

latitudes as well. The description of Fig. 30 should run "Cyclonic current formed round a sinking centre in the southern hemisphere", and the corresponding erratum note at the beginning of the book should be deleted. A description of the calculation of the vertical differences of velocity in a current by the method founded on the work of BJERKNES by HELLAND-HANSEN and SANDSTRÖM is also given. In the section dealing with temperature the importance of the effect of eddy motion in producing vertical mixing is well brought out, as is also the value of the information to be gained by considering the mean temperature of the whole of a vertical column. An interesting example of this is given in Fig. 54 which shows that in 1921 at a point twenty miles south-west of Plymouth the temperature was the highest recorded, and in addition that this abnormal temperature was reached in October, a month after the mean date of the maximum. The curve is an excellent proof of a strong inflow of water from the Atlantic. A slip occurs on p. 156; $10\text{\AA} = \mu\mu$, not μ . The last chapter treats of the general problem of the fertility of the sea, the cycle of life, the importance of the upwelling of water rich in phosphates and nitrates and the question of their ultimate regeneration. It seems possible that the stock of these essentials is being slowly transferred to the depths where they are of no use.

The book contains good bibliographies and gains in value in that it is a product of the Plymouth Laboratory where so much work has been done in these directions since the war. It should be of great use to all interested in marine chemistry and physiology. D. J. MATTHEWS.

H. H. POOLE and W. R. G. ATKINS. Further Photo-electric Measurements of the Penetration of Light into Sea-Water. *Journ. Marine Biol. Assoc.* XV No. 2, pp. 455—483. 1928.

The paper under review forms a continuation of three former papers, viz.: 1) POOLE, H. H. On the Photo-electric Measurement of Submarine Illumination. *Sci. Proc. R. Dublin Soc.*, 1925, 18, No. 9, 99—115. — 2) POOLE, H. H. and ATKINS, W. R. G. On the Penetration of Light into Sea-Water. *Journ. Marine Biol. Assoc.*, 1926, 14, No. 1, 177—198. — 3) ATKINS, W. R. G. A Quantitative Consideration of some Factors concerned in Plant Growth in Water. Pt. I. Some Physical Factors. *Journ. du Conseil Internat. pour l'Exploration de la Mer*, 1926, I, No. 2, 99—126.

In the paper under review the apparatus is briefly described and an account is given of the improvements so far made. The light-sensitive part of the photometer is a photo-electric cell through which flows an electric current from a battery. The current through the cell being exactly proportional to the illumination with light of a given wave-length, this current is measured. The way in which the current-measurement is made is described. Two kinds of photo-cells were used. The one, a gas-filled potassium-hydride cell of the Kunz type, is more sensitive than the other, the vacuum-cell, but this latter has the great advantage of constancy. Thus it has proved advantageous to use the vacuum-cell from the surface down to about 40 metres in clear water, and to use the gas-filled cell at greater depths. The colour-sensitivity of various cells has been investigated and the result shown in diagrams with the wave-lengths from 4000 ÅU

to 6500 ÅU as abscissæ and the sensitivity as ordinate, taking the maximum sensitivity as unit. The diagrams show that a gas-filled cæsium cell has its maximum sensitivity at about 5300 ÅU, whereas the five other cells investigated have their maximum sensitivity at much smaller wave-lengths, 4300 ÅU or less.

During the autumn September—December of 1927 many investigations were carried out in the Channel at various distances from the sea-shore at Plymouth. The very interesting results of these investigations may be summarised as follows. The opacity of the water most often decreases with increase of depth, although the opposite has also been found. This may possibly be explained by the distribution of the plankton of which the zooplankton makes vertical movements according to the optimum light intensity for each species. The opacity decreases with the advent of winter to such an extent that the coefficient of absorption in December has about half the value of that in September. This is very clearly demonstrated in a diagram in the paper, and is explained by a corresponding decrease in the amount of plankton.

The authors tried without much success to correlate the maximum depths of visibility of a Secchi disc with the absolute and the percentage illumination at that depth. This lack of correspondence is tentatively explained by the special effect of the surface, and the authors are right in stating that the use of a water telescope might possibly lead to more consistent results. The reviewer is of opinion that a special study of the Secchi disc ought to be undertaken in order to compare the maximum depth of visibility with and without the use of a water telescope.

The paper is highly interesting and shows clearly that the authors have been able, not only to construct the rather complicated and delicate apparatus they have employed, but also to use the apparatus on board with much success.

MARTIN KNUDSEN.

BIRGITHE FÖYN und H. H. GRAN. Über Oxydation von organischen Stoffen im Meerwasser durch Bakterien. Det Norske Videnskaps-Akad. Oslo. Matem.-Naturv. Klasse. 1928. No. 3.

Towards the end of March 1926, during the height of the spring outburst of diatom growth, water samples from various depths were collected from Romsdal to beyond the edge of the continental shelf, some fifty miles out to sea. Waters of diverse types were obtained. In the fiord, the upper layer, supersaturated with oxygen and rich in diatoms, lies on relatively stagnant deep water about 80 per cent. saturated with oxygen. Here 636 diatoms per cc. were found at 10 meters and only 2 at 75 meters. Outside the fiord, water of moderate depth extends over the continental shelf for some 40 miles to seaward, this water forming the Baltic current running northward along the Norwegian coast. Here some 136 diatoms per cc. were found at 10 meters, while at the edge of the continental shelf 1461 diatoms per cc. were present, the species found in the fiord having given way to *Asterionella* which was also found dominant in the more saline Atlantic water beyond the shelf, where 380 individuals per cc. were found at 10 meters. At each position investigated, plankton organisms