

view you have been abundantly supplied with all the instruments and apparatus which modern science and practical experience have been able to suggest and devise, and, with the exception of a few beaten tracks in the Atlantic and other isolated lines through the Indian Ocean, you have a wide field and virgin ground before you.

Independently of the great scientific interest which attaches to these experiments, it is to be remembered that the rapidly progressing establishment of electric communication between all parts of the earth renders it most important that the accurate depths of the ocean and the character and temperature of its bed should be known. You are therefore furnished with a series of charts on which are shown the spots where soundings are most required, and which, wherever they lie within or near to your course, you will endeavour to obtain. On these charts are also shown the existing lines of submarine cables, in order that you may be able to avoid them in your dredging operations, and as their positions are not determined with critical accuracy, a wide margin should be allowed while working in their locality.

In regard to magnetical observations, you are supplied with a complete suite of instruments both for observations on shore and at sea, and the most clear and minute instructions have been drawn up by Captain Evans, the chief of the Magnetical Department, for their use. Several of your officers have likewise undergone a course of instruction at the Hydrographical Department and at Kew Observatory, and I will say no more than urge upon you the great importance of a complete and careful record of such observations throughout the whole voyage, for rarely if ever has so favourable an opportunity presented itself as the present.

Your attention is also drawn to the subject of the measurement of waves, which no doubt you will have many opportunities of observing, especially in passing from the Cape of Good Hope to the southward, and printed instructions prepared by Mr. Froude on this subject are forwarded to you, and they have been supplemented by a paper of Professor Stokes. These documents, together with the magnetical instructions, which I have also caused to be printed should be distributed among your officers.

The phenomena of the tides will no doubt receive your special attention, and I would desire particularly to refer you to that part of the Royal Society's memorandum which treats on the question of permanent bench marks, to denote any changes which may be going on in the elevation or subsidence of the land, and especially on the eastern coast of Australia, which is generally believed to be rising. Full particulars should be noted, so that these bench marks, which should be cut deep into the rock, and metal plates affixed, may be identified in future years.

The general route which it is proposed the ship should follow is shown on a chart of the world which you are provided with, and although it is possible that it may be found necessary to deviate in some degree from the course there laid down, and that you may not be able to adhere strictly to the dates assigned in these instructions, yet they are to be observed as far as circumstances will admit, and there must be no departure from the general programme without the special sanction of their Lordships.

Leaving England at this season of the year, you should endeavour to get south of Cape Finisterre with as little delay as possible. You will then carry a line of soundings from the Cape, between the depths of 140 and 1000 fathoms, to Lisbon, and especially between the parallels of 40° and 38°, where, according to the present chart, there is a submarine valley running in towards the Burlings Rocks between two projecting and comparatively shallow banks.

From Lisbon, should you deem it necessary to call there, you will proceed on to Gibraltar, making a short stay, and, if opportunity offers, without much delay you may be able to add to the current observations southward of the ground already examined by yourself in the "Shearwater." Stretching then across to Madeira, circumstances may enable you to make an examination of Josephine Bank, unless it should be more convenient to do so after leaving Lisbon, and perhaps to get a haul of the dredge upon it. It will also be desirable to obtain a few deep soundings in as direct a line as convenient between Cape St. Vincent and Madeira. During your stay at Madeira it would be an object to make a larger and better plan than exists of the anchorage on the south side of Porto Santo, which is a far better rendezvous for a fleet than Funchal Roads, but in this you must be governed by time and circumstances, bearing in mind that at this season of the year strong southerly winds may be looked for at times.

From Madeira you would pass between Tenerife and Gran Canaria, getting a deep-sea sounding or two in the channel if the north-east wind, which generally blows with great force between these islands, will permit,