abgeschlossen ist, lässt sich aus den bisherigen Ergebnissen doch schon erkennen, dass die Reststrommessungen in der Strasse von Dover ausser ihrem fischereibiologischem Werte auch eine erhebliche allgemein hydrographische Bedeutung haben und es ist nur zu wünschen, dass die Beobachtungen noch weiterhin fortgesetzt werden und wir ausserdem bald die in Aussicht gestellte eingehendere Bearbeitung erhalten.

BRUNO SCHULZ.

1) C. F. BROOKS. Reliability of Different Methods of taking Sea Surface Temperatures. — Journ. Wash. Acad. Sci. Vol. 18, No. 20, Baltimore, Md., 1928, pp. 525—545.
2) G. F. MCEWEN. Significance of Water Temperature Measurements not made exactly at the Surface. Ibid. pp. 545—546.
3) P. M. VAN RIEL. The Influence of Sea Disturbance on Surface Temperature. — Konink. Nederland. Met. Inst. 102. Meded. en Verhand. 30. Amsterdam 1928.

The usual procedure in commercial ships for observing the temperature of the sea surface is a legacy which has been handed down a long while without essential change. Samples of sea water have customarily been taken with a bucket either of iron or, more frequently, of canvas. Recently the methods in use have been scrutinised and revisions suggested. This attention is timely not only by reason of the change which conditions at sea have undergone, but also owing to the need for greater accuracy in the basic material for present-day investigations.

An important matter which studies such as those under review help to clear up is the precise significance of "surface" observations. The term "surface" in this connection is admittedly vague and the representative value of such observations largely depends upon the degree of homogeneity in the water column. When in very calm weather the gradient in the uppermost metre is strongly accentuated and appreciable differences may exist from centimetre to centimetre (c. f. A. MERZ, Veröff. d. Inst. f. Meeresk. N. F., Reihe A. Heft 5. 1920) the actual depth to which a "surface" sample (taken from a moving ship) relates must be problematical. Since it is not as a rule practicable to obtain a complete picture of the temperature conditions in the water column (we have to be content with one observation at each point on the route), the following two questions must be answered to our own satisfaction at least. Firstly, which depth has the greatest value for the work in hand; secondly, to what extent are the observations mutually comparable, a matter which to some extent turns upon the method of observation adopted. Mr. VAN RIEL accepts existing methods and endeavours to decide the degree of comparability among the observations obtained, whereas Dr. BROOKS prefers to attack the problem through the methods and so to standardise the measurements.

As for the first question, it is sometimes held that the surface film is of the greatest importance, since it is this layer which is in direct contact with the air and in which the phenomena of evaporation, radiation and absorption proceed most actively. On the other hand, it is the condition of the wind-stirred stratum below upon which rests, as Dr. Brooks points out, "the continuation of the influence of this sea-surface at approximately the same level of temperature". Fortunately, however, we are relieved of part of the responsibility for choice of depth, since the calm conditions necessary to the existence of a surface film and the concomitant sharp temperature gradient are not, generally speaking, the most frequent at sea, a fact to which both Dr. Brooks and Mr. van Riel refer.

In his paper, Dr. Brooks recapitulates the results of earlier studies made during a cruise in the "Empress of Britain" (Monthly Weather Review, Vol. 54, 1926), and these conclusions are supported by means of additional information gathered on a later cruise in the "Finland". The suitability of the condenser-inlet for surface temperature observation is maintained and experience of the operation of thermographs already installed in various ships leads Dr. Brooks to recommend these instruments for the purpose of measurement. Except in calm weather and near the shore, 98 per cent. of the surface observations (i.e., made with a bucket) were the same as those at 5 to 7 metres. In calm weather, however, a difference of about 1° C. was noticed between observations from over the bow and in the stern-wash and there was also an appreciable difference in temperature of the sample according to the distance from the ship's side at which the bucket was dropped in the sea. Nevertheless, it appears that even in summer canvas bucket observations are less reliable as measurements of the temperature of the actual surface than are condenser inlet observations, owing to cooling of the bucket by evaporation.

