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William S. Bruce

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2. BATHYMETRICAL SURVEY OF THE SOUTH ATLANTIC OCEAN AND WEDDELL SEA.

By WILLIAM S. BRUCE.

(With Map and Illustrations.)

Before the departure of the *Scotia* we had absolutely no knowledge of the depths, deposits, physical and biological conditions of the South Atlantic south of 39° S. through more than eighty degrees of longitude. It is true that there were bathymetrical maps in existence, but these were entirely hypothetical, and largely based on a single sounding taken by Ross in $68^{\circ} 34'$ S., $12^{\circ} 49'$ W., where he recorded 4000 fathoms no bottom,¹ a record which the Scottish Expedition has proved to be erroneous. The Swedish Expedition during its first cruise with Dr. Otto Nordenskjöld took some soundings in the vicinity of Graham's Land, including one of 1800 fathoms² in 63° S. 45° W., and during the second cruise with Dr. Gunnar Andersson took six soundings of great interest to the W. and NW. of South Georgia. Outside these few soundings the whole of our present bathymetrical knowledge of the south of the South Atlantic Ocean and Weddell Sea is derived from the soundings taken by the Scottish Expedition, and the same may be said for the other sections of the oceanographical work.

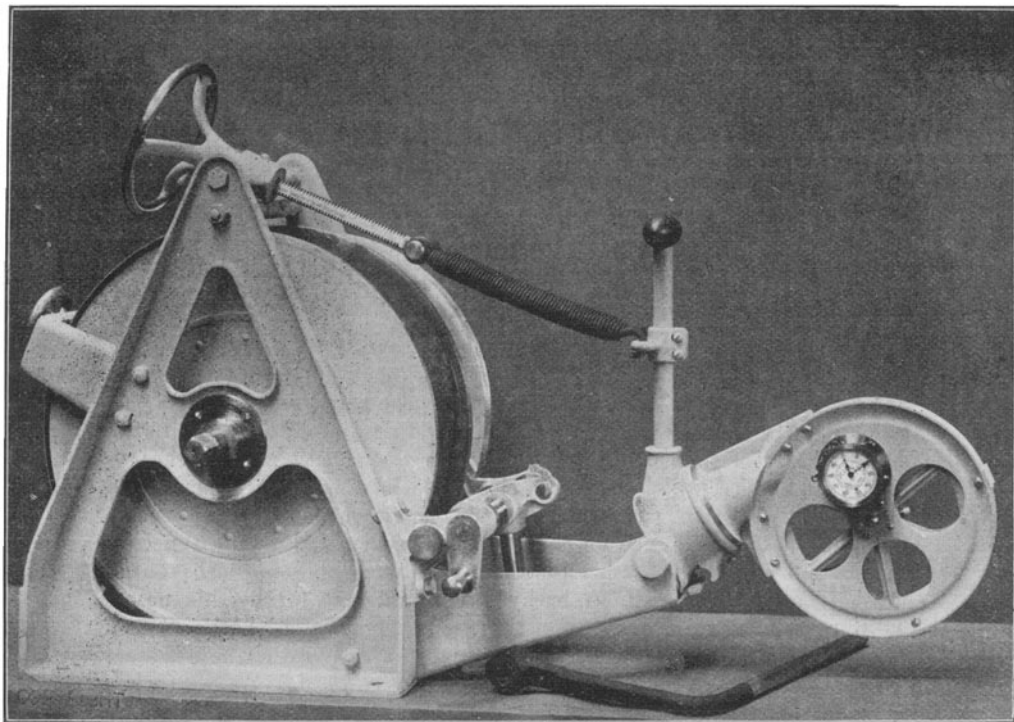
Altogether the *Scotia* took seventy-five soundings in the region described, besides nearly five hundred in the neighbourhood of the South Orkneys in water less than 100 fathoms. These last-named are not considered here. Twenty-six of these seventy-five soundings were taken south of the Antarctic Circle, and fifty were taken whilst navigating actually in the ice; forty-three were taken in water exceeding 2000 fathoms, twenty-three in water exceeding 2500—ten of the last being south of the Antarctic Circle. The deepest sounding was 2900 fathoms, or a depth of rather more than three and a quarter miles, in $39^{\circ} 27'$ S. $5^{\circ} 17'$ E., between Gough Island and Cape Town.

