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University improved the method for nitrate determinations somewhat, but it became perfectly evident that its accuracy is only sufficient to give roughly quantitative results.

During the summer of 1930 the determination of phosophate and nitrate was continued intensively and with improved technique. Instead of distributing the work over a large area the variations at one or two stations were studied at frequent intervals. A general confirmation of the results of the previous year was obtained; values of the same magnitude and of the same wide range of variability were found. Without a doubt these changes are not caused by variations in the abundance of life or in growth processes. The source of nitrate and phosphate and its relation to the outflow from the land is still to be found. It is probably significant that high concentrations of nitrate were found far up the Sullivan River, especially in the shallow, muddy Hog Bay.

A study was also made of the ionic ratios in the water—the relations which exist between the sodium, potassium, calcium, magnesium, sulphate and chloride ions, which compose nearly all of the salt content. The relative proportions of these constituents have always been reported to show remarkable constancy, notwithstanding the influence of river water flowing into the sea. No data have been available, up to the present time, from the North Atlantic Coast. The relation between the sulphate and chloride in a large number of samples at various stations and depths in Frenchman's Bay was determined, as well as in a series of samples extending far up into Sullivan River. Since the fresh water outflow from Sullivan River is very limited a number of samples were collected from several stations in Penobscot Bay and River and a fairly complete analysis of these was carried out to determine the concentrations of the various ions listed above. A few samples from Frenchman's Bay were analyzed in the same way for comparison. Due to the limitations of time and of laboratory equipment it was not possible to attain more than a moderate degree of accuracy in this study, but the results were in full agreement with those from other localities, although with some indication of variations which will be the subject of further study. A possible influence of the fresh water from the Penobscot River upon the ionic ratios is indicated, but not demonstrated as yet with sufficient certainty.

6. PHYTOPLANKTON STUDIES

By P. R. BURKHOLDER, Buffalo Museum of Science

During the summer of 1930 investigations were carried out to determine the kinds and quantity of phytoplankton occurring in the waters

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of and adjacent to Mt. Desert Island. The major portion of the work was devoted to studies of the marine plant plankton in cooperation with several other investigators working together upon the problem of the production of life in the sea. However, gatherings of fresh water plankton were made and identified from all the lakes of Mt. Desert Island.

For purposes of identification samples were obtained with a no. 20 silk tow net at regular intervals throughout the summer from several selected stations in Frenchman's Bay and once from a series of stations in Penobscot Bay. Quantitative methods were also employed regularly to obtain data upon the volume of plankton production. Such samples were collected by two methods: 1) straining through a no. 20 silk net a measured volume of water obtained from various depths with a rubber hose and gasoline pump; and, 2) centrifuging a small volume of water to recover those tiny organisms which may have been lost through the meshes of the net. A part of each quantitative sample of plankton was dried and ashed for the purpose of obtaining the organic weight, and another fraction was used for identification and counting of the microscopic algae and diatoms by means of the standard method.

The summer's work will yield both qualitative and quantitative data concerning seasonal variation, vertical distribution and tidal fluctuation of the marine phytoplankton, and a taxonomic list of species found in the freshwater lakes of Mt. Desert Island.

7. ZOOPLANKTON INVESTIGATIONS

By CHARLES J. FISH, Buffalo Museum of Science

Zooplankton observations were made at selected localities throughout the season, special attention being given to two stations, one near Googins Ledge and one in the channel between Iron Bound Island and Long Porcupine Island. The latter station lies in the largest channel formed by the group of islands separating the inner and outer parts of the Bay. In order to get conditions typical of the inner area as a whole, this station was visited so far as possible on the last quarter of the ebb tide. In all sixty-two series of quantitative and qualitative determinations were made.

As the Sullivan River forms the principal source of river drainage into Frenchman Bay, observations were made along its entire course and into the tributary streams. It was found that during the past summer the importance of this river as a contributing factor to the fertility of the Bay was negligible. Even the head waters were populated by a marine neritic community and, except for the turbid brown color of the brackish water, little evidence of outwash could be detected. Over most of the river typical marine conditions prevailed. A haul