

practise his net could not filter the whole of the water which ought to pass through ; it was possible, however, to work out a coefficient for each size of net, namely a fraction indicating what proportion of the total quantity of water had actually been filtered. Hensen trusted chiefly to vertical hauls, since he was anxious to know definitely the exact distance through which the net had passed. He lowered his apparatus open, but with a heavy weight attached, so that it went down end-first and therefore caught nothing until hauling in began. Initial investigations aimed at ascertaining the total quantity of plankton in the photic zone, and accordingly the net was drawn in one haul from a depth of 200 metres right up to the surface, or from the bottom to the surface in water shallower than 200 metres, the idea being to find out the quantity of plankton in a column of water of known depth 1 metre square.

It is not, however, sufficient merely to compare the total quantity of plankton present in different localities ; it may be just as important to know what there is at different depths, not only because we have to consider the effect of light, let us say, upon plant production, but because there may be layers of water, such as we find especially in coastal areas, totally distinct in hydrographical characters, and with different conditions of existence. Hensen made vertical hauls from different depths, and had recourse to subtraction when estimating the plankton of the deeper layers, but since that time closing-nets have been introduced, and we are able now to get samples from any layer we wish to study. C. G. Joh. Petersen constructed a closing-apparatus to go with Hensen's vertical net, and Nansen also designed a vertical closing net which was invariably used by the "Michael Sars," and found to be handy and reliable. Provided only the bag be long enough in proportion to the opening, it will act successfully from a quantitative point of view, though we did not employ it much for this purpose, as we had better methods of our own for estimating quantity. Otto Pettersson obtained his estimates of quantity by attaching silk nets to a large current-meter, which recorded the velocity of the current, and thus indirectly supplied approximate figures denoting the amount of water filtered. A series of very interesting determinations, from samples secured in this way, has been described by Broch.

Petersen's
closing
apparatus.

Nansen's
closing net.

Pettersson's
method of
attaching nets
to current-
meter.

Broch.

The net-method was found unreliable as time went on. In the first place, it does not fairly represent the total quantity of plankton, since many of the smaller forms pass altogether, or to