I conducted the sounding work myself, being assisted by Captain Thomas Robertson, Dr. Pirie, and the officers of the *Scotia*, and I may mention here that for most soundings taken I was able to secure samples and temperatures of sea-water at various depths from the surface to the bottom. Once the whole operation was over Mr. D. W. Wilton tested the specific gravities of the waters obtained, and Dr. Pirie secured and examined the samples of bottom deposits. The results of Dr. Pirie's examinations are given in the accompanying paper by him (see p. 413). The work was not carried out without considerable

¹ *Voyage of Discovery and Research in the Southern and Antarctic Regions during the years 1839-43.* By Captain Sir James Clark Ross, R.N., etc., 1847. Vol. II. chap. xiii. pp. 363, 364.

² I am indebted to my friend Dr. Otto Nordenskjöld for supplying me specially with the data of this easternmost sounding taken by the Swedish Expedition, which helps the drawing of the bathymetrical contours in this neighbourhood.

difficulty, labour, and discomfort, especially as we carried it on not only in a region of ice, but even in temperatures approaching zero Fahrenheit. Numbed fingers resulting from the water brought up with the wire and instruments which soaked and froze one's mittens, chilled bodies due to standing for long periods on the most exposed part of the weather side of the ship, made the work very different indeed from the usual run of hydrographic operations carried out in warmer and less boisterous parts of the world. Usually sounding platform, sounding



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FIG. 1.—The Lucas Automatic Sounding-Machine.

This machine is for depths up to 6000 fathoms; it is fitted with a grooved wheel for driving by a rope band from a steam-winch or other engine, and with screw gear for guiding in the wire. The wire as it is paid out passes over a measuring wheel, the revolutions of which record on a dial the number of fathoms out; a spring brake, which is capable of stopping the reel instantly, is kept out of action by the tension of the wire during the run out, but when the sinker strikes the bottom the loss of tension allows the brake to spring back and stop the reel, and the depth can then be read off on the dial.

machine, and workers, were covered with ice from the frozen water carried aboard by the incoming wire. Pack ice floating in the water formed an additional difficulty, and there was often risk of it carrying away the sounding wire with valuable instruments attached to it. The

wire was often caught and entangled in the pack ice, and sometimes it would so seriously interfere with operations as to make it necessary to repeat the sounding a second, and even a third time.

I used the Lucas sounding-machine, which I had previously worked with in the Arctic regions in 1898 on board Major Coats's yacht *Blencathra* (Pandora), and had found thoroughly satisfactory. There were two of these on board, one carrying 6000 and the other 4000 fathoms of ordinary sounding wire. The latter was presented to the expedition by Major Coats. The type of wire which was most useful was a triple stranded wire specially made for the expedition. This wire was able to stand the wear and tear very much better than the single wire, and was safer for the instruments attached. Connected with the sounding-machine was a small quick-working steam-winch, with which we were easily able to wind the wire in at the rate of 100 fathoms per minute, the greatest speed attained being 144 fathoms per minute. The most satisfactory sounding-tube, and that most frequently used, was the Buchanan sounding-tube, invented by Mr. J. Y. Buchanan of the *Challenger* Expedition, a number of these, along with many other valuable oceanographical instruments, having been presented to me by H.S.H. the Prince of Monaco, who has taken such a deep interest in the work of the expedition.

