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LEECHES[1]

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Leeches are boneless, wormlike animals whose segmented bodies bear a suction structure at each end. The suckers are used for attachment; also, the one at the head end, which borders the mouth, assists in withdrawal of blood and juices from prey.

Most of the leeches live in water. They are members of the phylum Annelida, which includes the earthworms. Four families occur in North America: the snail leeches (Glossiphoniidae), the fish leeches (Piscicolidae), the worm leeches (Erpobdellidae), and the blood suckers (Hirudinidae). Some 40 species have been recognized in the United States [14]. It is not known how many kinds inhabit Michigan but a publication [10] in which a complete listing was not attempted records 13 species.

The adults of American leeches range from about 1/4 inch to 12 inches in contracted length. Their colors are varied and usually subdued. The American medicinal leech, one of the larger and more familiar species in our state, is about 2 inches long, dark green on the back and reddish orange on the underside.

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Leeches may be found in various places in lakes, ponds, and streams, but they prefer soft-bottomed areas. They crawl around and rest on the bottom or else attach themselves to stones, logs, other submerged objects, and vegetation. The large kinds are adept swimmers.

The foods of leeches differ according to species. The diet of the group as a whole includes nonliving organic materials, tiny animals, and the blood and juices of snails, crustaceans, turtles, frogs, salamanders, and fishes.

Leeches are produced from eggs. Although reproduction results from the mating of pairs, these animals are hermaphroditic; that is, each individual possesses both male and female sex organs. The earthworms also have this arrangement.

Leeches are distributed all over the world. They inhabit the seas as well as fresh waters. Probably only the deserts and the continuously frozen areas of the polar regions lack these animals. Although most of them live in water, some exist on land and others are amphibious; the two latter groups are confined to the tropics.

A good popular source of information on leeches is Ann Haven Morgan's Field Book of Ponds and Streams [13]. Other good general accounts appear in The Encyclopedia Americana and The Encyclopedia Britannica. Serious students interested in the biology of these animals certainly should not overlook Mann's scholarly book [9] on the subject.

Value and nuisance

Leeches were used extensively in medical practice in Europe during the 1700's and 1800's, and in this country during the first half of the last century. They were placed on wounds and inflamed areas to reduce infections and induce bleeding. To maintain adequate supplies of them, they were cultured on so-called "leech farms" in Europe in the 1800's [12]. The quotations below, from an article [1] published 154 years ago, show the high regard for leeches then held by some practitioners.

> "These valuable animals having come into use in this part of the country but lately, a regular supply is obtained with difficulty. The following article from a Pharmacopoeia Chirugica, lately published, gives the necessary instructions for breeding and employing them.
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> " 'The freedom with which topical blood-letting is now employed, may be considered as one of the improvements of modern surgery; and in many cases one of the most effectual and least objectionable, is by the leech. These animals, however, are become so extremely dear, either from the exactions of those people who gather them, or by the monopoly of our drug merchants, that the patient is very frequently under the necessity of enduring his pain and sufferings from the utter impossibility of procuring what his surgeon has prescribed. . .' "

After a brief account of culturing leeches and more detailed instructions on applying and removing them from patients, the author concluded:

> " 'In all phlegmonous inflammations, whether from injury or any other cause, leeches afford one of the most effectual modes of relief, and they are often invaluable. In slow inflammations taking place in the large joints, or near them, in ecchymosis, in boils, whitlows, in schirrus, when painful, and when there are hopes of effecting a cure, leeches constitute an important remedy.' "

Leeching eventually fell into disrepute in America and Europe, but is said to be still practiced to some extent in the Orient.

Fish feed on leeches; therefore, as fish food, leeches are indirectly beneficial to man. A few anglers use them for bait. Beyond these considerations, and their doubtful therapeutic value, they apparently have no other utility.

These animals are more important from the nuisance standpoint. Several kinds of leeches that inhabit the tropics can be harmful. At least one species of the near East may live in humans, and in exceptional cases causes death. It is reported that in India another parasitic leech kills a number of cattle, horses, and dogs. Terrestrial leeches that attached themselves to soldiers in the Pacific islands and southeast Asia were serious pests during World War II. Several repellents were developed for use against them [2, 6].

