

During Otto Torell's expedition to Spitzbergen in 1864, a great number of creatures were taken at a depth of 1000 to 1400 fathoms in the "Macleans nets." They included Rhizopoda, Bryozoa, Sponges, Annelids, Crustacea, and other forms. In subsequent expeditions to Spitzbergen, creatures were frequently secured from a similar depth.¹

In 1865 a paper by Professor Forchhammer of Copenhagen on the Composition of Sea-Water in different parts of the Ocean was published in the *Philosophical Transactions*,² recording the result of twenty years of patient work, and its publication made an era in the history of ocean chemistry. Forchhammer worked under great disadvantages; his samples of water were brought home by seafaring men from different parts of the world in corked bottles, and they were necessarily all taken from the surface or immediately beneath it. Forchhammer did not attempt to determine quantitatively all the elements that occur in sea water, but confined himself to the very accurate estimation of the principal components, viz., chlorine, sulphuric acid, magnesia, lime, potash, and (by difference) soda. Although his methods have since been improved on, all the analyses were models of care and accuracy, and all his results have been confirmed and extended by Professor Dittmar's elaborate research, carried on under conditions so immensely more favourable on the water samples carefully collected on board the *Challenger*. Forchhammer's grand conclusion is that although the salinity of sea water may and does vary within certain limits, yet if samples be taken in all parts of the open sea, avoiding the vicinity of land and the mouths of large rivers, the proportion of each constituent to the total salts will be found to be the same everywhere. The differences in surface sea water then are merely differences due to dilution and concentration.

In 1867 Count L. F. de Pourtalès commenced, in connection with the United States Coast Survey, a series of deep dredgings on the margin of the Gulf Stream. Working in the U.S. Coast Survey steamer "Corwin," he dredged down to a depth of 350 fathoms; and in the following year he resumed the work in the same place in the U.S. Coast Survey steamer "Bibb," and dredged successfully in 510 fathoms, finding animal life exceedingly abundant. Although a great part of the collections made by Pourtalès were lost in the great fire of Chicago, many new species have been described and brought under the notice of zoologists, and the wide bearing of the new facts obtained were comprehensively discussed by Professor Louis Agassiz, who took part in these explorations with Pourtalès.³

It has always been supposed that costly appliances and a large crew are absolutely necessary for successful dredging in water of any great depth. G. O. Sars indeed had worked down to 300 fathoms in a small boat manned by three men, off the Lofoten

¹ *Zeitschr. f. wiss. Zool.*, Bd. xx. p. 457, 1870.

² *Phil. Trans.*, vol. clv. pp. 203-262, 1865.

³ *Bull. Mus. Comp. Zool.*, Cambridge, U.S.A., 1868 and 1869.