

ends modified on the *Iguanodont* plan. This form was considered by the author nearly allied to *Iguanodon*, and to approach *Hadrosaurus* in most points in which it differs from the former genus. He proposed to establish for it a new genus, *Orthomerus*, and to name the species *O. Dolloi*. The collection further included a tibia and metatarsal bone referable to the same form. These Maastricht Dinosaurs furnish the most recent known evidence of the existence of the order.

BIBLIOGRAPHICAL NOTICES.

The Micrographic Dictionary: a Guide to the Examination and Investigation of the Structure and Nature of Microscopic Objects. By J. W. GRIFFITH, M.D., and ARTHUR HENFREY. Fourth edition, edited by J. W. GRIFFITH, assisted by the Rev. M. J. BERKELEY and T. RUPERT JONES. 8vo. London: Van Voorst, 1881-3.

It is with no small pleasure that we find ourselves once more called upon to announce the completion of a new edition of this important work. Having assisted, in the French sense of the word at any rate, at the first appearance of the book in 1855, and having welcomed the second edition in 1859, the completion of which was saddened by the recent death of one of the authors, and the third edition in 1874, we not unnaturally feel considerable interest in its success, and a hope that at each successive appearance it may be found to have grown in usefulness as in bulk.

In this respect the purchasers of this fourth edition will have no reason to complain; but, from the very nature of the case, it is impossible for us to say much more on this subject than that a great amount of labour has evidently been bestowed upon the book, and that much new information has been worked into it. The alterations and new articles are necessarily so scattered through the pages of a book the contents of which are alphabetically arranged, that it is for the most part a vain effort to try to seize any thing sufficiently striking to be worthy of special mention. One article, however, we may particularly refer to, namely that on the microscopic structure of rocks, for which the editor acknowledges his indebtedness to Prof. Rutley. This article gives an excellent summary of the principles of petrology, and is illustrated by a very nice plate of coloured figures. The portions of the work dealing with the preparation and preservation of objects have hardly received so much attention as we should have expected; but the article on angular aperture has been remodelled so as to take up the results of recent researches upon this much discussed subject, and a new article on microphotography has been introduced.

Prof. Rupert Jones has again attended to the revision of the parts of the work dealing with the Foraminifera; and the general treatise

on that group, taken in conjunction with the special articles upon the various families and genera scattered through the work, furnishes the best guide at present extant to the classification of those interesting though lowly organisms. Upon Bacterium and the Schizomycetes we find a considerable quantity of new information brought in, as also upon the parasitic insects and Acarina and the Infusoria, derived from the recent publications of Mégnin and Andrew Murray upon the former groups, and from the valuable manual of the Infusoria of Mr. Saville Kent. We are sorry to note, however, that while fully availing himself of the last-mentioned important work, the editor has entirely passed over the most magnificent work that has appeared of recent years upon any group of Protozoa, namely Prof. Leidy's 'Monograph of the Freshwater Rhizopoda of North America.' This is the more to be regretted as, since its publication, a manual founded upon it has been published in America, and there can be no doubt that many of the genera proposed by Prof. Leidy will be frequently referred to in the literature of the microscope.

We had noted several other points in which it seems to us that there is room for improvement; but fault-finding is an unsatisfactory business, and all the deficiencies that we could indicate would but very slightly derogate from the general excellence of the book. Its chief value consists in the immense mass of varied information upon all subjects of interest to microscopists, collected in its pages in a most convenient form for reference; and from the mode of treatment adopted it is, as we have before pointed out, well fitted to serve as a guide in the investigation of many departments of natural history quite outside the domain of microscopic work. On this ground we can recommend it to all students of natural history, and especially to those located in country places at a distance from libraries. To such workers it will prove invaluable as a general book of reference.

The plates with which the volume is illustrated are for the most part the same as in the last edition; but five new ones have been added, bringing the whole number up to fifty-three, a large proportion of them coloured. The immense number of figures contained in these plates, with the numerous woodcuts scattered through the text, render this one of the best-illustrated volumes with which we are acquainted.

A Catalogue of the Collection of Birds formed by the late Hugh Edwin Strickland, M.A., F.R.S., &c. By OSBERT SALVIN, M.A., F.R.S., Strickland Curator in the University of Cambridge. Cambridge University Press, 1882.

