

engineering, ethnology, forestry, geography, geology, mineralogy, ornithology, paleontology and zoology. Along all these lines the researches were energetic and successful; and the more general results are incorporated in the two volumes just issued, and in a series of special memoirs now in the course of publication by the Washington Academy of Sciences, but designed for ultimate reissue in volumes supplementary to those under notice. These volumes themselves, produced as they were by leading authorities, must form a standard source of knowledge concerning Alaska; and when the series is completed it will undoubtedly command a high place among the classics of place and country.

The body of the first volume opens with a narrative of the expedition by John Burroughs; then follow chapters on the 'Pacific Coast Glaciers,' by John Muir, and on the 'Natives of the Alaska Coast Region,' by George Bird Grinnell. The second volume comprises 'The Discovery and Exploration of Alaska,' by William Healey Dall; 'Days Among Alaska Birds,' by Charles Keeler; 'Forests of Alaska,' by Bernard E. Fernow; 'General Geography,' by Henry Gannett; 'The Alaska Atmosphere,' by William H. Brewer; 'Bogoslof, Our Newest Volcano,' by C. Hart Merriam; 'The Salmon Industry,' by George Bird Grinnell; and 'Fox Farming in Alaska,' by M. L. Washburn. There is also a preface by Mr. Harriman and an introduction by Dr. Merriam, together with an opening poem by Charles Keeler; while the work ends (save for the excellent Index) with an effective poem by Dall, captioned 'The Song of the Innuït' and (somewhat tautologically) listed as 'The Innuït People.' It would be impracticable to abstract the papers prepared by the several contributors; it must suffice to note that they are, without exception, excellent, authoritative, well written, and carefully edited by a participant in the expedition, himself a recognized authority in scientific matters. Merely as examples, it may be noted that the chapter on glaciers came from the pen of the world's most sympathetic student of ice fields and ice streams; that the historical chapter was written by the leading authority on Alaskan exploration; and that the account of

Alaskan geography and the accompanying maps were prepared by our foremost practical geographer. The maps, although small, show the general features of the territory satisfactorily; they are, of course, quite up to date, embracing the results of all surveys up to 1900, including those of the expedition itself, as well as those of the U. S. Geological Survey and the U. S. Coast and Geodetic Survey.

The volumes are especially notable for the beauty and fidelity of the illustrations, most of which were based on photographs. The lithograph plates have never been excelled in delicacy and refinement of both color and form; many of them are pictorial gems, displaying landscape and waterscape, mountain and valley, flower and foliage, fur and feather, with a faithfulness seldom sought and never passed. The photogravures are of corresponding excellence; while the text figures combine artistic quality and graphic fidelity in remarkable degree. The typography, paper and binding are correspondingly sumptuous; so that the book is a thing of beauty as well as an object of utility.

Perhaps the most serious defect of the work (despite evident editorial care, which might well have been more prominently acknowledged) is the discontinuity naturally growing out of the multiple authorship; another defect, which must somewhat discommode librarians and dealers as well as students, is the absence of a definite title. 'Alaska,' indeed, stands out boldly on the title-page in carmine ink, while the publisher's imprint and the expeditionary superimprint and vignette are uniform, but otherwise the title-pages are diverse—and worst of all, the title on the back is not that of the book but that of the expedition. W J M.

*The Protozoa.* By GARY N. CALKINS, Ph.D. Columbia University Biological Series, Vol. VI. New York, Macmillan Co. Price, \$3.

It is no easy task to compress into a volume of scarcely more than 300 pages a résumé of even the more important facts and theories relating to a large group of organisms like the Protozoa. The difficulty of the task is apparent when one stops to consider that the very position of the Protozoa in the animal kingdom has of necessity enveloped them in a nimbus of

biological speculation. They have been and will long continue to be the one group about which cluster the numerous theories of biogenesis, the origin of the Metazoa, the origin and significance of sex, heredity and death, the dawn of consciousness and instinct and innumerable problems of lesser magnitude. Dr. Calkins is to be congratulated on having worthily overcome, or at any rate adroitly avoided, many of the difficulties of this task. At the same time he has upheld the high standard of scholarship set by the previous volumes in the well-known 'Biological Series.'

As Dr. Calkins informs us in his preface, "The subject-matter of the volume is treated from three points of view: (1) The historical, to which the first chapter is devoted. (2) The comparative to which five chapters are given, one to the group of Protozoa as a whole, the other four to the main classes. (3) The general, to which three chapters are devoted. One of these is given to the phenomena of old age or senile degeneration in Protozoa and renewal of youth through the union of two individuals, and to the bearing of these phenomena upon sexual reproduction in general. Another is given to the special structures of nuclei and centrosomes of the Protozoa; this, the most technical chapter in the book, is introduced because of the growing importance which the Protozoa have in the problems of cellular biology, especially with those dealing with the origin of the division-center and its accompanying structures in the cells of the Metazoa. The last chapter is devoted to a consideration of the physiology of the Protozoa, with especial reference to the Protozoa as *organisms* endowed with the powers of coordination and of adaptation, which up to the present time have eluded physical and chemical analysis."

