

In addition to the strictly benthonic animals living attached to or creeping over the bottom, there are likewise in deep-water regions numerous Fishes, Crustaceans, and other organisms which live within about 100 fathoms of the bottom and occasionally rest upon it. These species are frequently taken in the trawls when this instrument has been dragged immediately over but not allowed to touch the mud or ooze covering the bed of the sea, and are also captured in the cages or traps let down into deep water. It has, however, been doubted whether the intervening waters in mid-ocean between one hundred fathoms above the bottom and a few hundred fathoms beneath the surface are inhabited by marine organisms. The tow-net experiments carried out on board the Challenger during several years in all parts of the world led me to the conviction that these intermediate regions were inhabited, although with a much less abundant fauna than the waters near the bottom or those near the surface of the ocean. Thousands of hauls of the tow-nets were taken in the surface and sub-surface waters, and the contents were daily submitted to microscopic examination; the forms present in these waters became quite familiar to the naturalists. When, however, the tow-nets were sent down to deep water, and dragged in depths as nearly as possible of 500, 1000, and 2000 fathoms, organisms—such as the Tuscaroridæ among the Radiolaria—were nearly always observed in the gatherings in addition to the usual surface organisms. Organisms from these intermediate layers of water appear to have a much wider horizontal distribution than the surface fauna or flora. These oft-repeated experiments produced a strong belief that all the intermediate zones of depth were inhabited. I am not aware that the Tuscaroridæ have ever been taken in the surface or sub-surface waters. It is probable that the animals in the intermediate zones of depth obtain their food by the capture of the dead organisms continually falling from surface to bottom. It is well known that the deposits at the bottom are in most regions chiefly made up of the dead shells and skeletons of surface organisms. We have no definite ideas as to the rate at which these surface creatures may be falling to the bottom, but it is evident that nets which have been dragged in these intermediate depths on the opening and closing principle, without capturing any of these falling organisms, have either not been dragged for a sufficiently long time and through a sufficiently great extent of water, or have not worked successfully.

THE FAUNA OF
THE INTERMEDIATE
DEPTHS IN
OCEAN WATERS.

The surface and sub-surface organisms are distributed in zones of latitude similar to the benthonic animals and plants of the shallow-water regions along the shore, but a very much greater number of the species are circum-tropical, circum-boreal, circum-antiboreal, and circum-polar. Species of Diatoms, Coccospheres, Rhabdospheres, *Pyrocystis*, *Oscillariæ*, *Protococcaceæ*, *Halosphæra*, and the yellow cells of Radiolaria and Foraminifera together with other unicellular Algæ, abound in the surface-waters

PELAGIC ALGÆ.