Fish Grubs in Freshwater Ponds and Lakes

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Fish grubs are the immature forms of parasitic worms that invade the flesh of fishes. Grubs appear as round or bead-like structures embedded in the fish's flesh. Grubs are contained in spherical or oval cysts. If the cyst is opened, the immature worm will straighten and flatten into a form that resembles the adult. The short, flat adult fish grub lives in another animal which uses fish for food.

The cysts and grubs of some types of worms have characteristic colors. Thus, some species are commonly called yellow grubs, white grubs and black grubs. In Texas ponds and lakes, the worms live as parasites in almost every kind of fish. The most common worms are the yellow grub, white grub, black grub and eye grub.

Yellow Grub

(Clinostomum marginatum)

This large grub infects bass, bream, catfish and many other fishes. It invades the muscles or edible part of the fish, and its size and color make it easily visible.

Although this parasite is not harmful to humans eating the fish, the flesh of a parasitized fish may lose visual appeal.

The life cycle of the yellow grub is very interesting as it involves not only the fish but also a snail and a bird. The cycle begins in the water with the hatching and release of a stage known as a miracidium from the microscopic-size egg (figure 1).

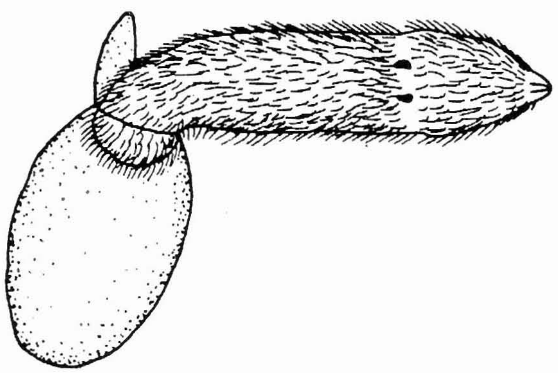

Figure 1. Miracidium hatches from egg and begins search for a snail.

The miracidium, whose length is greater than its width, is propelled by the movement of cilia (hair-like structures) on the body surface. After a few hours of swimming, the miracidia die.

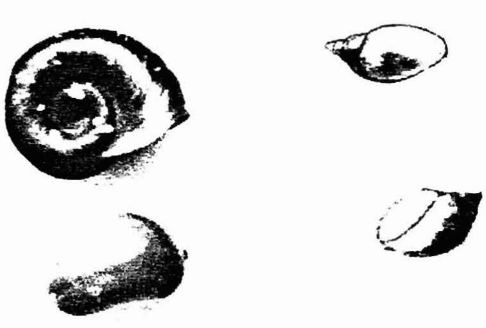

Figure 2. Snails that are parasitized by fish grubs. The snail on left is infected by the yellow grub; the one on the right by the white grub.

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If a miracidium comes in contact with a snail of the type shown in figure 2, it enters the snail, sheds its cilia, and forms a sporocyst. The sporocyst produces several stages known as rediae (figure 3). Each of these similarly produce larvae known as cercariae (figure 4) or daughter rediae which then produce cercariae. Consequently, a grub parasite multiplies into numerous individuals after entering a snail as a single individual.

Figure 3. Rediae of the yellow grub removed from a snail.

Figure 4. Infective stages or cercariae in search of a fish. They swim by wagging their forked tails.

The cercariae leave the snail and, by the swimming action of their tails, come into contact with and penetrate fish. As the cercariae enter the fish, they lose their tails and form cysts.

The next stage, known as the metacercariae (yellow grubs in fish's flesh), develop within the cysts. The cyst typically has two walls, a thinner wall (figure 5) that is thought to be secreted by the parasite and a thicker outer wall (figure 6) that is thought to be provided by the fish.