The bathymetrical campaign commenced on 31st January 1903 by a sounding to the north of the South Orkneys of 1698 fathoms in $58^{\circ} 22' S.$ $45^{\circ} 00' W.$, a sample of diatom ooze being secured. On the following day we took another sounding, finding diatom ooze again at a depth of 2307 fathoms. Owing to the large quantity and the heavy nature of the ice, which was very closely packed, we had difficulty in finding a passage to the south in the neighbourhood of the South Orkneys, where we landed on the 4th of February, and found it necessary to sail 500 miles further east before we were able to push southward. This was not without bathymetrical interest, for by this means we were able to get three interesting soundings between the South Orkneys and South Sandwich Group in comparatively shallow water. To the south of the Sandwich Group to $70^{\circ} 21' S.$ $17^{\circ} 00' W.$, we took a series of soundings, the one furthest south being 2543 fathoms. Having been firmly beset a few miles south of this position owing to continued low temperatures, it was necessary to seek for a winter harbour, and for reasons already stated I selected the South Orkneys as being most suitable. The *Scotia* returned thither by a large sweep to the westward, taking 21 soundings, mostly in depths of about 2500 fathoms, except to the east of the South Orkneys, where the water shallowed. The track of the *Scotia* in fact follows, it will be found, as nearly as possible the 2500-fathom contour.

There was a lull in oceanographical work during the wintering of the *Scotia* for eight months when she was frozen up in Scotia Bay; during this time, however, local hydrographical survey work was carried on. Oceanographical work was again resumed, however, on November the 27th, ten soundings being taken between the South Orkneys and the Falkland Islands. After refitting at Buenos Aires and calling again at

Port Stanley, a course was steered so as to secure soundings between the South Shetlands and South Orkneys; but unfortunately a gale and heavy sea sprung up, which forced me to abandon this part of the programme of the second season's work. On account, however, of the much smaller quantity of ice, I was fortunate in being able to steer a south-easterly course from the South Orkneys over unexplored sea almost midway between the outward and homeward tracks of the previous season, getting a good series of soundings showing deeper water to the eastward than that indicated by the previous year's soundings, which were taken further to the south-west. It was also fortunate that for the same reason the expedition was able to penetrate 220 miles further south than the previous season, and thus determine the limits of the Weddell Sea to the south-east by the discovery of 150 miles of the coastline of the Antarctic Continent, which I have named Coats Land, after the two chief supporters of the Scottish Expedition, namely, Mr. James Coats, junr., of Paisley, and Major Andrew Coats, D.S.O., of Ayr.

In the vicinity of Coats Land the water shelves very markedly till depths of 161 and 159 fathoms were obtained two miles from the land. Off Coats Land the *Scotia* was beset in heavy ice and heaved out of the water four feet during a severe storm: temperatures below zero Fahrenheit ensuing, the good ship was not liberated for a week. Under such circumstances, once the *Scotia* was free, I was compelled to retreat; but there was yet important work to be done, and that was to determine whether or not Sir James Clark Ross's sounding of 4000 fathoms no bottom was correct: accordingly, a course was steered in that direction, and we got a good series of soundings towards it from the south-west, and although these increased in depth as we approached the locality of the Ross sounding, yet not getting more than 2620 fathoms within 90 miles of it made me doubt very much whether it really existed. Next day the *Scotia* had overrun the mark by more than 30 miles to the east, where a sounding of 2487 fathoms was taken, which very greatly reduced the chance of Ross's sounding being correct. Next day, viz. March 23, 1904, we were within two miles of the assigned position of Ross's sounding, and I was fully prepared with wire and other gear for sounding in water up to 6000 fathoms, should any such depth occur. The occasion was an important one, and every one on board was eager to see the result of this interesting sounding. To illustrate how the sounding was taken, I went out in the dinghey and took photographs of the ship lying in position ready for sounding, and also of the sounding-gear. These photographs now appear for the first time; and it is interesting to compare our gear with that which Ross used sixty-one years previously. Instead of working with a compact machine from the ship itself; and having the valuable assistance of steam, and instead of working with apparatus that has taken sixty years to bring to its present state of perfection, this old veteran and pioneer of deep-sea exploration did wonderful work with very rude apparatus, and gave us much information about ocean depths in many parts of the world. Ross did all his sounding from boats lowered for the purpose, with hemp line instead of wire, which was laboriously hauled in by hand on large cumbersome drums by his crew, an example

of patience and endurance which deserves all praise, and which in these days we would do well to follow. Ross's line evidently sagged after the

