XXV. *Some Notable Irrigation and Hydro-electrical Developments. By C. E. Grunsky.*—Here the actual achievements of irrigation referred to in the preceding chapter are the subject matter. The projects of the U. S. Reclamation Service and a large number of private undertakings for irrigation and power are taken into account. No irrigation bonds are offered for sale.

XXVI. *Chemical Resources and Industries. By Harry East Miller.*—A review of the chemical industries, based largely on natural mineral and agricultural products.

XXVII. *Mountaineering on the Pacific Coast. By Joseph N. LeConte.*—For the man or woman who accepts no challenge from any upturned angle of the earth, this chapter is a suggestion of things to do.

XXVIII. *Outdoor Life and the Fine Arts. By John Galen Howard.*—A pleasant account of the development of the Forest Theater and Mountain Plays, of the combination of out-of-doors with the drama, to which the western climate has lent the guarantee of success.

XXIX. *Literary Landmarks of the Pacific Coast. By S. S. Seward, Jr.*—Bret Harte, Mark Twain and Stevenson, in passing; Ambrose Bierce (lately discovered by the East), Joaquin Miller, Edwin Markham, Edward Roland Sill, John Muir, Jack London, make a pyramid of "land-marks" of which the capstone is only laid when we add the name of Gelett Burgess.

XXX. *Legal and Political Development of the Pacific Coast States. By Orrin K. McMurray.*—A suggestive account of the development of the legal code from the unformed code of the miners' camps and frontier civilization, a few permanent effects of the Spanish procedure and a brief sketch of the later history of jurisprudence and its controlling conditions.

XXXI. *Scenic Excursions. By A. O. Leuschner.*—A condensed Baedeker of the out-of-doors to a multitude of delectable spots, with the price per spot.

The form of the book, 12mo, makes it handy for the pocket, but as for the paper and typography, these meritorious essays must feel strangely indecorous in their black-and-tan dress of fat, round, gray-black type on yellow paper, most unhappily tiring to the eyes.

JOHN M. CLARKE

Catalogue of the Freshwater Fishes of Africa in the British Museum. Vol. III. By G. A. BOULENGER. London, 1915.

It was originally intended to complete the account of the freshwater fishes of Africa in three volumes, but so many new species have accumulated during the progress of the work, that a fourth volume has become necessary. The third volume, now issued, is principally concerned with the Cichlidæ, but also includes a number of smaller families. In all, 394 species are described, the great majority also figured. No less than 231 of these species have been first described by Dr. Boulenger, whose labors on African fishes far exceed in magnitude and importance those of any other writer, or perhaps all other writers combined.

The Cichlidæ are of particular interest because of their abundance in Africa and South America, suggesting to some minds a former direct land connection between these continents. In this case we fortunately have positive evidence of a former more northern distribution, a genus of these fishes (*Priscacara*) being found in the Eocene of Wyoming. Boulenger recognizes no less than 41 genera of African Cichlidæ, all distinct from the 26 genera which Eigenmann catalogues for the neotropical region. No less than 21 genera are confined to Lake Tanganyika, so far as the records show. In the large genera *Tilapia* and *Paratilapia* we are told that the scales are "cycloid or ctenoid," but there is some confusion in the use of these terms, owing to the fact that weak and minute ctenoid structures are overlooked, and the scales pass as cycloid, as for example in *Tilapia nilotica*. For a correct understanding of the scale-structure of all these genera, the scales must be removed from the fishes and examined microscopically.

The Cyprinodontidæ or Pœciliidæ present a very different case from that of the Cichlids, having still a northern distribution, and pos-

sessing genera common to Africa and America. The African genera are only six, whereas we have very numerous genera in North America. Three, each with a single species, are exclusive African, one being from Lake Tanganyika (a remarkable form, with ctenoid scales), one from the Cameroon-Niger region (the exposed surface of the scales said to be regularly hexagonal), and one which is really Palæarctic, being found on the northern slope of the Atlas Mountains, in hot springs. The last mentioned, *Tellia,* is like *Cyprinodon,* with the pelvic fins wholly absent. Eighteen species are placed in *Fundulus*—the genus which is persecuted every summer by the biologists at Woods Hole. Forty-two others are referred to *Aplocheilus,* which Dr. Boulenger calls *Haplochilus,* the only distinguishing feature of which appears to be the fact that the dorsal fin is placed more posteriorly. Other characters have been cited by authors, but they apparently break down in dealing with the African fauna. The weakness of *Haplochilus,* as now defined, is indicated by the fact that in 1911 Dr. Boulenger himself described the sexes of a species (*Fundulus gardneri*) as two different things, placing the male in *Fundulus* and the female in *Haplochilus.* Another species, *Haplochilus liberiensis,* certainly seems nearer to *F. gardneri* than the latter is to some other species assigned to *Fundulus.* Thus we have a more or less continuous series, which is divided into two genera principally on grounds of convenience, by a character which in most of the species can be recognized at a glance. The only objection to this arises from the possibility that the arrangement is artificial, and that our American *Haplochilus* have no immediate relationship with those of Asia and Africa. If we use the single character employed by Boulenger, our *Fundulus floripinnis* must be referred to *Haplochilus,* where in fact Cope originally placed it.

Boulenger's "Freshwater Fishes of Africa" is a book which, although strictly technical, ought to find a place in general zoological laboratories, because it serves so well to illustrate the modifications which characterize genera and species. Very rarely can we see such complete series as are represented by the illustrations, and with the relatively scanty materials at our command, we are little able to appreciate the real diversity of animal life.

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A BIBLIOGRAPHY OF FISHES TO BE PUBLISHED

The time is ripe—and has, indeed, long been ripe—for the publication of a carefully prepared bibliography of fishes, to cover the entire range of the subject: fishes fossil as well as living, and fishes from many points of view, such as anatomy, physiology, embryology, pathology, parasitology, distribution, taxonomy, everything in short excepting matters which deal with clerical details of the fisheries. Such a compilation, it is clear, means much for this branch of zoology; for the literature of the fishes is vast, widely scattered and ill digested. In fact, I believe that there is hardly an investigator to-day who has not been obliged, needlessly, to give weeks or months of his time to searching for references.

The importance of such a bibliography was brought home to me about 1890: at that time I began the work of collecting references to be used in my studies, and as years passed I was able to build up a card-catalogue giving author and subject, which proved indispensable. Later my catalogue became known to correspondents, who in turn found it of use in their studies; and they, for their part, were generous in contributing references, and thus added notably to its value. It next, through the kindness of the Smithsonian Institution, absorbed the bibliography which Professor Goode undertook to publish and which his death left unfinished. Thus the value of the work became greater year by year. About 1910 the American Museum of Natural History allowed me secretarial help in the direction of editing the catalogue for publication. And thereafter, for about a year and a half this secretarial work was carefully carried on under the supervision of my colleague, Dr. Louis Hussakof, and since 1914 by Dr. C. R. Eastman, of the American Museum.