

Certificates of recommendation of the following candidates for Fellowship were read:—For the second time, in favour of Lawrence Root Waldron; for the first time, in favour of Bindiganavale Thirumalachar and Thengumparampil Kurien Koshy.

The Cichlid Fishes of Africa.
By Miss Ethelwynn Trewavas.

THE Cichlidae are a family of Perciform fishes that inhabit the fresh waters of South and Central America, of Africa, and Madagascar, with a genus in India and Ceylon. They are fairly generalized perches, but are distinguished by the presence of a single nostril on each side, by having only sixteen principal rays in the caudal fin, by the absence of a subocular shelf, by the toothless palate, and the sutural union of the lower pharyngeal bones.

For breeding they pair, and the eggs and young are sheltered in the mouth of one of the parents.

Division into genera was at first very artificial, for the characters used, chiefly of dentition, although sometimes reliable, are often very different in closely related species, or may even change with age.

Dr. Tate Regan's studies on the African genera, beginning in 1920, showed that the structure of the apophysis on the base of the skull for the attachment of the upper pharyngeal bones is of two types, and that by means of it the genera may be grouped in two main divisions. *Tilapia* and related forms have the pharyngeal apophysis formed by the parasphenoid alone. *Haplochromis* is the largest genus in which the basioccipital also takes part in the formation of the apophysis.

Further division of the main groups into genera is very difficult, owing to the great evolutionary vigour of the group. In the African great lakes the Cichlidae appear to have found ideal conditions, and have evolved into numerous closely related species, which fill every possible ecological niche in the lakes, availing themselves of every type of food-material present, and showing modifications in form and dentition which may often be correlated with the feeding-habits. Dr. Tate Regan's revision of the Cichlidae of Lake Tanganyika * recognized 89 species of 37 genera in this lake. In Lake Nyassa † there are fewer genera, but many more species, mostly of *Haplochromis* and related genera. Several striking instances of parallel evolution are provided by the Cichlids of Lakes Nyassa and Tanganyika, and other Nyassa and

* Regan, C. Tate, 1920. 'The Classification of the Fishes of the Family Cichlidae.—I. The Tanganyika Genera.' *Ann. & Mag. Nat. Hist.* (9) v, pp. 33-53.

† Regan, C. Tate, 1921. 'The Cichlid Fishes of Lake Nyassa.' *Proc. Zool. Soc. London*, 1921, pp. 675-727, 30 text-figs, 6 pls.

Tanganyika species find parallels also in the Victoria Nyanza. Here the species of *Haplochromis* are numerous and diverse, but generic divisions are not well marked*.

The Lake Edward fish-fauna is mainly Cichlid, and Dr. Worthington's collection enables us to recognize six species in common with Lake Victoria, seventeen endemic and two Nilotic species. One of the latter is the widespread *Tilapia nilotica* (already recorded from the lake); the other, *Haplochromis multicolor*, was found in the Semliki River, not in the lake itself. The endemic *Haplochromis* are all closely related to Lake Victoria species. The endemic *Tilapia* represents the two Lake Victoria species †, with some of the characters of each. *Schubotzia*, the endemic genus, was not represented in this collection.

Lake Rudolf resembles Lake Albert in having a Nilotic fish-fauna, mainly non-Cichlid. The Cichlidae comprise three species of *Tilapia* common in the Nile, a new endemic species of *Haplochromis*, and a new species of *Pelmatochromis*. The presence of a *Pelmatochromis* is very surprising, since the genus is a West African one, not represented in the Nile.

As Dr. Regan wrote in 1922, 'If the degree of differentiation be taken as a guide, one may form the conclusion that the Cichlidae have inhabited Tanganyika longer than Nyassa, Nyassa longer than Victoria.'

The new collections abundantly confirm the earlier suggestion that the present fish-fauna of Lake Edward is derived from the Victoria Nyanza, with very little connection with Lake Albert, and the Nile, and that Lake Rudolf was formerly connected with the Nile system. In addition, a hint is given of a more ancient connection between Lake Rudolf and the West African drainage-system.

Dr. C. TATE REGAN said that he and Miss Trewavas were collaborating in an attempt to put the Cichlidae in order. This was a large family, including probably a thousand species, and it was very difficult to classify, unless one were content to have one or two very large genera that included a great diversity of species, and to separate from these a number of small, mostly monotypic, genera, each distinguished by some specialized feature.

Mr. J. T. CUNNINGHAM said that he had been especially interested in the adaptive modifications related to different kinds of food and methods of feeding described by Miss Trewavas, and in the fact that such modifications were quite independent of specific characters and relations.

* Regan, C. Tate, 1922. 'The Cichlid Fishes of Lake Victoria.' Proc. Zool. Soc. London, 1922, pp. 157-191, 14 text-figs, 4 pls.

† See Graham, M., 1928. Ann. & Mag. Nat. Hist. (10) ii, pp. 209-13, pls. ix-xi.