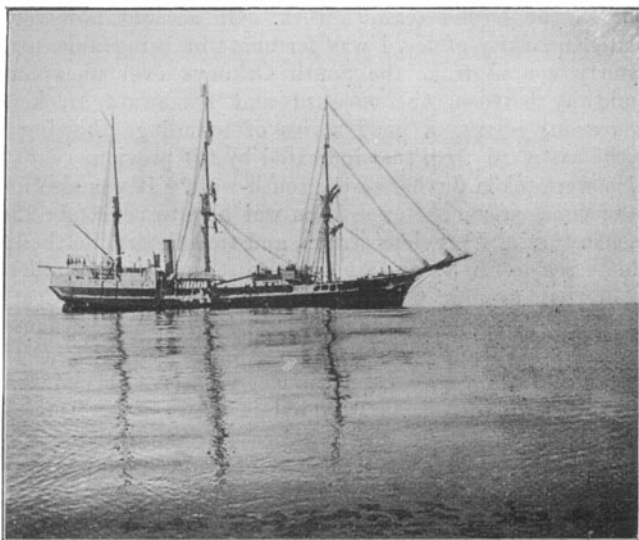


FIG. 2.—*Scotia* sounding in supposed Ross Deep on March 23, 1904.

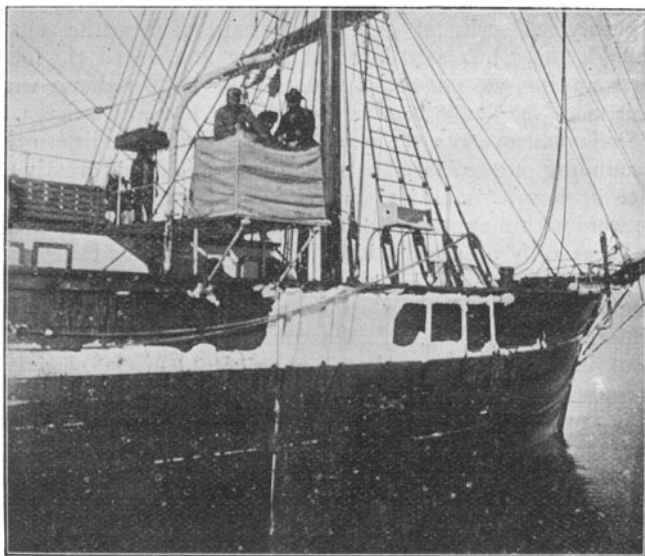


FIG. 3.—*Scotia* sounding in supposed Ross Deep $68^{\circ} 32' S.$ $12^{\circ} 49' W.$, on March 23, 1904.

weights had touched bottom, being carried by the strong currents existing in this neighbourhood, which prevented our trawl from reaching

bottom on three occasions in spite of extra weight being attached and a large amount of extra cable being paid out. Here with every modern appliance the *Scotia* touched bottom with 2660 fathoms of wire, bringing up with the Buchanan sounder a large sample of "blue mud."

Next day to the northward we obtained water of a similar depth, and eliminated the possibility of there being any depth equivalent to Ross's in this region. Thus, after more than sixty years of doubt, Ross's Deep was removed from the map, and all the bathymetrical maps based upon this sounding were no longer of any practical use.

We were still navigating in the region of ice, and the weather was getting very boisterous, and the nights were long and dark, and a sharp outlook had to be continually kept to avoid collisions with icebergs, which were especially numerous and of great size. But more work had to be done, and that in what is probably the stormiest part of the world in one of the stormiest seasons of the year. Our destination was Cape Town, but by steering the straightest and easiest course I should have found myself traversing ocean which the *Valdivia* had previously sounded in 1898-99. My object was therefore to keep as far to the westward as possible, making Gough Island our objective. This we succeeded in doing, though not without difficulty on account of a long succession of north-westerly gales and very heavy seas. I was determined, however, to get soundings in this part of the world, where none had previously been taken, even if it meant the sacrifice of all the gear on board; for once at Cape Town, the work for which the expedition specially set out would be finished. The sacrifice had to be made, for probably soundings were never made under such boisterous conditions before, and we arrived at Cape Town with very little in the way of sounding-gear on board. The result, however, was a fine line of fifteen important soundings from 68° S. to 40° S. along the meridian 10° W., completely altering previous conceptions of the form of this part of the bottom of the ocean. A further series of five soundings in depths up to 2900 fathoms was taken along the latitude of 40° S. 120 miles south of previous soundings, between Gough Island and the Cape; local soundings were also made in the vicinity of Gough Island.

