of Vol. II of this Series.

Publications that have already appeared in which reference has been made to some of the soundings of this Expedition are the following:—

"The Soundings of the Antarctic Ship 'Aurora' between Tasmania and the Antarctic Continent (1912)," by J. K. Davis: The Geographical Journal, Oct., 1913, pp. 361–364.

"With the 'Aurora' in the Antarctic," by J. K. Davis: London, 1920.

Also some of the soundings appear on the maps included in "The Home of the Blizzard" by D. Mawson: London, 1915. Again some have been incorporated in certain of the Admiralty Charts.

AUSTRALASIAN ANTARCTIC EXPEDITION
1911-14

UNDER THE LEADERSHIP OF SIR DOUGLAS MAWSON, D.Sc., F.R.S.

SCIENTIFIC REPORTS.

SERIES A.

VOL. II.

OCEANOGRAPHY.

PART 3.

SOUNDINGS

BY

JOHN K. DAVIS (EXTRA MASTER), F.R.G.S.,

MASTER OF S.Y. "AURORA," SECOND IN COMMAND OF EXPEDITION.

WITH TWO PLATES.

PRICE: TWO SHILLINGS AND SIXPENCE.

Wholly set up and printed in Australia by

THOMAS HENRY TENNANT, ACTING GOVERNMENT PRINTER, SYDNEY, NEW SOUTH WALES, AUSTRALIA.

1940.

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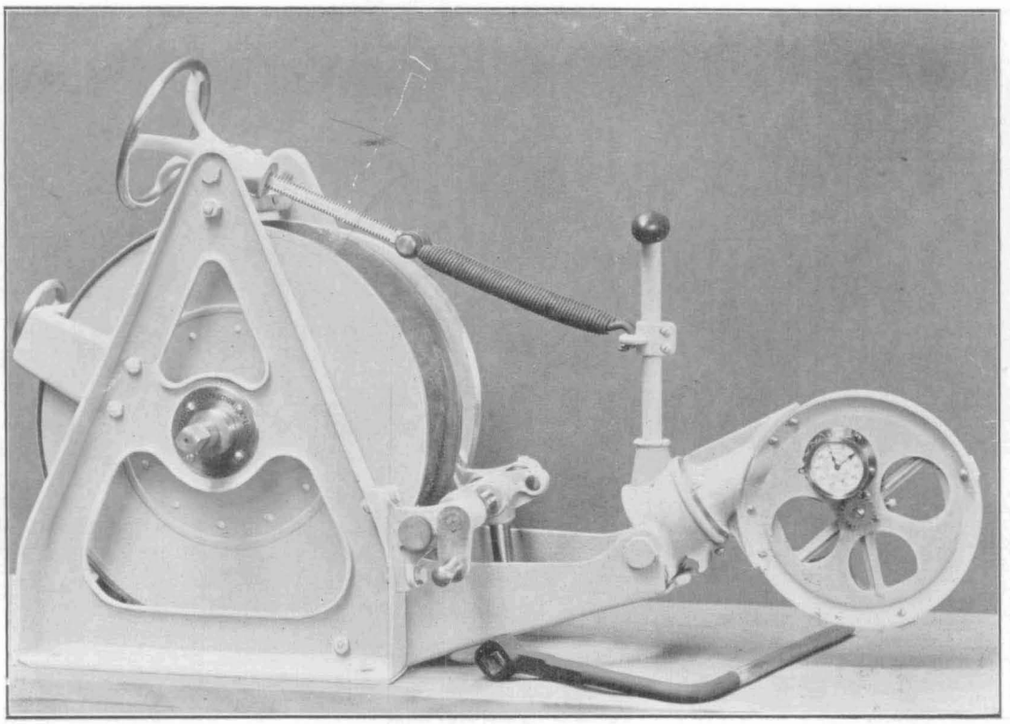

FIG. 1.—LUCAS AUTOMATIC SOUNDING MACHINE.

FIG. 2.—SHOWING THE BAILEE DRIVER WITH WEIGHTS ATTACHED READY FOR SOUNDING.

