

LETTERS TO THE EDITORS

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An Example of 'Mimicry' in Fishes

AMONG the genera of Cichlid fishes peculiar to Lake Nyasa, *Corematodus*, comprising two species, is characterized by the dentition, which consists in each jaw of a broad file-like band of small pointed teeth. Otherwise these two species would be included in the large genus *Haplochromis*, of which more than a hundred, nearly all endemic, have been recorded from Nyasa. Among the *Haplochromis* and their related genera in Nyasa, many species have a colour pattern characteristic of the Lake and rarely met with elsewhere in Africa, namely, a dark oblique band from nape to caudal fin. *Corematodus taeniatus* Trewavas also has this pattern on a silver-grey ground; the largest specimen known is 19 cm. in total length. *C. shiranus* Blgr. has quite a different pattern, consisting of vertical, or nearly vertical, black bars extending from the back to near the ventral surface. This pattern is exactly similar to that of females and non-breeding males of the Nyasa species of *Tilapia* of the *T. squamipinnis* group; and *C. shiranus* reaches a length of 27 cm., which is one of the commonest lengths of the *T. squamipinnis* caught during the Fishery Survey of 1939¹.

The guts of six specimens of each species of *Corematodus* were examined. The intestine is long, narrow and coiled. In each case stomach and intestine contained nothing but hundreds of minute scales exactly like those which cover the caudal fin of so many Cichlid species of Lake Nyasa, including *Tilapia squamipinnis*. The efficacy of the double file of the jaws of a *Corematodus* in rasping scales from the caudal fin of a *Tilapia* can easily be demonstrated, and except for the loss of some scales, the tail can be pulled undamaged from between the closed jaws. It seems that *Corematodus* specializes in this curious diet.

The strong superficial resemblance of *C. shiranus* to *T. squamipinnis* must be very useful to the former, enabling it to swim unnoticed in the shoals of *Tilapia*. The relationship between the two fulfils the conditions required of model and mimic. *Tilapia* is abundant and swims in shoals, *Corematodus* is relatively rare and is solitary, and reaps the advantage of the resemblance.

It was not found possible to identify the scales in the gut of either species of *Corematodus* as being those of *Tilapia* or of one of the *Haplochromis* group. It would be interesting to know if the two species do, in fact, select as victims fishes resembling them respectively in colour-pattern. The *Corematodus* seen were caught singly, in hauls including numerous *Tilapia* and also some oblique-banded Cichlids.

The two species of *Corematodus* were exhibited some years ago with the species they resemble by Dr. Tate Regan, but until 1939 their habits, which give point to the mimicry, were unknown.

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¹ Ricardo Bertram, C. K., Borley, H. J. H., and Trewavas, E., Report on the Fish and Fisheries of Lake Nyasa (1942); see p. 28 and p. 60.

A Fungus Parasitic on *Coptotermes curvignathus*, Holmgr.

DURING the course of some observations designed to determine the most suitable conditions for maintaining the workers of *Coptotermes curvignathus* (the termite pest of *Hevea brasiliensis*) in captivity, the development of an unusually high death-rate in one of the treatments led to an examination which disclosed that the insects had been parasitized by an entomophthoraceous fungus. The causal organism was isolated, and cultivated without difficulty on standard media and on rice-bran.

Its ability to parasitize and kill *Coptotermes* workers has been established experimentally; a 100 per cent kill being obtained within 48 hours in trials in which the insects (maintained in Petri dishes on sterile soil) were supplied with infected rice-bran as a source of food, the presence of the characteristic hyphae in the tissues of the insects confirming the cause of death. The mortality in the controls, fed on sterile bran, was 3 per cent during the same period.

Reference to the literature suggests a relationship between this parasite and the species of *Conidiobolus* isolated from *Nasutitermes* by Kevorkian in Cuba¹. The Imperial Mycological Institute, to which a culture was sent, considers, however, that the Malayan fungus does not completely agree with the Cuban fungus as that was described; in particular, the primary conidia of the first measure distinctly larger, and it has not been observed to form the structure termed 'villose resting spores'. Pending comparison with authentic material, it is regarded tentatively as a new species of *Conidiobolus*.

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¹ Kevorkian, A. G., *J. Agric. Univ. Puerto Rico*, 21, 191 (1937).

A Disease of Pyrethrum in Kenya

THE demand for pyrethrum (*Chrysanthemum cinerariifolium*) resulted in a greatly increased production of this profitable crop in Kenya during the War. It has been cultivated commercially in Kenya since 1928. From 1,864 tons in 1938, the yield rose to 7,409 tons from 52,837 acres in 1945. This acreage is concentrated in a few areas in the Highlands, most of it at an altitude between 6,000 ft. and 9,000 ft. Minor losses, due to root and crown rot, are of common occurrence, but until 1946 the crop had escaped any serious disease in spite of the continuous and intensive cultivation to which it has been subjected.

The most important of the higher yielding areas is on the Mau Escarpment, where in June 1946 a serious falling off in yield, estimated in some instances to be as high as 80 per cent, occurred. Although the plants themselves appeared healthy, the flower buds failed to develop on account of an attack by the fungus *Ramularia bellunensis* Speg.¹. By the end of the year, the disease had spread to all the main pyrethrum areas with the exception of the Nyeri-Nanyuki area on the slopes of Mount Kenya, which, up to the time of writing, had remained free.

Although typically a disease of buds and flowers (see illustration), rarely extending beyond the apical inch or so of flower stalk, the disease has been found infrequently on the foliage. Here no definite spots are formed, but the infection starts from the tip of the leaf segments and extends inwards.