Shackleton reached the western coast of South Georgia and climbed over the Allardyce Range to the whaling station at Stromness Bay. The fact that the island had not been crossed before gives some indication of the difficulty of this feat, which can also be realised from the map and photographs published in Mr. Ferguson's recent memoir on the island (Transactions Roy. Soc. Edinburgh, vol. l., part iv., 1915). A relief expedition was at once despatched to Elephant Island, but only an eighty-ton vessel was available, and the ice was too thick for her to force a passage to the land.

The Government has already promised the funds for the larger rescue expedition which had appeared necessary. The problem is now much simplified, as the work to be done is definitely known. Elephant Island—in 61° 10′ S., about the latitude of the Shetlands—though sometimes surrounded by drift ice, can apparently be reached by a suitable vessel at any season of the year. Relief is obviously wanted urgently. The party on April 24 had only five weeks' provisions, which it can doubtless supplement by penguins and perhaps seals. The name Elephant Island refers to the once-abundant sea-elephants; but as the island is easily accessible they have been practically exterminated there; and Sir Ernest Shackleton's account of the locality where his comrades are camped suggests that it may be a very difficult hunting-ground.

The larger South Georgia whalers are probably now on their way to Europe, and unless a suitable steamer can be obtained in Argentina or at the Falkland Islands it is to be hoped that the whaler nearest to South Georgia can be promptly intercepted and sent back there, *en route* for Elephant Island.

RETURN CURRENTS AND ELECTROLYTIC CORROSION.[1]

THE two memoirs referred to below are part of the series of valuable contributions which are being issued by that admirable institution, the U.S. Bureau of Standards, under the able directorship of Dr. Stratton.

The publications before us relate to the troubles which arise from the electric return currents that leak through the soil from electric tramways and railways, in consequence of their setting up electrolytic corrosion in buried pipes or other metallic objects in the neighbourhood of the tramway or railway lines. This was an acute question in Great Britain as well as in North America some twenty years ago when electric traction was a novelty. But, so far as England is concerned, it long ago ceased to be acute in consequence of the prompt action of the Board of Trade. That often abused body framed a regulation that the maximum allowable voltage drop between any two points of the earthed return-system, near which underground metallic structures are laid, should be limited to seven volts. This limitation, though not an absolute safeguard against stray currents, has practically solved the difficulty; and we never, or seldom, hear any suggestion of electrolytic corrosion. Were any considerable difference of potential between two points of an earthed return system to be allowed to subsist, that difference of potential would have the result of forcing a fraction of the current to leave the return rails at some point of higher potential and to find its way through the soil or other available path, to re-enter the return rails at some point of lower potential, presumably nearer the generating station or sub-station. If such stray or vagabond currents merely traverse moist soil in widespread paths they do no damage; but if a waterpipe, or other metallic object, lie along their course, some of the current will find a readier path along such conductor; and wherever the current emerges from the metallic conductor into moist surroundings, electrolytic action will ensue, corroding and pitting the metal surface—sometimes with disastrous effects. Various palliatives, such as the better bonding of the return rail tracks, the use of return feeders, the careful connecting of the negative side of the system to the metallic pipes or other objects by metal connectors, have been used, including the employment of appliances called negative boosters.

The first-named of the monographs before us is devoted to a discussion of the electric conductivity of various kinds of soils under various conditions of moisture, pressure, and temperature, and the effects of these factors on the electrolytic corrosion question. Methods of measuring the resistivities of soils *in situ*, as well as in the laboratory, are discussed. The soil of cities appears to be more highly conductive than that of country districts by reason of absorption of drainage and sewage. The presence of refuse in "made" land is distinctly promotive of conductivity, and therefore of electrolytic corrosion. The authors of the monograph, Messrs. McCollum and Logan, have done their work thoroughly, and have added statistical tables, which, in countries like the United States, where legislation has not intervened to stay the damage, must be very valuable.

The second memoir, by Messrs. Rosa and McCollum, is a lengthy discussion, as an engineering problem, of the mitigation of electrolytic corrosion, or as they rather unfortunately describe it, of "electrolysis." They deal with corrosion in reinforced concrete; with attempts to prevent corrosion by protective coatings of paint; with the use of insulating joints in pipes; with electrical means of combating or compensating the tendency to stray currents; with summaries of the various legal regulations in use in different countries. It appears that the Bureau of Standards has issued eight different publications on this subject. The present memoir alone extends to more than 143 pages.

1 "U.S. Department of Commerce. Technologic Papers of the Bureau of Standards (Washington)." No. 26, Earth Resistance and its Relation to Electrolysis, etc. No. 52, Electrolysis and its Mitigation. (Washington: Government Printing Office, 1915.)