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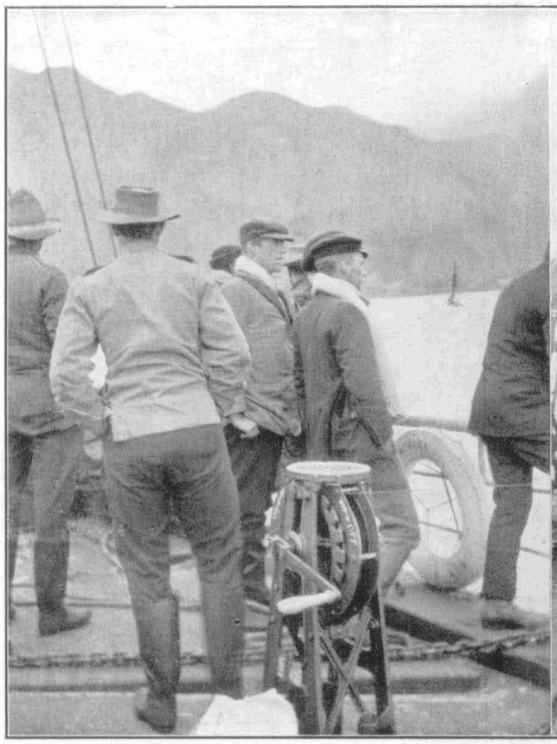

FIG. 1.—KELVIN SOUNDER.

FIG. 2.—OPERATING THE KELVIN SOUNDER.

FIG. 3.—READING THE TEMPERATURE RECORDED ON ARRIVAL OF THE EKMAN REVERSING WATER-BOTTLE AT THE SURFACE.

TABLE OF SOUNDINGS.

Date.	S. Latitude.	E. Longitude.	Depth.		Nature of Bottom and Remarks.
			Fathoms.	Metres.	
1912.	deg. min.	deg. min.			
3 Jan. ...	65 57	144 0	210	384	Dark grey terrigenous mud with foraminifera, etc.*
5 ,, ...	66 16	144 6	230	420	Grey mud.
6 ,, ...	66 40	145 0	...	...	No bottom at 230 fathoms.
6 ,, ...	66 57	145 16	398	728	Pale grey sandy mud with diatoms, radiolaria, etc.*
6 ,, ...	67 00	144 55	....	...	No bottom at 200 fathoms. Approximate position only.
7 ,, ...	66 55	144 52	150	274	Sandy glacial mud with stones.
8 ,, ...	66 49	143 00	...	...	No bottom at 250 fathoms.
20 ,, ...	66 43	141 25	40	73	
20 ,, ...	66 41	141 23	32	58	
20 ,, ...	66 39	141 18	45	82	
20 ,, ...	66 36	141 13	65	119	
20 ,, ...	66 32	141 7	120	220	Sandy mud (approximate position).
20 ,, ...	66 35	140 50	110	201	
20 ,, ...	66 32	140 26	308	563	Light coloured diatomaceous and spicular ooze.*
21 ,, ...	65 39	139 00	292	533	Terrigenous mud with organic remains.
22 ,, ...	65 2	135 20	239	437	Rock.
23 ,, ...	65 2	132 26	160	293	Greenish-grey sandy and pebbly mud with diatoms, forams, radiolaria, etc.*
23 ,, ...	65 30	132 31	156	285	Glacial mud with sponge spicules and shell fragments.*
23 ,, ...	65 42½	132 33	190	348	
23 ,, ...	65 45½	132 35	230	420	Sandy glacial mud with diatoms, forams and radiolaria.*
24 ,, ...	65 26	132 31	170	311	Glacial mud with organic remains.
25 ,, ...	65 16½	129 10	230	420	Greenish glacial, pebbly mud with radiolaria, forams, etc.
29 ,, ...	65 14	125 10	...	...	No bottom at 260 fathoms.
30 ,, ...	65 34½	124 7	630	1,152	Rock.
31 ,, ...	66 1½	119 30	340	622	Grey glacial mud with radiolaria and forams.*
1 Feb. ...	64 49	115 57	927	1,696	Pebbly glacial mud with forams, etc.*
2 ,, ...	64 40	111 43	1,150	2,104	Terrigenous ooze with organic remains.
3 ,, ...	65 39	108 35	300	549	Brown pebbly glacial mud with forams, etc.*
4 ,, ...	65 5½	107 20	291	532	Rock.
5 ,, ...	65 7	106 39	450	823	Rock.
6 ,, ...	64 31	106 28	1,500	2,744	Pale grey glacial mud with globigerina, etc.*
7 ,, ...	64 30½	102 9	1,080	1,975	Sample lost.
8 ,, ...	63 48	97 28	...	...	No bottom at 270 fathoms (approximate D.R. position).
8 ,, ...	63 52	96 32	...	...	No bottom at 850 fathoms (approximate D.R. position, corrected by subsequent sight).
9 ,, ...	64 34	96 58½	110	201	Pebbly mud with ophiuroids, etc.*