The main problem with leeches in temperate regions involves fish. Severe infestations occasionally occur in wild fish populations [15, 16] but evidently are more common in cultured populations, especially in Europe.

The leeches in this country are not dangerous to humans. They sometimes are bothersome, as when they attach themselves to people who wade where they are plentiful. As is true also of harmless snakes and repulsive worms, the main nuisance aspect of leeches is the abhorrence they are apt to incite. Some kinds draw blood when attachment is prolonged, but the wounds are minor. Usually they are detected and removed soon after attachment.

Control in natural situations

Probably all Michigan lakes, streams, and long-established ponds contain leeches, but they are seldom abundant. Biologists collect and examine many fish each year, but rarely find one with a leech attached. Also, leeches are not frequently encountered in the extensive dredging that is done for studies on fish-food organisms. Apparently predation by fish holds down their numbers. The larger populations usually occur where fish are scarce, as in new impoundments and winterkilled lakes.

Few complaints on leeches are received by the Department of Conservation. Occasionally, though, an inquiry appears which resembles this fictitious letter:

Dear Sirs:

Yesterday our young son was wading in Full Moon Lake in front of our cottage. When he came ashore, a creature that looked something like a worm was attached to the top of his foot. It was black and about an inch long. Will you please tell us what it was? My son showed it to a neighbor and he said it was a leech. Is this so? He says he has found others like it in this lake in front of his cottage.

We are worried that they may give us trouble. Will they bite or harm people in any other way? I shudder to think of being in the same water with such repulsive things. We bought this property just recently and would like to have a good, safe place for bathing, although the bottom here is quite soft and muddy.

Please tell us how we can get rid of these ugly things.

Sincerely yours,

Mrs. _____ _____

The reply to such a letter would read like this:

Dear Mrs. _____:

Yes, the animal you described in your letter to us quite certainly was a leech. Leeches are fairly common inhabitants of lakes and streams, although a person may not often see them. Those in this part of the world are not dangerous to

humans, even though some of them are capable of drawing blood. Such abrasions are minor, however, and need not be of serious concern. The repulsive aspect of leeches is their most undesirable feature.

Maybe you will not be bothered as much by leeches as you anticipate. But the comment that your neighbor has seen a number of them in Full Moon Lake suggests that they may be more plentiful there than in most lakes.

Unfortunately, a reliable method has not been found to date for controlling leeches in natural bodies of water by killing them. If such a method were known, it probably would be useful only to the extent of reducing their numbers. Some kind of toxic chemical seems to hold the most promise for achieving this effect. At least to date, nuisance reports on leeches are too few to warrant intensive effort on developing such control measures.

A practice we have recommended for leech control on bathing areas is that of altering the lake bottom. These animals thrive on mucky soils, and especially if debris is present. Therefore it seems logical that they will abandon such areas if their hiding and breeding places and sources of food are destroyed. We suggest that all large objects that are present (such as branches, stumps, and rocks) be removed. Further, that the soft bottom soil be either

covered or replaced (as the situation requires) with a substantial layer of sand. If there is only a thin layer of muck over firm ground, a 3-inch covering may be sufficient; but where 6 inches or more of ooze occurs, its removal by dredging is advised, followed by replacement with sand. Extensive probing of the bottom with a pole will help determine the thickness of the soft material and the amount of removal required.

We hope this reply will give you some understanding of leeches, and if they really present a problem at your location, that our suggestion of dealing with it will be helpful.

Sincerely yours,

Department of Conservation

Something should be said also about the avoidance of problems with leeches. The old saw, "An ounce of prevention is worth a pound of cure," can be applied to leeches as well as germs and other sources of trouble. That is, try to avoid them if they bother you. A person who is in the market for a lake shore lot is in an excellent position to heed this suggestion. As a general procedure, a person should always thoroughly examine a site before he buys it. For example, if a first-class place for bathing is wanted, he should find out whether the lake bottom on the property is sufficiently firm and the water deep enough to satisfy his desires. Besides being a poor area for bathing, an extremely soft, muddy bottom may harbor many leeches. Remember, though, that

dense populations of leeches do not occur on all soft-bottomed shoals; also, that such areas are not always undesirable. Many lakes which completely lack sand bottom nonetheless provide desirable water frontage.

