man. In the domestic horse there are five regions where whorls occur—*i. e.*, the frontal, inguinal, pectoral, post-humeral or axillary, and cervical. These are due, the author shows, to the traction of the underlying muscles. It is interesting to observe that they are absent in the zebra, and are apparently the result of the movements and work done by the horse in a state of domestication. 'It is difficult,' the author concludes, 'to see any explanation of the formation of whorls, featherings and crests in the hairy coats of mammals other than a dynamical one.' His reasons for the dynamical view are as follows:

1. They all occur, except that on the vertex, in regions where opposing traction of underlying muscles is found.

2. They never occur over the middle of a large muscle, and seldom in any place where there is not a hollow or groove in the superficial anatomy.

3. They are most uniform and most marked in animals with very strong muscles, and those that are actively locomotive.

4. Their constancy appears to depend upon range of action and activity of function of the muscles in the part and individual animal affected. This is especially shown in the three regions of the domestic horse—pectoral, post-humeral and inguinal.

As regards the hair slope, the author arrives at the following conclusions:

1. To understand the disposition of hair on living animals, it is necessary to look upon it as a stream, and this is very plastic.

2. In man, and various groups of animals, the great majority of the peculiarities here noted are congenital.

3. Certain peculiarities of hair-slope are at present in process of development.

4. The hair streams are disposed in the lines of least resistance.

5. The mechanical conditions required for the production of both the general and the special hair-slopes are in present operation.

6. The hair-slope can be modified during the life of an individual.

7. Selection (whether natural, sexual or germinal) is incompetent to produce these peculiarities of hair-slope.

8. If these are not originally created with the forms of life which present them, they must have been produced in ancestors by use or habit.

The author seems to have made out a good case and to have been led by the legitimate use of the inductive method to what seem to be valid and natural conclusions.

A. S. P.

Some Fossil Corals from the Elevated Reefs of Curaçao, Arube and Bonaire. By T. WAYLAND VAUGHAN. Sammlungen des Geologischen Reichs-Museums in Leyden, Ser. 11, Bd. 11, Heft. 1901.

Mr. Vaughan makes his report upon the fossil corals from the Dutch West Indies, collected by Professor K. Martin, director of the Leyden Geological Museum, part of an elaborate study of the history and synonymy of the West Indian corals. The paper is companion to another by the same writer, shortly to appear, upon the stony corals of Porto Rico collected by the recent survey of the U. S. Fish Commission. The latter will contain photographic reproductions of most of the living species of West Indian corals. Both papers are subsidiary to a larger work upon the post-Eocene Corals of the United States, now in the course of preparation.

The author is preeminently qualified for the task he has undertaken. In addition to having access to the large accumulations of corals at the U. S. National Museum and Geological Survey, including the type specimens of Dana, he has visited the collections in London, Paris, Berlin, Turin and other centers, where are contained the types of Milne-Edwards and Haime, Ehrenberg, Klunzinger, Duncan, Duchassaing and Michelotti, and other workers on the corals. In some way the present revision is a continuation of the work of Professor J. W. Gregory on the fossil corals of Barbados.

The result is what might have been expected. With the further accumulation of material for study, enabling the possible variations within the limits of a species to be estimated, and the comparison of the type specimens of different investigators, either side by side, or by the aid of photographs, it

has been possible to bridge over a large number of the gaps which separate certain so-called species, and to demonstrate that many of the latter are but varieties of growth in a somewhat protean group. Thus, to take a couple of instances: *Orbicella acropora* (Linnæus) now embraces ten species, and has been known under the same number of genera; *Meandrina meandrites* (Linnæus) has a synonymy in which are represented seven genera and thirteen species.

Unfortunately the revision of the synonymy reveals the necessity for several important changes in long-established names if the rules of nomenclature are to be strictly followed. Vaughan now shows that the true *Meandrina* is not the brain coral which students, from the time of Milne-Edwards, have been accustomed to associate with the name, but is the *Pectinia* of Milne-Edwards, while the *Meandrina* of the 'Coralliaires' has for the future to be known as *Platygyra*. It is with a sigh that one relinquishes *Madrepora* for the corals so long associated with this name. As was first pointed out by Geo. Brook, in the British Museum Catalogue of the Madreporaria, none of the species at present included under *Madrepora* were embraced by Linnæus when he instituted the term in 1758. Vaughan now suggests its replacement by *Isopora*, a name first used in the subgeneric sense by Studer in 1870.

The writer follows Brook in regarding all the forms of the West Indian *Madrepora* as but one species, the three Lamarckian species —*palmata, cervicornis* and *prolifera*—being reduced to formæ or varieties. Gregory in 1895 had come to the same conclusion as Brook, but in 1900, following upon a visit to the West Indies, and the opportunity of seeing the different representatives in situ, he reverts to the Lamarckian arrangement, and endeavors to dispose of the specimens which Brook regarded as intermediate in form.

In the immense coral flats around the various Antillean islands the three types of *Madrepora* growth usually retain a remarkable distinctness of form, though often growing side by side; and from a study of these alone one would be far from induced to admit their specific unity. The polyps, however, are practically alike in form and color, and anatomically and histologically they reveal no important differences. Vaughan also believes that he possesses colonies which should be regarded as intermediate in habit between the three recognized types. In his forthcoming Porto Rican paper the author proposes in like manner to unite under two groups the many and varied West Indian representatives of the allied genus *Porites*.