The accompanying map illustrates the result of the *Scotia's* bathymetrical work, and it is interesting to compare it with previous maps which were chiefly theoretical, and based to a large extent on Ross's sounding.¹ In this map I have made use of the few soundings taken by

- ¹ 1. *Région Polaire Antarctique, Atlas Universel.* Par Vivien Saint Martin. Hachette et Cie., 1883.
2. *South Polar Chart showing Heights of Land and Depths of Sea on Lambert's Equal Area Projection.* By John George Bartholomew. *Scottish Geographical Magazine*, vol. ii., 1886, p. 576.
3. *South Polar Regions*, by J. G. Bartholomew, F.R.S.E., showing height of land and depth of sea. Map accompanying "The Renewal of Antarctic Exploration," by John Murray, Ph.D., LL.D., of the *Challenger Expedition.* *The Geographical Journal*, vol. iii., p. 80.
4. H. O. Forbes, *The Chatham Islands: their relation to a former Southern Continent.* With map. 1893. R.G.S. supplementary papers, iii. 607-637.
5. Von Haardt, *Sud-Polar-Karte von von Haardt*, 1895.

the Swedish Expedition to the westward, and of those of the *Valdivia* to the east of Bouvet Island. Before the departure of the *Scotia* the newly taken soundings by Dr. J. Gunnar Andersson of 3279 fathoms in $48^{\circ} 27' S.$ $42^{\circ} 36' W.$, seemed to bear out the hypothesis of Sir John Murray and Mr. J. G. Bartholomew that there was deep water connecting this western part of the South Atlantic Ocean with Ross's sounding of 4000 fathoms no bottom, and that this deep water was continued far to the east beyond longitude $36^{\circ} E.$ in high southern latitudes where the *Valdivia* obtained three soundings of more than 3000 fathoms.

The first season's work of the *Scotia*, although it added much to our knowledge of the bathymetrical conditions prevailing in the Weddell Sea, did not refute any of these previous ideas of the depth of the sea in the region mapped out by Murray and Bartholomew. It was interesting, however, to have mapped out the area of the Weddell Sea in which there is a depth of about 2500 fathoms, extending as far as $42^{\circ} W.$ in lat. $65^{\circ} S.$ to $76^{\circ} 21' S.$ in $17^{\circ} W.$, and to have demonstrated that the water deepened as one went further east. The *Scotia* soundings also showed a shallowing of water towards the Sandwich Group from the south, and demonstrated quite shallow water by six soundings taken between the Sandwich Group and the South Orkneys, water which appears to be certainly less than 1500 fathoms. The second voyage of the *Scotia* demonstrated clearly the deepening of the water to the eastward of the 2500-fathom contour. Our first sounding taken in higher southern latitudes than we had reached the previous year showed a shallowing of the water to the south up to 1131 fathoms, on March 3rd, eleven miles from Coats Land, which we discovered that morning in $72^{\circ} 25' S.$ $17^{\circ} 27' W.$ The discovery of Coats Land in this position was most important, and falls in approximately with the position of the coastline of Antarctica according to Von Haardt, who apparently did not take Ross's sounding into account. The belief in Ross's sounding necessarily compelled Murray and Bartholomew to throw back their continental line in this region south of $80^{\circ} S.$, and personally I must say that I was inclined to this view before the departure of the *Scotia*.