THE title of the present volume fully explains its contents, and renders much further explanation unnecessary. It is a descriptive catalogue of the extensive collection of birds formed by the late Mr. Strickland and bequeathed by his widow to the Cambridge

University. Attached to the 'Catalogue' is a supplement or list showing the sources whence the specimens (about 6000 in number) were obtained. Such a work will greatly enhance the value of this collection, to which it forms an almost exhaustive guide; and as such it will doubtless be warmly welcomed by most working ornithologists. Appended to each species is the reference to its original description and to works containing its geographical distribution; but we think that the value and interest of the 'Catalogue' would have been considerably increased if the latter item had been briefly sketched out in a similar manner to that in the British-Museum Catalogues of Birds. The general arrangement adopted, subject to certain necessary modifications and additions, is that elaborated by Messrs. Sclater and Salvin in their 'Nomenclator Avium Neotropicalium,' which has for its basis the system of Huxley.

In the earlier portions of the work (the only ones at present we have had the opportunity of carefully examining) we notice that Mr. Salvin does not admit the distinctness of *Turdus magellanicus* from *Turdus falklandicus*. The latter bird is, we believe, an island form confined to the Falklands, whilst the former is found in various parts of South America. Again, we fail to see why the genus *Merula* should be disregarded when the genera *Oreocincla*, *Geocichla*, *Petrocincla*, and *Zoothera* are recognized. The name *Oreocincla Heinii* of Cabanis surely has the precedence over that of *O. iodura* of Gould, although the former naturalist erroneously gave "Japan" as the locality for his species. We also notice that Mr. Salvin (following Messrs. Blanford and Dresser in their celebrated 'Monograph of the Chats') makes the *Saxicola leucomela* of Pallas synonymous with the *Saxicola lugens* of Lichtenstein, although these two birds are quite distinct. Again, upon what grounds is Cetti's Warbler included in the subfamily Rutilinæ? Mr. Salvin also makes this bird synonymous with the *Bradypterus platyrus* (? *platyrus*) of Swainson. The type of this species (from S. Africa) is in the Cambridge Museum, and was identified as "nothing but Cetti's Warbler" by Mr. Dresser in his 'Birds of Europe,' a conclusion shown to be totally erroneous by Mr. Seebohm in 'The Ibis' for 1878, p. 380. Swainson's generic name will stand for this South-African species; but his specific name must give place (if the law of priority is enforced) to that bestowed by Vieillot; and it will consequently stand as *Bradypterus brachypterus* (Vieill.). Moreover Cetti's Warbler has no claim whatever to be included in the genus *Bradypterus*, nor has it the slightest claim to such a generic title. The type of this genus (*B. brachypterus*) has twelve tail-feathers, whereas the group of Warblers amongst which Cetti's Warbler is included (*Cettia*) is distinguished by having only ten tail-feathers.

We must also strongly protest against the changing of many well-known names—names familiar to us from our childhood—of such birds as the Garden-Warbler, the Whitethroat, the Dartford Warbler, the Reed-Warblers, and the Chiffchaff, and substituting for them unknown synonyms raked up from a just and well-merited

oblivion, or transferring the name of one species to another until it ceases to have any definite meaning.

But apart from these faults and inaccuracies it is impossible to overestimate the value of such a Catalogue, dry enough, it is true, to a non-scientific reader, but to the ornithologist working with the birds in this magnificent collection truly a "friend in need."

Over den bouw der Schelpen van Brachiopoden en Chitonen. (On the Structure of the Shells of Brachiopods and Chitons.) Doctor-Dissertation. Leiden, 1882. By Dr. J. F. VAN BEMMELIN.

In this work the author gives a chronological list of the literature relating to the anatomical structure of Brachiopods; a short account of the contents of the most important works, especially with a view to the different opinions entertained with respect to the affinities and homologies of Brachiopods; an historical review of the investigations of others on the structure of their shells; and, finally, some observations of the author's on this subject, illustrated by a few figures, showing the different aspect presented by the under surface of the shell in different parts, and a transverse section through a tubular mantle-papilla.

The chief part of these contents, translated into German, are to be found in "Untersuchungen über den anatomischen und histologischen Bau der Brachiopoda Testicardinia" in the 'Jenaische Zeitschrift für Naturwissenschaft,' Bd. xvi. neue Folge, Bd. ix. Heft 1 & 2, 1883.

As introduction, a chronological account is given of the views of different authors with respect to the systematic position of Brachiopods; especially the opinions of Steenstrup, Huxley, Hancock, Morse, and the Hertwigs are noticed, and, finally, Bütschli's supposition that the Chætogathi are perhaps the nearest allied to Brachiopods, on account of their development, is mentioned.

