

that only becomes luminous on the surface of the animal, the phosphorescence seems to present an analogy or likeness to certain chemical reactions, for instance, the slow oxidising of organic compounds (grape sugar, etheric oils), which are accompanied by a feeble emission of light. In higher specialized organs chemical processes of a more complex nature probably take place. From the structure of the organs we may be induced to believe that the development of the organ must have depended on the fact that its function was intended to be seen by an eye. The light emission must evidently be of vital importance to the life of the animal and to the maintenance of the species. The discussion of these questions must therefore be postponed until we have mentioned the eyes of the different animals.

EYES

Nothing has appeared more hopeless in biological oceanography than the attempt to explain the connection between the development of the eyes and the intensity of light at different depths in the ocean. In a trawling from abyssal depths in the ocean we may find fishes with large eyes along with others with very small eyes or totally blind. Nowhere would a more perfect uniformity be expected than in the dark and quiet depths of the ocean. Brauer, who has given a valuable contribution to our knowledge of the eyes of deep-sea fishes, remarks in his treatise on the fish collections of the "Valdivia" Expedition: "If the surroundings really acted directly on the organisms, and were the only agents which could produce alterations, their influence would be much more uniform and general. Instead of this we find the greatest variation. Thus we find the eyes now altered or permutated, now highly differentiated even in closely related forms."

Variation in
the size of
the eyes.

The conditions, however, where these different forms live, are not so uniform as was supposed, or rather, these forms do not really live under the same conditions. First of all it made a great difference when we learnt that certain fishes were bottom dwellers and others pelagic in their habits.

Most, if not all, bottom dwellers from abyssal depths have large eyes, very often larger than those of bottom fish living in the strong light of the coast banks. Perhaps there is a maximum in the development of eyes in bottom fish at a certain depth followed by a decrease in size as we proceed still deeper. But even the deepest living forms, which must be supposed to