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studied Unger's memoir treating of the subject. 5. The Silurian assemblage of Fossils, elucidated with the description of a Trilobite; and then follow (6) notes on the Fossils of the Lower Silurian rocks, (7) those of the *Lingula*-beds; (8) of the Tremadoc Slate; and (9) of the Llandeilo Flags; and here we have the modern Cœlenterate analogues of the Graptolite well shown in woodcuts; but some would like to have their Polyzoan allies shown also. But these are vexed questions; and altogether, among the fossils of doubtful alliances Mr. Baily walks delicately; nevertheless he might have been bolder in referring more of the so-called Annelids and Fucoids to crustacean galleries and tracks (as our correspondent Mr. Albany Hancock indicated long ago); and *Ribeiria* (not *Ribieria*) might also have gone over to the Crustaceans, as Mr. Salter has suggested. So much for a weak point or two; but we must add that, as this excellent work is intended for amateurs and students, as well as for experts, it would have been advantageous to them if the author had given the meanings of the names of the genera and species. This would be generally of real use in indicating the characters, conditions, or history of the things named; and it would almost always serve in some way, by association of ideas, to enable the reader and thinker to remember both names and things.

A systematic statement as to the relative abundance or peculiar occurrence of the several fossils figured would also greatly enhance the value of this work.

With Plate 10 we enter upon the fossils of the Bala-Caradoc formation; and we look forward with pleasure to the illustration of the other principal groups of organic remains in this convenient shape, which is uniform with Professor Morris's well-known 'Catalogue of British Fossils.'

MISCELLANEOUS.

On the Structure of the Eye in the Gasteropoda, and on the Development of the Eyes in the Animal series. By V. HENSEN.

VARIOUS authors have recently paid attention to the structure of the eye in the Gasteropoda, and more especially to that of the retina; among them are MM. Leydig, Keferstein, Krohn, Hensen, and Babouchine. The investigations of these naturalists have clearly shown that the retina of the Mollusca is divided into an outer and an inner layer, separated by a thin stratum of pigment. But all these authors do not agree as to the parts of this retina which are directly impressed by the luminous waves. Some, particularly M. Hensen, regard the inner layer as sensible to light; others, on the contrary, consider it to be insensible, and that the luminous rays must pass through interstices of the pigment in order to irritate the outer layer of the retina.

M. Hensen indicates that, in certain theories of vision proposed by the most recent authors, the pigment plays an inadmissible part. Thus, for example, the heat reflected by the pigment has been ad-

duced to explain the phenomenon of vision. As the author points out, the case of albinos shows that luminous perceptions do not cease when the pigment is absent; and we do not know any case in which the pigment is absolutely necessary for the perception of light. The pigment really fulfils two functions. In the first place it absorbs the superfluous light and prevents it from being reflected upon other parts of the retina; and it arrests all the luminous rays which may penetrate into the eye by any other road but the pupil, whether through the cornea or the sclerotic. This second function is of particularly great importance in the Mollusca. In many of these (for example, in the Heteropoda) the parts surrounding the eye are perfectly transparent; and even in the snails the ommatophore is sufficiently transparent to allow us sometimes to see the outer layer of the retina without any difficulty. The luminous rays may, therefore, strike this outer layer of the retina in all directions; and from this M. Hensen justly concludes that it cannot be sensitive to light. Sensibility to luminous rays consequently appears to be peculiar to the inner layer, accessible only to the rays which have passed through the crystalline. This layer alone is comparable to the stratum of bacilli in the Vertebrata.

