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The Scientific Work of the Swedish Antarctic Expedition at the Falkland Islands and in  
Tierra del Fuego

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approaching them from the south and ascertaining definitely whether they had any connection with the conjectural antarctic continent. On January 24 land was seen and identified as the South Shetlands. A number of small islands were named after various victories of the Russians over the French in Napoleon's campaigns. At Little Yaroslav island Bellingshausen found on the morning of January 25 eight British and American sealers lying at anchor, and, having invited Captain Palmer on board the *Vostok*, he obtained from him some particulars as to the work of the hunters. It is somewhat remarkable to find no mention made of the mainland south of the South Shetlands, to which Fanning explicitly states that Bellingshausen gave the name of Palmer land, and to find no mention of the services of Palmer as pilot, to which Fanning devotes some space. No stay appears to have been made, and the north-eastward course was resumed, a few more small islands being sighted and named on the way; the 60th parallel was passed on January 31, and after a time of severe but needless anxiety on account of the Shag rocks, which were passed in a fog, Rio was reached on February 26 and left on April 23. At last, on June 24, 1821, the two ships dropped anchor once more at Kronstadt, after an absence of 751 days, 527 of which had been passed under sail, and the whole distance travelled had been  $2\frac{1}{4}$  times the circumference of the Earth.

The voyage had been planned as a continuation of the voyage of Cook, and Bellingshausen seemed to have possessed not a little of the spirit of the great navigator whose labours he most loyally supplemented, even to the extent of foregoing the opportunity of possibly approaching nearer to the pole in order to explore the more open parts of the Southern ocean in the longitudes where Cook had got far south. It is unfortunate that this splendid voyage remained without result; for the course of subsequent explorations would have been the same had it never taken place. A timely translation into English would have facilitated the voyages of Biscoe, Balleny, Wilkes, and Ross.

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## THE SCIENTIFIC WORK OF THE SWEDISH ANTARCTIC EXPEDITION AT THE FALKLAND ISLANDS AND IN TIERRA DEL FUEGO.

By Dr. J. GUNNAR ANDERSSON.

I. *The Falkland Islands*.—After the return of the *Antarctic*, on July 4, to Port Stanley from South Georgia (see *Geo. Journal*, vol. xx. p. 405), the members of the expedition on board this ship carried on investigations in different parts of the Falkland islands until September 11. The botanist made valuable collections of marine algæ, and to some extent also of land-plants, though the season was very unfavourable

for investigations of this kind. In the shallow bays and harbours of the Falkland islands seventeen trawlings were made, some of which have shown a rich animal life. Also of the lower land and fresh-water fauna (insects, crustaceans, molluscs) a considerable collection has been brought together.

In connection with the geological survey, collections of marine fossils have been made both in East and West Falkland, in the Devonian sandstone, first studied by Darwin, forming the prevailing formation of the islands. Scattered and badly preserved plants have also been found, partly together with the marine fossils. The hitherto unknown base of the Devonian formation has been discovered in Cape Meredith, West Falkland, where the sandstone rests on a highly disintegrated formation of gneiss and granite.

Special attention has been devoted to these grand phenomena so characteristic of the Falkland islands, which have been described as "stone-rivers." A detailed survey of one of the largest stone-rivers has proved that we have here on a large scale a peculiar mode of detritus-transport, previously described by the author from the arctic region (Bear island). The formation of the stone-rivers belongs to a past period, and it seems very probable that it ought to be regarded as a subglacial facies of the ice-age. In that time, when Tierra del Fuego, South Georgia, and the Dirk-Gerritsz archipelago were under their maximum glaciation, there probably existed in the Falkland islands a climate not favourable to the formation of glaciers, but in winter-time permitting the deposition of a thick snow-cover, which, when melting in summer-time, caused a slow but extended movement of the detritus downhill.

We have found in the Falkland islands evidence both of a submergence and of a greater elevation than exists at present. Small river-valleys, the lower part of which is now submerged under the surface of the sea, forming numerous creeks all round the coasts of the main islands, indicate that this archipelago before the ice-age (in the time of the stone-river formation) was elevated at least 30 to 50 feet above its present position, while on the other side raised beaches (terraces and shingle-covered plains) prove that these islands in a post-glacial period have been submerged at least 210 feet below the present sea-level.

II. *Trawlings on the Banks between the Falkland Islands and Tierra del Fuego.*—On the passage between the Falkland islands and Tierra del Fuego, September 11–15, five trawlings were made on the coast banks and the Burdwood bank, the fauna of which was hitherto very little known (south of West Falkland, 100 fathoms; the Burdwood bank, 80 fathoms; three trawlings; eastern entrance of Beagle channel, 50 fathoms). These trawlings yielded an extraordinary rich result, in which were to be observed hydroids with large luxurious colonies,

belonging to several species; corals, ophiurids, asteroids, etc., with the most beautiful forms and colours. The most valuable find, according to the report of the zoologist, Mr. K. A. Andersson, are some colonies of that very remarkable *lephalodiscus*, discovered in 1876 by the Challenger Expedition in the Strait of Magellan, but never found afterwards. Once before *lephalodiscus* had been found by our expedition, viz. on January 16, 1902, at Cape Seymour (lat.  $64^{\circ} 21' S.$ , long.  $56^{\circ} 46' W.$ ), at a depth of 80 fathoms.

