

ably form the chief basis, and in the open sea practically the sole basis, of nutriment for all the pelagic animal life, as well as, through their pelagic forms, for the fauna of the sea-bottom. It is not, however, quite so certain that all the different algæ are equally useful as food to the animals which live on plant stuffs. Brandt's chemical studies of plankton organisms have distinctly shown that nutritive value does not necessarily correspond to volume. Diatoms, with their long silicated setæ, or with big bladder-shaped cells that merely enclose a thin layer of protoplasm along the inner side of the wall, have little nutritive value compared to the majority of the peridineæ, in which most of the cell-chambers are full of protoplasm. The dry substance of diatoms, according to Brandt's analyses of plankton samples, chiefly *Chatoceras*, contains 10 to 11.5 per cent albumen, 2.5 per cent fatty matter, 21.5 per cent carbohydrates, and as much as 64.5 to 66 per cent ash, 50 to 58.5 per cent of this last being silicic acid. Another sample, largely consisting of *Ceratium tripos*, had a totally different composition, the dry substance containing 13 per cent albumen, 1.3 to 1.5 per cent fatty matter, 80.5 to 80.7 per cent carbohydrates (half of which was chitin), and not more than 5 per cent ash.

Chemical  
composition  
of plankton  
samples.

We are still without systematic studies of the nutriment of plankton animals, and consequently do not know for certain whether some families of plants are preferred to others. The contents of the intestinal canals of salpæ make it evident that these animals at any rate collect all the different small organisms to be found in their neighbourhood. In warmer waters the greater part of their stomach-contents consists of coccolithophoridæ and other tiny forms, but we find besides representatives of all the plankton-algæ. Small peridineæ, for instance, like *Gonyaulax polygramma*, are seldom wanting. In fact, Stein, the well-known specialist on protozoa, who had no plankton-catches to aid him in his researches, got the best part of his material from the stomachs of salpæ, and was thus able to write his valuable initiatory monograph on peridineæ. And this, too, was the plan adopted at first for studying diatoms, so that our knowledge of pelagic genera like *Asteromphalus* and *Asterolampra* is largely due to the examination of the stomachs of salpæ. During the cruise I invariably examined the stomach-contents of salpæ, and obtained thereby plenty of small forms, coccolithophoridæ especially, for comparison with the material in the centrifuge samples. As we approached the coast of Europe, however, the contents took on another character, for at Station

Food of *Salpa*.