

an *Argyropelecus* seen from above, and we see that the eyes point upwards, which is probably the case in most fishes possessing telescopic eyes, even if exceptions occur.

Two interesting facts go to explain this peculiar adaptation. Firstly, these telescopic eyes occur only in fishes which are very bad swimmers, fishes which practically only float in the water-layers. Secondly, the light-measurements in the Sargasso Sea showed that the light-rays acted more strongly on the top plate than on the side plates; for fishes possessing small swimming capacity the telescopic eyes seem to be most perfectly adapted to receive the faint rays of light which penetrate to these dusky depths.

Among eyes built on the general principle the difference in size first commands attention when the vertical penetration of light and the vertical distribution of each species come to be investigated. As regards the upper layers, an interesting subject will also be found in the detailed study of the anatomy of different eyes. In the retina of the human eye two special kinds of sensory cells are known to occur, viz. "rods" and "cones." These cells occur also in the eyes of fish from the surface layers. From Brauer's investigations we know that in all deep-sea fishes, as well as in silvery fishes from about 300 metres, only the "rods" are found in the retina of the eye. According to an old maxim of Max Schultze, nocturnal animals possess only "rods" while diurnal animals have both "rods" and "cones." It has therefore been generally believed that the "rods" alone possess the faculty of observing light-intensity, light and shade, while only the "cones" perceive colours, quality of light.

Further, an interesting difference has been found in the colour-substance or pigment of the retina by day and by night. Brauer has also found that these conditions in the eyes of deep-sea fishes signify that their eyes are constantly adapted to nocturnal conditions. The deep-sea fishes are "nocturnal animals" and "day-blind." But the gradual development of these peculiarities from the surface to the bottom, from the



FIG. 500.
Argyropelecus hemigymnus.
Cocco. Head seen from
above, enlarged.

Anatomy of
the eyes.