The structure of the *shell* was investigated by making transverse sections through decalcified fragments. No communication between cæcal cavities in the mantle-tubules and lacunæ or vessels in the mantle itself was found. The corpuscles in these tubules seemed to be for the greater part nuclei belonging to cells that clothe the walls of the shell-perforations. No openings in the periostracum occurred on the tops of the cæca, which tops showed with perfect clearness the radiating ring of fine striations discovered by Carpenter and King.

The number of cæca on the same part of the shell-surface in very old and very young specimens of *Waldheimia cranium* was found to be the same. This fact shows that the distance between two cæca does not change with age, and led the author to the conclusion that no intussusception occurs during the growth of the shell.

The bases of the calcareous prisms were found to be very regularly shaped at the margin of the shell, but (especially in *Terebratula* and *Terebratulina septentrionalis*) they became very irregular

towards the older parts. The concentric lines of growth occurring on the outer surface were totally absent on the inner surface, which is explained by supposing the apposition at the margin to stop for some time, the formation of new layers at the whole under surface at the same time continuing.

The chief result of the investigation of the *body-wall* (with its pallial lobes) on surface-views and sections was the demonstration of the *non-existence of the lacunary system described by Hancock*. Under the simple epiblastic epithelial layer was found a homogeneous intercellular substance, containing a reticular network of multipolar cells—a “mesenchymatic” layer. These cells have probably been mistaken by Hancock for a system of lacunary spaces.

At the side of the coelomic cavity the body-wall shows a layer of flat epithelial cells.

The so-called tendinous portions of the muscles were found to be specially developed portions of the mesenchymatic layer under the real insertions of the muscular fibres. This was most obviously shown in the ocluser muscles of *Waldheimia*, where the tendons are united, to a considerable extent, with the body-wall, and where, in transverse sections, not the slightest difference or limit between them is to be found.

The same origin must be attributed to the peduncle, which, contrary to that of *Lingula*, consists of a solid mass of mesenchymatic tissue containing many fibres. Such fibres are also found in the margin of the mantle and the free or inner walls of its sinuses; they serve for support, and were believed to be muscular by Hancock.

The epiblastic epithelium is everywhere a unicellular layer, except on a small area under the mouth, where the nervous system is in immediate contact with it. No cellular layer was found at the outer surface of the mantle-lobes under the shells; it only showed a reticular design, corresponding to the bases of the shell-prisms, and therefore most regular at the border of the mantle.

The *nervous system* is described by the author as a nervous collar with a large infra- and a small supræesophageal ganglion. In the description of the first he agrees with Hancock; but in that of the latter he quite differs from him, inasmuch as a median ganglionic mass is described passing on each side, without any sharp demarcation, into a broad nerve, running along the brachial groove and innervating the brachial fold. The commissures uniting this supræesophageal ganglion with the nervous centrum under the mouth are very thin and supported by two membranous inward prolongations of the body-wall, while the two centra themselves lay in the mesenchymatic substance of the body-wall itself, the supræesophageal immediately under the ectodermal epithelium, the infraesophageal separated from it, except along its upper border, by a layer of homogeneous tissue. From the infraesophageal ganglion also an arm-nerve was found to originate, which, running parallel to the first-mentioned supræesophageal nerve, innervates the bases of the cirri. Both these arm-nerves were surrounded by a network of many large cells that communicated with them everywhere.

The infræesophageal arm-nerve resembled even more a concentration of the fibrous prolongations of these multipolar cells than a well-defined nerve; the latter are therefore considered as nervous elements, distributed in the arm-walls and probably connected as follows—those of the supracæesophageal nerve with the high epithelium of the brachial groove and fold, those of the infræesophageal with the muscles of the cirri.

On transverse sections, the infræesophageal centrum was found to consist of two longitudinal masses of small ganglionic cells connected by a broad median commissure of nerve-fibres. This was called by Hancock the median ganglionic mass; and it is, indeed, not quite destitute of nerve-cells.

No ganglionic plexus was to be found in the mantle; nor was the author able to find any trace of the auditory sacs mentioned by Morse as occurring in *Lingula*.

