Zooplankton – A Lake's best Friend

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By Dana Wilkinson

Zooplankton

As an employee of the Indiana Clean Lakes Program, I have the opportunity to view hundreds of plankton samples from around the state. Some of my favorite organisms to see are zooplankton. So often as lake enthusiasts, we think of the fish we love to catch or the algal blooms we hate to see, but what about all the other microscopic organisms swimming around in the water? What role do they play in the health of our lakes?

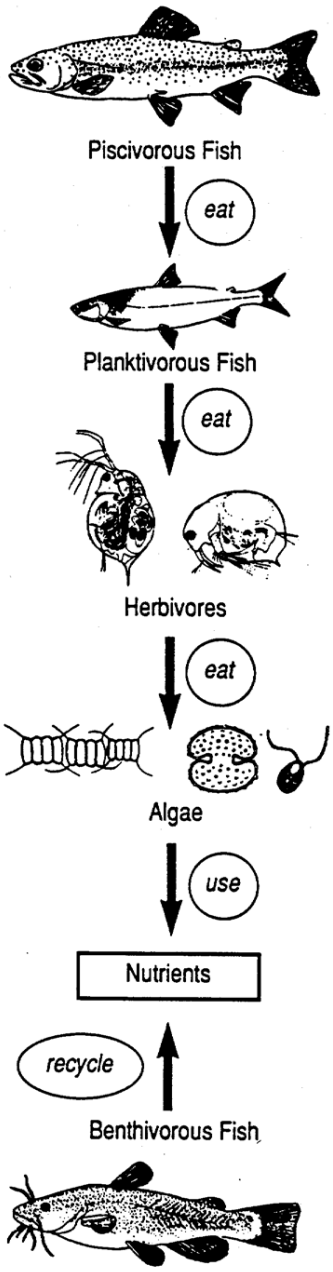

Figure 1. A typical aquatic food chain.

Zooplankton play an important role in a lake's ecosystem and food chain. Unlike algae, or phytoplankton, zooplankton are microscopic animals that do not produce their own food. They are responsible for eating millions of little algae that may otherwise grow to an out-of-control state. In fact, as mostly filter feeders, a community of zooplankton can filter through the volume of an entire lake in a matter of days! However, not all algae are edible and oftentimes it's the blue green algae that we would like to see disappear that can't be eaten.

Zooplankton are also a valuable food source for planktivorous fish and other organisms. The presence or absence of healthy zooplankton populations can determine some commercial fisheries success in both fresh and salt water bodies. By insuring that the lower parts of the food chain are healthy, we can protect the higher ordered organisms, like fish, whales and even us humans.

Below I've shared a little bit about some specific zooplankton groups that I often see in Indiana lakes.

Rotifers

There are over 2000 species of rotifers in freshwater systems. They are so named for their distinct mouth, called a corona. It is used for both locomotion and filter feeding.

Rotifers serve as a food source for larger organisms, including other zooplankton. Most do not swim and must simply drift along with the water, as many plankton do. But some species are better at moving themselves along than others. They are very efficient reproducers and can multiply asexually in good conditions. They eat bacteria, detritus, other rotifers, algae and protozoa.

Cladocerans

These small crustaceans are characterized by a two-valve carapace, or outer shell, covering most of their body (figure 2). Examples of this group include *Daphnia, Bosmina, Ceriodaphnia,* and *Diaphanosoma;* all of which look very similar except for very small differences in body shape. Some of them grow large enough to be spotted with the naked eye when captured in a light colored container. They feed on algae, detritus and bacteria. As filter feeders, they use their legs to create a flow of water past their mouths to then suck up food particles. The fine hairs on their legs also act as filters and can catch food drifting by.

Daphnia, known as the water flea, are able to move in the water, in a very unique, jerky manner by moving their appendages in a paddling motion. When viewing live specimens on the microscope, it can be very frustrating to keep them in view!

Figure 2. A Daphnia *female with three embryos in its brood chamber.* Photo by Bill Jones.

Several different genera of Cladocerans are seen in most lake samples that I count in the Clean Lakes laboratory. For instance, I saw quite an abundance of *Daphnia longiremis*, among many other zooplankton genera, in Lake Cicott of Cass County this past summer. The number of zooplankton we catch in one sample can often be determined by the quality or quantity of current algal food sources, time of day or sampling technique.

Figure 3. A rotifer, Testudinella. Photo by Micrographia.

Daphnia, and several other zooplankton, perform what is known as 'diurnal migration.' This is a daily routine of migrating between the darker, deeper waters of the lake during the day and the more food dense surface waters during the night. Although scientists don't fully understand this behavior, there are several hypotheses explaining their movement. One thought is that by avoiding the bright, sunny surface waters during the day, zooplankton can avoid predators and feed at the surface safely under cover of night.

Copepods

Two notable copepods that I see often are calanoids and cyclopoids (figure 4). As larva they are known as nauplii. The egg hatches into a nauplius larva and the life cycle typically includes 6 stages as a nauplii and 6 stages as a copepod, the last of which is the adult stage. As suspension feeders, they feed mainly on phytoplankton and protozoans, but some species are predatory. Copepods can be strong swimmers and will also undergo diurnal migration. They are an important link which connect food webs between small, algal cells all the way up to large fish and even whales.

Figure 4. A typical calanoid copepod. Photo by Severson Bay Plankton.

Next time you're out on a sunny, summer day, dip a white cup into the water, and see if you can't spy any tiny organisms moving about in the water.