

## APPENDIX B.

*Hydrographic Instructions to Captain G. S. Nares, H.M.S. Challenger.*

The Lords Commissioners of the Admiralty having caused H.M.S. CHALLENGER to be specially equipped for a voyage of scientific research, and having appointed you to the command, it becomes my duty, under their Lordship's direction, to furnish you with the following hydrographical instructions for your guidance in the conduct of the expedition.

You are aware that this voyage has been undertaken principally upon the recommendation of the President and Council of the Royal Society, and that the main objects of it, and the general principles on which they should be carried out, have been set forth in a memorandum prepared by a committee of that body at the request of the Admiralty.

On the recommendation of the President and Council of the Royal Society, a staff of scientific gentlemen, presided over by Professor Wyville Thomson, F.R.S., of the University of Edinburgh, has been attached to the expedition, and it is their Lordship's wish and desire that throughout the voyage, in all matters connected with its scientific conduct, you will consider Professor Thomson as your colleague; that in all these matters you will observe such consideration in respect to his wishes and suggestions as may be consistent with a due regard to the orders under which you are acting, and to the comfort, health, discipline, and efficiency of your crew; and, moreover, that those friendly relations and unreserved communications may be maintained between you which will tend so materially to the success of an expedition from which so many important results are looked for.

The objects of the expedition are manifold; some of them will come under the entire supervision of Professor Thomson and his staff, others will depend for their success on the joint co-operation of the naval and civil elements, while many will demand the undivided attention of yourself and your officers; it is not, however, too much to say that upon the harmonious working and hearty co-operation of all must depend the result of the expedition as a whole.

In as far as the memorandum of the Royal Society deals with questions hydrographical, or of a kindred nature, you will consider it as supplied for your guidance, but manifestly in a voyage of this extent and character there are many questions practical and technical which require to be dealt with in greater detail.

The main object of the voyage is to investigate the physical conditions of the deep sea throughout the three great ocean basins, that is, to ascertain their depth, temperature, circulation, &c., to examine the physical and chemical characters of their deposits, and to determine the distribution of organic life throughout the areas traversed, at the surface, at intermediate depths, and especially at the deep ocean bottoms.

As secondary, but by no means unimportant objects, are the hydrographical examination of all the unknown or partially explored regions which you may visit, a diligent search for all doubtful dangers which may be in or near your track, with a view to expunging them from the charts or definitely determining their positions, a careful series of magnetical and meteorological data, and the observation and record generally of all those oceanic and atmospherical phenomena which, when faithfully recorded, afford the means of compiling practical information of the greatest importance to seamen. Your own experience as the commander of a surveying ship, and the general rules which have been issued from time to time by the Hydrographical Department for the guidance of Admiralty Surveyors,—copies of which are supplied to you,—obviate the necessity of entering into any detailed instructions on this head, and I will only observe that on all the coasts along which you may pass, and at all the ports which you may visit, I shall hope to receive from you such surveys and such complete hydrographical information as circumstances and the time at your disposal may enable you to accomplish.

If any one of the various objects of the expedition is more important than another, it may be said to be the accurate determination of the depth of the ocean, for on this must depend many other problems of deep scientific interest.

If the bottom is reached by the sounding line, late experience has shown that it can be examined by the dredge even at very great depths; thus the existence and distribution of organic life is ascertained, as well as the temperature, specific gravity, and chemical condition of the sea from the surface to the bottom. With this