It might have been supposed that the study of the polyps themselves, both in their living condition and anatomically and histologically, would have revealed distinctions tending to strengthen the specific separations founded upon the skeletal form. But such is not the case. A comparative study of the polyps of many so-called species of *Madrepora, Porites, Orbicella,* etc., now in progress reveals very few differences within each genus. Compared with those of *Madrepora* the polyps of *Porites* vary greatly in color, often on the same colony, but except for slight variations in size no other differentiations of importance can be established in any part of their structure.

Extensive studies like those now being undertaken by Vaughan indicate that the greater the number of specimens of Madreporarian corals which are studied, with regard both to the skeleton and soft parts, the greater will be the tendency to lessen the number of species. As it has been expressed by the author: "The number of species is very often a function of the amount of the material studied." The same tendency has already reached its climax in the case of the Hydrozoan coral, *Millepora*. In the course of a study of both polyps and skeleton of this genus, extending over many years, and embracing specimens from all parts of the world, Professor Sidney Hickson has recently come to the conclusion that it is impossible to maintain any specific distinction. All the numerous skeletal forms, hitherto included under about thirty-nine names, are, from Hickson's researches, to be regarded as but so many varieties of growth, which presumably may be assumed by any one individual under like conditions.

Zoologically the tendency is healthy. For the student's time will be set free to investigate collections of specimens from other standpoints than that of assigning each its name, animated by the desire to produce the longest possible list. Variations in a form will be studied as modifications adapted to particular environments. In museums the specimens can then be arranged, not as objects with so many long names as appendages, but as illustrating vital principles of natural history.

J. E. DUERDEN.

JOHNS HOPKINS UNIVERSITY,
BALTIMORE, MD.

GENERAL.

A NEW edition of Stieler's Handatlas to contain 100 copper-plate maps is now in course of publication by Perthes of Gotha, in fifty parts; the price of the complete work being 30 Marks. Half the maps are newly projected and engraved. All of them have relief in brown, in order to make the names in black more legible. In preparation for binding, each sheet has its title printed on the right corner of the back, with on outline map that indicates the location of the sheet and of the neighboring sheets with their numbers. The present edition is the ninth of this valuable work; the first having been completed by Stieler in 1831. Later editions were by Stülpnagel. Petermann, Berghaus and Vogel.

SCIENTIFIC JOURNALS AND ARTICLES.

THE January (opening) number of Vol. III. of the *Transactions of the American Mathematical Society* contains the following papers: 'On a Class of Automorphic Functions,' by J. I. Hutchinson; 'Concerning the Existence of Surfaces Capable of Conformal Representation upon the Plane in such a Manner that Geodetic Lines are Represented by a Prescribed System of Curves,' by H. F. Stecker; 'Zur Erklärung du Bogenlänge und des Inhaltes einer krummen Fläche,' by O. Stolz; 'The Groups of Steiner in Problems of Contact,' by L. E. Dickson; 'Quaternion Space,' by A. S. Hathaway; 'Reciprocal Systems of Linear Differential Equations,' by E. J. Wilczynski; 'On the Invariants of Quadratic Differential Forms,' by C. N. Haskins; 'The Second Variation of a Definite Integral when One End-point is Variable,' by G. A. Bliss; 'On the Nature and Use of the Functions Employed in the Recognition of Quadratic Residues,' by E. McClintock; 'A Determination of the Number of Real and Imaginary Roots of the Hypergeometric Series,' by E. B. Van Vleck; 'On the Projective Axioms of Geometry,' by E. H. Moore.

THE December number (Vol. VIII., No. 3) of the *Bulletin of the American Mathematical Society* contains the following articles: 'The October Meeting of the American Mathematical Society,' by Edward Kasner; 'Modern Methods of Treating Dynamical Problems and in Particular the Problem of Three Bodies,' by E. W. Brown; 'The Hamburg Meeting of the Deutsche Mathematiker-Vereinigung,' by C. M. Mason; 'Some Curious Properties of Conics Touching the Line Infinity at One of the Circular Points,' by E. V. Huntington and J. K. Whittemore; 'Picard's Traité d'Analyse,' by Professor Maxime Bôcher; 'Errata,' 'Notes' and 'New Publications.' The January number of the *Bulletin* contains: 'Note on Mr. George Peirce's Approximate Construction for π,' by Emile Lemoine; 'Concerning the Elliptic $\wp(g_2, g_3, z)$-Functions as Coordinates in a Line Complex, and Certain Related Theorems,' by H. F. Stecker; 'On the Abelian Groups, which are Conformal with Non-Abelian Groups,' by G. A. Miller; 'The Infinitesimal Generators of Certain Parameter Groups,' by S. E. Slocum; 'Shorter Notices'; 'Notes' and 'New Publications.'

SOCIETIES AND ACADEMIES.

CHEMICAL SOCIETY OF WASHINGTON.

THE 130th regular meeting was held December 12. The following program was presented:

'The Solubility of Mixtures of Sodium Chloride and Sodium Sulphate': A. SEIDELL.

The author first gave a brief summary of the status of solubility work in solutions other than very dilute ones, and described in detail the experimental difficulties which have to be met in this kind of work. He then presented