* A sample of this deposit has been examined and reported upon by F. Chapman; see Part 1 of this Volume.

TABLE OF SOUNDINGS—*continued.*

Date.	S. Latitude.	E. Longitude.	Depth.		Nature of Bottom and Remarks.
			Fathoms.	Metres.	
1912.	deg. min.	deg. min.			
9 Feb. ...	64 36½	97 15	110	201	Sand and stones.
10 „ ...	64 26	97 11	120	220	Coarse sand and stones with polyzoa, etc.*
10 „ ...	64 18	97 26	870	1,591	Sand and small stones, forams, etc.*
11 „ ...	64 40	96 0	120	220	Sand.
11 „ ...	64 47	95 40	120	220	Pale greenish-grey mud with forams, radiolaria and diatoms.*
12 „ ...	65 6	94 2	235	430	Terrigenous mud with organic remains.
13 „ ...	65 38	94 28	375	686	Pale greenish-grey mud with forams, diatoms and radiolaria.*
13 „ ...	65 54½	94 25	500	914	Grey glacial mud with forams, radiolaria and sponge spicules.*
13 „ ...	66 21	94 14	250	457	Terrigenous mud.
14 „ ...	66 19	94 16	220	402	Glacial mud and pebbles with forams and diatoms.*
14 „ ...	66 15	94 15	160	293	Glacial mud and pebbles rich in forams and ostracods.*
14 „ ...	66 10	94 15	123	225	Shelly mud and stones with abundant forams and ostracods.*
14 „ ...	66 4	94 19	160	293	Terrigenous mud.
15 „ ...	66 18½	94 52	182	333	Grey sandy mud and stones with polyzoa diatoms, forams, ostracods, etc.*
15 „ ...	66 18½	94 58	222	407	Pale greenish mud, rich in forams, ostracods, polyzoa, etc. Ship station at West Base.*
21 „ ...	65 48½	95 11	543	993	Rock.
26 May ...	44 12	140 19	2,590	4,736	Globigerina ooze.*
28 „ ...	47 38	139 30	2,452	4,484	Globigerina ooze.*
30 „ ...	51 29	140 0	2,150	3,932	Sample lost.
6 June ...	54 28	159 2	...	...	No bottom at 1,000 fathoms. 3½ miles E. of North-East Bay.
6 „ ...	53 45	158 12	800	1,463	Diatom ooze.*
7 July ...	49 17	167 36	398	728	Pumiceous slag rock.
7 „ ...	49 2	167 49	380	697	Rock.
8 „ ...	48 0	169 18	380	697	Rock.
8 „ ...	47 49	169 14	375	686	Rock.
9 „ ...	47 16	169 52	348	636	Rock.
13 Nov. ...	44 3	147 36	658	1,203	Rock and shell.
13 „ ...	44 21	147 35	1,470	2,688	Sample lost.
13 „ ...	44 20½	147 33	1,475	2,697	Globigerina ooze; bluish-grey colour.*
14 „ ...	45 26	147 26	2,083	3,810	Globigerina ooze; cream colour.*
14 „ ...	46 2	147 30	1,940	3,548	Grey globigerina ooze with radiolarians and diatoms.*
15 „ ...	46 28	147 29	792	1,448	Rock. Duplicate sounding gave 794 fathoms.
15 „ ...	47 2	147 31½	660	1,207	Hard bottom.
15 „ ...	47 14½	147 31	700	1,280	Rock.
17 „ ...	48 46	146 29	1,570	2,872	Lost length of wire and driver. Possibly did not reach bottom.
18 „ ...	49 36	149 12	...	...	1,740 fathoms of wire out without reaching bottom.