Dr. Brooks adds a further source of error, namely, guesswork, to his previous list; that is to say, occasionally the temperature was simply guessed to save the trouble of drawing a sample.

The gist of the short note by Dr. McEwen is to the effect that it should be possible to draw up and apply suitable corrections to observations at 5 metres which would render them comparable with "surface" observations. It is also shewn that about sixteen observations were required to estimate with a probable error of 0.2° C. the average temperature of a certain area of sea surface off California over a period of ten days.

The main conclusion reached by Mr. van Riel is that, where temperature decreases as depth increases, the effect of sea-disturbance is to reduce the average surface temperature. It is also shewn that where temperature increases as depth increases, this effect is reversed. Reference is made to the interesting fact that the highest temperature will, in calm weather, be found not at the very surface but just beneath. Consequently disturbance of the sea surface causes at first a slight rise in surface temperature, but thereafter a fall. This is clearly displayed by means of diagrams in which the amount of sea-disturbance is plotted against temperature, given as a difference. (There is a slip in diagram 3; the longitude should be E.)

The curves so obtained are compared with hypothetical curves, but the source from which these latter curves are derived is not made clear. From this comparison the deduction is made that under "calm" or "very smooth" conditions the method of observation (i.e., sampling with a bucket) does not permit the temperature of the actual surface to be accurately observed, owing to the disturbance caused by the ship, etc. With greater disturbance the mixture of the upper layers will be so complete that the observations obtained may be regarded as referring to the actual surface. It is interesting to note, however, that the author's preference is for observations with buckets rather than from the condenser-inlet.

The difference between the average temperature for mean smooth and for mean moderate conditions amounts to about $^1/_2$° C. for most of the regions investigated. Only in the equatorial Atlantic this difference is $^1/_4$° C. Another effect, experienced in a less degree in the equatorial Atlantic again, is the reduction of the daily range by about 0.16° C., for a similar change of sea-disturbance. J. R. L.

JERRY H. SERVICE. Measurement of Salinity of Seawater. U. S. Coast and Geodetic Survey: Special Publication, No. 147. Washington, 1928.

The United States Coast and Geodetic Survey makes wide use of the radio-acoustic method of ranging for the purpose of fixing positions at sea when out of sight of land. It is necessary that the velocity of sound in the waters under survey should be known, and this is preferably calculated from the salinity and temperature. The salinity has a comparatively small influence on the velocity, and it is sufficient if it is known with no uncertainty greater than two or three units in the first decimal place. The methods of determining salinity described in this paper reach this standard of accuracy and can be used on board ship in ordinary surveying weather. They are those by hydrometer, by titration, by determining the refractive index with the dipping refractometer, and by balancing a column of the water against one of kerosene.

D. J. MATTHEWS.

MARIE V. LEBOUR. The Larval Stages of The Plymouth Brachyura. Proc. Zool. Soc., pt. 2, 1928, pp. 473—560, plates 1—16, textfigures 1—5. London 1928.

From the waters at Plymouth 37 species of Brachyura are known. Miss Lebour has traced the larval stages of all these species, except four, but the development of two of these has been described by others. As far as possible the larvæ were hatched from eggs from berried crabs, and the development has then been continued in the laboratory. In other cases (even when the adult crabs are rare or not to be found) the larvæ occur sometimes in the plankton. A few were reared from egg to crab, others from egg to megalopa; thus there is no doubt as to the identification of the species. Sometimes the gaps were filled with material from the plankton.

The paper is divided up into several sections, the first of which contains general characteristics of the larval stages partly from a morphological, partly from a systematic point of view. Probably all the British crabs hatch from the egg as a pre-zoëa (enclosed in an embryonic skin of extreme thinness and thus quite unable to swim) with a free existence of at most some hours, and this stage gives rise to the first zoëa (with two pairs of