The *Scotia* coasted along this portion of the Antarctic continent, so suitably named Antarctica, for a distance of 150 miles, and in two places—30 miles apart—obtained water of 159 and 161 fathoms two miles from the shore. This last-named sounding was obtained in the highest southern latitude attained by the *Scotia*, viz. $74^{\circ} 1' S.$ On her return towards the north-east along a stretch of 180 miles the *Scotia* obtained soundings in less than 2000 fathoms on three different occasions 30 to 50 miles from the coast, two of the soundings being less than 1500 fathoms. In

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6. *South Polar Chart*, by J. G. Bartholomew, F.R.S.E., showing Sir John Murray's proposed scheme for Antarctic Exploration, 1898.
 7. Stanford, *South Polar Regions*. Undated, about 1901.
 8. *Meerestiefen im Atlantischen u. Indischen Ocean*, etc., by Dr. Gerhard Schott. *Wissenschaftliche Ergebnisse der Deutschen Tiefsee-Expedition auf dem Dampfer "Valdivia,"* 1898-99. Band i. Atlas. Jena, 1902.
 9. *Süd-Polar Karte*. Entworfen von A. Petermann-Stieler's Hand Atlas, plate 6. Gotha: Justus Perthes, 1905.

this vicinity, viz. $71^{\circ} 30' S.$ $12^{\circ} 30' W.$, Ross in 1843 narrowly escaped discovering the position of the Antarctic coastline discovered by us. From this point northwards the water deepened, attaining a depth of 2764 fathoms, our deepest Antarctic sounding, in $61^{\circ} 21' S.$ $13^{\circ} 02' W.$: in the locality of Ross's sounding already described the *Scotia* touched bottom in 2660 fathoms. After the deepest sounding the water shallowed up, until in $57^{\circ} S.$ $10^{\circ} W.$ we crossed the 2500-fathom contour. One hundred miles farther north we obtained 2270 fathoms, and crossing the 2000-fathom contour, touched bottom in 1766 fathoms in $52^{\circ} 33' S.$ $9^{\circ} 47' W.$ We held this shallow water right up to Gough Island for 750 miles along the 10th meridian, getting hard ground almost all the way. This was a discovery of the greatest importance, as it showed a continuation of the South Atlantic rise a thousand miles further south than it was previously known to exist. There is little doubt in my mind that this comparatively shallow water extends to the Sandwich Group and to the shallow rise on which Bouvet Island is situated. More soundings, however, are highly desirable to the east and west of the line of soundings taken by the *Scotia* along the 10th meridian. Dr. Pirie is inclined to the opinion that the water to the east of the Sandwich Group may be 500 fathoms deeper than I have indicated; but although I think the water must deepen very rapidly on the eastern side of the Sandwich Group, yet I do not think water of over 2000 fathoms will be found there. One thing is certain, and that is that the "deep" discovered by the *Valdivia* is independent of that discovered by the *Antarctic*, the water shallowing 1000 to 1500 fathoms between them. I believe that the "deep" discovered by the *Valdivia* extends almost as far as $20^{\circ} W.$ in $65^{\circ} S.$, according to three soundings taken by the *Scotia* in this region in depths exceeding 2700 fathoms. Future investigation will alone show whether the *Antarctic* deep, which is founded on one sounding only, is really as extensive as I have made it. In this connection it is interesting to note that the "deeps" existing in the South Atlantic Ocean are one and all isolated and not very extensive in area. One of Sir John Murray's reasons for believing in the existence of Ross's supposed 4000 fathoms and its connection with the deep to the north of South Georgia, was the temperature of the deep water to the east of South America,¹ but this will now have to be accounted for in some other way; possibly the series of salinities and temperatures of the sea taken by the *Scotia* may throw some light on this question.

Some time ago Mr. H. O. Forbes, in a paper² on the Chatham Islands and their relation to a former Southern Continent, showed a relationship not only between these islands, New Zealand and Eastern Australia and Antarctica, but also a connection between Madagascar and South America and Antarctica. It is not without importance and interest that the *Scotia* soundings have helped to prove Forbes's theory,

¹ "The Renewal of Antarctic Exploration," by John Murray, Ph.D., LL.D., of the *Challenger* Expedition. *The Geographical Journal*, vol. iii., 1894, p. 12.

