

depths greater than 300 fathoms. He was afterwards assisted by his son, G. O. Sars, in carrying on this work, and in 1864 they gave a list of 92 species living in depths between 200 and 300 fathoms, and showed a few years later that marine life was abundant down to depths of 450 fathoms.

MacAndrew. In 1856 MacAndrew published the results of his observations on the marine Mollusca of the Atlantic coasts of Europe and northern Africa, giving a list of 750 species obtained in his dredgings, which covered 43 degrees of latitude.

United States Coast Survey. The oceanographical researches of the United States Coast Survey may be said to date back to 1844, when the Director, Bache, issued instructions to his officers to preserve the deposit-samples brought up by the sounding-machine. Bailey. J. W. Bailey studied these deposit-samples, and published the result of his examination in 1851, followed in 1856 by other papers on deposits and on the formation of greensand in modern seas.

Maury. The name of M. F. Maury, of the United States Navy, was for a long period associated with the hydrographical work of the United States. He issued several editions of his Sailing Directions to accompany the wind and current charts published by the U.S. Hydrographic Office, the last edition appearing in 1859. About this time the need was felt for an improved and more trustworthy method of sounding in deep water, and various attempts were made to devise forms of apparatus to replace the heavy weight attached to a line which had to be let down and then drawn up to the surface again, the difficulty being to know when the weight touched the bottom. This problem was finally solved by Midshipman Brooke, who conceived the idea of detaching the weight used to carry down the sounding lead upon striking the bottom, the sounding tube, enclosing its deposit-sample, being alone drawn to the surface. He used a spherical weight (a bullet), with a hole passing through the centre to receive the sounding tube, suspended by a cord to the upper part of the sounding tube; on touching the bottom the cord was thrown off its support and remained at the bottom along with the weight. With the aid of Brooke's sounding apparatus, the records of deep-sea soundings rapidly accumulated, and enabled Maury to prepare the first bathymetrical map of the North Atlantic Ocean, with contour-lines drawn in at 1000, 2000, 3000, and 4000 fathoms, which was published in 1854 and is reproduced in Map I. The deposit-

Brooke's
sounding
apparatus.

Maury's map
of North
Atlantic.