In the investigated species the sexes were found to be separated. The *generative organs* were investigated on transverse sections; and special attention was given to their young tops. The lamella connecting the glands with the body-wall was found to be nothing but an excrescence of the mesenchymatic layer of this wall, on which the cœlomic epithelium continued uninterrupted and unchanged. At the free edge of this supporting lamella an irregular cavity was found, forming a longitudinal canal (Hancock's genital artery). The walls of this canal made many folliculiform evaginations, which at their free surface were covered by the germinal epithelium. In the testes this consists of thick masses of small cells with relatively enormous nuclei. These masses by their bulk and number form a continuous layer around the central cavity. Outside of this another layer was found, consisting of much smaller cells, many of which already show the caudal filaments of spermatozoids, while their nucleus forms the head of them. The masses of germ-cells at the tops of the evaginations gradually pass into the simple epithelial layer of their walls; and this layer is only a continuation of the cœlomic epithelium of the supporting membrane. At the growing tops of the testes nothing but a solid mass of undifferentiated cells was found, showing in its centrum a small lumen, and connected with the body-wall by a small lamella, the epithelium of which passes uninterruptedly into this cell-mass.

No membrane surrounds the germinal layers of the testes; the spermatozoids therefore, when ripe, must fall into the body-cavity.

In the *ovary* the evaginations of the supporting membrane are covered all over with egg-cells in different stages of development. Many were enveloped by a follicle of flattened cells; and these eggs showed a large nucleus and a finely granulated protoplasm: others were destitute of such a follicular membrane; and in this case the nucleus was generally also wanting or very rudimentary, while the plasmatic granules were much coarser. The latter cells, which occurred in all shapes, are considered as on the way of resorption. Between the distinct egg-cells many small germinal cells were found, from which, not only the eggs themselves, but also their fol-

licle-cells are supposed to originate. Towards the side of the supporting membrane the germinal cells diminish in extent and pass insensibly into the common epithelium of the body-cavity.

At the young top of the ovary no evaginations occur; only a fold of the body-wall shows the direction in which the genital gland is growing. On this fold some of the coelomic epithelium-cells have increased in size, especially with regard to their nucleus, and show the features of young egg-cells.

By these results the author is led to the conclusion that *the germinal epithelium is a specially differentiated part of the epithelial layer of the body-cavity.*

In the *nephridial canals* that open with funnel-shaped mouths into the body-cavity egg-cells were often found, this fact proving that, when necessary, the reproductive cells are evacuated in that way, and not, as Gratiolet believed, by pores in the mantle-tissues.

The impregnation is supposed by the author to take place in the sea-water, into which both eggs and spermatozooids are evacuated through the genital funnels; because he cannot believe spermatozooids to enter the body-cavity of females by the small external openings of these ducts.

The brown spots on the surface of the ovaries, supposed by Hancock to be the places of origin of the sperma, were found to be accumulations of egg-cells undergoing retrogressive metamorphosis. They were also found on the testes, and there consisted of spermatozoid mother cells undergoing the same degeneration.

The microscopical structure of the *muscles* was found to be as Hancock describes it. They consist of thin longitudinal fibres, perfectly parallel, and probably as long as the whole muscle itself. Apposed externally to these fibres were found nuclei surrounded by a minimal quantity of protoplasm. From this fact, the author believes in the epithelial character of the muscles, which probably have originated from the coelomic epithelium, and, in becoming independent of it, have retained the nuclei of their formative cells.

All muscular fibres were found to be smooth, with the exception of those of the posterior oclusors, which are distinctly striated. In this fact, already mentioned by Hancock, the author sees a new proof for the assertion of the Hertwigs, that between smooth and striated muscles there need not be any morphological, but only a physiological difference. The oclusores posteriores and anteriores have the same function; they are inserted on the same tendinous mass; but the former are striated, the latter smooth.

The *results* the author believes he has obtained are summed up by him as follows:—

1. The free parts of the body-wall are covered everywhere with a monocellular epiblastic epithelium.

2. Beneath this epithelium is found a mesenchymatic layer of homogeneous substance with interspersed multipolar cellular elements.

3. The tendinous parts of the muscles and the whole peduncle are highly developed parts of this mesenchymatic layer.

4. The nervous system lies imbedded in this mesenchymatic layer ; only the [supraoesophageal ganglion and the] superior margin of the infraoesophageal are in contact with the ectodermal epithelium.

5. The central nervous system consists of a circumoesophageal ring, which not only shows a large infraoesophageal but also a supraoesophageal ganglionic centrum of a certain significance. Both these centra give origin to arm-nerves ; the nerves of the supraoesophageal are even more important than those of the other ganglion.

6. The nervous centra are formed by thin nervous fibres and very small cells, the peripheral nerves by parallel fibres only, between which nuclei of connective tissue or perhaps of nervous elements are to be found.

