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THE "ENCYCLOPÆDIA BRITANNICA"

Encyclopædia Britannica. Vol. III. (Edinburgh : Adam and Charles Black.)

FIRST NOTICE.

THERE are several important scientific articles in this third volume which we shall briefly notice, the articles generally being quite up to the standard of the preceding volumes. In this first notice we shall refer especially to the articles "Birds" and "Biology." The former article is the joint production of two authors, Professors W. K. Parker and Alfred Newton.

Prof. Parker has undertaken the anatomical portion of the subject. Allowing himself to be led away in the direction of his favourite line of research, the author has persuaded himself that in the space allotted to him for his article "there is merely room for justice to be done to one category of organs; and as the skeleton and especially the skull is of most direct importance to the zoologist and palæontologist, and as its form determines, as it were, all other organs . . . it seems to be that on which election should fall for the fuller treatment." From this opinion we disagree *in toto*. If the space allotted for the subject is insufficient, it must be a fault of the general management of the "Encyclopædia." If the skull "determines, as it were," all other organs, then the study of anatomy is on a very different footing from that on which it seems to stand. By a glance at the earlier volumes of the work, in which, as in the case of the article "Anatomy," by Prof. Turner, apparently unlimited space is allowed to the author, we come to the conclusion that there is no fault in the editorial department, in this direction at least. As to the "determining" influence of the skull the true relationship of three groups of birds—the woodpeckers, toucans, and barbets—which will be found explained below, is quite sufficient to demonstrate how unwarranted is the assumption.

In 1867 Prof. Huxley propounded a classification of birds, not entirely, but mainly based on the nature of a portion of the palatal region of the skull. This valuable addition to ornithological and zoological literature has given a great stimulus to more minute investigation of avian structure. It brought to light many new facts, and placed prominently forward others previously too much neglected. The classification was, however, only an artificial one, for, according to that author's own words in the article "Biology" before us, "in an artificial classification some prominent and easily observed feature is taken as the mark of resemblance or dissemblance." The features employed in this case were two—the fusion or non-fusion of the maxillo-palatine plates of the maxillary bones, and the shape of the vomer. In a hobby-run-wild manner, Prof. Parker, in his article "Birds," has further elaborated this artificial arrangement to a degree which, more than anything else, demonstrates its untenability. He begins by dividing the "Carinatae" into two sections, firstly, the Dromaeognathæ (*Tinamous*), and secondly, all the others; because in the *Tinamous* the vomer is broad behind and interposes between the pterygoids, the palatines, and the basi-sphenoidal rostrum (which, however, is

also the arrangement in some of the penguins at least.) Among the other carinate birds, Prof. Huxley's divisions are retained, except that the woodpeckers are removed from the Ægithognathæ to form an independent group of equal importance with them, the Saurognathæ! The Desmognathæ (Huxley), we are told, do not form a well-collected group, and Prof. Parker does good service by indicating the different ways in which desmognathism may be produced.

According to this classification, there are some so great anomalies, when it is looked at from the aspect based on the totality of the morphological resemblances in the bird-class, that it is certain that the palate, *per se*, is in reality of secondary importance in the determination of the relationships of many birds.

For instance, according to Prof. Parker, the Woodpeckers (*Picidæ*) form a main division (Saurognathæ) of the non-desmognathous carinate birds, at the same time that the Toucans (*Ramphastidæ*), together with the Barbets (*Capitonidæ*) form part of a minor section (Coccygomorphæ) of the desmognathous birds. In other words, they would be made to have as little to do with one another as they well can. Now the structure of the rest of the body, other than the head, tells quite a different tale. From the form of the feathers and the pterylosis, there being no after-shaft, a tufted oil-gland and quite a characteristic distribution of the peculiarly narrow feather-tracts; from their osteology, the sternum and other bones being almost identical in all of them; from the anatomy of the alimentary canal, in which the colic cæca are absent; from the arrangement of the toes in the scansorial foot; from their myology, in which they are identical when dissected, muscle by muscle, and different in points from all other birds, it is certain that the three groups, viz., the Woodpeckers, Barbets, and Toucans, are most intimately related, and have not, in reality, a family difference between them; their dissimilarities—the Toucans and Barbets merging into one another—leading to their being arranged in two sub-families.

As another example of the different teaching of the artificial and the natural classifications, the Swifts (*Cypselidæ*) and the Humming Birds (*Trochilidæ*) may be referred to. These two groups, from the details of their internal structure when examined one by one, are most certainly related as intimately as are the Woodpeckers with the Toucans. There is, in fact, not a family difference between them, and yet, from their palates, Professors Huxley and Parker place them in quite different divisions, because the vomer is truncated in the one and pointed in the other.

We think that we have said enough to show that the structure of the skull does not alone suffice to determine the mutual affinities of birds, the head in them being subject to rapidly developing peculiarities which are associated with their habits of life.

With the exception of the skeleton, the rest of which is described in fair detail, Prof. Parker devotes but few columns of his article to the organs, muscles, vessels, and nerves; he in most cases quoting verbatim from Prof. Huxley's "Anatomy of Vertebrated Animals."

