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The "Southern Cross" Expedition to the Antarctic, 1899-1900: Discussion  
Author(s): Captain Creak, Mr. Borchgrevink and Admiral McClintock  
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May 31, 1900.—

Astronomical time.	Temperature. C.	Scale-div.	Value in arc.	Remarks.
H. M.	°		'	
6 45	-8.3	40.0	80.0	Magnet in meridian and steady. At 6.50 diffused aurora in north.
7 0	-7.8	47.5	95.0	Aurora becoming brighter, magnet oscillating between 47 and 48.
7 7	—	52.0	104.0	Beam of aurora shot up towards zenith, and magnet moved to 52.
7 10	—	53.8	107.6	Aurora becoming much brighter in magnetic north.
7 12	—	56.0	112.0	Beam shot up from arc towards zenith.
7 15	—	57.5	115.0	Aurora arc from north by east to west (magnetic).
7 18	-8.0	58.0	116.0	Aurora stronger, curtain of aurora with slow motion.
7 22	-8.0	52.0	104.0	Arc and curtain in north and north-west becoming faint.
7 25	-8.7	55.0	110.0	Aurora arc becoming stronger in north-west.
7 27	-9.1	50.0	100.0	Aurora faded away in west.
7 30	-9.8	47.0	94.0	Becoming diffused.
8 0	-8.8	42.0	84.0	No sign of any aurora.

The following are extracts from the Meteorological Journal :—

May 6, 1889.—Very fine Aurora Australis first visible at 6 p.m. in the form of an arc of light in the north. The centre of the arc was about 3° above horizon, and bore about north by east. The arc was of large radius, the inner side or base being of much greater intensity than the outer; much yellow and red in the base part. Curtains of vertical beams of light, always parallel to the original arc, commenced to move slowly and bodily towards the south. The lateral movement was very rapid, and always east and west, and the bottom part of the beams denser and redder than the top. The curtains of light advanced no farther than about 15° north of the zenith, the limit in the east being the planet Jupiter and in the west the star Sirius. As the curtain of light moved south, the original arc became diffused but stationary, and had little movement. The display reached its greatest intensity at about 6.30 p.m. and ended at 7 p.m. A kind of diffused after-glow remained in the north for many hours. Temperature of air = 12° Fahr; barometer, 29.262 inches.

August 4, 1899.—An aurora was observed at a little before 6 p.m. in the form of a double luminous arc in the north. The arcs were separated from one another by about 2°, the inner one being about 8° above the horizon. The west extremity of the arc bore about north-north-west. The east extremity was invisible, being hidden behind the cape. The arcs lay in the same plane, and had a common centre. Winding curtains of aurora afterwards manifested themselves in the usual way, moving towards the zenith and forming coronæ there. Temperature of air — 41.5° Fahr; barometer, 29.200 inches.

Before the reading of the paper, the PRESIDENT said: At the International Geographical Congress in 1895, I had the pleasure of welcoming Mr. Borchgrevink on his return from his first voyage to the antarctic regions. From that time until Sir George Newnes undertook to send out an expedition under Mr. Borchgrevink, he worked incessantly—I will not say obstinately, but untiringly—to get an

expedition sent out under his command, and he succeeded. Last year we all thought of him and his gallant companions who were trying a great experiment, for they were the first men who ever wintered on land within the antarctic circle. In speaking of them then, we expressed our warmest sympathy for the zeal and determination they had shown in facing so many hardships and dangers in the cause of science. It must have been a relief to Sir George Newnes, who had undertaken a great responsibility, when he received a telegram to tell him that Mr. Borchgrevink and his companions had finished their work, and that they were safe. We all rejoiced, and are glad to welcome Mr. Borchgrevink here this evening, after having done his very best to secure the results for which the expedition went out, and with a large measure of success. I now request Mr. Borchgrevink to address the meeting.

