

**THE FRESH-WATER FISHES OF AFRICA.**  
*Catalogue of the Fresh-water Fishes of Africa in the British Museum (Natural History).* Vol. iv. By Dr. G. A. Boulenger. Pp. xxvii+392. (London: British Museum (Natural History), and Longmans, Green and Co., 1916.) Price 30s.

THE British Museum has recently published the fourth volume of Mr. G. A. Boulenger's "Catalogue of the Fresh-water Fishes of Africa." Thus is brought to a conclusion—at any rate, for some years to come—a work of very great value. Mr. Boulenger's research into the ichthyology of the African rivers and lakes has gone far beyond a mere catalogue of species. It began to attract attention nearly twelve years ago by the light that it threw on the past geological history of Africa, the former superficies of this continent at different times in regard to rising and falling levels of land, the connections of the continent with outlying islands, the desiccation or the flooding of great areas of land in the interior, the increase or the restriction of river basins and of lake limits. Briefly summarised, it went to show that the Nile system in past times has been in direct communication with the now isolated Lake Rudolf, and has come very near to the Chad Basin, which again has communicated intermittently with the Niger, while the Niger or its upper portion may at one time have had an outlet into the Atlantic in common with the Senegal, and have been separable by only a few miles of land from the upper waters of the Gambia, the Volta, and of all those streams that flow from north to south through the forests of Guinea and the Gold Coast into the great African Bight. On the other hand, it showed a comparative poverty and isolation in fish fauna of the Zambezi Basin and South Africa; and it illustrated, above all, the specialised character and wealth in fish-fauna of the Congo Basin. This region (with which Tanganyika was not always connected) must have approached very closely to the upper waters of the Gaboon and Cameroons rivers to account for the near relationship between their fish-fauna and that of the Congo Basin.

So far back as 1870, Dr. Günther, of the British Museum, could only catalogue about 255 species of African fresh-water fish. Mr. Boulenger raised this number in 1906 to 974; but he is enabled in the volume now under review to put the total of species at 1425.

In this amazingly complete survey of African fishes he has been helped by many enthusiastic collectors and students, and directly or indirectly by the Belgian, French, and Luxembourg Governments, as well as by those of Egypt and the Union of South Africa. Volume iv. of this magisterial work deals with the fresh-water Gobies, the Anabantids or "climbing perch," the Mugilids or Mulletts, the Blennies, the Mastacembelids (anguine in form, and so often taken by negroes to be water snakes because many of them are handsomely marked with viperine patterns), and the Tetrodonts. In addition, there is matter supple-

mentary to the other volumes, which gives us further information in regard to the presence of "saw fish" sharks (*Pristis*) in the rivers of Portuguese Guinea; additional knowledge of the Polypterids of Portuguese Guinea and Liberia, and of that very interesting aberrant type, the *Calamichthys* of Calabar; of the Mormyrids of the Juba River (Somaliland) and of Portuguese Guinea, Northern Zambesia, the Upper Wele, Lake Bangweulu, and the Lower Niger; of the fresh-water herrings of Angola, the Characinids of western Congoland and Portuguese Guinea, Cyprinids from all parts of Africa, including the far south, and Silurids of an equally wide scope. (It is interesting to note, by the way, that there is a species of fish—*Salarias*, a Blenny—shared between Madagascar and Réunion Island.)

A tribute is justly paid by Mr. Boulenger to the magnificent collecting work accomplished by the late Dr. W. J. Ansorge, who, after exploring Uganda and other parts of Africa in the medical service of the British Government, devoted himself, on his retirement, to a systematic examination of the fish (and other) fauna of Portuguese West Africa, especially Angola and the little-known Portuguese Guinea. It is to be hoped that men like these, who have died in the prosecution of really noteworthy scientific research, might be commemorated by tablets let into the walls of the British Museum of Natural History.

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#### THEORETICAL AND PRACTICAL CHEMISTRY.

- (1) *The Theory of Valency.* By Dr. J. Newton Friend. Second edition. Pp. xiv+192. (London: Longmans, Green and Co., 1915.) Price 5s. net.
- (2) *Qualitative and Volumetric Analysis.* By W. M. Hooton. Pp. 86. (London: Edward Arnold, 1915.) Price 3s. net.
- (3) *Laboratory Manual arranged to accompany "A Course in General Chemistry."* By Profs. W. McPherson and W. E. Henderson. Pp. v+141. (Boston and London: Ginn and Co., 1915.) Price 3s.
- (4) *The Rugby Course of Elementary Chemistry.* By H. P. Highton. Pp. 79. (London: Edward Arnold, 1915.) Price 2s. 6d.

(1) THE perusal of a treatise on valency leaves an impression of incompleteness and uncertainty, of a mass of theories no single one of which can claim to correlate and interpret more than a portion of the relevant facts. This aspect of the matter, to which reference was made in the review of the first edition of Dr. Friend's excellent volume (*NATURE*, 1909, lxxx., p. 395), has been accentuated by recent work on radioactivity, and the modified views with regard to chemical combination and valency to which this work has led. The author, although fully aware of the extent to which earlier conceptions are undergoing change, points out that nothing like finality has been reached. He therefore does not