Prof. Newton's portion of the article "Birds" forms a valuable memoir on the topics he discusses. The elegance of the style, and the careful manner in which the

relative importance of the facts which are introduced is weighed, adds a charm to the subject equal to that which it already possesses. "Fossil Birds," "Sub-fossil Birds," "Birds recently extirpated," "Birds partially exterminated," "The Geographical Distribution of Birds," "Migration," "Song," "Nidification," "Eggs," and "Moult," are the headings of the various sections of his subject; the whole occupying about fifty pages of the "Encyclopædia;" that on Distribution being of considerably the greatest length, as it is fairly exhaustive in its account of the avifauna of the different regions. Speaking of the general principles of zoogeography, first laid down by Mr. Sclater in 1857, Prof. Newton remarks that "without infringing upon what must be deemed the generalities of biological distribution, it is proper to observe that Mr. Sclater's success is to be attributed to the method in which his investigations were carried on—a method in which he had but few predecessors. Instead of looking at the earth's surface from the point of view which the geographer would take of it (a point of view which had hitherto been adopted by most writers), mapping out the world according to degrees of latitude and longitude, determining its respective portions of land and water entirely regardless of the products of either element, or adhering to its political divisions—time-honoured as they were—he endeavoured to solve the question simply as a zoologist should, by taking up the branch of the subject with which he was best acquainted, and by pointing out and defining the several regions of the globe in conformity with the various aspects of ornithic life which they present. But herein there was at once a grave difficulty to be encountered. Birds being of all mammals most particularly adapted for extended and rapid locomotion, it became necessary for him to eliminate from his consideration those groups, be they large or small, which are of more or less universal occurrence, and to ground his results on what was at that time commonly known as the order *Incessores*, or *Passeres*, comprehending the orders now generally differentiated as *Passeres (veræ)*, *Picariæ*, and *Psittaci*. On this basis, then, Dr. Sclater was enabled to set forth "that the surface of the globe exhibited six great regions," an account of each of which is given in detail, with the light thrown upon them by more modern research.

As might be imagined, the section on "Birds recently extirpated" is a more complete and accurate *résumé* of their history than any other extant, the Starling of Réunion (*Fregilupus varius*), the Solitaire of Rodriguez (*Pezophaps solitarius*), and the Crested Parrot of Mauritius (*Lophopsittacus mauritianns*), being figured as well as described.

The article "Biology" is by Prof. Huxley and Mr. W. T. Dyer. The subject is treated generally by the former author in his well-known style, whilst Mr. Dyer gives the principles of classification of the vegetable kingdom as they are now understood by the most advanced botanists.

Prof. Huxley classifies the phenomena of life under four headings:—1. Morphology; 2. Distribution; 3. Physiology; and 4. Etiology. The last of these, from its theoretical nature, presents features of more especial interest. With reference to the doctrine of spontaneous generation we read: "It has been pointed out at the

commencement of this article that the range of high temperatures between the lowest, at which some living things are certainly killed, and the highest, at which others certainly live, is rather more than 100° Fahr. It makes no sort of difference to the argument how living beings have come to be able to bear such a temperature as the last mentioned; the fact that they do so is sufficient to prove that, under certain conditions, such a temperature is not sufficient to destroy life. . . . Thus it appears that there is no ground for the assumption that all living matter is killed at some given temperature between 104° and 208° Fahr." Again, "it is argued that a belief in abiogenesis is a necessary corollary from the doctrine of evolution. . . . In the eyes of a consistent evolutionist any further independent formation of protoplasm would be sheer waste."

Prof. Huxley gives his powerful and entire sanction to the doctrine of Ontogeny, explaining the facts that in many forms there are gaps and irregularities in the order of production of the organs, by assuming that the series of developmental stages of the individual organism never present more than an abbreviated and condensed summary of ancestral conditions.

Mr. Dyer devotes himself to the "Limits and Classification of the Vegetable Kingdom," and concludes his article with a synoptic view of the relations of plants, which shows how much attention has recently been paid to the lower forms. Schwendener's hypothesis is assumed, and "Lichens must now be regarded as composite structures, partly consisting of an alga, partly of a fungus." The Thallophyta are classified according to the method of Sachs, and the Cryptogams according to Cohn. The stepping-stones between these last and the Phanerogams are excellently sketched.

We think we have said enough to show the great importance of the two articles which we have been attempting to criticise.

A. H. GARROD

FOSSIL BUTTERFLIES

Fossil Butterflies. By Samuel H. Scudder. (Published by the American Association for the Advancement of Science, Salem, 1875.)

THE memoir now before us will be a boon, not only to geologists, but to entomologists, inasmuch as it reproduces in a small compass, as Mr. Scudder says, "all that has been published of this group of fossils, whether of text or illustration."

After giving a complete list of all the works treating of the subject, the author proceeds to characterise the genera and species, beginning with *Neorinopsis sepulta*, from Aix in Provence, a fossil more discussed than any other ancient Lepidopteron. He confirms Mr. Butler's determination of its affinities, but adds that, from a careful study of the original, he has been enabled to correct an error as regards the actual condition of the fossil, which he thus describes:—

"The thorax, hind legs, and both pair of wings of the left side are preserved, almost completely; all the rest is lost. The thorax is viewed from above, and somewhat on the left side; the hind coxæ seem to be almost torn away from their immediate connection with the trunk. The two hind legs are stretched out, bent at the femoro-tibial articulation; the left leg lies above both the wings,