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by A. V. Monakov and T. I. Pugacheva

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Preliminary Data on Nutrition of Cyclops Vicinus (Copepoda, Cyclopoida).

By A.V.Monakov and T.I.Pugacheva.

(From: "Informatsionnyy Byulleten" /Information Bulletin/, USSR Academy of Sciences, Institute of Inland Biology, Leningrad, No.10, pp. 40-42, 1971).

The purpose of the present article is to study the peculiarities of the nutrition of Cyclops vicinus; the latter occurs extensively in the plankton of coastal and open parts of the Rybinsk Reservoir. We have no published information on the feeding of this species.

The radio-carbon method developed by Yu.I.Sorokin (1966) is used in this article. Animals collected in the water basin were placed in small vessels with a 50 to 250 cubic centimeters in capacity and were fed with various feeds marked by radioisotope C^{14}. Prior to the marking, the inverse specific activity (C_r), the ratio of the weight content of carbon in the food objects to its radioactivity were determined. After 3 to 4 hours exposure the animals were washed

and transferred to an aquarium with natural water where they were kept for one half of an hour to clear their intestines of non-assimilated marked food. Then the radioactivity of the bodies of the consumers (R) was determined and the assimilation value (C_y) was calculated without correction for the loss on respiration

$$C_y = \frac{C_r \cdot R \cdot 24}{t}$$

The assimilation index (Ga/C) was used as the index of feeding intensity; the former concept is a percentual ratio of the assimilation value to the carbon content in the body of the consumers. The daily rations were calculated by the usual method on the basis of the difference in the concentration of objects at the beginning and at the end of the experiment. The experiments were set-up at room temperature on animals preliminarily adapted to the conditions of the experiment.

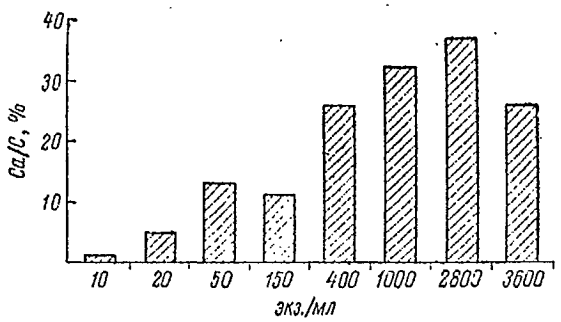
The initial step in the study of the feeding of C.vicinus was the determination of its food spectrum. We accepted conditionally the feed for which the maximum assimilation index was observed for cyclops as the optimal feed. The obtained results (see the table) indicate with sufficient evidence the predatory character of the feeding of cyclops. The assimilation indices when feeding on plant food turned out to be /p.41 several times lower than in experiments in which cyclops were given animal feed. The index was also rather high when the cyclops were fed on natural detritus the organic basis of which, as proved by microscopical studies, consisted of protozoa and apparently of bacteria. Microcystis detritus was used much less (see table).

Feeding intensity of Cyclops vicinus

1 Вид корма	2 Концентрация корма	3 Число животных в опыте	4 Число наблюдений	5 мкг C_y в С'экз.-сутки	Ca/C, %
Staurastrum	4 мг/л 9)	20	3	0.03 ±0.008	0.44
Scenedesmus	4 »	20	3	0.013 ±0.002	0.2
Ankistrodesmus . . .	4 »	20	3	0.037 ±0.003	0.5
Chlorella	4 »	20	3	0.12 ±0.03	1.7
6 Детрит естественный	В осадке 10)	20	3	0.73 ±0.1	12.0
7 Детрит из Microcystis	» »	20	3	0.3 ±0.03	4.1
8 Инфузории	150 экз./л 11)	40	4	1.14 ±0.05	16.2
Ceriodaphnia sp.	2.8 мг/л 9)	20	3	0.3 ±0.05	4.3
Ceriodaphnia sp. . .	2.8 »	20	3	0.5 ±0.06	9.0
Bosmina longirostris	4 »	10	4	5.5 ±0.5	55.0

Key:

1. Feed
2. Food concentration
3. Number of animals in the experiment
4. Number of observations
5. Micrograms of C_y in C/specimens x days
6. Natural detritus
7. Detritus out of Microcystis
8. Infusoria
9. Milligrams per litre
10. In the residue
11. Specimens per litre.



The relation between the feeding intensity of Cyclops vicinus and the food concentration.

Along the ordinate: assimilation index, %; along the abscissa: concentration of infusoria, specimens per millilitre.

We know that the feeding intensity of many planktonic crustaceans is closely connected with the concentration of food organisms. This connection is most clearly manifested in the filtrators, whose assimilation index first increases together with the growth in concentration, then stabilizes itself regardless of any further increase in the concentration of food (Monakov and Sorokin, 1961). A similar picture appears in predators, in the given instance in C.vicinus: the curve of assimilation index becomes level at concentrations commonly observed in a water basin, however, at concentrations higher than those occurring in nature the assimilation index drops rather sharply (see drawing). To determine the values of daily food consumption the animals were kept in aquariums not less than 24 hours since brief experiments on the determination of the daily rations, as a rule, show too high results.

The cyclops were fed the following five feeds.

Feed	Number of animals in the experiment	No. of observations	Ration in milligrams	Ration,% of raw weight
Ceriodaphnia sp.	15 - 35	2	0.008±0.001	11.4
Eudiaptomus sp.	21	1	0.014	20.0
Polyphemus Chironomidae	30 - 50	4	0.056±0.005	80.0
Chironomidae larvae	32	1	0.003	4.0
Eudiaptomus sp.	40	2	0.011	16.4

We note primarily, the considerable spreading of values when /p.42 feeding on different kinds of food, a completely natural occurrence, since the value of the ration is determined to a considerable degree by the availability of food. In this specific case Polyphemus pediculus turned out to be the most accessible ones; they form rather solid accumulations in the aquariums. The relatively large chironomid larvae were used considerably less. On the average the daily consumption of feed when feeding on various kinds of food was slightly below 30% of the body weight. Approximately identical values were obtained by us for the predatory Calanoida (Monakov and Sorokin, 1971a).

Thus, C.vicinus according to its feeding character differs but slightly from other predatory copepoda (Monakov, 1959, 1963). Under natural conditions it evidently feeds upon various small invertebrates ranging from protozoans to arthropods. Although the plant food and as the latest studies have shown (Monakov and Sorokin, 1971b) also the bacterial detritus may be a part of this species' ration, the intensity of the feeding of C.vicinus on animal food is considerably higher.

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