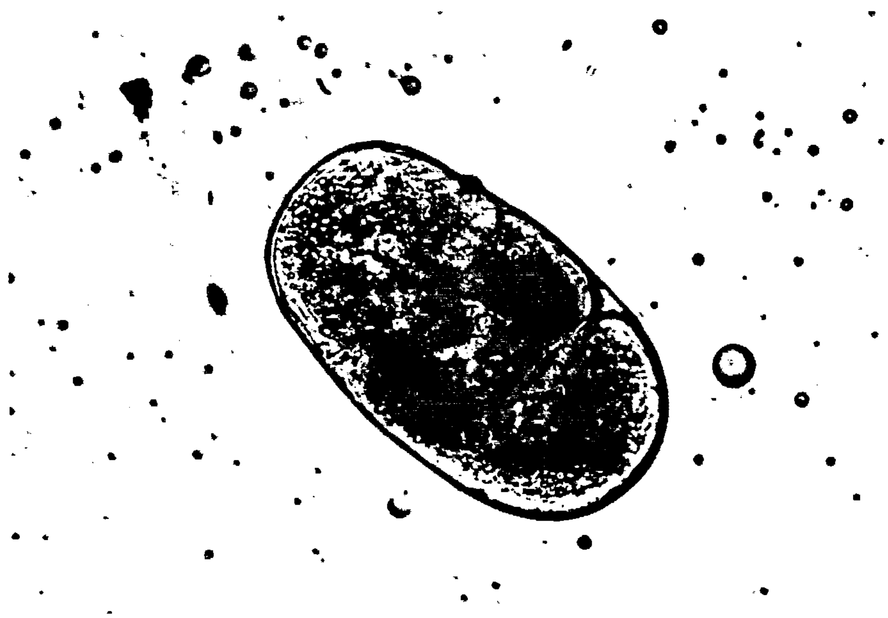

Figure 5. A fish grub removed from a fish. It is enclosed within a thin membrane.

Figure 6. The previous cyst before removal from the thicker outer cyst.

Distribution of the worms is random and the yellow grubs may be seen in the fins, gills and mouth when casually examining the fish (figure 7). Upon skinning or filleting the fish, the worms become apparent in the flesh (figures 8 and 9).

If an infected fish is consumed by a fish-eating bird, the fish passes down into the stomach of the bird where the cysts are digested by enzymes. The freed grubs migrate up the esophagus to the trachea, the mouth cavity (figure 10), or the upper esophagus.

Figure 7. Yellow grubs beneath the skin of channel catfish.

Figure 8. Yellow grub removed from a cyst shown in previous figure.

Figure 9. Yellow grubs in the flesh of a partially filleted largemouth bass.

Figure 10. Mature grub parasites in the mouth cavity of an egret.

They attach themselves and become sexually mature adults (figure 11) in 4-6 hours. When the water bird thrusts its beak into the water, eggs laid by the adult worms are released into the water. When the eggs hatch, the cycle is completed.

Development time for the parasite in the egg is a few hours; in the snail, approximately 5 months; and in the bird, a few days. The grubs may live for as long as 3 years in the fish.

Figure 11. Mature parasites.

White Grub

(Posthodiplostomum minimum)

The white grub (figure 12) occurs in a variety of fishes but mainly in sunfishes and minnows. The strain found in ponds affects sunfishes almost exclusively. Although quite common, this grub does not attract as much attention as the yellow grub because it is smaller and encysts in the visceral organs rather than throughout the flesh. The principal organs affected are the kidneys, liver and heart (figure 13).

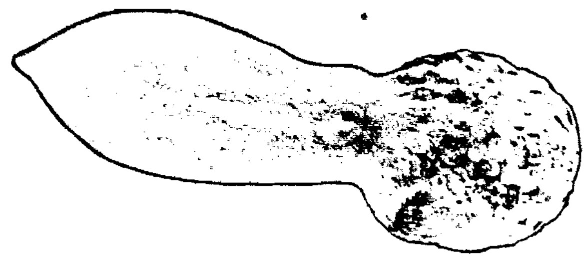

Figure 12. A white grub removed from its cyst and allowed to flatten for photographing.

