SCIENTIFIC BOOKS.

Contributions to the Tertiary Fauna of Florida with especial reference to the Silex Beds of Tampa and the Pliocene of the Caloosahatchie River. By WILLIAM HEALEY DALL, A.M. Transactions of the Wagner Free Institute of Science of Philadelphia, Vol. III., pp. 1654, 60 plates.

With the appearance of part VI. the Wagner Institute has brought to a close the work upon the Tertiary geology and paleontology of Florida begun in 1886, and recorded in Vol. I., and the series of volumes composing 'Vol. III.' of the *Transactions*. Vol. I. (1887) by Professor Angelo Heilprin, announcing the discovery of the Caloosahatchie Pliocene beds by Professor Heilprin and Mr. Joseph Willcox, with a first report on its fossils and those of the silex beds at Tampa, has already been noticed in these columns.

In 1890 the work was resumed by Professor Dall with the cooperation of the U. S. Geological Survey, originally with the intention of exploiting the Tampa silex beds (then called Old Miocene), the Chesapeake Miocene and the Caloosahatchie Pliocene. As the work progressed, these bounds were found too narrow for the full development of the subject, and practically all marine Tertiary faunas of America, from Panama to Canada, have supplied materials for the work. Even Cretaceous horizons have been laid under contribution. This spreading of the subject over faunas not indicated in the title of the work has provoked some adverse criticism not wholly undeserved, for it is undeniably a hardship to have new Cretaceous species described in a work on Neocene paleontology. But to the evolutionist, the student of molluscan genealogies, this wide range of comparison in a vertical direction, so to speak, is of inestimable value, and in the hands of Dall has brought out the relations of successive faunas in a way never attained by the old method of dealing with each formation separately.

Although the work deals only secondarily with stratigraphy, yet the collateral researches and field explorations undertaken in connection with the paleontological work give it high value from the purely geological standpoint. It marks an epoch in the study of eastern and middle American Tertiary deposits. The recognition and exposition of the marine Oligocene of Florida and the Antilles is one of the notable advances in geological knowledge. In the earlier part of the work it was recognized that the so-called Miocene of Florida comprised two very dissimilar faunas, and to the earlier the term Old Miocene was applied in this work. Further study and material showed that this 'Old Miocene' had nothing to do with the Miocene of the United States in its most typical development, as in Virginia and Maryland, but represented a group of horizons strictly analogous to those which had received from European geologists the name of Oligocene. These horizons contained a very rich warm-water fauna which was soon found to be more or less distinctly represented in the Tertiaries of middle America and the West Indian Islands." This led to the examination of the fauna of the beds at Bowden, Jamaica, and in Santo Domingo, etc., that the correlation of Antillean and continental beds might be discovered. "It was found that the connection between the Atlantic and Pacific faunas ceased at about the climax of the Oligocene, and that the relations between the faunas were so intimate that the Pacific coast forms could not safely be entirely neglected." These conditions gradually led to an extension of the work, in the course of which 'several distinct Oligocene faunas have been worked out with fulness and their relations established; a wide extension has been given to the Pliocene deposits, long confused with those of the Upper Miocene; the geological relationships of the beds between the Vicksburgian and the Pleistocene have been established in their main lines more clearly than has hitherto been the case.'

Regarding Antillean geology, Dr. Dall considers that the views of Professor R. T. Hill are supported by the evidence of Mr. T. W. Vaughan's field observations, and the information from other sources, as opposed to the hypotheses of Dr. J. W. Spencer, based upon his studies of submarine topography and of non-fossiliferous terranes supposed by Spencer to be marine Pliocene and Pleistocene. This

conclusion is not unexpected by those who have carefully examined the evidence, both geological and faunal. The data of zoogeography are wholly at variance with Spencer's hypotheses involving oscillations of gigantic vertical amplitude within late Neocene time.

To the paleontology Dall has brought to bear the experience of a life-long study of recent mollusca, an advantage possessed by few, if any other, writers upon American fossils. This has led naturally to a juster appreciation of the morphologic problems encountered than has been possible to most paleontologic authors, whose acquaintance with living mollusks is, as a rule, largely at second hand—from the manuals rather than the things themselves. With the great collection of recent American marine mollusks in the National Museum, the material for exact comparison of the fossil and existing forms was always at hand, and a vast number of corrections and rectifications of all sorts, in the nomenclature and classification of both recent and Tertiary mollusks have been made. This gives the work fully as much value to the student of existing faunas as to the paleontologist.

During the progress of the work a new classification of the bivalve mollusks (Pelecypoda) has been elaborated, a separate part being devoted to an exposition of the general system of pelecypods. Whether or not this classification will eventually supersede that of Pelseneer, which at present is generally adopted abroad, it possesses certain manifest advantages for the paleontologist over that of the Belgian zoologist, in that the hard parts, which alone are preserved as fossils, are taken into account. The work of Newmayr, the researches of Bernard and others upon the ontogeny of the bivalve hinge, and the phylogenetic studies of Dall himself, all indicate that the several elements of the hinge with its interlocking processes or 'teeth' are the biological expression of stresses to which they are subjected in the individual. The evolution of these wonderfully adapted structures has been in part worked out, so that the great part played by parallel or convergent evolution, hitherto hardly taken into account by paleontological students of bivalves, is now exposed, and sound phylogenies become possible.

