

ing among these multitudinous lowly organisms, that what is recognized among higher animals as specific differentiation, cannot exist, any more than among the foraminifera. So, for the purpose of marshalling, in some sort of order, the chaos of individuals, perhaps nothing better could have been chosen than the arrangement adopted.

The richest source of the material described is the radiolarian ooze of the Pacific Ocean, the remarkable deep-sea mud consisting chiefly of the skeletons of these animals. The tow-net also yielded rich treasures. Professor Haeckel has also included the fruit of his own numerous journeys to the Mediterranean and the eastern Atlantic as well as to the Indian Ocean. Capt. Heinrich Rabbe of Bremen also contributed most important material from the Indian seas; and the collections of Murray and others on various expeditions, such as the Knight-errant and Triton voyages, added to the total. The alimentary canal of various pelagic organisms and even Jurassic coprolites have been laid under contribution. Dr. R. Teuscher of Jena has co-operated with the author in his work; among other things he undertook the tedious micrometric measurements, some eight thousand in number, by which the constancy of the so-called specific forms was endeavored to be tested. The result showed their inconstancy, as might be expected. The conclusion of Professor Haeckel that all other organisms exhibit a similar inconstancy, is, we believe, not in accordance with the general experience of naturalists.

No description can do justice to the wonderful variety and beauty of these minute creatures, and for fuller realization the reader must turn to the plates of what we may properly call this stupendous undertaking.

FOURTH ANNUAL REPORT OF THE BUREAU OF ETHNOLOGY.

THE present volume, which has just been issued, contains the report of the director for 1882-83, and some papers of eminent value. The latter must be reviewed separately, and we shall confine ourselves to some remarks on Major Powell's report. The broad basis on which the researches of the bureau are carried on is due to him, and ethnologists must be thankful for his encouragement of special lines of study—for instance, Mallery's researches on sign-language and pictography—and of special researches on certain groups of tribes, which cannot be made without the assistance and support of a powerful institution. In this respect the work of the bureau is of the greatest value, as it puts an end to the diletanteism which formerly obtained in American ethnology. Major Powell's attempts to gain the

co-operation of scientists not officially connected with the bureau cannot but exert a wholesome and encouraging influence on American ethnology. Numerous valuable researches which are included in the reports of the bureau and in the contributions to North American ethnology are proof of this.

Another important feature of the work of the bureau is the broad and systematic plan by which Major Powell carries on the researches of the bureau. He keeps three publications particularly in view. His remarks on this subject are of great interest. He contemplates the publication of, “1°, a series of charts showing the habitat of all tribes when first met by Europeans, and at subsequent eras; 2°, a dictionary of tribal synonymy, which should refer the multiplied and confusing titles, as given in literature and in varying usage, to a correct and systematic standard of nomenclature; 3°, a classification, on a linguistic basis, of all the known Indians of North America, remaining and extinct, into families or stocks.

“The order of possible preparation of these publications is the reverse of the above. The charts cannot be drawn until the tribes, as villages, confederacies, and leagues, shall have been resolved from multiplicity and confusion into identification and simplicity. The linguistic classification precedes the whole of the work, and the difficulties attending it have at times suspended its satisfactory progress until expeditions of research had been sent forth to clear up the obstacles of uncertainty and ignorance. Numerous publications of ethnologic charts of partial synonyms and of tentative classifications have appeared from various sources, but all have been imperfect and more or less erroneous. The personal attention of the director and of all the officers and employees of the bureau has been steadily directed, in addition to the several branches of work from time to time undertaken, to presenting them in a proper form. The labor and study required have been beyond expression, but may be partially indicated by the fact that, apart from the linguistic and sociologic problems involved, the mere mechanical compilation has produced over twenty thousand cards of synonymy. The present condition of this interconnected work is encouraging.” The publication of this material will be the first sound basis of continued researches on American ethnology. We do not enter into the details of the field-work done by the bureau, as during the subsequent years much additional work has been done, and has become known in its outlines. In this respect it must particularly be regretted that these reports, like most other government publications, are not sooner issued.