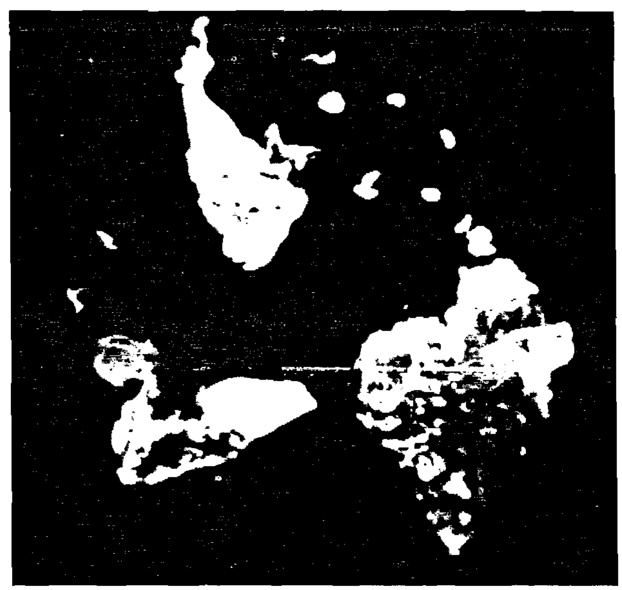

Figure 13. White grubs in a kidney and two hearts removed from bluegill sunfishes.

The life cycle of the white grub is similar to the yellow grub in that a fish, bird and snail are used as hosts. Important differences are:

1. The adult lives in the intestine of the fish-eating bird and expels eggs with its waste rather than through the mouth.

2. A different type of snail (figure 2) is used and a sporocyst produces cercariae directly.

3. The cercariae penetrate the fish and are carried by the circulatory system to the organs where they develop into metacercariae (white grubs).

The development time of the white grub is shorter than the yellow grub. The longevity of the grub stage in fish may be quite extended as observations of more than 4½ years have been made by some investigators.

Black Grubs

(several species)

Black grubs (figure 14) represent several species that affect a variety of fishes. One common species, *Uvulifer ambloplitis,* affects bass and bream. The affected fish appears "peppered" as the cysts of the parasite are lodged just under the skin and have a black color. The life cycle of this parasite also involves a fish, bird and snail. The snail used is like that used by the yellow grub and the adult matures in the intestine of a bird (Kingfisher). Cercariae are produced from sporocysts as no rediae are formed. The cercariae penetrate beneath scales or into fins and form cysts. The fish deposits pigment cells around the cyst and it appears black to the naked eye within three weeks. The metacercariae (black grubs) have been recorded by investigators to live as long as 4½ years.

Figure 14. Black grubs in the skin of a minnow. Infested sunfishes have a similar appearance. The black spots on the catfish in Figure 7 are not black grubs, but only part of the normal coloration.

Eye Grubs

(Diplostomulum)

Eye grubs do not encyst like the other grubs but eventually become situated in the lens or vitreous chamber of the eye. The grub commonly seen is the metacercaria of *Diplostomulum spathaceum.* Upon close examination of an eye of an infested fish (figure 15), the eye grubs can be seen gliding about within the lens. The life cycle involves a fish, bird and snail. Cercariae are produced from sporocysts about 6 weeks after the miracidium penetrates the snail. After swimming for less than a day, the cercariae penetrate various parts of the fish's body and travel to the eye lens. Here, they become mature eye grubs (figure 16) about 5 to 6 weeks after entering the fish. After being eaten by birds, they become adults in less than a week in the bird's intestine. Released eggs hatch in about 3 weeks.

