# Reviews.

**Alphonse Berget.** Leçons d'Océanographie Physique: 2me partie: L'Océan et l'Atmosphère. Ann. de l'Inst. Océanogr. N. S., Tome XI, pp. 396, 193 figures. Paris, 1931.

This is the second part of Professor BERGET's treatise on physical oceanography. Like the first part (Tome IX of the same series), it is an eminently clear exposition of the matters dealt with. It is illustrated adequately, for the drawings and diagrams, though rough, are sufficient for their purpose. Chapters I to IV deal with the chemical and optical characteristics of the atmosphere; Chap. V with solar radiation and Chaps. VI to XI with winds and the general physics of the atmosphere. Chaps. XIV to XVII again deal with winds, storms and other atmospheric movements, by themselves and in relation to oceanic drifts and currents. Chap. XVIII treats of climate as it may be related to oceanographic matters. The rest of the book has for its subject currents and drifts, their descriptions and the methods by which they are investigated. Forms of apparatus for the elucidation of the directions and intensities of water movements in the ocean are not well described. (For instance, well-known methods and apparatus devised by CARRUTHERS do not receive notice). Nor are the actual descriptions of current systems adequate. On the scale adopted by the author these water movements appear to be far too simple and the real complexities which any detailed investigation of a small region shows are not mentioned. Such a course of lessons in oceanographical science as this ought to suggest (at least) that natural conditions, as they are known to investigators, are far more complex, and more difficult of exposition, than they appear to be when they form the subject-matter of a course of lectures. JAS. JOHNSTONE.

**G. Böhnecke.** Beiträge zur Ozeanographie des Oberflächenwassers in der Dänemarkstrasse und Irminger See. Teil I, zugleich Bericht über die Fahrt des "Meteors" im Sommer 1930. Annalen der Hydrographie u. s. w. LIX Jahrgang (1931), Heft IX. Berlin, 1931.

In 1928, 1929 and 1930 the German surveying ship "Meteor" was used for oceanographical investigations in the Denmark Strait and Irminger Sea between Iceland and Greenland. In 1928 J. GEORGI made observations on a voyage from Reykjavik to the neighbourhood of Angmagsalik, round the southern part of Greenland to Julianehaab and back to Reykjavik.

In 1929 different hydrographical investigations were made from the ship by the scientists Dr. BÖHNECKE, Prof. HENTSCHEL, cand. phil. GEISSLER, Dr. THORADE and Dr. WATTENBERG on four sections between about 60° and 65° N. Lat., and 25° and 40° W. Long. In 1930 the investigations were continued by Dr. BÖHNECKE, Prof. DEFANT, cand. phil. FELBER, Prof. SCHULZ and Dr. WEICKMANN on two sections from Reykjavik to about 55° N., 35° W., and on two sections from this area to the southernmost part of Greenland.

In the present paper G. BÖHNECKE discusses the surface observations from the three years' work and the paper is a continuation of an earlier one by G BÖHNECKE, E. HENTSCHEL and H. WATTENBERG in Ann. d. Hydr., 1930.

The author first tries to obtain a general view of the relation between temperature and salinity for each of the years in question by means of TS-diagrams based upon surface material from the whole of the investigated area. The diagrams show clearly the mixing of the Atlantic water with that of the East Greenland current, but it is found that the diagrams are different in different years. As the author says, this may be partly due to the fact that the area investigated in the different years has not been the same. The diagrams for all three years have the same form but are not straight lines, and probably their characteristic shape is due to the atmospheric influence, which may cause an exchange of heat between the Atlantic water and the water of the East Greenland current (and the Greenland land-mass) without a mixing of the waters.

The author has drawn charts of mean temperature and mean salinity for the month of August for the investigated area and made an analysis of the different sorts of water existing there. The Atlantic water is mainly found east of the Reykjanes ridge, which the echo-soundings of the "Meteor" have shown to be of larger extent than was hitherto thought. Of special interest is the mixing between the Atlantic and the polar water. The Atlantic water passes the northeastern part of the Reykjanes ridge near Iceland, penetrating into the Denmark Strait. Here it meets the polar water of the East Greenland current, and the two sorts of water form the "arctic mixed water" on a sinuous "Polar Front" lying between Iceland and Greenland, off Angmagsalik, and along the east coast of Greenland.