We heartily concur with Major Powell, in his remarks on the undesirability of amateur collectors and travellers. Unfortunately, many explorers are so little conversant with the elements of ethnology, and so little able to consider natives from any other point of view than that of our own civilization, or to enter into their methods of thinking, that they do more harm than good. Any one who has studied ethnological literature knows how true this is. It is an underestimation of private work, however, when Powell says, "Experience has shown that individual travellers, unguided and without common system, have failed to obtain the best results in examining members of native tribes both as individuals and as aggregations." This affirmation is opposed to the encouragement of private researches, which Powell has so successfully made the policy of the bureau. We do not doubt that scientists who are supported by the moral influence and the means of the bureau have better chances of success than those who travel without such support; but, as the bureau of ethnology is not able to carry out all the field-work that is necessary and desirable, researches of scientists undertaken outside of the systematic plan of the bureau ought to be welcome.

We consider the plan by which the researches of the bureau are carried on a very successful one. The principal idea is that the phenomena of ethnology and archeology must be studied from a common point of view, and that a knowledge of the former is indispensable for understanding the latter, and that the supposition of sudden cataclysms, instead of that of a continuous development, is only justified where clear evidence of the occurrence of such phenomena can be shown. The work of the bureau is of great importance not only for science, but also for a successful method of making the Indian a useful member of the state and of human society. We cannot press upon him our civilization. A thorough knowledge of the Indian character is necessary to reach satisfactory results in this line. Both scientists and philanthropists must wish that the work of the bureau be carried on as vigorously as possible, and that its operations ought not to be hampered by lack of means for extensive field-work and publications.

DR. FRANZ BOAS.

THE ROTIFERA.

IN our previous notice of this work (vol. vii. p. 402) we based the favorable judgment, which we then expressed, upon the first two parts. We have now before us the completed work, the ex-

The Rotifera; or, Wheel-animalcules. By C. T. HUDSON, assisted by T. H. GOSSE, F.R.S. Parts iii.-vi. London, Longmans. 8°.

amination of which strengthens our previous favorable opinion. The authors are not of those whose studies are prompted by an insatiable eagerness for knowledge, but rather, it appears to us, are they lovers of Nature, who seek the closest intimacy with her to gratify their affections. They are pleased to quote upon the reverse of their titlepage Shelley's lines:—

"Those viewless beings,
Whose mansion is the smallest particle
Of the impassive atmosphere,
Enjoy and live like man."

We do not mean that the characterization of the species is vague and dreamlike. It would be difficult for a biologist to determine the systematic position of Shelley's 'viewless beings' from the poet's description; but Mr. Hudson's are scientifically exact, although they are rendered interesting by the addition of something of the literary flavor that alone is present in Shelley's beautiful inexactitude. It is this combination of qualities which imparts a double merit to Hudson and Gosse's monograph, and renders it acceptable and welcome alike to the professional and to the amateur naturalist.

The work is a valuable contribution to science, as every conscientious monograph must be; for it is indispensable to progress that we should have from time to time, in regard to a given subject, a comprehensive presentation of the accumulated knowledge. A monograph of the Rotifera was very much needed, for it is twenty-five years since the revision by Dr. Arlidge. To execute the task worthily, it was necessary that the many, by no means always rare, species which had remained undescribed should be properly investigated, so as to be included in the monograph. This laborious undertaking the authors have accomplished. Their work contains more than one hundred and twenty species which were unrecognized when Dr. Arlidge wrote: nearly all of these have been added to science by the authors themselves, some eighty of them by Mr. Gosse.

When Mr. Hudson passes beyond his rôle of observation and description, and occupies himself with problems of morphology and of the affinities of the Rotifera, he is less fortunate than we could wish. Thus, he says in his preface that his discovery of the remarkable *Pedalion mirum* "has put beyond question the fact that the Rotifera, in one point at least, are closely linked to the Arthropoda." Now, *Pedalion* is a true rotifer, which has six limb-like appendages, two of which are on the median line (one being dorsal, the other ventral), and four of which are lateral. The limbs have terminal bristles. These appendages impart, in