Leeches as fish bait

Not everybody concerned with leeches tries to side-step or destroy them. Some people search for them, especially the fishermen who use them as bait and say they are fine for perch, walleyes, bass, and bluegills. But such usage is rather limited, probably because this information is not widely known and plentiful supplies of leeches are scarce. Only a few bait dealers keep them in stock.

Now and then someone asks how he can gather leeches easily. No sure-fire method is known. Finding an area where they are numerous is a major problem. Hand-picking from submerged rocks and waterlogged wood is the usual procedure used in collecting them. Stirring up the pond bottom with one's foot sometimes is effective in disturbing leeches enough to cause them to swim to the surface where they can be caught with a fine-meshed dip net. From tests made with submerged jugs of heated water, we have observed that warm surfaces tend to attract these animals when the lake water is cold. If a self-heating device could be developed for the purpose, it might prove to be a good gadget for obtaining leeches.

Leeches can be stored easily because they need but little oxygen and survive a long time without food. Small numbers of them can be kept in glass or plastic jars; large supplies may be held in tanks like those used for minnows. The containers should be covered, as leeches will crawl out of open-topped vessels.

Control in fish cultural facilities

Apparently leeches plague fish culturists much oftener in Europe than in North America. However, such trouble is a potential threat almost anywhere, so a review of published methods for control in hatcheries and cultural ponds is included in this discussion.

Pink salmon fry and eggs that had become heavily infested with leeches in a Washington hatchery were placed in a bath of undiluted sea water (2.8% salinity) [5]. Treatment lasted from 15 minutes to 1 hour. All the leeches had fallen off after 15 minutes, and all those exposed to the 1-hour treatment were killed.

In experiments performed in the Philippine Islands [7], 2% sodium chloride killed mature leeches in 48-75 hours, 3% in 3-7 hours, 4% in 1-2 hours, and 5% in 30-70 minutes. A preparation of Derris illiptica roots at a concentration of 1:100 (10,000 ppm) killed the mature animals in 6 1/2-17 hours.

In India, leech-infested carp from an aquarium were treated successfully with a solution of 1 part of glacial acetic acid to 1,000 parts of water [8]. The parasites were killed in one minute with no

harm to the fish. The aquarium was disinfected with a solution of 1 gram of potassium permanganate to 1,000 parts of water, which killed all the remaining leeches in 24 hours.

A Russian investigator [4] has recommended use of one of four baths to remove leeches from carp: (1) 2.5% sodium chloride solution for one hour with artificial aeration; (2) 0.2% solution of lysol for 5-15 seconds; (3) 0.2% solution of unslaked lime, very fresh and free of impurities, for 2-5 seconds; (4) 0.005% solution of cupric chloride for 15 minutes.

The effect of these baths is to detach the leeches rather than kill them. An important consideration is whether species less hardy than the carp can withstand these treatments, but the question could be settled by tests on small numbers of fish.

Other Russians [3] claim that 0.4-0.5 part per million of copper sulfate applied to the surface of ponds in which the flow of water was discontinued 1-2 days was highly effective in killing leeches. They advise use of a freshly prepared solution, clarified with a few drops of ammonia.

The leech of concern in Russia apparently is far more sensitive to copper sulfate than some other species. Other experiments with copper sulfate have shown leeches to be considerably more resistant to this chemical [7, 11].

In tests with copper sulfate on a leech common in the Philippine Islands, a solution of 1:1,000 (or 1,000 ppm) killed mature

specimens within 2-2 1/2 hours [7]. Weaker doses of 1:10,000 (100 ppm) and 1:50,000 (20 ppm) required 5-7 hours and 48-75 hours, respectively. A concentration of 1:100,000 (10 ppm) did not harm adults but killed young in 48-57 hours. It was concluded that 20 ppm was the weakest solution practicable for control work in the Philippines.

Although copper sulfate is highly toxic to fish and must be used with extreme care in their presence, it seems to hold good promise for controlling leeches. Further research is required to find concentrations and techniques of application that will be effective on local species without destroying fish. It might be found usable also for treating limited areas of lakes where leeches are abundant and troublesome.

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