* A sample of this deposit has been examined and reported upon by F. Chapman; see Part 1 of this Volume.

TABLE OF SOUNDINGS—*continued.*

Date.	S. Latitude.	E. Longitude.	Depth.		Nature of Bottom and Remarks.
			Fathoms.	Metres.	
1912.	deg. min.	deg. min.			
18 Nov. ...	49 53	149 35	2,605	4,764	Sample lost.
19 „ ...	50 27½	151 29	2,595	4,746	Sample lost.
20 „ ...	51 40	155 3½	2,570	4,700	Pale ochre-yellow globigerina ooze.*
21 „ ...	53 8	157 0½	2,460	4,499	Pale ochre-yellow globigerina ooze.*
21 „ ...	53 29	157 49	2,540	4,645	Sample lost.
21 „ ...	53 46	158 46½	1,405	2,569	Sample lost.
22 „ ...	53 34	159 4	636	1,163	Sand on rock.
22 „ ...	53 44	159 3	570	1,042	Rock.
22 „ ...	54 4	159 5	1,750	3,200	Sample lost.
25 „ ...	54 34½	159 2	1,548	2,831	Rock. Station 3 miles off E. coast, Macquarie Island.
25 „ ...	54 34½	159 12	...	...	No bottom at 2,745 fathoms. Station 10 miles off coast.
26 „ ...	53 35	160 57	1,855	3,393	Rock.
26 „ ...	53 18½	161 35	2,100	3,840	Rock? No sample in driver.
27 „ ...	51 51½	164 40	2,430	4,444	Greenish-grey terrigenous mud, rich in globigerina and sponge spicules.*
28 „ ...	50 56½	166 29	254	465	Rock. Station 15 miles off Auckland Islands.
28 „ ...	50 47½	166 42	84	154	Shell over rock. Station 16 miles off Auckland Islands.
28 „ ...	50 44	166 54½	198	362	Hard bottom.
28 „ ...	50 43	166 58	215	393	Hard bottom.
28 „ ...	50 33	166 58	60	110	Polyzoa.*
28 „ ...	50 1	167 12	81	148	Shells and polyzoa.*
30 „ ...	49 50	163 32½	1,965	3,594	Hard bottom.
1 Dec. ...	49 23½	159 47	2,610	4,773	Globigerina ooze, with some terrigenous sand; greenish-yellow.*
4 „ ...	48 17	151 42	2,700	4,938	Globigerina ooze with some terrigenous sand; ochreous yellow.*
5 „ ...	48 19½	149 19	1,076	1,948	Globigerina ooze; cream coloured.*
6 „ ...	48 16½	147 56	1,300	2,378	No sample. Duplicate sounding recorded 9 fathoms deeper.
6 „ ...	47 57½	147 41	835	1,527	Hard bottom.
6 „ ...	47 40½	147 32	735	1,344	Hard bottom.
6 „ ...	47 30	147 29	710	1,298	Shelly globigerina ooze on hard bottom.*
7 „ ...	47 28½	148 21	543	993	Foraminiferal ooze and fragments of shell.*
7 „ ...	47 27½	148 52½	645	1,179	Hard bottom.
7 „ ...	47 27	149 17½	918	1,679	Hard bottom.
8 „ ...	46 45	148 40	1,490	2,725	Hard bottom.
8 „ ...	46 47	148 17	935	1,710	Hard bottom.
8 „ ...	46 38½	147 56	840	1,536	Shells on hard floor.*
11 „ ...	43 4½	148 24	1,100	2,012	Brown terrigenous sand. Cape Pillar S. 60° W. (true), distant 18 miles.*
11 „ ...	42 53	148 25½	675	1,234	Brown terrigenous sand with forams and sponge spicules.*

*A sample of this deposit has been examined and reported upon by F. Chapman: see Part 1 of this Volume.

