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OCEANOGRAPHY

The Depths of the Ocean. A General Account of the Modern Science of Oceanography based largely on the Scientific Researches of the Norwegian Steamer *Michael Sars* in the North Atlantic. By Sir John Murray and Dr. Johan Hjort. With Contributions from Prof. A. Appellöf, Prof. H. H. Gran and Dr. B. Helland-Hansen. xx and 821 pp. Maps, ills., index. Macmillan & Co., Ltd., London, 1912. £1 8s. 9½ x 6½.

Geographers and other general readers will find this an up-to-date treatise on oceanography. The *Michael Sars* is the tiny steam trawler of the Norwegian "fisheries," which has explored the Norwegian Sea in great detail since 1900. Sir John Murray suggested her four months' trip into the Atlantic in 1910; went with her, and bore a generous part of the expense. European shelves and the slopes to the deep ocean were explored as far south as the Canaries, from there the ocean was crossed to Newfoundland via the Azores, and return made to Bergen by way of Glasgow.

The intention was to add the light of Atlantic comparisons to the results of the researches of the *Michael Sars* in Norwegian waters. Incidentally a number of stations occupied by the *Challenger* in 1873 were reoccupied, and observations repeated with the improved apparatus of to-day. It is highly creditable to Murray's open-mindedness that he should urge the application of the newest thought and appliances to studies which long ago brought him established fame, and be able to work alongside and through some of the best trained men of 1910.

Dr. Johan Hjort, of the Norwegian "Fisheries," was in command of the expedition and writes the description of the *Michael Sars* and her apparatus, the account of the cruise of 1910, and chapters on bottom fishes, pelagic animals, and general biology of the ocean. Sir John Murray contributes an historical review and 180 pages on the depths and deposits of the ocean. This covers all the oceans, and is illustrated by colored charts of depths and deposits. Murray's general chapters and the narrative of the voyage of 1910 are the main threads of interest, illustrated by the special papers.

At Gibraltar they made the first velocity studies of the upper and lower currents. The westward under-current varied in speed from one fourth knot to five knots. On one occasion it extended from the bottom to the top for an hour, but its usual upper limit was at depths between fifty and 150 meters. The upper current, as was known, is usually to the east. Its speed was found to vary between one and three knots. The changes in the currents coincided in time with tidal changes outside. Temperatures and salinity were thoroughly investigated at all depths in the Spanish Bay outside the Straits. The use of the current meter enabled Helland-Hansen to detect currents with tidal change of "set" in the deep ocean west of the Canaries at depths of 915 and 1,830 meters, the total depth there being 5,000 meters. As the ship had to drift there, absolute velocities were not ascertainable. The same tidal set was observed and a current of a half knot measured across the mid-Atlantic Ridge south of the Azores, where the ship was anchored for fourteen hours in 900 meters, the current meter being at 732 meters depth.

The few catches on the mid-Atlantic Ridge give a hint of greater abundance of life there than over greater depths. Everything confirms the sparsity of life in the greatest depths. There is interest in every page of the volume, and while it notes great progress in knowledge it opens out new fields for study in every direction.

MARK JEFFERSON.

La Vie dans les Océans. Par Dr. L. Joubin. In Series: Bibliothèque de philosophie scientifique. 334 pp. Ills. Ernest Flammarion, Paris, 1912. Fr. 3.50. 7½ x 4½.

The author uses very few pictures in his book, which is popular but clear and written with real literary skill. He has selected his matter with care and presents it vividly.

All the properties of the ocean that touch nearly on life are described fully enough to show their bearing. Mainly they are motions, temperature, pressure, composition, and lighting. None are allowed to lead us aside from our object.