Those who oppose the major divisions of Dall's classification will admit that the marshalling of the families into superfamily groups, and the internal analyses of these groups, has been accomplished with the consummate skill of a master.

In many groups of bivalves the classification down to genera and subgenera is worked out for all known forms, so that the work is a general manual of the subject, often with an entire recasting of the groups and their definitions, as in the Mactracea and Leptonacea (Parts IV. and V.). The treatment of the Veneracea and allied groups in Part VI. is equally elaborate, though less completely revolutionizing prior conceptions.

The matter of nomenclature has received great attention, and as a general rule the numerous changes of current usage have been made with excellent judgment. In some cases, such as that of *Pisidium,* it would seem that Dall has gone more than half way to meet trouble; while the emendation of some other names for the sake of Latin form will not be received with general enthusiasm. Thus if *Pitar* Römer (1857) is barred from acceptance because of its derivation from a West African tongue, it can not be used as a generic name in the form *Pitaria* (Römer) Dall (1902), because several other names were applied to members of the genus between these two dates, one of which would lead as a generic term. Here, as usual in such cases, it seems best to accept a generic name as it was coined, even if it is bad Latin. Little advantage or glory comes from breaking lances against such windmills.

An interesting and valuable point to the evolutionist is the persistence through long periods of characters apparently trivial—now a minute lamella or tubercle in the hinge, now an external sculpture-pattern or an internal sculpture, like the marginal grooving of *Transennella.* What we have looked upon as mere 'ornamentation' has often suffered the least change from age to age, and characterizes the successive members of phyla which in structures apparently far more important have

gone on evolving in parallel or divergent series. H. A. PILSBRY.

SCIENTIFIC JOURNALS AND ARTICLES.

The American Naturalist for January contains the fourth of the series of papers on 'Adaptations to Aquatic, Arboreal, Fossorial and Cursorial Habits in Mammals,' the present being devoted to 'Cursorial Adaptations,' by Richard S. Lull. R. W. Shufeldt has a lengthy paper 'On the Osteology and Systematic Position of the Pygopodes,' giving at the end a comparison of the differential characters of the loons and grebes which are considered as forming two superfamilies. The affinities of these groups to the extinct *Hesperornis* are said to be practically certain, but this conclusion should be received with caution. T. A. Jaggar, Jr., renders a translation of the account of 'The Eruption of Mount Pelée, 1851,' from the French of Le Prieur, Peyraud and Rufz which is of considerable interest. The balance of the number is devoted to reviews and notes.

The Popular Science Monthly for April begins with an account of 'Recent Discoveries in Radiation and their Significance,' by R. A. Millikan, briefly summarizing our present knowledge of the subject and suggesting that certain elements, at least, are transmutable into others. 'The Evolution of the Human Form' is discussed by Charles Morris, who reaches the conclusion (somewhat open to question) that if there are beings on the other planets that answer to man they must follow his physical configuration. Solon I. Bailey describes 'The Arequipa Station of the Harvard Observatory' and Edward F. Williams presents his second paper on 'The Royal Prussian Academy of Science and the Fine Arts, Berlin.' Carl Duisberg considers 'The Influence of Liebig on the Development of Chemical Industries,' believing that while this is now great his indirect influence will be still greater in the future. J. Madison Taylor has the third article on 'The Conservation of Energy in Those of Advancing Years,' a general plea being for rational exercise and diet and not dependence on drugs. 'The Caucasian in Brazil' is considered by Thomas C. Dawson, who believes that he can hold his own in the tropics and adduces figures to show the greater fertility of the white race. Finally, Guy L. Hunner treats of 'The Air of the Luray Caverns.' The number contains the index to Vol. LXIV.

THE April number of the *Transactions of the American Mathematical Society* contains the following papers:

G. A. BLISS: 'An Existence Theorem for a Differential Equation of the Second Order, with an Application to the Calculus of Variations.'

L. E. DICKSON: 'Determination of all the Subgroups of the Known Simple Group of order 25920.'

C. N. HASKINS: 'On the Invariants of Quadratic Differential Forms, II.'

E. D. ROE, JR.: 'On the Coefficients in the Product of an Alternant and a Symmetric Function.'

F. N. COLE: 'The Groups of Order $p^3q\beta$.'

MAX MASON: 'Green's Theorem and Green's Functions for Certain Systems of Differential Equations.'

E. J. WILCZYNSKI: 'Studies in the General Theory of Ruled Surfaces.'

SOCIETIES AND ACADEMIES.

THE BIOLOGICAL SOCIETY OF WASHINGTON.

THE 384th regular meeting of the society was held Saturday evening, March 19, 1904. Dr. C. E. Waters exhibited numerous specimens of common ferns in which the fronds were only partially fertile. The entire series demonstrated a complete gradation from the sterile to the fertile fronds. Dr. B. W. Evermann exhibited a series of seventy-three engravers' proofs of colored plates of Hawaiian fishes. All were drawn and colored from living fish, chiefly by A. H. Baldwin and C. B. Hudson. The live specimens were placed in an aquarium as soon as caught and the artist began work on them immediately or within a very short time. The result is an accurate reproduction of the actual life colors of the animals. The plates will be published in the near future by the U. S. Fish Commission.

Mr. W. P. Hay read a paper on the 'Life History and Economic Importance of the Blue Crab, *Callinectes sapidus*,' illustrating his remarks with lantern slide views. The more important life functions and habits of