TABLE OF SOUNDINGS—*continued.*

Date.	S. Latitude.	E. Longitude.	Depth.		Nature of Bottom and Remarks.
			Fathoms.	Metres.	
1912.	deg. min.	deg. min.			
11 Dec. ...	42 40½	148 25½	73	134	Polyzoa. Station 11 miles east of Maria Island.
11 „ ...	42 38½	148 37	1,180	2,158	Pale green terrigenous mud with forams and sponge spicules. Station 20 miles east of Maria Island.*
12 „ ...	42 38½	148 41½	1,320	2,414	Pale green terrigenous mud with forams and spicules. A duplicate sounding at this station gave 1,300 fathoms.*
12 „ ...	42 44	148 41	1,300	2,378	Green terrigenous spicular mud with forams.*
12 „ ...	42 35	148 25½	68	124	No sample.
12 „ ...	42 34	148 24½	65	119	Coralline sand.
12 „ ...	42 39	148 22¾	64	117	Coralline sand.
12 „ ...	42 40	148 20¼	62	113	Coralline sand.
13 „ ...	42 48	148 40¾	1,270	2,322	Globigerina ooze.
13 „ ...	43 28	148 39½	1,980	3,621	Globigerina ooze.
29 „ ...	47 21½	145 32	1,670	3,054	Pale cream globigerina ooze.*
31 „ ...	49 58½	144 40	2,020	3,694	Globigerina ooze.*
1913.					
1 Jan. ...	51 16	144 17	2,170	3,969	Sample lost.
2 „ ...	53 43	147 10	...	....	No bottom at 1,850 fathoms; wire parted.
3 „ ...	54 46	146 55	1,850	3,383	Sample lost.
4 „ ...	56 13	146 35	1,670	3,054	Diatomaceous and spicular ooze with some globigerina.*
5 „ ...	57 25½	146 33	1,900	3,475	Diatomaceous and spicular ooze with some globigerina and radiolaria.*
5 „ ...	58 12	146 47	1,900	3,475	Diatomaceous and spicular ooze; globigerina and radiolaria common.*
7 „ ...	59 59	146 54	2,230	4,078	Diatomaceous and spicular ooze with globigerina and radiolaria.*
8 „ ...	61 53½	146 39	2,250	4,115	Diatomaceous and spicular ooze with manganese nodules.*
9 „ ...	63 6	146 41	2,260	4,133	Rich diatomaceous ooze.*
9 „ ...	63 39	146 49	2,150	3,932	Rich diatomaceous ooze.*
10 „ ...	64 8	146 40	2,100	3,840	Diatomaceous and spicular mud.*
11 „ ...	64 52	146 48	1,950	3,586	Yellowish-green glacial mud with diatoms and radiolaria.*
11 „ ...	65 20	146 48	1,625	2,972	Grey-green glacial mud with diatoms, radiolaria and globigerina.*
11 „ ...	65 35½	146 2	1,480	2,707	Hard bottom.
12 „ ...	65 51	144 19	350	640	Pebbly glacial mud with sponge spicules, etc.*
12 „ ...	66 11	144 19	184	337	Greenish sandy and pebbly mud with diatoms, etc.*
12 „ ...	66 11	144 19	224	410	Sample lost.
12 „ ...	66 12	143 59	230	421	Hard bottom.
12 „ ...	66 16½	143 28	320	585	Green glacial mud with diatoms and sponge spicules.*
30 „ ...	67 14	144 50	340	622	Rock.
27 Feb. ...	58 14½	96 59	2,330	4,261	Sample lost.
28 „ ...	56 15	98 56	2,330	4,261	Sample lost.
20 Nov. ...	44 54	146 47	1,700	3,008	Sample lost.

