

these animals are absent, and the volume is obviously at a minimum.

We may therefore assert that the small nets actually capture a purely accidental selection of the animals present, and that the use of the nets only above 200 metres gives a merely casual selection, which is by no means a characteristic gauge as to the quantity of organisms living beneath a square metre of surface even at the moment.

Is the idea of a certain quantity per square metre of surface on the whole of any value whatever as regards the ocean? We may speak about the quantities produced per hectare or per square metre of soil, and we may also classify the production of a pond; but is there in the ocean any connection whatever between the different layers of a column of water 5000 or 6000 metres deep by 1 metre square in regard to the vertical exchange of nutritive substances? Is it not probable that this exchange takes place in an oblique direction and at various angles at different depths? At the surface of the North Atlantic the Gulf Stream in many places runs with great velocity, but how deep this current extends, or, to put it more correctly, at what depths it runs in the same direction and with the same velocity, is indeed as yet almost unknown. Below this current there are perhaps in places powerful reaction currents, running in opposite or other directions, probably with a considerable vertical range (see current measurements described in Chapter V.), and these would have to be passed through before reaching depths where the water layers move very slowly or not at all. Bodies sinking from the productive plant-stratum at the surface must, therefore, be supposed to be carried far away in a horizontal direction before reaching deep water. The nutriment of the deep layers of any locality is thus not derived from a point situated exactly above it, but has probably come from some very distant point, and the fact that boreal forms are found in deep water below the warm waters of the south may be a corroborative proof of this.

Qualitative investigations must precede quantitative estimations.

Notwithstanding my admiration for Hensen's methods, I have always held that before these methods can be applied in nature we must make a qualitative investigation, to be followed by an investigation as to the relative quantities of the organisms present, in order to define the selection which must be made if we wish to determine the absolute quantities. To define the quantity of something perfectly casual is indeed of little