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Hydra in an Iowa Nursery Lake

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During the months of May and June of 1946, tremendous numbers of a brown hydra, tentatively identified by L. H. Hyman of the American Museum of Natural History, as *Pelmatohydra olagactis*, were found in the nursery lake known as Diamond Lake. Diamond Lake is located in sections 14 and 15 of Diamond Lake Twp., Dickinson County, Iowa. For the past fifteen years this shallow (maximum depth 6 feet), 160 acre lake has been used as a yellow pike perch, (*Stizostedion vitreum vitreum*, commonly known as walleye), nursery pond.

On May 17 during a routine examination of a gill net that had been set the day before, it was noted that each bar mesh of the entire net was coated with what appeared at first to be a brown filamentous algae. A closer examination revealed that this brown coating was actually hydra. Each bar mesh appeared to be about four to five times its normal size and the net had a slippery, silky feel, similar to a mass of filamentous algae. An examination of the abundant vegetation in the lake, mostly sago pondweed, (*Potamogeton pectinatus*), confirmed the fact that these hydra were equally abundant in all parts of the lake; hydra could be found on every plant.

A 100 foot experimental gill net had been set for a period of three hours on the evening of May 7. It was reset on May 8 and examined twenty-four hours later. On the morning of the 10th the net was examined for fish and removed from the lake and was not reset until May 16. Nothing unusual was noted in connection with the net during this period of activity. Therefore it is doubtful that the hydra were present in large numbers prior to May 11.

Three closely related questions immediately presented themselves: First, how many hydra were there? Second, how would an abundance of hydra affect the zooplankton food of the walleye fry; and what damage would or could be inflicted on the fry themselves?

As mentioned previously, Diamond Lake supported a very abundant growth of sago pondweed at this time and every stalk and leaf was covered with large numbers of hydra. On May 18 a laboratory examination of a few of these pondweed leaves indicated that a one-inch linear section of leaf would have as many as 100 hydra attached, with an average of 41 per inch. This, of course, represented

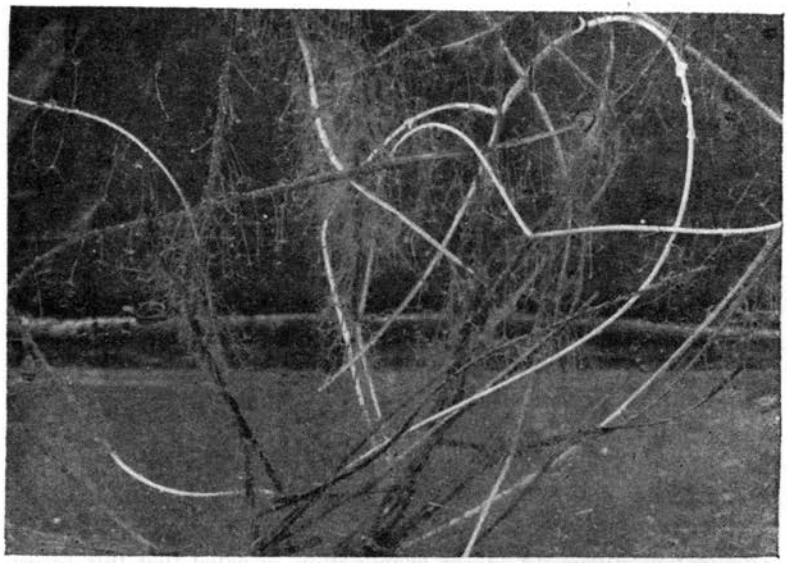

Fig. 1. Hydra as they appeared on sago pondweed removed from Diamond Lake in the spring of 1946.

an accumulated population and there was no way to make even an estimate of the linear extent of the vegetation in the lake (Fig. 1.).

The gill net was reset on May 21 after being soaked in salt water and dried. On the same date branches broken from trees along shore were placed in the lake at three different points. The net and branches were examined forty-eight hours later and were found to be covered with hydra. The gill net was removed from the lake, soaked in salt water and dried. It was reset on May 30 and left in the lake for a period of 136 hours. At various intervals during this period one or two bar meshes, usually one bar mesh from the top and one from the bottom of the net, were carefully removed and the hydra counted. A section of three-quarter inch seine was substituted for the gill net on July 26. This section of seine remained in the lake until September 14. At each visit several meshes were removed and examined for hydra but no counts were made (Table 1). Hydra were apparently abundant during the four-week period of May15-June 15, and again for a short period about the first of September.