* A sample of this deposit has been examined and reported upon by F. Chapman; see Part I of this Volume.

TABLE OF SOUNDINGS—*continued.*

Date.	S. Latitude.	E. Longitude.	Depth.		Nature of Bottom and Remarks.
			Fathoms.	Metres.	
1913.					
21 Nov. ...	47 28	147 37	604	1,105	Hard bottom.
22 ,, ...	49 9	148 1	2,400	4,389	Pale cream globigerina ooze with radiolaria.
23 ,, ...	50 30	148 2	2,470	4,517	Pale cream globigerina ooze.
24 ,, ...	52 18	148 10	2,180	3,987	Sample lost.
25 , ...	54 30	148 13	2,300	4,206	No sample in driver.
26 ,, ...	53 35	151 4	2,220	4,060	Hard bottom.
27 ,, ...	54 28	154 29	2,340	4,279	No sample in driver.
28 ,, ...	54 22	157 20	2,180	3,987	Quartz pebble encrusted with manganese oxide.*
28 ,, ...	54 22	158 0	2,260	4,133	No sample in driver.
6 Dec. ...	55 43½	157 59	2,420	4,426	Hard bottom.
7 ,, ...	58 19½	155 39	2,000	3,658	Small stones with attached forams.*
8 ,, ...	59 30½	154 10	1,560	2,853	Hard bottom.
10 ,, ...	63 33	150 29	2,100	3,841	Soft mud.
12 ,, ...	66 25	144 50	250	457	Green glacial mud with diatoms, radiolaria and sponge spicules. Bearing of Madigan Nunatak S. 35° W. (true).*
12 ,, ...	66 37	144 8½	450	823	Greenish glacial mud with sponge spicules and diatoms.*
22 ,, ...	66 56½	142 27	424	775	Hard bottom. Bearing of N. end of Cape Hunter N. 86° W. (true).
22 ,, ...	66 54¼	142 29	354	647	Terrigenous mud rich in diatoms and sponge spicules.*
27 ,, ...	66 51	145 35	288	527	Yellow sandy mud with diatoms, radiolaria and sponge spicules.*
28 ,, ...	66 55½	145 24	318	580	Grey sandy mud with diatoms and sponge spicules.*
29 ,, ...	66 49	145 42	240	439	Whitish terrigenous mud with diatoms and sponge spicules. Station 2 cable lengths from the face of the Mertz Glacier tongue.*
30 ,, ...	66 43	143 29	240	439	Sample lost.
30 ,, ...	66 54½	143 51	55	100	Rock bottom. One mile north of Stillwell Island.
31 ,, ...	66 32	141 39	157	287	Green terrigenous mud with forams, diatoms, radiolarians and sponge spicules.*
1914.					
1 Jan. ...	65 43	140 19	205	375	Sandy mud with sponge spicules and diatoms.*
1 ,, ...	65 21	139 48	1,440	2,633	No sample recovered.
2 ,, ...	65 35½	137 30	330	604	Sample lost.
2 ,, ...	65 53	137 30	230	421	Pebbly and sandy glacial mud with diatoms and spicules.*
2 ,, ...	65 48	137 32	330	604	Pale green terrigenous mud with diatoms and radiolarians.*
3 ,, ...	64 53	135 35	940	1,719	Greenish grey terrigenous mud with diatoms, radiolarians and sponge spicules.*
3 ,, ...	64 39	134 46	945	1,728	Green sandy terrigenous ooze with radiolaria.*
4 ,, ...	64 25	132 26	950	1,737	Green terrigenous spicular mud with diatoms and radiolaria.*
4 ,, ...	64 0	132 22	1,810	3,310	Green terrigenous mud with diatoms, radiolaria and sponge spicules.*
5 ,, ...	64 14	130 1	1,550	2,834	Green terrigenous mud with sponge spicules, diatoms and abundant radiolaria.*
6 ,, ...	64 34½	127 17	1,700	3,109	Yellow terrigenous mud with diatoms and sponge spicules.*
9 ,, ...	65 28½	120 59	1,400	2,560	Green terrigenous sponge spicules, radiolaria and abundant diatoms.*
10 ,, ...	64 35	117 1	1,350	2,469	Green spicular terrigenous mud with abundant diatoms.*

