

species which live in intermediate depths, and are now and again, like the Scopelidæ, captured at the surface (see p. 649).

The function and importance of the light-organs in the life of animals have been subjects of controversy in the world of science. The production of light has been explained as a simple consequence of metabolism, and it has been supposed that the light itself serves no purpose. Comparisons have been drawn between the accumulation of mucous substance and the mucous secretion of the light-organs, and it has been pointed out that these organs occur particularly in pelagic animals, which in order to float in the water are supposed to need the mucus for the purpose of reducing their specific gravity. Brandt, who has studied the adaptations of animals to pelagic life, is perhaps right in supposing that metabolic factors have played a part in the history of the development of light-organs, but a closer scrutiny of the structure of these organs, and particularly the discovery of reflectors and lenses, seem to place it beyond doubt that the light-organs serve the function of projecting light in definite directions. This is the function for which the higher animals use their light-organs, but for what purpose do they project light? Is it in order to illuminate the surrounding water, to avoid foes, or to recognise their own kind? These questions are not easy to answer with any certainty. At all events the answers would probably tend to show that the many different kinds of light-organs serve different purposes. For instance, the large light-organs carried on the tentacles of the Ceratiidæ are probably used for other purposes than the smaller organs found in *Vinciguerria* on the side of the body.

Brauer has examined the position of light-organs in relation to body segments in different species, and has found them to be arranged in exactly the same manner in all individuals belonging to the same species, and consequently the number and position of the light-organs are specific characters. He advocates the idea that in the ocean the light-organs replace the specific colour-markings of terrestrial animals.

Is it possible to explain the peculiar geographical distribution of luminous animals, for instance, fishes? The fact that light-organs are found only in marine animals has been explained by supposing the salt to be necessary for the production of light. Experiments have shown that luminous bacteria develop and emit light only when sodium chloride or calcium chloride is present. As regards those organisms which secrete a slime

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