In order to obtain some idea of the relative abundance of zooplankton and hydra, a number of plankton tows were taken using an improvised plankton net. On May 23 each thirty foot tow collected one or two hydra and large numbers of zooplankton. The number of drifting hydra increased during the following two weeks. Plank-

ton tows on June 5 indicated that the hydra outnumbered the plankton in each haul with the larger entomostracans entirely absent. On June 25 no hydra were taken and zooplankton was considered abundant again. Kofoid (1908) found a maximum number of 5,335 hydra per cubic meter of water in Quiver Lake during a vernal plankton pulse.

As might be expected of a shallow body of water, Diamond Lake is subject to rather quick temperature changes. Only a partial temperature picture is available. Water temperature taken at irregular intervals between May 8 and September 14 varied from a minimum of 56° F on May 10 to a maximum of 79° F on June 26 (Table 2). From these records it appears that the optimum temperature occurred between 60 and 70° F.

It was rather easy to demonstrate that the hydra were able to overcome and eat walleye fry. Although no direct observations of the affect of the hydra on the walleye fry in the lake was possible, the following observations in the laboratory indicate that the high population of hydra could have limited the walleye production. Langlois (1936) reports that eggs disappeared from bass nests when hydra were abundant.

A small amount of vegetation with an estimated 2,000 hydra attached was put into a hatching jar filled with water. Thirty fry were added to this jar. These fry were 8 mm in total length. With-

Table I

Hydra abundance as indicated by numbers per inch of gill net. (A section of three-quarter inch seine was substituted for the gill net during July, August and September but no counts were made).

Date Examined	Type of net	Hours submerged	Inches of net measured	Hydra per inch
May 31	Gill net	18	4.25	6.8
June 1	Gill net	46	3.62	72.9
June 3	Gill net	90	3.80	1.0*
June 5	Gill net	136	3.74	28.6
June 15	Gill net	26	none	0.0
June 26	Gill net	24	none	0.0
July 30	¾ inch seine	96	none	0.0
August 15	¾ inch seine	420	none	0.0
August 31	¾ inch seine	37 days	none	"several"
September 5	¾ inch seine	42 days	none	"several"
September 14	¾ inch seine	51 days	none	0.0

*Even this lowest estimate would indicate a population of 172,800 hydra to the 200 feet of 2-inch gill net 6 feet deep.

Table II

Tabulation of Diamond Lake water temperatures and the presence or absence of hydra. Temperatures were taken at the surface and recorded in degrees Fahrenheit.

Date	Water temperature	Hydra present	Hydra absent
May 7	58		X
May 8	58		X
May 10	56		X
May 17	59	X	
May 23	61	X	
May 31	64	X	
June 3	65	X	
June 6	68	X	
June 15	75		X
June 26	79		X
August 31	65	X	
September 5	71	X	
September 14	65		X

in 30 minutes every fish was either dead or completely paralyzed. When a fish came in contact with a single hydra it was able to escape, but only temporarily. The initial contact with a hydra resulted in violent action on part of the fish in an effort to escape the nematocysts. If an individual fish came in contact with as many as three hydra at one time, it was only a matter of four or five seconds before the fish was unable to move, either paralyzed or dead. Two fish were partially ingested by individual hydra one hour after the fry were introduced. One-half hour later no change could be noted in the portion of the fry ingested. The experiment was accidently terminated by the addition of tap water and due to the fact that there was no way to approximate natural conditions the experiment was not repeated.

Several attempts were made during the summer months to collect walleye fingerling from Diamond Lake. Only two of these attempts were successful. Five fish were caught on July 2 and two fish were caught August 8. Even during years of poor production the same effort would have produced five to ten times more fingerling. Two months of intensive fall seining with as much as 2,000 feet of one-quarter inch seine collected only 58 fingerling walleyes. The average production of walleye fingerling in Diamond Lake is about 10,000 per year with a previous low of 1,760 and a high of

516,000. Evidence seems to point to the fact that the hydra made a fairly clean sweep of the walleye fry in Diamond Lake.

The exact status of hydra in Diamond Lake prior to or since this time is not known but numerous visits have failed to detect their presence.

ACKNOWLEDGMENTS

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