The fauna of filamentous algae aggregations in the Kuibyshev water reservoir

by M. Ya. Kirpichenko

Original title: Fauna skoplenii nitchatykh vodoroslei v Kuibyshevskom vodokhranilishche


Translated by the Translation Bureau (GM)
Multilingual Services Division
Department of the Secretary of State of Canada

Department of the Environment
Fisheries and Marine Service
Freshwater Institute
Winnipeg, Man.
1977

5 pages typescript
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Trudy Instituta biol. vodokhr.
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<td>BUREAU NO.</td>
<td>LANGUAGE</td>
<td>TRANSLATOR (INITIALS)</td>
<td>FEB - 8 1977</td>
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Trudy, Institut biol. vodokhr., AN SSSR, Vol. 8, 1965, pp 137-139

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in the Kuibyshev water reservoir

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M. Ya. Kirpichenko

During the formation of the Kuibyshev reservoir and the establishment of its fauna partially submerged trees and shrubs at various points in the reservoir played a special role in the life of the animal population of that water body. The protruding tops of the trees created the illusion of large islands, measuring in many instances tens of hectares. Throughout the growing season of 1957 these trees and shrubs were covered with green foliage. The submerged trunks and branches became covered with masses of filamentous algae forming crusts up to 1 m thick. These thick crusts turned the submerged trees into a special kind of biotope which supported an animal population of a size greater than on any of the flooded substrates.

The distinguishing features of this biotope were not only the heavy encrustment with filamentous algae, creating optimal living conditions

*The numbers in the right-hand margin denote the page numbers in the Russian original. - Transl.
for aquatic insect larvae, but also the existence of optimal conditions for imagoes seeking refuge among the branches and leaves of the trees projecting above the water. The latter was an important factor well away from the shore, sometimes tens of kilometres out in the middle.

On the submerged substrates which permeated the entire depth of water and emerged at the surface (trees, piles and so on), the filamentous algae in many cases attained a length of 10-20 cm.

Encrustments of filamentous algae on submerged substrates are called carpets (Aristovskaya, 1958), or simply accumulations of filamentous algae. These general terms do not bring out the ecologically very important feature of filamentous algae encrustments (Cladophora, Lyngbia and others), which attach themselves by one end of the filament to the substrate while the other end dangles free in the water. These threads form en masse distinctive mats, or as they are known popularly "mermaids' tresses". It is these mats that form centres of development for a very rich fauna of tendipedids and other animals. Aggregations of filamentous algae that have become detached from their substrate and do not form mats are usually sparsely colonized by hydrobionts. The abundance of animals in the mats suspended in the surface layers of water is due to the vigorous aeration that takes place there and the constant water exchange which brings nutrients to the filter-feeders.

The mats of filamentous algae were fished out with a lift net that was passed under the branches to which they were attached. The branches were either cut off or else the threads were scraped off with a knife. The material collected was fixed in formalin and the animals were extracted in the laboratory. At the same time the volume of mats was measured by placing them in a measuring cylinder containing water so that they floated in something approaching their natural state. The animals were
usually removed from a volume of mat not exceeding 1 litre, and their numbers were recalculated to $1 \text{ m}^3$. The density and biomass of the animals were recalculated to $1 \text{ m}^2$, allowing for the fact that in the water body the mats normally form layers with an average thickness of 10 cm, and this meant that the abundance per $1 \text{ m}^3$ had to be divided by 10. This recalculation was necessary to enable comparison with the data of other authors who had recalculated the biomass in terms of area.

The species composition of the fauna of the filamentous mats is poor. It includes of the oligochaetes *Stylaria lacustris* (from 20 to 1488 specimens per litre) and other naidids; of the leeches *Piscicola geometra* and *Erpobdella nigricollis*; of the mollusks species of *Dreissena* (post-veliger stages, sometimes numerous) *Lymnaea* and *Planorbis*; of the amphipods *Pontogammarus* sp. and *Dikerogammarus haemobaphes*; some species of mites; insect larvae of the genera *Lestes* and *Ordella*; the trichopter *Hydroptila*; the bug *Micronepta*; beetles; larvae of *Culicidae* and *Culicoides*.


An important feature of the mats was that they provided exceptionally favourable conditions for the prolific development of tendipedid larvae, and especially *Endochironomus* and *Cricotopus*. In many cases however the latter were no more abundant than *Stylaria lacustris*. The maximum number of animals per cubic metre sometimes reached improbable proportions: 4,754,000 specimens weighing 12,305 kg, made up of 4,504,000 tendipedids weighing 12.25 kg and 250,000 *Stylaria lacustris* weighing 55 g (see Table).
Abundance and biomass of animals in filamentous mats

<table>
<thead>
<tr>
<th>Animal group</th>
<th>Per 1 m(^2) (ave.)</th>
<th>Per 1 m(^3) (ave.)</th>
<th>Fluctuations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>Weight(g)</td>
<td>No.</td>
</tr>
<tr>
<td>Oligochaeta .</td>
<td>54900</td>
<td>10.40</td>
<td>549000</td>
</tr>
<tr>
<td>Tendipedidae .</td>
<td>141200</td>
<td>271.60</td>
<td>1412000</td>
</tr>
<tr>
<td>All animals .</td>
<td>183600</td>
<td>305.3</td>
<td>1836000</td>
</tr>
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The prolific development of tendipedids in the filamentous mats is due to the mode of life of these animals: *Endochironomus* are filter-feeders (Konstantinov, 1959), and the mats provide a comfortable habitat where they can construct their tubes by cementing together the algal threads (*Cladophora*).

The *Endochironomus* larvae in their tubes are difficult to discern immediately after the mats have been fished out of the water. It takes several minutes of exposure to the air before they leave their tubes and become visible.

The abundance of tendipedid larvae in the filamentous mats was reflected in an abundance of imagoes. The adult culicids emerged in July, August and September 1957 on the partially submerged tree islands; the swarms of tendipedid imagoes covering the leaves and branches were always in evidence. A swarm of midges was observed in Cheremshansk bay near Bork on the night of July 31st 1957. The swarms of insects covered the research boat and crowded every compartment. Their persistent humming filled the air. In the morning the grass on Bork island was covered with midges. Along the shore, near the water's edge, their bodies formed a continuous fringe. Mass proliferation of tendipedids, chiefly of the genus *Tendipes*,

...
in reservoirs was reported on by F. D. Mordukhai-Boltovskoi and A. F. Gun'ko (Mordukhai-Boltovskoi, Gun'ko, 1959; Mordukhai-Boltovskoi, 1961). The same authors in a joint paper (Mordukhai-Boltovskoi and Gun'ko, 1959) comment on the abundance of Endochironomus larvae on the freshly inundated floodplain meadow soil of the Gorky reservoir in 1957.

There are grounds for distinguishing within the broad biocenosis of submerged substrate encrustations a narrower biocenosis of "filamentous algae mats" with clearly expressed extreme features. This biocenosis is short-lived since it ceases to exist when the filamentous algae die off. In autumn there are very few animals among the dead filamentous algae assembled near the banks and in other places. The entire animal population of the biocenosis evidently dies towards winter or else transfers to another biotope.

REFERENCES


