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### Scale-eating Habits of African Cichlid Fishes

In a recent communication, Marlier and Lelcup<sup>1</sup> have described how the Tanganyikan Cichlid fishes of the genus *Plecodus* deliberately attack other fishes and bite off the scales, which are their sole or main means of subsistence. These authors mention the specialized, large, curved teeth which enable the species of *Plecodus* to feed in this way and remark on the apparent uniqueness of the habit.

Although this seems to be the only observation of fishes engaged in such a habit, a similar diet has been recorded for Nyasan Cichlids of the genus *Corematodus*. During the 1939 Fishery Survey of Lake Nyasa<sup>2</sup>, six specimens each of *C. shiranus* Boulenger and *C. taeniatus* Trewavas were examined and the stomachs and intestines were found to be full of minute fish scales, matching in size and structure those that densely coat the caudal fin in the Nyasan Tilapias and other Cichlid fishes. The dentition of *C. shiranus* is figured by Boulenger<sup>3</sup>, who describes it as consisting of "extremely broad bands of innumerable minute club-shaped teeth with compressed oblique crowns". Trewavas<sup>4</sup> describes how the caudal fin of a *Tilapia* can be held between the upper and lower file-like tooth-bands of *Corematodus* and only pulled free at the cost of losing some scales.

During the course of work on a rocky shore of Lake Nyasa, one of us (G. F.) has recently collected five specimens of the little-known endemic Cichlid *Genyochromis mento* Trewavas. The guts of all five contained a number of relatively enormous fish scales, evidently derived from Cyprinid fishes of the genus *Labeo*. These scales were partly digested and apparently constitute the main food of the species, as in all cases they composed the bulk of the gut contents, sometimes to the exclusion of all else. In one specimen they were accompanied by a few slender fin-rays but by no other bones, and in another by a very small quantity of filamentous algae.

The dentition of *G. mento*, figured by Trewavas<sup>5</sup>, is quite different from that of either *Corematodus* or *Plecodus*. The lower jaw is stout and prominent. Both jaws bear bands of teeth, of which all but those of the outer row are tricuspid; the outer are bicuspid. If the outer teeth of the lower jaw are inserted under the edge of a scale of *Labeo* the scale is easily removed.

*Genyochromis mento* is related to *Pseudotropheus*, *Petrotilapia* and *Cyathochromis*, the members of which

graze on epiphytic and epilithic algae. Baerends and Baerends-van Roon<sup>6</sup> describe in *Tilapia natalensis* "a peculiar way of eating algae from substrates. It opens the mouth widely, presses it against the substratum and closes it while pressing". This is very similar to the account by Marlier and Leleup of the action of *Plecodus* in biting scales from its victims. One of us (P. H. G.) has noticed in a Cyprinid, *Labeo*, of Lake Victoria, behaviour that suggests a possible step by which a grazer on algae may become a scale eater. The *Labeo* was seen repeatedly to graze on the sessile rotifers growing on the flanks of a *Polypterus* kept with it in an aquarium. *Labeo* has toothless, sharp-edged jaws; but most Cichlid grazers on algae, including those related to *Genyochromis*, have bands of movable teeth. The teeth of *Genyochromis* are relatively firmly fixed. The same jaw action would shave the surface where the teeth are movable and remove scales where the teeth are fixed, especially with a prominent lower jaw. These rather scattered observations suggest how the scale-eating habit in *Genyochromis* might evolve from the grazing, with a change from movable to fixed teeth.

The three genera that have adopted the scale-eating habit are not very closely related within the family Cichlidae and have achieved the same end by dissimilar means.

Except that it seems to be related to *Perissodus*, a genus that also has a specialized dentition, the ancestry of *Plecodus* is obscure; but it does not necessarily follow that because some individuals will take a bait the species or its ancestor is predominantly voracious. Yet in this case scale-eating may be a modified predation, as it almost certainly is in *Corematodus*.

The work on *Genyochromis* is part of a study now in progress of the ecology of some littoral zone fishes in Lake Nyasa.

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<sup>1</sup> Marlier, G., and Leleup, N., *Nature*, 174, 935 (1954).

<sup>2</sup> Bertram, C. K. Ricardo, Borley, H. J. H., and Trewavas, E., Report on the Fish and Fisheries of Lake Nyasa, pp. 60-61 (1924).

<sup>3</sup> Boulenger, G. A., "Cat. Fresh-Water Fishes Africa", 3, 494 (1915).

<sup>4</sup> Trewavas, E., *Nature*, 160, 120 (1947).

<sup>5</sup> Trewavas, E., *Ann. Mag. Nat. Hist.*, (10), 16, 65 (1935).

<sup>6</sup> Baerends, G. P., and Baerends-van Roon, J. M., *Behaviour*, Supp. 1, 30 (1950).