*A sample of this deposit has been examined and reported upon by F. Chapman; see Part 1 of this Volume.

TABLE OF SOUNDINGS—*continued.*

Date.	S. Latitude.	E. Longitude.	Depth.		Nature of Bottom and Remarks.
			Fathoms.	Metres.	
1914.	deg. min.	deg. min.			
11 Jan. ...	64 44½	113 46	990	1,810	Green terrigenous spicular mud rich in diatoms.*
12 „ ...	64 37	109 6	1,530	2,797	Greenish diatomaceous ooze with terrigenous matter.*
14 „ ...	63 21	101 42	710	1,298	Green sandy and pebbly mud with diatoms and spicules.*
14 „ ...	63 13½	101 42	870	1,591	Green terrigenous mud with abundant diatoms.*
15 „ ...	62 47	99 20	2,250	4,115	Green pebbly spicular mud with diatoms, forams, etc.*
16 „ ...	62 58	96 2	1,660	3,036	Green spicular mud rich in diatoms.*
17 „ ...	62 33½	94 34	1,990	3,639	Green terrigenous mud with forams, radiolaria and abundant diatoms.*
20 „ ...	65 47	90 16	290	530	Sandy spicular terrigenous mud with radiolaria.*
20 „ ...	65 47	90 39	300	548	No sample.
20 „ ...	65 48	91 21	280	512	Pale green glacial mud with sponge spicules. Drygalski Island bears E. by N., distant about 25 miles.*
20 „ ...	65 46	91 55	100	183	Hard bottom, about 9½ miles west of Drygalski Island.
20 „ ...	65 45	91 59	54	99	Hard bottom, about 8 miles west of Drygalski Island.
21 „ ...	65 47	92 15	56	102	Pebbles and sand with an isopod.
21 „ ...	65 46	92 13	95	174	Hard bottom. One mile west of Drygalski Island.
21 „ ...	65 56	92 12	400	731	No sample. Drygalski Island N. 22° W., distant 9 miles.
21 „ ...	66 7	92 12	425	777	No sample. Drygalski Island N. 12° W., distant 21 miles.
21 „ ...	66 18	92 13	505	923	No sample.
21 „ ...	66 27	92 19	233	426	No sample.
21 „ ...	66 28½	92 27	210	384	No sample. Haswell Island bears S. 69° E., distance 8 miles.
22 „ ...	65 58	93 10	360	658	No sample.
26 „ ...	66 17	94 20	204	373	Terrigenous mud with spicules. Station just off S. end of grounded berg.*
27 „ ...	66 10	94 20	145	265	No sample. Station off W. side of grounded berg.
27 „ ...	66 8	94 17	112	205	Station off the W. side of grounded berg.
27 „ ...	65 55	95 18	328	600	Terrigenous spicular mud with abundant forams, etc. Station 1 mile off wall of Shackleton Shelf.*
28 „ ...	65 31	95 18	225	412	No sample.
28 „ ...	65 19½	95 27	240	439	Pale green terrigenous sandy mud with diatoms, etc.*
28 „ ...	65 8	95 43	252	460	Brown mud with polyzoans.*
28 „ ...	65 7	96 3	320	583	Greenish spicular terrigenous mud with radiolaria, diatoms, etc.*
29 „ ...	65 6	96 13	325	594	Green terrigenous mud with radiolarians, sponge spicules, etc.*
29 „ ...	65 2½	96 13	350	640	Green terrigenous mud with radiolarians, etc.*
30 „ ...	64 53	95 59	370	677	Green sandy terrigenous mud with abundant radiolaria, etc.*
30 „ ...	64 42	96 10	110	201	Pale grey-green pebbly terrigenous mud with sponge spicules.*
30 „ ...	64 36	96 35	114	208	Pale grey green spicular sand.*
30 „ ...	64 44	97 29	358	654	Grey terrigenous spicular mud with diatoms, globigerina, etc.*
31 „ ...	64 33½	97 21	111	203	Hard bottom.

