"Discovery II" and The Exploration of the Whale's Habitat.

THE Royal Research ship "*Discovery II*" returned from Antarctic on June 3rd after completing her third commission. The expedition was of 20 months' duration and covered 2 arctic summers. The scientific work was in charge of Dr. N. A. Mackintosh with Mr. H. F. P. Herdman as Chief Hydrologist and Lieutenant A. L. Nelson, R.N.R. in executive command.

The ship left Thames on October 21st, 1933, and 5 weeks later (Nov. 21st) was on the whaling grounds of South Georgia. After a few days' stop there, she left Georgia and a line of stations was then made across the Scotia sea to the South Shetlands and from there due north to the western opening of the Straits of Magellan. A number of observations was made with the primary object of following the seasonal changes in the water movements and so trace the circulation of the marine animals and plants, on which the whales and all other antarctic life are ultimately dependent. Thirty full stations were made during the cruise and in addition 19 subsidiary "towing" stations. A full station takes 3 to 4 hours; it includes a sounding and noting of meteorological data; of chief importance are the observations of sea temperatures taken at, at least 20 points between the surface and the bottom—here from 2½ to 3 miles deep—and of the collection of water for chemical analysis from the same points. Concurrently, a series of hauls are made, both vertically and horizontally with nets of varying mesh; those of the finest—200 meshes to the linear inch—are designed to collect the microscopic vegetation, which constitutes the "pastures" of the ocean, and is as important at sea as on land; those of the medium mesh are for the smaller forms of animal life, including young stages of whale food; and the largest, for the adult whale food, a prawn some 2½ in. in length—the so called "krill" which forms the only food of the rorquals. A "towing" station is confined to using certain of the nets to keep a check on the intervals between stations, as the distribution of animal and plant life is sometimes "patchy".

"*Discovery II*" returned to South Georgia on April 10th and on her way back repeated the series of stations already gone through. The second season was begun under winter conditions and after traversing the East Pacific Sector and making some important observations, was back at South Georgia on January 27th, 1935. On her return journey, she communicated with a whale marker "*William Scoresly*" which was also working towards the same objective as "*Discovery II*". While the latter was exploring the whales' habitat and the life-history of its food supply, "*William Scoresly*" is interested in marking the whales in order to know whence and where they travel, at what speed and in what numbers.

"*Discovery II*" is to leave London again in the course of the next autumn on her fourth and probably final commission.—(*From an article in 'Statesman', June 18th.*)

Research Notes.

Can Quantum-Mechanical Description of Physical Reality be considered Complete?

ON the basis of the uncertainty principle arising from Quantum Mechanics, the philosophical outlook of modern science has been asserted to be one of indeterminism and the principle of causality has been repudiated by such scientists as Bohr, Heisenberg, Weyl, Eddington and Jeans. On the other hand Einstein, Planck, Rutherford and Silberstein are staunch adherents to the view that the principle of causality still rules Physical Science. In view of this divergence of opinion, a paper with the above title by Einstein, Podolsky and Rosen (*Phys. Rev.*, 1935, **47**, 777) requires careful consideration. In this paper the authors observe that any physical theory which attempts to explain the objective world must satisfy two conditions, *viz.*, that it must be true and that the description given by the theory should be complete. They formulate the condition of completeness in the following terms: "Every element of the physical reality must have a counterpart in the physical theory." They define a physical reality by postulating that "if, without in any way disturbing a system, we can predict with certainty (*i.e.*, with probability equal to unity) the value of a physical quantity, then there exists an element of physical reality corresponding to this physical quantity." This they consider not as a necessary but only a sufficient criterion of reality. Translating this condition into the language of quantum mechanics they show that in the case of particle with a single degree of freedom its momentum satisfies the condition of reality while its co-ordinate of position does not satisfy that condition. There are now two alternatives: (1) either the description of reality given by quantum mechanics is not complete, or (2) when the operators corresponding to two physical quantities do not commute the two quantities cannot have simultaneous reality. The assumption so far has been that the description given by quantum mechanics is complete so that the second alternative was chosen. The authors now show, however, that this assumption leads