² *The Chatham Islands: their Relation to a former Southern Continent*. By Henry O. Forbes. R.G.S. supplementary papers, III., part iv., 1893.

by showing the existence of a long ridge about 300 miles in breadth, extending in a curve from Madagascar to Bouvet Island, and from Bouvet Island to the Sandwich Group, whence there is a forked connection through the South Orkneys to Graham's Land, and through South Georgia to the Falkland Islands and South American Continent. Thus Antarctica, South America and Madagascar become connected with one another in a most direct manner by this "rise." The discovery of sedimentary rocks in the South Orkneys by Dr. Pirie,¹ of the Scottish Expedition, proves the existence of a much greater extension of land to the south-east of South America in former times, than was previously expected. It is interesting also to notice that the mid-Atlantic "rise" becomes connected

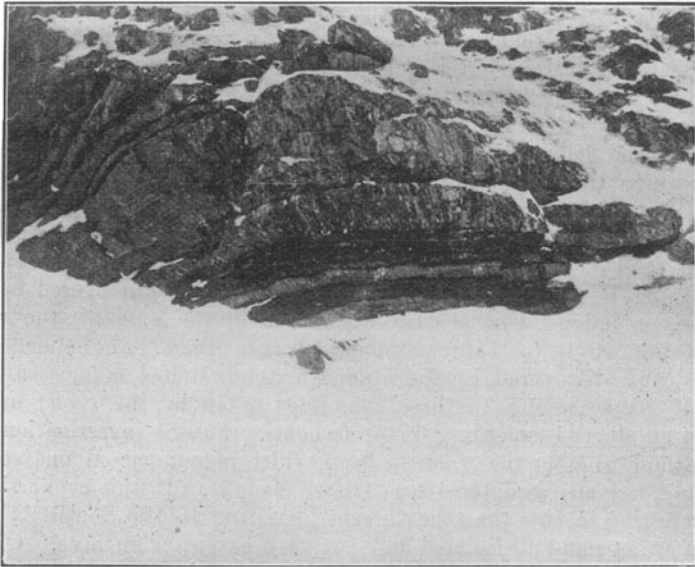


FIG. 4.—Alternating shales and greywackés in Wilton Bay, South Orkneys.

with the "rise" between Bouvet Island and the Sandwich Group, and this may be of interest in relation to the distribution of the fossil faunas of South America and Africa. It will be seen by the accompanying map that I have given a much larger area for the continent Antarctica, and have made it appear more extensive and continuous than in any recent maps, especially in the region of Graham's Land and the Weddell Sea. This is directly opposed to Sir Clements Markham's recent theory,² (which to my mind is open to severe criticism), that the Antarctic area

¹ "On the Graptolite-bearing Rocks of the South Orkneys." By J. H. Harvey Pirie. *Proc. Roy. Soc. Edin.*, xxv., 1905.

² Address to the Royal Geographical Society, 1905. By Sir Clements R. Markham, K. C. B., F. R. S., President. *Geographical Journal*, vol. xxvi., 1905, pp. 1-28.

consists of two land masses of unequal size, Victoria Land and Edward VII. Land, separated by a great barrier of ice, and of two seas extending far to the south, the Ross Sea and the Weddell Sea. As regards the Weddell Sea, Sir Clements Markham inclines to the belief that Graham's Land is a large island, and that the land discovered by the Scottish National Antarctic Expedition is an island and not part of the Antarctic Continent. Some criticism will doubtless be offered to the hypothetical coastline of Antarctica that I have inserted between Coats Land and Enderby Land, but I see no other way of accounting for the obstructions which all navigators have met with who have attempted to penetrate south in this region. Cook, Bellinghausen, Biscoe, Ross and Moore, between the years 1778 and 1845, have all been prevented from penetrating far south along the whole of this line. In 40° E. the *Valdivia* found the sea shallowing to the south; in 10° W. the *Scotia* again found the sea shallowing to the south; in 25° W. the *Scotia* again found the sea shallowing towards the south, and for fully 150 miles followed the coastline of Coats Land running in a south-westerly direction in accordance with this shallowing. In all the *Scotia* soundings in the Weddell Sea, south of 65° S. and between the longitudes of 10° and 45° W., those taken to the south and west are shallower than those to the north and east. All the evidence gathered together tends to prove that Coats Land is out-and-out continental and not insular.

