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On the nutrition of the predatory cladocerans Leptodora and Bythotrephes.
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In the present article are set forth additional results of the investigation on certain problems of the nutrition of Leptodora and Bythotrephes not touched upon in earlier published works (Lepneva, 1950; Mordukhai-Boltovskaya, 1958; Sebestyen, 1931, 1949; Weismann, 1874).

The principal food of predatory crustaceans in the Rybinsk reservoir throughout the greater part of the season consists of Cladocera, but in early spring their significance is less than other groups of zooplankton. To clarify the composition of the food of Leptodora and Bythotrephes in this period, experiments were provided on their nutrition by cyclopids and rotifers.

Young and adult leptodorids readily devour the rotifers Asplanchna herricki, A. priodonta, Euchlanis dilatata, in lesser quantities Conochilus sp., Keratella cochlearis and K. quadrata. On mixed food of Asplanchna herricki, Conochilus unicornis and the alga Volvox, the crustaceans lived from 2 to 12 days. With normal nutrition they can live) up to 1½ months (Mordukhai-Boltovskaya, 1956).

Bythotrephes on a ration of rotifers survived 4-5 days.

Dissection of the guts of Leptodora (200 specimens) and Bythotrephes (100 specimens), taken from the reservoir, confirmed the foregoing laboratory observations; in 17 leptodorids were displayed remains of the trophi of rotifers of the type incudatus (fam. Asplanchnidae) and malleatus (fam. Brachionidae); in Bythotrephes they were absent. The small cyclopids - Mesocyclops lenokarti, M. oithonoides and others, and also copepodites, nauplii and the species Diaptomus in small quantities are used in the food of both predatory crustaceans.

Probably, in May in the Rybinsk reservoir Leptodora, after emerging from its winter eggs feeds principally on rotifers and cyclopids, and

Bythotrephes mainly on the latter.

Predatory crustaceans in aquaria devour also young larvae of tendipedids (Tendipes, Procladius), temporarily appearing in the plankton, eating about 3-4 individuals per day. However, when the larvae of Tendipes sank to the bottom of the vessel and began to build tubes, the leptodorids and bythotrephids often became entangled in their webs or fell as prey to the predatory larva of Procladius.

The interrelations between the larvae of fish and predatory cladocerans maintained in the laboratory bear a peaceful character. The larvae of roach and zope [Abramis ballerus L.] 6-10 mm long, placed in a single vessel with Leptodora (5-6 mm) and Bythotrephes (2 mm) for a long time remained untouched. Only with a shortage of food or accidentally coming across a dead larva did the crustacean seize it. Evidently, the disparity in the dimensions of the larvae of the fish and the crustaceans does not play in the present instance a principal role, as for example the predatory cyclopids (Acanthocyclops viridis, Macrocyclus albidus, measuring 1.7-2 mm) according to our observations, attack Leptodora 6-8 mm long.

Experiments on the influence of low (8-10°) and high (25-27°C) temperatures on the nutrition of predatory cladocerans were made in an aquarium with flowing water and in a thermostat. The crustaceans were separated singly in small vessels of 2-4 cm diameter. Food was recounted once per 24 hours. At low temperature (8-10°) Leptodora and Bythotrephes of all ages at the beginning of the experiment for the first 2-3 days did not feed on or consume more than 1-3 crustaceans (Polyphemus pediculus). Newborn Bythotrephes on the 5th-6th days could eat a maximum of 6-7 crustaceans, adults - on average, 8, but one case was registered, when a female consumed 28 crustaceans out of 30. Newborn leptodorids at the low temperature did not feed and lived no more than 4 days. Adult Leptodora (5-6 mm) consumed 7-13 crustaceans in 24 hours (in one case 28 out of 39 crustaceans).

High temperature (25-27°) the predatory crustaceans endure badly; Leptodora on average lives 3-6 days, maximum 14 days (two cases out of

44), Bythotrephes 3-4 days, maximum 11 days (one case out of 101). Newborn leptodoridae at the high temperature live only a day and do not feed. The average daily ration of the adult Leptodora is 20 crustaceans, and the highest observed daily consumption is 63 crustaceans (one case).

Out of 84 experimental crustaceans 14 newborn Bythotrephes at high temperatures did not feed in the first 24 hours, 30 consumed up to 10 crustaceans, 29-10 to 14 crustaceans, 11 upwards of 15. On the 3rd-4th day their daily ration increased to 30 crustaceans (3 cases), and in the adults (with 2-3 pairs of claws) up to 46 (3 cases).

It was clear that, with a constant addition of objects of food during the 24 hours to the extent of their consumption, the average daily ration of predatory cladocerans at a temperature upwards of 25 comprised 15-20 crustaceans. Consequently, the intensity of feeding of Leptodora and Bythotrephes undoubtedly is reduced at a temperature below 15-10 and above 25°, as is known from previous experiments (Mordukhai-Boltovskaya, 1958), that at temperature of 15°-20°, apparently optimal for both crustaceans, they consume per 24 hours on average 25-30 crustaceans, and sometimes more.

The influence of illumination on the feeding of predatory cladocerans was tested by the following experiments: small vessels with experimental crustaceans and food, given according to calculation, were placed under a bell-glass covered with black paper. Control vessels were placed under normal illumination. Bythotrephes in darkness lived not more than 7 days (3 cases out of 37) and consumed in 24 hours at a temperature of 19-20 from 1 to 14 crustaceans. Leptodora bore the darkness better: several individuals, feeding normally, lived 20-30 days. Thus, one can conclude that absence of sufficient illumination lowers the intensity of feeding of Bythotrephes, but the feeding of Leptodora it does not affect. The account permits one to doubt the leading role of the factor of nutrition in the daily vertical migration of predatory cladocerans.

Literature.

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Notice

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