

ART. XII.—*On a Hornblende-andesite from the Solander Islands.*

By R. SPEIGHT, M.A., B.Sc., F.G.S.

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THE Solanders consist of a very small group of rocky islets, the largest about a mile long and 1,100 ft. high, lying to the south-west of New Zealand. Their exact position is twenty nautical miles south of the south coast of western Otago and thirty-five miles W. 15° N. of the north-west point of Stewart Island. They are thus to the south of the western entrance of Foveaux Strait. Between them and the mainland the sea reaches a depth of nearly 100 fathoms, as appears from soundings on the Admiralty charts. There are a number of "rises" in the western floor of the strait, but these do not reach so near the surface as to be any danger to navigation; however, a wide fringe of submerged and partially submerged reefs extends along the northern shore of the strait. The depth of the sea between the Solanders and Stewart Island is over 70 fathoms. The islands, therefore, lie in somewhat deep water. From their isolated position, and on account of the danger of landing except in the very calmest weather, they are rarely visited now, although sealers frequently landed on them in the early days. They have usually been supposed to be a remnant formed of rocks similar to those on the neighbouring coasts, but this turns out not to be the case.

When the G.S.S. "Hinemoa" was searching for traces of the lost ship "Loch Lomond," Captain Bollons landed and brought back two small specimens of the rock of the islands, and transmitted them to me through Dr. Cockayne.

Instead of being a granite or gneissic rock, they are a hornblende-andesite, quite different from any hornblende-andesite that I have met with in New Zealand. Macroscopically they show fairly large crystals of feldspar up to 1 cm. in length, and smaller hornblendes 0.75 cm. in length, in a dark groundmass. The rock is somewhat vesicular, and has a low specific gravity—viz.; 2.42. When examined under the microscope the phenocrysts are feldspar (labradorite), with the usual characters. There is also an occasional mica flake and much brown hornblende in large crystals, with marked pleochroism. These crystals show idiomorphic outlines at times, but they grade down through all sizes till they form irregular fragments and flakes. Some take lath- and needle-shaped forms, with parting across. The groundmass is of the hyalopilitic type, with much brownish glass and extremely small microlites of feldspar (oligoclase-andesine), and of hornblende similar to the phenocrysts, the whole showing at times rough flow-structure. The rock shows little sign of alteration, and is as fresh in appearance as many of the Ruapehu andesites. It is therefore likely to be of fairly recent date, most probably late Tertiary.

This occurrence of volcanic rocks is also interesting because no similar type has been recorded from Otago. Dr. Marshall tells me that he saw loose blocks of hornblende-andesite at Cuttle Cove, Preservation Inlet, but was unable to trace them to their source. Dr. Cockayne also says that fragments of scoriaceous and pumiceous rocks are frequently picked.

up on the shore of Mason Bay, on the west of Stewart Island. This last occurrence has been difficult to account for, owing to the absence of volcanic rocks on the island, but if there is any extent of submerged volcanic land to the westward the powerful currents and heavy seas could easily explain the presence of scoriaceous material on the west coast of Stewart Island.

The Solanders are undoubtedly the remnant of a volcanic cone of probable recent date, a large part having been removed by powerful marine erosion, or been buried under the sea on the land in the locality sinking. There is evidence both from the Sounds of Otago on the one hand, and from the drowned valleys of Stewart Island on the other, that the land was formerly higher, and is now depressed much below its former level. There is also evidence of a very recent elevation. It is possible that the submergence of a large block of land to the south and south-west of New Zealand was connected not only with the formation of the valleys and fiords of western Otago, but also with the volcanic outbursts at the Solanders. Foundered areas, as it has been pointed out, are associated with fractures in the neighbouring crust, which may determine the direction of valleys to a certain extent, and thus affect the initial stages in the formation of fiords; and fractures are no doubt also intimately connected with volcanic action. Their occurrence together in this case may be only a coincidence, and not a different surface manifestation of the same deep-seated cause.

ART. XIII.—*The Fresh-water Amphipoda of New Zealand.*

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THE immediate cause of this paper was the discovery in February, 1908, of a fresh-water gammarid at Rona Bay, Wellington Harbour, which, on examination, proved to be the same as *Phreatogammarus propinquus*, a species described in 1907 from a single specimen collected by Mr. Crosby Smith on Mount Anglem, Stewart Island. This species was of special interest as the first species of *Phreatogammarus* to be recorded from the surface waters of New Zealand, and owing to its near relationship to *P. fragilis*, a species inhabiting the underground waters of the Canterbury Plains. During the last few years, too, several facts referring to the other fresh-water *Amphipoda* have been collected, and it seems desirable to gather them together here. This group of the *Crustacea* possesses considerable interest from the point of view of geographical distribution, and for this reason a paper on the subject was commenced and partly written out about fifteen years ago, but was then left unfinished owing to want of knowledge of the fresh-water *Amphipoda* of Australia and elsewhere. Since then many of the gaps have been filled up, and, though our knowledge is still far from complete, some comparison of the fresh-water *Amphipoda* of New Zealand with those of other countries is now possible.