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Review: Rivers and Tidal Currents

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marginal headings, and closely associated with references to divers works and to original documents. The volume is not indexed.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

RIVERS AND TIDAL CURRENTS.

'Rivers and Estuaries, or Streams and Tides.' By W. H. Hunter, M.INST.C.E.
London: Longmans. 1913. Pp. 69. *Diagrams.* 2s. 6d.

Based on courses of lectures delivered in London and Manchester, this slight volume is intended for students of engineering as an introduction to the subject. The treatment, which is quite elementary, of course takes the point of view of the engineer in discussing the movements of river and tidal waters and their constructive and destructive work, but for this very reason it is suggestive to the geographer, and despite its small compass the book is worth reading even by those who have no concern with the regulation of river-flows and estuarial works. The author strongly advocates the construction of working models of estuaries as most useful in solving engineering problems relating to them, and reminds us of the favourable report on these presented by the British Association Committee appointed to report on that method of investigation some years ago. On one point Mr. Hunter's lectures may give rise to some controversy, and that is where he maintains, on the authority of the late Prof. James Thomson's experiments, that at the bend of a river the velocity is greatest at the inner or convex bank, though the erosion is greatest on the concave bank.

NORTHERN WATERS.

'The Sea West of Spitsbergen.' The Oceanographic observations of the Isachsen Spitsbergen Expedition in 1910. By B. Helland-Hansen and Fridtjof Nansen. Christiania: Jacob Dybwad. 1912. Pp. 89. *Six plates.*

This paper, published by the Fridtjof Nansen fund, is one of the publications of Captain Gunnar Isachsen's Spitsbergen expedition of 1909 and 1910, but the observations discussed were all taken in the summer of 1910. Of the two types of water-bottles employed the insulated ones proved the most satisfactory, since the reversing ones did not always close properly. The readings of the Nansen thermometer used with the insulated bottle were satisfactory, although generally too low. A similar but more pronounced error has been found in the use of this type of thermometer in Antarctic waters.

Special interest attaches to these observations in their bearing on the Spitsbergen Atlantic current. The authors conclude that the annual variations in salinity of this current are small; in this it resembles the Norwegian Atlantic current. This is opposed to the view held by Swedish oceanographers based on the Swedish observations of 1898 and 1908. The variations in temperature of the Spitsbergen Atlantic current agree with variations in the distribution of ice in the Spitsbergen and Barents seas; and these variations seem to agree, as far as our data go, with variations in the temperature of the Atlantic current about the Lofotens one year earlier, and in the Sognefjord section two years earlier.

Most interesting are the researches on the vertical circulation of water in Ice Fjord, and the explanation given of the facts discovered, which again is different from that put forward by Swedish oceanographers. But considering the fact that Ice Fjord is yet very badly sounded, and that even the probable absence of a sill at its mouth is not established, one wonders that Isachsen in addition to taking his temperatures and salinities did not take a few bottom soundings and so settle some of the features of this fjord.

While it would be superfluous to eulogize the work of these two accomplished

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