III. *Tierra del Fuego*.—Here our expedition has been working, first in the month of March, 1902, before the departure for South Georgia, then since September 15, the investigations being not yet concluded. If an excursion to Lago Fagnano, in the interior of Tierra del Fuego, is left out of consideration, all our operations have been limited to the Beagle channel. There may be mentioned a visit to the small isolated occurrence of the Tertiary formation in Slogget bay (eastern entrance of the Beagle channel). The Tertiary beds here rest upon disintegrated rocks belonging to the Cordillera series. The deposits of the ice-age, hitherto unknown from the south-eastern part of Tierra del Fuego, have been observed in Slogget bay, at the eastern end of Lago Fagnano, in a river-valley at the north side of the Cordillera and in the neighbourhood of Harberton harbour. In all these places there occur, in connection with the moraine stratified sediments, coarse gravel and sand of considerable thickness, and evidently of fluvio-glacial origin.

Very instructive was the splendid section in the 120-foot-high *fairauca* on the west side of Gable island in Beagle channel. The lower part of the section consists of stratified sediments, coarse gravel with intercalations of beds of sand, the whole presenting fine discordances. On these stratified sediments, the largest visible thickness of which was found to be 75 feet, there rests a mass of typical moraine clay, without any sign of stratification. The largest thickness of the moraine observed was 45 feet. In this moraine clay were found some fragments of fossils (mussels and balanids). This find indicates that the ice-stream which once filled up Beagle channel has mixed in with its moraine *débris* of Tertiary or Quarternary (pre- or interglacial) marine beds, that is, sediments which are not yet known from this region.

The botanical investigations have yielded considerable collections of marine algæ. As regards the land flora, the higher mountain regions especially have given a good result. Zoological trawlings have been made in the Beagle channel in fifteen localities, and in depths from 120 fathoms to the littoral zone. Two of the largest lakes of Tierra del Fuego, Lago Rosa (Arigami) at Lapataia bay, and Lago Fagnano in the interior, have been made the objects of zoological investigations. Two of the members of the expedition, Messrs. K. A. Andersson and Skottsberg, visited Lago Rosa on October 8 to 13, made collections of the fauna and vegetation of the lake, and sounded very considerable depths down

to 45 fathoms. The excursion to Lago Fagnano started from Harberton on the Beagle channel, and went through a pass in the Cordillera. In this region three young pioneers, Messrs. Bridges, sons of the well-known English missionary, have, with a subvention from the Argentine Government, cut a horse-track through the forests. In this road I brought with the assistance of Ona Indians, a canvas boat to Lago Fagnano, and made from it zoological collections in the eastern part of the lake.

Since the *Antarctic* has in Ushuaia been completely fitted out, we leave for the south early in November. At first we intend to make cartographical, geological, and biological investigations at the South Shetland islands and in Orleans inlet. About December 10 we expect to arrive at the winter station of the expedition on Snow hill. The second part of the summer voyage will be arranged by the leader of the expedition, Dr. Nordenskjöld.

Our expedition has received most valuable support from the Argentine Government. Twice we have received in Ushuaia free of expense a supply of coal, and now, moreover, a considerable quantity of reserve provisions. This generosity has made us deeply indebted to a nation which has also directly taken part in the great antarctic scientific co-operation by erecting a station on Staaten island, and by sending an officer of its navy to winter with Dr. Nordenskjöld.

Harberton, Tierra del Fuego, October 31, 1902.

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## MAJOR DELMÉ RADCLIFFE'S MAP OF THE NILE PROVINCE OF THE UGANDA PROTECTORATE.\*

Note by Sir HARRY JOHNSTON, G.C.M.G., K.C.B.

THAT portion of the Uganda Protectorate which is styled the Nile Province has never, until quite recently, received anything like a systematic survey. None of the work done under Sir Samuel Baker, Gordon Pasha, or Emin Pasha was of an accurate nature. The late Colonel Vandeleur laid the foundations of something approaching systematic geography in Uganda and Unyoro, but the Nile Province in 1895 was far too unsettled and distant for Colonel Vandeleur to extend his work in that direction. The expedition under Colonel J. R. L. Macdonald, which did so much to increase our knowledge of this protectorate, confined its work to the regions east of the Nile Province, so that when the writer of these lines came on the scene as Special Commissioner in 1899 he found the greatest difficulty in shaping any military or civil policy north of the Victoria Nile, or determining what steps should be taken to finally extinguish the mutiny of the Sudanese

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\* Map, p. 220.