

DAMAGE TO FISH FRY BY CYCLOPOID COPEPODS

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OBSERVATIONS

Some fish fry were obtained from a Lake Erie plankton sample collected at Put-in-Bay, Ohio on July 4, 1958. The fry were examined immediately, but they were dead. Each had from 5 to 7 cyclopoids clinging to it (*Cyclops bicuspidatus* and *Mesocyclops edax*). It could not be ascertained whether the fry had died from the crowded conditions in the sample, or directly from bites by the copepods.

Specimens of the fry of the rockbass (*Ambloplites rupestris*) were obtained. Unfortunately they were well advanced (6.5 mm long), and were more active and alert than younger fry would have been. One of the fish was placed in 10 ml of lake water containing 5 specimens of *Mesocyclops edax*. The copepods had been isolated individually for the previous 24 hr to prevent any feeding. They were between 0.9 and 1.0 mm in length.

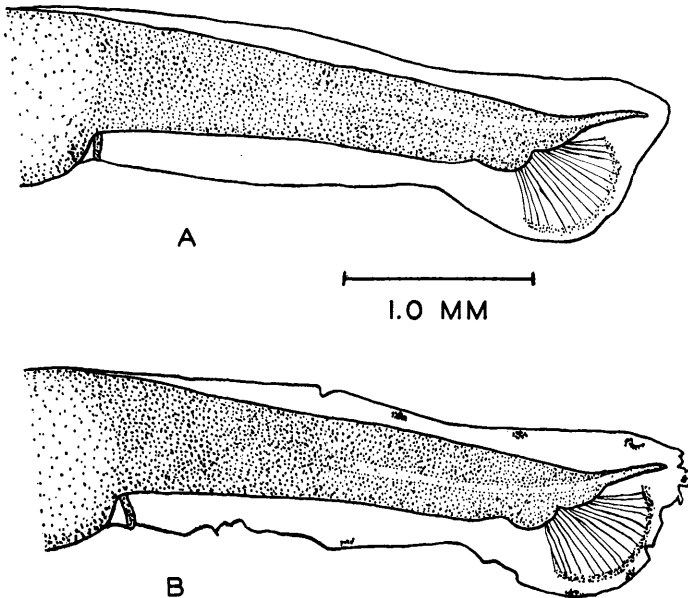


FIGURE 1. Posterior regions of two 6.5 mm fry of the rockbass, *Ambloplites rupestris*. **A.** A control animal, with fins intact. **B.** An animal after being subjected to harassment by *Mesocyclops edax* for one hour, at a population density equivalent to 500 per liter. The dorsal, caudal and ventral fins are frayed and bruised, with many small and a few larger pieces broken off. Drawings after sketches from life, checked against the same specimens preserved.

There was no indication that copepods swimming nearby were detected by the fish. The copepods, however, paused briefly as they passed near the fish. Thereupon, they suddenly pounced upon it and bit at it. To this stimulus the fish responded rapidly by flicks of the tail that both threw the copepod off and removed the fish from the danger. Often the response of the fish was so rapid that little or no damage was inflicted. However, in the course of half an hour, damage to the caudal and ventral fins became evident (bites on the head and other

parts of the body left no evidence visible with the lighting conditions used). The damage to the fins consisted mainly of a gradual fraying of the edges, the loss of small pieces, and the appearance of bruised spots. However, one copepod succeeded in removing a piece of the ventral fin nearly its own size, and some others removed rather sizable portions. After about an hour of harrassment, the fry showed distinct signs of fatigue.

Figure 1 shows the damaged fins of the experimental fish, compared to sound ones from a control fish.

DISCUSSION

It is well known that fresh-water cyclopoids form an important part of the food of many fish. It is evident, however, that a certain amount of harm may be done by them to the relatively helpless fry. Most such juvenile fish, in fresh waters, lie on the bottom, somewhat protected from predation by planktonic copepods. On the other hand, many cyclopoids regularly explore the benthic region for food. In the conditions of the described experiment the concentration of *Mesocyclops* was equivalent to 500 per liter, a quantity that is not infrequently encountered in nature. The actual and potential damage inflicted by cyclopoids upon fish fry needs to be assessed more precisely by larger-scale experiments, and by observations in the field.

It has been shown that some fresh-water cyclopoids are herbivorous while others are predatory (Fryer, 1957a, 1957b; Naumann, 1923). Practically all reports of predation by them concern only their capture of smaller prey, such as nauplii, adult copepods, rotifers, mosquito larvae, etc. Oliva and Sládeček (1950), however, reported the death of axolotl young (about 2 cm long) "attacked by . . . numerous *Cyclops*," and they mentioned a similar observation earlier by Babák (1913). A search of the literature failed to disclose other reports.

Many aquarium hobbyists are highly suspicious of *Cyclops*, but they are sharply divided in their views respecting the danger (e.g., see Ghadially, 1957 and Innes, 1955). Some advocate using cyclopoids as fish food, whereas others fear that breeding is poor in the presence of these copepods. Undoubtedly the different viewpoints are the result of experiences with different species of Cyclopidae, some vegetarian and some predatory, from which broad generalizations incriminating or exonerating all species have been made. The present observations support the contention that at least some cyclopoids may be harmful to the young of aquarium fish.

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