After the reading of the paper, the following discussion took place:—

Captain CREAK: I should like to ask one question, as I hear the expedition located the south magnetic pole. According to our present knowledge, the magnetic pole is 400 miles from where Mr. Borchgrevink wintered, as determined by the observations of Sir James Ross in 1840-45. Prof. Gauss, in 1840, by calculation, located it about 100 miles from that position. I should like to ask Mr. Borchgrevink where he places the pole now. From investigations resulting from the *Challenger* Expedition, we have been shaken in the idea that the magnetic pole moves round the geographical pole; we have begun to doubt it, and it is almost impossible that the magnetic pole, as placed from Sir James Ross's observations and others, can have travelled 400 miles in forty years. This pole is an area, not a point, and the only possible means of fixing it is as magneticians have agreed—to observe at points surrounding its supposed position. We cannot make the deductions from the few observations, I suppose about a dozen, made in a limited area on the ice or land. He does not state definitely what his observations at Cape Adare were—whether they were differential observations, or absolute observations; he also does not tell us whether the aurora had any effect on the magnetic instruments. There is a doubt, from what he says, as to whether the locality he examined is not disturbed magnetically; I am not aware that he has given information on that point. I have not heard yet that the ship was utilized to take observations at sea, where they would have been free from local magnetic disturbances. We know from our surveying vessels that the dip differs  $30^{\circ}$  from the normal at Cossack, in North-West Australia, and I am sorry the *Southern Cross* was not taken out to sea for observations free from local disturbance. I do not know how far from the shore he took his observations on ice. I should again, therefore, like to ask him where he places the magnetic pole now, and whether determined by observation.

Mr. BORCHGREVINK: The approximate position of the south magnetic pole, according to the calculations of my observers, is  $73^{\circ} 20' S.$  and  $146^{\circ} E.$  I did not know that the magnetic pole ever changed round the geographical pole. I believe the observations we were able to make from Coulman island and southward give us information sufficient to justify us in determining the south magnetic pole to be  $73^{\circ} 20' S.$  and  $146^{\circ} E.$  It differs somewhat from the admirable work of Ross and the theoretical work done by excellent men in Europe, but we know the pole is not stationary. We have reason to believe that these observations made away from the vessel on the ice rather far from the shore, where less local attraction will occur than on the land itself, are under the most modest computations reliable, and a great support to these results is the admirable work done by Prof. Neumayer of Hamburg, whose figures almost coincide with the very excellent magnetic observations of my staff. It is important that a continuous series of magnetic observations

should be carried on at South Victoria Land, as magnetic events once missed we will never be able to work up to again, because what is past is lost, is a missing link, and I, as leader of this expedition, must use my influence to urge on to lose no time. Another expedition must follow in our steps, to add links to that chain which we have been able to pick up from my predecessor, Sir James Clarke Ross.

Admiral McCLEINTOCK: I wish to ask one very practical question—whether, in Mr. Borchgrevink's opinion, we could reasonably expect a steamer to visit Victoria Land, and if she reached there, whether she would find his huts in a habitable condition?

Mr. BORCHGREVINK: I went there once as a sailor before the mast, next time in command of an expedition; on both occasions we were able to get to Cape Adare. In 1898 I found the summer season a little bit later than on my first visit. For a well-fitted vessel with good engines the chances of landing are very great, especially if a course is taken east of  $170^{\circ}$ ; and I believe, under an able leader, which a national expedition naturally would have, that it could be done, and they will be able to carry on the able work of the illustrious Sir James Ross, who worked without the aid of steam. But with steam I think new difficulties arise. I think in a steam-vessel a very important feature is a well to change the propeller without going into dock. There should be two vessels, as I felt if the *Southern Cross* had been crushed we would have had to wait a few years before any one took us off.