7. The arm-nerves are surrounded by and connected with a ganglionic plexus, situated in the supporting tissues of the arm-walls immediately under the ectodermal epithelium, and formed of large multipolar cells and nucleated protoplasmic threads, intercommunicating so as to form a network. No connexion with the neighbouring epithelial cells was discovered ; but still this seems very probable.

8. The coelomic body-cavity is clothed with a flat-celled epithelium.

9. The genital glands are supported by a membranous fold of the mesenchymatic layer containing irregular cavities in its axis.

10. The germinal cells are specially differentiated cells of the coelomic epithelium.

11. In the investigated species (*Terebratula vitrea*, *Terebratulina septentrionalis*, *Waldheimia cranium*, *Rhynchonella psittacea*) the sexes are separated.

12. The muscles are formed of simple parallel fibres of contractile substance, hardly held together by any connective material, and probably attaining the length of the whole muscle. Adhering to the outer surface of these fibres are nuclei, surrounded by a very small quantity of protoplasm. The striated muscles have in every other respect the same structure as the smooth.

13. The growth of the shells, in thickness as well as in extent, is exclusively the effect of apposition.

14. No lacunary system as described by Hancock is to be found. Probably the reticulum of connective-tissue cells is mistaken by this author for a network of canals.

These results the author believes to confirm to some extent the opinion of the Hertwigs as to the Brachiopods being typical enterocoelic animals. Their muscles are, according to his opinion, "epithelial" organs ; their connective tissue, on the contrary, is a mesenchymatic structure playing a very subordinate part ; their generative organs are germinal parts of the coelom-epithelium.

According to the author's opinion, the Brachiopods are closely allied to the Chætognathi. The great external differences between these animals are all attributed by him to the influence of the shells, and so considered secondary changes, while, on the contrary, the

features common to both are called by him chief or primary characters of organization. As such he mentions the similarity in development, already pointed out by Bütschli and the Hertwigs, the segmentation of the larvæ into three segments, the number, position, and origin of the generative organs, and their relations to the nephridial efferent ducts, the perfectly similar structure of the nerve-collar with its two centra, the ventral and dorsal longitudinal and the two pairs of transverse mesenteries. To these facts he adds some remarks on the great similarity in histological structure between Brachiopods and Chætognathes, as the great simplicity of all the epithelial layers, the subordinate significance of the connective tissue, the similar character of the muscles, the plexiform distribution of peripheral nerves, and the occurrence of horny setæ in ectodermal follicles.

The points of difference between Brachiopods and Chætognathes are explained as consequences of the development of the shell, which in itself cannot be an argument against their affinity. This shell caused the development of the peduncle, the arms, and the muscles, the removal of the anus to the right side or its total disappearance together with eyes, auditory organs (?), and jaws, and perhaps also the unisexuality (to prevent self-fertilization, while cross-fecundation was secured by the animals living in colonies).

As support for this view the author points out the great difference in plan and structure of peduncle, arms, and muscular system between different kinds of Brachiopods, especially between Testicardines and Ecardines.

MISCELLANEOUS.

Echinoderms of the Norwegian North-Atlantic Expedition.

By D. C. DANIELSSEN and J. KOREN.

THE 'Annals' for December last (p. 436) contained a translation of some remarks upon the genus *Solaster*, extracted from a paper by MM. Danielssen and Koren on the Echinoderms collected during the Norwegian North-Atlantic expedition. The article contains a list of the starfishes obtained, numbering forty-one species belonging to twenty genera, four genera and eleven species being indicated as new. The previously known species are *Asterias stellionura*, Perr., *A. panopla*, Stuxb., *A. Mülleri*, M. Sars, *A. grönlandica*, Steenstr., *A. rubens*, Lin., *Stichaster roseus* (O. F. Müll.), *S. albidus* (Stimps.), *Cribrella oculata* (Linck), *Pedicellaster typicus*, M. Sars, *Solaster affinis* (Brandt), *S. furcifer*, Düb. & Kor., *S. papposus* (Linck), *S. endeca* (Gmel.), *Pentagonaster granularis* (O. F. Müll.), *P. hispidus* (M. Sars), *Hippasteria plana* (Linck), *Asterina tumida* (Stuxb.), *Pteraster militaris* (O. F. Müll.), *P. pulvillus*, M. Sars, *P. multipes*, M. Sars, *Hymenaster pellucidus*, W. Thoms., *Astropecten Andromeda*, Müll. & Trosch., *A. arcticus*, M. Sars, *A. irregularis*, Linck, *Oteno-*



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