

is in perfect harmony, for these minute organisms multiply with extraordinary rapidity in positions illuminated by and exposed to the sun, but abound less in shady places and are never found to vegetate in darkness. Hence in the great depths of the sea, to which light, because of absorption, cannot penetrate, only dead valves of Diatoms will be found.

I have given at length in another communication¹ arguments based on the existence of Diatoms in the stomachs of abyssal Echini, which seem to me to show that these organisms might possibly live at depths of 1340 fathoms, and that sunlight might penetrate to greater depths than at present supposed. Mr. Murray, however, informs me that it was observed during the Expedition that the great majority of deep-sea animals lived by eating the surface layers of mud or ooze forming the bed of the ocean, which usually contained a large number of the remains of surface animals and Diatoms; his opinion is that a small amount of organic matter is carried down with the dead shells and frustules from the surface waters where the organisms lived, and that the deep-sea animals obtain their nutriment from it. Had Diatoms been observed in the alimentary canal of fishes, they might have been obtained at less depths. As, however, Echinodermata live only on the bed of the ocean itself, it must be regarded as very probable that these frustules formed a portion of the food of these animals.

The significance of such observations in connection with deep-sea life is of the highest value, as tending to explain the existence of animals in a normal state at the greatest depths—a fact that has already been recognised by many marine scientific expeditions organised by Great Britain, the United States, and other nations. The existence of life in darkness must be regarded as exceptional, although there are numerous and well-known instances of rare and blind animals (such as *Proteus*) which inhabit caves into which no light can penetrate.

On the other hand, the facts that the eyes are fully developed in some of the animals that inhabit the deep sea, and that they possess beautiful and brilliant colours, seem necessarily to imply the presence of light in these abysses, since, in its absence, the organs of vision should become atrophied, and the colouration be more or less dark.

These conclusions have been universally accepted, but the belief that light could not penetrate to such depths on account of absorption in its passage through the water afforded ground for advancing hypotheses to explain the facts, the reality of darkness at the bottom not being doubted.

Among these hypotheses it has been held that the phosphorescent light given off by the bodies of abyssal animals is sufficient to make up for the absence of sunlight. Although the weight of this suggestion is very great, it may be asked—Can marine animals emit light when alive and in their normal state? Fishes, Crustacea, and other marine creatures are phosphorescent when they are dead or at least out of their proper medium.

¹ Nuove Osservazione sulla Profondità cui giunge la Vegetazione delle Diatomee nel Mare.—*Mem. Pont. Accad. d. Nuov. Lincei*, vol. i. 1885.