The PRESIDENT: In thanking Mr. Borchgrevink for his paper, I think we may sum up with the conclusion that the expedition has done a very interesting and important piece of work. He selected Cape Adare as the place for wintering, and making his efforts at exploration. It appears now that it is practically impossible to penetrate into the interior at Cape Adare, because I suppose that the great mountain range approaches closely to the sea and terminates in cliffs and glaciers broken by enormous crevasses, and it would not probably be practicable for any sledge party to go inland for any great distance. We find from the paper he read that he made many desperate and determined efforts to penetrate inland, but found it impossible. Nevertheless the work that was done at his winter quarters is very important. I think it will be found that the meteorological observations have been taken with great care, and will be extremely valuable, extending over a whole year. The natural history collections are interesting, and some of the specimens, especially the fish and the mollusca, are, I understand, quite new to science. Therefore we have to thank Mr. Borchgrevink, although he was unable to penetrate into the interior, for having done valuable work during the year at Cape Adare. I gather from the paper that he made one attempt to explore the coast to the westward. He also appears to have found that impracticable, and did not get any great distance. To me and most geographers, by far the most important work was done during the period when he was able to land on the great ice-barrier, although I was astonished to find the difference in latitude between Sir James Ross and Mr. Borchgrevink is nearly 36 miles. Now, assuming all the observations to be correct, that can only be accounted for by the barrier having broken off to that extent and formed a bay during a period of 60 years. It is also interesting to know that the landing can be effected on what hitherto we have believed to be continuous cliffs 400 miles in extent. If Mr. Borchgrevink had had more time he might have gone a greater distance to the south. It would appear, from what he says about the places for winter quarters that exist inside Coulman island and at Newnes land, that hereafter the continent may be penetrated by sledges on the principles adopted by McClintock, and important discoveries may be made there. We must thank Mr. Borchgrevink and his staff for the extremely valuable scientific work done at Cape Adare, and for giving us further information about the ice-barrier.

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In asking you to pass a vote of thanks to Mr. Borchgrevink for his paper, which is an extremely interesting one, and for his excellent series of photographs, I would also wish to include the members of his staff present here this evening, who have worked so hard and done so excellently in their different departments; and I think we cannot forget Sir George Newnes, who, through his munificent generosity, enabled this work to be done. I now propose a vote of thanks to Mr. Borchgrevink, his staff, and Sir George Newnes.

## STUDIES IN THE ANTHROPOGEOGRAPHY OF BRITISH NEW GUINEA.\*

By Prof. ALFRED C. HADDON, Sc.D., F.R.S.

WITH regard to the Gulf natives, we may safely regard the short, very dolichocephalic people of Maipua as belonging to a primitive stock. The skulls from the Purari river, which is the same district, have a somewhat higher average index (72 to 73) than the six Maipua men measured by Chalmers (70). Perhaps the skulls are those of enemies taken in battle. The Orokelo and Toaripi people may be regarded as belonging to one group; their cephalic index on the living subject may be taken as 77. They are tall men—1·677 metre (5 feet 6 inches) for the former, and 1·702 metre (5 feet 7 inches) for the latter; but the Rev. J. H. Holmes has measured the stature of twelve Orokelo men, and obtained the high average of 1·715 metre (5 feet 7½ inches)—min. 5 feet 3 inches, max. 5 feet 11 inches. Bevan refers to the high stature of the men on the Aivei (Purari river). He says, "Some would measure at least 5 feet 10 inches (1·778 metre) in height," and states that they approximate to the Toaripi.

Up the Fly river, well in the interior, there is a decidedly dolichocephalic population, which Mantegazza and Reglia have shown to be craniologically allied to the Geelvink bay natives; but even high up the Fly river there are traces of brachycephalism. This is well marked in its delta, where a mixture of peoples has taken place. Some of the inland or "bush" tribes are certainly of the ordinary dolichocephalic type. These appear to be pressed back by a mesaticephalic or low brachycephalic people, who have established themselves at Canoe island, Kiwai, Oriomo, and probably at other places on the coast of Daudai, as I measured a Parama man with an index of 77·2, and a Mawatta man with one of 80.

Torres strait is inhabited by a dolichocephalic people, which has probably remained pure in the eastern group—Erub (Darnley island) and Mer (Murray island), but the western islands appear to have been overrun by a more or less brachycephalic people, who are doubtless of the same stock as those who have occupied the adjacent coast of New Guinea and the delta of the Fly river.

\* Continued from p. 291.