In comparing the eyes of the Mollusca with those of other animals, M. Hensen directs attention to the difficulty resulting from the variable meanings of terms. The words *eye*, *retina*, *iris* have acquired a perfectly definite physiological sense; but this is not the case with the words *sclerotic*, *cornea*, and *choroid*, because they are used to designate organs with various and still ill-defined functions. Thus, for example, the sclerotic serves at once as the protective envelope of the eye, as the support of the cornea, and as the basis for the attachment of muscles, without its being possible to say that any one of these functions is more essential than the rest. In the Vertebrata the sclerotic and the neurilemma of the optic nerve are justly regarded as prolongations of the *dura mater*. This morphological character ought, apparently, to be the best guide in the investigation of the homologies of the sclerotic; but when we come to animals in which the eyes are not formed as if by a budding of the brain, and in which we can find no *dura mater*, it becomes very difficult any longer to speak of a sclerotic.

With regard to the structure of the retina there is, between the Vertebrata and the Invertebrata, a chasm which seems to defy all homologies. Thus in the former the bacilli form the outer layer of the retina; in the latter they form its inner layer. And yet it is remarkable that, notwithstanding this fundamental difference in the typical organization of the essential part of the organ of sight, the uniformity of organization persists in the accessory organs. Thus, as M. Hensen remarks, in the Cephalopoda, the crystalline continues to be an epithelial production, resulting from an invagination of the skin, as in the Vertebrata. In these higher Mollusca there also exist an iris, a cornea, and eyelids—organs which, it is true, disappear one after the other in this class of animals. The sclerotic appears as if divided into fragments. One portion forms the

outer capsule of the eye, and bears the cornea : another more closely envelopes the retina ; it is cartilaginous, serves for the attachment of the muscles of the eye, and reminds us of the sclerotic ring of birds and reptiles. Even in the *Nautili*, however, there no longer remain any of these homologous parts of the sclerotic. In the other Mollusca it would be very difficult to say what we are to regard as the sclerotic. It is equally impossible to distinguish a cornea in them. We cannot say, indeed, that the essential character of the cornea is its being the first refractive medium in the eye. The serpents teach us the opposite of this, since in them the first refractive medium is formed by the eyelids. Moreover, in a great number of Mollusca, the region which is usually designated by the name of the cornea does not present any greater transparency than the rest of the envelopes of the eye.

In the Vertebrata, on the contrary, the *cornea* has a very definite meaning, especially as, from the observations of M. Hensen, it presents a development *sui generis*. In the embryo, immediately after the invagination of the crystalline, this anatomist has seen the cornea appear as a very delicate basilar membrane of the epithelium. As long as the crystalline still contains a cavity there exists between it and the cornea, in front of the pupillar membrane, a sort of gelatinous tissue, exactly similar to that of the vitreous body at the same embryonic period. Neither the sclerotic nor the choroid has any connexion with a similar tissue.

It is equally difficult to determine the homologue of the choroid in the Mollusca. In the Vertebrata this membrane is at once vascular and pigmentary. The concordant investigations of MM. Kölliker, Hensen, Schultze, and Steinlin show clearly that the black epithelium of the choroid is in reality a dependency of the retina ; it is formed, in fact, by the outer lamella of the primitive ophthalmic vesicle. M. Hensen asserts that he has ascertained that the cones and bacilli are produced by this epithelium and not by the rest of the retina. Hence the principal character of the choroid is vascularity, and the name of *vasculosa* has frequently been given to it in human anatomy. From this point of view it would be impossible to find the least trace of a choroid in the Invertebrata. The intra-retinic pigment layer of the Mollusca in particular by no means merits the name of choroid.

It is generally supposed that the ophthalmic vesicle which subsequently forms the retina is nothing but an extravagination of the central nervous system. The embryological researches of M. Hensen tend not only to confirm this view, but also to establish a complete parallel between the different layers of the retina and those which primitively form the central nervous tube.—*Archiv für mikr. Anat.* Bd. ii. 1866, p. 399 ; Abstract by E. Claparède in *Bibl. Univ.* November 25, 1867, *Bull. Sci.* pp. 268–271.

Adanson's Black Crocodile. By Dr. J. E. GRAY.

Dr. Alexander Strauch asserts that Adanson's "Crocodile noire" is not *Crocodilus frontatus*, but *C. cataphractus*. Adanson mentions