Weddell, I believe, like Ross, was not far from discovering the edge of the Antarctic Continent when he turned homeward, and one strong reason I have for believing this is the large number of birds that Weddell met in $74^{\circ} 15' S.$, which entirely accords with the distribution of birds in relation to our discovery of Coats Land. Just before our arrival off this coast bird-life was very plentiful, though previously scarce. The land reported by Morrell in 1823 has, up till now, not been considered sufficiently reliable to be placed on most Antarctic Charts. It appears, however, on this chart; and one of the reasons is that Ross in 1843 supports Morrell by describing the appearance of land to the south of him when in $65^{\circ} S. 44^{\circ} W.$, though it is doubtful whether Morrell's Land, lying between this and the South Orkneys, exists, unless it is a small island which has escaped the vigilance of recent navigators. It appears to me also that the evidence in favour of Graham's Land being part of the Antarctic Continent is greater than that in favour of its insularity. There is not much doubt that the shallow water of about 260 fathoms discovered by the *Belgica* in 1898 is strong evidence in favour of the continent being continued from Graham's Land through Alexander Land to the south-west at least as far as $100^{\circ} W.$ in about 73° or $74^{\circ} S.$, and that if Morrell's Land be correct in $71^{\circ} S.$, that it is continuous with Alexander I. Land, Graham's Land, and Coats Land—that is "Antarctica." Sir Clements Markham has spoken of warm and snow-laden winds experienced at the winter quarters of the *Discovery* as blowing across the Pole from the Weddell Sea. This is entirely at variance with the observations taken on board the *Scotia* and at Scotia Bay, South Orkneys. If such high temperatures exist in the Weddell Sea, how does Markham account for such low temperatures at the South Orkneys, where it was possible in

1903 for a ship to be frozen in for eight months, and in 1904 for a much longer period? According to Mr. Mossman's observations, who was in charge of the Omond House Station for the Argentine Government, a ship would have been frozen in for fully twelve months during 1904-5.

Is it not remarkable that temperatures of -40° F. should have been recorded in the South Orkneys at the northern extremity of the Weddell Sea, if at the same time warm winds were to travel from that same sea across the Pole to Victoria Land? One of the strongest pieces of evidence that exists supporting the presence of a large mass of land existing to the south and west of the South Orkneys is the extremely low



FIG. 5.—*Scotia* beset in heavy ice in $74^{\circ} 1' S.$ off Coats Land. The shearlegs show the position of the baited trap in 161 fathoms.

temperatures which are recorded with winds from that direction. During 1903 the Weddell Sea was very full of ice, and in the middle of February the *Scotia* was beset and frozen in $70^{\circ} 25' S. 17^{\circ} W.$ Low temperatures were experienced by the *Scotia* in the middle of March when in the vicinity of Morrell and Ross's Land. In 1904 the *Scotia* was beset and frozen in for a week with temperatures below zero, and with great dryness of the atmosphere off Coats Land—strong evidence surely of cold extensive continental masses. Altogether, it seems evidence increases rather than decreases in favour of the continuity and continentality of Antarctic land masses. Professor von Drygalski, by the discovery of Kaiser Wilhelm II. Land, has added to the land mass of the Antarctic regions; Captain Scott has added King Edward VII. Land; while the Scottish Expedition has added Coats Land.

BATHYMETRICAL SURVEY OF THE SOUTH ATLANTIC OCEAN AND WEDDELL SEA

BY WILLIAM S. BRIDGE, F.R.S.E.C.