*A sample of this deposit has been examined and reported upon by F. Chapman; see Part 1 of this Volume.

TABLE OF SOUNDINGS—*continued.*

Date.	S. Latitude.	E. Longitude.	Depth.		Nature of Bottom and Remarks.
			Fathoms.	Metres.	
1914.	deg. min.	deg. min.			
31 Jan. ...	64 33½	97 20	107	196	Sand on hard bottom.
31 „ ...	64 30	97 15	103	188	Sandy mud.
1 Feb. ...	64 26½	97 6	130	238	No sample.
1 „ ...	64 26	97 45	214	391	Wire cut.
1 „ ...	64 0	96 55	1,355	2,441	Wire cut.
2 „ ...	63 47	96 58	1,170	2,140	Grey spicular mud with radiolaria, diatoms, etc.*
5 „ ...	65 45	91 43	265	485	Greenish sandy spicular mud with diatoms, radiolaria, etc. Drygalski Island lies W. about 14 miles.*
5 „ ...	65 46½	91 47	265	485	Green sandy mud with sponge spicules, diatoms, etc.*
7 „ ...	62 55½	90 28	2,120	3,877	Pale green diatomaceous ooze with abundant radiolaria.*
12 „ ...	54 42½	96 11	2,190	4,005	Rich diatomaceous ooze with radiolaria; also erratic pebbles.*
15 „ ...	49 28	107 39	1,780	3,255	Pale cream-coloured globigerina and diatom ooze with abundant radiolaria.*
18 „ ...	44 10	117 20	2,600	4,755	Pink globigerina ooze, containing diatoms and radiolaria as well as fine argillaceous matter.*
24 „ ...	35 56	134 14	1,800	3,292	Globigerina ooze.*

* A sample of this deposit has been examined and reported upon by F. Chapman; see Part 1 of this Volume.

EXPLANATION OF PLATES.

PLATE VII.

Fig. 1. The Lucas automatic sounding machine.

Fig. 2. The Lucas machine set up on the fo'c'sle head with Chief Officer Fletcher standing by holding up the driver by the hempen tail rope. The driver is seen loaded with two annular weights and is all ready to be passed over the side to obtain a bottom sample and depth determination. (Davis negative P.273.)

PLATE VIII.

Fig. 1. Photo taken on the after deck of the "Aurora." In the foreground bolted to the deck is the Kelvin sounder. The white disc capping it is the dial recording the length of wire out. (Gray negative Q.231.)

Fig. 2. Second Officer Gray winding in the Kelvin sounder on the deck aft. The wire passes out over the stern rail. The wire, as it passes to the reel, is receiving a dressing of grease from oily tow held in the hand of one of the sailors. (Gillies negative Q.71.)

Fig. 3. View on the fo'c'sle head of the "Aurora" looking aft. In the foreground on the left is a large drum on which is wound a multi-strand wire used for lowering the reversing waterbottles for obtaining water samples and deep-sea temperatures. Captain Davis is seen holding the Ekman reversing waterbottle whilst Hunter with the aid of a pocket lens is reading the temperature recorded on the Richter thermometer. The waterbottle has just been hauled to the surface by the wire which passes from the drum over the metre wheel slung from the davit.

Further aft on the port side one of the sailors is seen in the act of attaching to the Lucas sounder the belt which communicates the drive from the winding engine, which is just out of sight behind the big reel on the left of the picture. (Hurley negative W.54.)

Sydney: Thomas Henry Tennant, Acting Government Printer—1940.

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