South and east of Cape Farvel relatively homogeneous water with temperatures from 8° to 9° and salinities from 34.5 to 34.8 ‰ is found. The author calls this water the "subarctic mixed water", which is supposed to have been formed by a mixing of Atlantic water, of water formed by mixing at the polar front and moving along the Greenland coast, and finally of some water from the Labrador current. At about 50°—51° N. this subarctic mixed water has a front to the Atlantic water south of it, which DEFANT in his treatment of these investigations by the "Meteor" calls a "secondary polar front".

On the basis of the charts of mean temperature and salinity the author has constructed a chart showing the average movement of the water in the investigated area. This movement may in the main be characterized as cyclonal.

At the polar front in Denmark Strait Atlantic water and polar water

are forced into one another, and various "tongues" of the two sorts of water are formed. The same thing occurs on the boundary between the subarctic and the Atlantic waters in the southern part of the area.

It is of interest to see that these tongues are found on the charts of mean values and may therefore be supposed to have to some degree a stationary character. The author himself mentions the fact that the method of deducing the currents from the distributions of temperature and salinity involves some uncertainty, as has also been pointed out recently by CASTENS. This question has just been discussed by DEFANT in his treatise on the "Meteor" investigations in the Denmark Strait and Irminger Sea, and, as he states, the mean general features of the currents may undoubtedly be found in this way. As DEFANT also points out, BÖHNECKE's chart is in good agreement with the hypothetical picture of the currents which has been given by NANSEN.

Besides the results so far mentioned special questions relating to the different years are also discussed. The question of the formation of the bottom water is touched upon, but it is remarked that a further contribution to the solution of this problem cannot be given before the material from the depths has been worked up. J. P. JACOBSEN.

**Trygve Braarud** and **Alf Klem.** Hydrographical and Chemical Investigations in the Coastal Waters off Møre and in the Romsdalsfjord. Norske Videnskaps-Akad. i Oslo. Hvalrådets Skrifter, Nr. 1. Oslo, 1931.

Die Arbeit erscheint als erste Nummer einer Serie von Veröffentlichungen, welche sich mit denjenigen physikalischen, chemischen und biologischen Faktoren beschäftigen soll, die für die Schwankungen im Vorkommen der wirtschaftlich wichtigen Lebewesen des Ozeans verantwortlich zu machen sind. Seit 1925 werden unter Leitung von Prof. J. HJORT und Prof. H. H. GRAN von der Walfangstation Aukra bei Molde aus hydrographische und biologische Untersuchungen längs eines Schnittes senkrecht zur Küste angestellt. In den letzten Jahren wurden in steigendem Masse auch die biologisch wichtigen chemischen Eigenschaften des Wassers studiert. Zu den Sauerstoff-, Phosphat- und Nitrat-Bestimmungen kamen noch Nitrit-, Ammoniak- und Eisen-Analysen hinzu.

Von den terminmässig befahrenen 6 Stationen liegen zwei im Fjord, drei auf dem Schelf und eine auf dem Schelfabfall. Dementsprechend ändert sich der Charakter des Wassers vom salzarmen Fjord über den als Fortsetzung des Baltischen Stroms aufzufassenden Küstenstrom bis zum salzreichen Wasser des Atlantischen Stroms. Die hydrographischen Verhältnisse ausserhalb des Fjords sind für die Jahre 1926—28 bereits von E. MARTENS[1]) beschrieben worden. Die Jahre 1929 und 1930 waren in den Hauptzügen den vorhergehenden ähnlich. Als Grundlage für die Diskussion der Hydrographie diente — wie auch sonst mehrfach in neuerer Zeit — zum grossen Teil die Verteilung des Sauerstoffs. Von den hydrographischen

[1]) Hydrographical Investigations in the Norwegian Sea off Møre 1925—28. Conseil Internat. Rapp. et Proc.-Verb. LVI (1929). Ref. Journal du Conseil Vol. 5, S. 238 (1930).