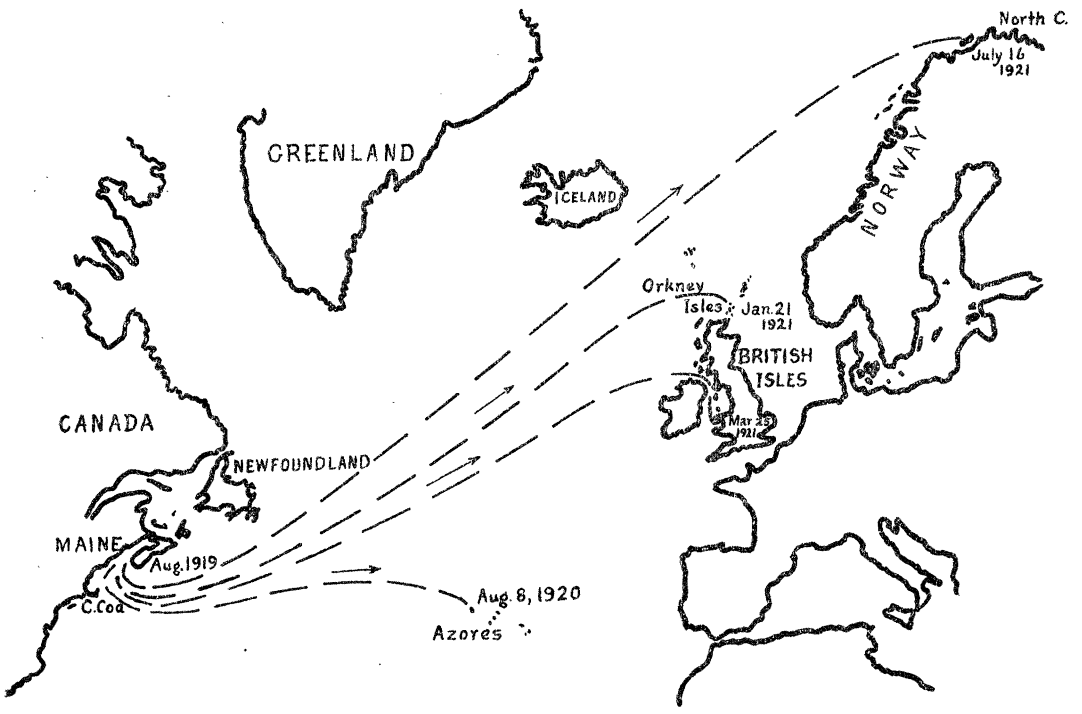

FIGURE 1. Chart on Mercator's projection of the positions of setting out and finding of drift bottles in the North Atlantic, 1919-21.

(13) The stimulus in all cases may pass beyond the location of the causal organism.

(14) Abnormal shoots and other growths (sometimes referred to as embryomas) are frequently formed in connection with many galls. Their status can not be determined from our present knowledge of the subject.

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THE COURSE OF THE GULF STREAM IN 1919-21 AS SHOWN BY DRIFT BOTTLES

IN several short notes published in this journal,[1] the writer has recorded the results of drift bottle experiments conducted for the Biological Board of Canada. Since the publication of these notes additional data has been obtained and it seems advisable to bring together to date that part of the data which bears on the course and rate of flow of the North Atlantic Wind Drift, the so-called Gulf Stream.

During the summer of 1919 some four hundred bottles were set adrift in the Bay of Fundy. Each bottle contained a postcard offering a reward to the finder who wrote in the spaces provided on the card the answers to the questions, "Where found? When found? By whom found?" Up to the present time no records have been received of bottles being found south of the Cape Cod peninsula. The records of the seventy-three bottles which were found on this side of the Atlantic during the year 1919 have already been published[2]. Four of the bottles have been found on the European side of the Atlantic. They were set adrift in the latter part of August, 1919, and the records of the finding of them follow:

No. 198. Azores, Island of Flores, August 8, 1920.

No. 230. Orkney Islands, Island of Papa Westray, January 21, 1921.

[1]Science, N. S., Vol. LII, No. 1349, page 442, November 5, 1920, Vol. LIII, No. 1365, page 187, February 25, 1921, Vol. LIII, No. 1373, page 289, April 22.

[2]Proceedings of the American Fisheries Society, 1920, page 334. Contributions to Canadian Biology, New Series, Vol. I, No. 8, page 103, 1922.

No. 98. Great Britain, Dyffryn, North Wales, March 25, 1921.

No. 129. Norway, two miles from land at the Böhle-Walstation, Sorö, Westfinmark, July 16, 1921.

The places referred to are shown in the accompanying chart, figure 1.

Considerable information as to the course and rate of flow of the North Atlantic Wind Drift or Gulf Stream during the winter of 1919-20 and the summer of 1920 is to be obtained from the finding of these bottles. The distances which they must have been carried, measured along the shortest courses which they could have taken, are approximately 2000, 2800, 2900 and 3800 geographical miles. The corresponding lengths of time which the bottles were "out" are 12, 17, 19, 23 months respectively. This close correspondence between the distances traveled and the times the bottles were "out" indicates that the bottles were picked up relatively soon after they reached the coast. If this assumption is justified the average rates at which the bottles moved across the North Atlantic were 5.8, 5.4, 5.1, and 5.5 geographical miles per day.

The success of this experiment carried out on a comparatively small scale—only four hundred bottles were used and they were all set out within thirty miles of the shore—indicates that important and far reaching results in the investigation of ocean currents are to be obtained from the use of drift bottles. Such experiments can be carried out at small expense. Since the bottles can be set out from any vessel while under way, practically the total cost of an experiment is that of the bottles and the rewards offered to those who find them.

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SCIENTIFIC EVENTS

THE PREPARATION OF STAINING SOLUTIONS

IN the text-books dealing with microscopy and with bacteriology, as well as in the journal literature dealing with these subjects, there are two general types of stain formulæ. In one type of formula so much dry stain in weight per given volume of solution is called for, in the other type so many cubic centimeters of a saturated solution of the stain. It will be readily seen that the same staining formula could be prepared by both methods provided the solubility of the dry stain and its actual dye content were known. If all batches of dry stain contained the same amount of actual dye either sort of formula would be perfectly satisfactory.

Unfortunately, however, different lots of any stain vary greatly in the amount of inert material they contain. This is true even in regard to different batches of Grübler stains and it is especially true now when there are so many different brands of stains on the market. An investigation of certain methylen blues, for example, showed a Grübler sample examined to contain 57 per cent. of actual dye, a Merck sample 55 per cent., while five different American samples varied from 69 per cent. to 88 per cent. It seems in general desirable that the color strength should be as high as reasonably possible, and it must be particularly pointed out that the sample containing 88 per cent. dye proved one of the two very best in a long series of methylen blues examined. It is obvious, however, that a staining formula calling for so many grams of Grübler methylen blue will be more concentrated if made up with one of these American stains. Considering how these stains vary in actual dye strength, much more nearly constant formulæ can be obtained provided they are prepared on the basis of a definite volume of a saturated solution. Although there are undoubtedly some differences in the amount of actual dye and goes into solution in the case of different brands of stains, nevertheless the results are much more constant in this case than when the formulæ are prepared on the basis of weight of dry dye. For this reason biologists publishing stain formulæ are urged to cooperate with the committee in putting the formulæ on the basis of so many cubic centimeters of saturated solution. The saturated solution may be either aqueous or alcoholic, according to the needs of the individual case. Objections are sometimes made to this type of formula in that it is difficult to prepare without waste when the solubility of a stain is not known. This is not a valid objection, however, because a saturated solution of any stain can