In pursuing this general plan the author has consistently resisted the temptation of involving himself in undue detail, and it is evident that he has everywhere striven to give proper shape and proportions to his work. In some parts of the volume, however, this brevity almost borders on meagerness and obscurity. The student who has long been irritated by the unsatisfactory text book accounts of the life-

histories of the Sporozoa will certainly wish that Dr. Calkins had expanded his excellent chapter on these organisms and introduced a fuller account of recent works on the Gregarinida and Hæmosporidia. We miss, *e. g.*, an account of *Apiosoma bigeminum*, the source of Texas fever, and its transfer by the cattle-tick (*Boophilus bovis*) in a manner analogous to the transfer of *Plasmodium malarie* by the mosquito (*Anopheles*). We should also have welcomed a fuller treatment of the geographical distribution of the Protozoa in general, their modes of dissemination and the phenomena of anabiosis.

Many morphologists and physiologists will wish that the author had dealt more critically with the conception of 'rejuvenescence,' a conception which smacks of 'Naturphilosophie' and is at most only an anthropomorphic 'Photographie des Problems.' The facts of parthenogenesis, both natural and artificial, appear flatly to contradict the assumption of Maupas and others that the temporary or permanent union of two exhausted cells results in one or two rejuvenated ones. This view was repudiated by Weismann on very good grounds several years ago.

The work of Calkins contains a classification of the Protozoa carried out to the families and genera. Unfortunately it is appended to three separate chapters and printed in such a form as to violate the very first rules of taxonomy. Classes, sub-classes, orders and suborders are all introduced in the same style of type and the various groups are coordinated in such a manner as to render a rapid and easy survey of the classification difficult, if not impossible. Taxonomy is the quintessence of our present morphological knowledge, and it is time that the prejudices of the narrow-gauge morphologist be not still further fostered by negligence in tabulating the essentials of the very science to which he is devoting himself with the characteristic myopia of one who sees not the forest because he is studying the venation of its leaves.

The volume is written throughout in a good, orderly style. Words like 'mononucleate' and 'unshelled,' in the sense of 'shell less' are conspicuously rare. The illustrations are clear, though occasionally too coarse for representations of such minute organisms. This is very

noticeable when they are compared with the delicate figures of Bütschli. Scarcely more than one tenth of the figures are original, and although the author has endeavored to avoid the commonplace in his selections from other writers, there is still a goodly array of the old and tiresome figures which seem to be as immortal as the Protozoa they represent, if one may judge from their perpetual metempsychoses in our zoological charts and text-books. The volume closes with an extensive, but by no means complete, bibliography and a good double index.

There can be no doubt that the volume should and will find a place in all our laboratories as a handy compendium of a marvelous group of organisms of basic importance in all our work in zoology, physiology and comparative psychology.

W. M. WHEELER.

*Annual Report of the Chief of the Bureau of Steam Engineering.* 1901. Washington, Government Print. 1901. 8vo. Pp. 70.

Admiral Melville reports in this document upon the condition and progress of the engineering branch of the United States navy, its personnel and material. The report is concise, clear, frank and illuminating. This Bureau has charge of all the machinery, of the navy, designs the engines, the boilers and machinery of the naval fleet, writes the specifications and contracts for such as may be built by private constructors, supervises the construction, makes the tests of completed machinery and has charge of the maintenance and repair of all such machinery. It expends \$3,000,000 to \$4,000,000 each year, mainly in repairs and preservation of the engines and boilers of the fleet. Of this work the report gives a detailed account, which is, however, not of special interest to the layman.

The new Naval Academy buildings, now under construction, are expected to cost about \$7,000,000. Admiral Melville asks that, of this total, about \$250,000 be applied to the construction of a laboratory for research in the physical sciences having direct application in engineering and marine construction. The building is to be two stories in height and 150 by 110 feet in plan, conforming in style of architecture

to the buildings, planned for the Academy, now in progress. It is proposed to appropriate \$150,000 for its equipment. This enterprise, if perfected, is another step in the direction of conforming the plan and workings of the Naval Academy to those of the great technical colleges of the world, and especially in the incorporation into its curriculum of experimental work in research as well as professional instruction.

With the resources of the general government available, the comparatively small expenditures needed to make the military and naval academies professional schools of the highest class, not only, as previously, in their organization and administration, but also in their equipment and in a complete and thoroughly modern curriculum, should be readily obtained, and these schools should take their rightful places as ideal, representative and model professional schools, in the extra-professional departments as well as in those which are purely vocational. In the applied sciences, particularly, they should be made perfect exemplars of the type which every civil as well as naval and military institution of learning should approximate as closely as means and the character of its faculty may permit.

Admiral Melville is pioneering here as effectively as when within the arctic circle and more usefully than ever did any explorer. He demands that the scientific departments of the Naval Academy, and especially the professional engineering division, be 'placed upon an equality with several universities whose colleges of mechanic arts and science in equipment far surpass the engineering outfit of the academy plant.'

The staff for this laboratory is to be organized from cadets and their teachers with, perhaps, one of the officers of the old engineer corps as its director. It is not only to be used in the investigation of the technical problems of the engineer department and of the naval service, but in the furtherance of the schemes of inventors where promising to be useful to the government or the public, also in testing all the appliances related to naval work; the materials and apparatus purchased by the Navy Department; and in the investigation of