

“Michael Sars” in 1910 tests were made at various depths, and it was found that the light was far stronger south of the Azores than in the northernmost portion of the Atlantic at corresponding depths. But whether light is in itself sufficient to explain the different vertical distribution of a species in different marine areas, or whether there are other contributing factors, are matters yet to be decided. So far the question has not been sufficiently studied.

Effect of
currents.

The animals of the ocean-floor owe their distribution mainly to the agency of currents, since these serve to transport their pelagic larvæ, and perhaps also carry along full-grown bottom-forms like the amphipods and most of the prawns, which creep almost as much as they swim. It is through transportation of larvæ that the Norwegian Sea acquired most of its southern forms, and to this day these forms are still being disseminated in similar fashion throughout its component parts. We must bear in mind that most bottom-animals are attached, or, if we except a few crustaceans, very limited in their locomotion, and that consequently distribution by direct migration is all but impossible. The distribution of larvæ is subject to physical laws, and is dependent on the occurrence of the adult animals, and on the hydrographical conditions that prevail. Larvæ of arctic forms which inhabit only polar areas will, as a rule, only be transported by polar currents, so that the bottom they will reach, when their development is completed, will lie within the arctic region. In the same way the species belonging to Gulf Stream areas will be retained in boreal waters.

In addition to the two main currents of the Norwegian Sea there are several others consisting of blended layers, such as mixtures of the Gulf Stream, polar water, coast water, North Sea water, and bank water in various combinations. Probably every one of these plays its own particular part in distributing the larvæ, and consequently the bottom-animals, but we do not yet know to what extent. It seems absolutely certain, in view of what we have learnt regarding pelagic animals, that the larvæ in an area bordering on two currents may be swept away by one or the other, and so conveyed to a strange area. This, I fancy, explains why a coast-form like our common sea-urchin, *Echinus esculentus*, may be exceptionally met with in deep water out in the North Sea and Atlantic, where it succeeds in existing as a somewhat different variety. The occurrence of the arctic amphipods, *Epimeria loricata* and *Acanthozoue*