



## P R E F A C E.

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THE literature of the natural sciences during the past few years exhibits, in a remarkable way, the profound influence our fuller knowledge of the deep sea has had on all general conceptions concerning the modifications the surface of the earth is now undergoing and has undergone in past geological times. This could not well be otherwise. Whenever science is enriched by a large addition of new facts, a change in theoretical views invariably follows. No complete theory of the earth was possible so long as we were ignorant of the conditions prevailing over the three-fifths of the globe covered by the waters of the ocean. It may fairly be said that since the discoveries of Columbus, Gama, and Magellan in the thirty years from 1492 to 1522, there has been no addition to the knowledge of the surface of our planet that can in any way compare with that acquired by the Challenger and other deep-sea expeditions during the past quarter of a century.

The difficulties connected with the exploration of the deeper waters of the great Ocean Basins arise from the fact that the vast majority of the observations are from the nature of the case indirect. At the surface of the ocean direct observation is possible, but our knowledge of the conditions in deep water, and of all that takes place beneath the surface, is wholly dependent on the correct working of instruments, the actions of which are, for the time, hid from sight. A few years ago the apparatus necessary for the