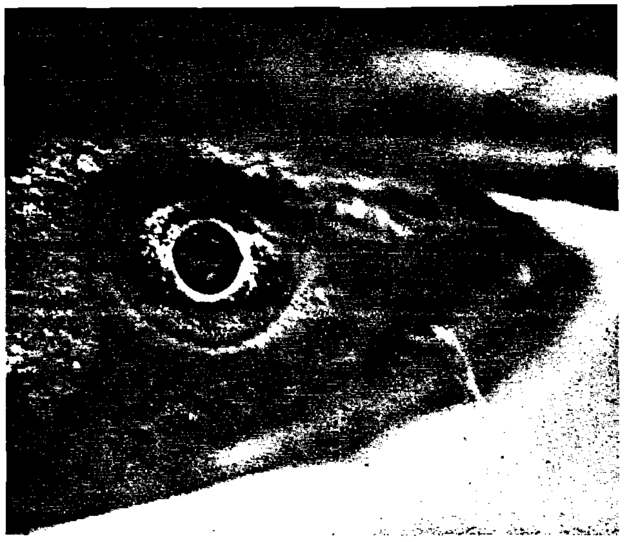

Figure 15. A catfish eye infested with eye grubs. The grubs were swimming about in the lens when the photo was made.

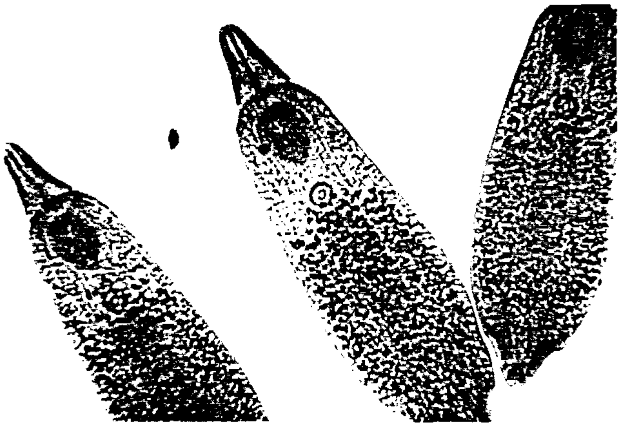

Figure 16. Microscopic view of the grubs in the previous figure.

Harmful Effects to Fish

The penetration of large numbers of cercariae into a fish can cause death to a fish (figure 17). Cysts that localize in a spot of vital function cause problems. Some grubs locate in particular organs and are harmful when in abundant numbers. A few eye grubs will not kill a fish but many will cause blindness and eventual death. A few white grubs may not noticeably affect a fish but many will slow growth, lower the condition or plumpness of the fish, and leave the fish more susceptible to a variety of diseases.

Figure 17. A dying catfish with a massive infestation of fish grubs.

Prevention and Control

Prevention of grub parasites requires avoidance of introduction of the parasite and alteration of the pond environment to discourage snails and birds. Care should be taken not to introduce snails or infected fish when stocking a pond. Since snails eat aquatic plants, reducing submerged vegetation would aid in reducing snail numbers. Deep pond edges and chemical applications for aquatic weed control reduce vegetation. Deep pond edges also help discourage birds that wade in shallow water. This will not prevent diving types such as cormorants, however.

Control methods often require the elimination of the birds or snails to break the cycle. Many chemicals have been produced that effectively kill snails but unfortunately, the levels at which most chemicals are used will also kill fishes. Although some chemicals, such as copper sulfate, have been employed with occasional success, snail control is not complete and the snails repopulate in a short period of time. Some success has been noted by stocking fishes, such as the red ear sunfish, which feed on snails and thereby reduce snail numbers.

Bird control is difficult because the birds are migratory and killing the birds is illegal.

Draining or drying of the pond is probably the only effective control method for grubs. The time required to get the pond back into production of harvestable fishes is a disadvantage of this method. Draining of large bodies of water such as reservoirs is impractical. Fall drawdown in lakes and ponds probably helps to reduce grub problems by reducing growth of aquatic plants.

Consumer Rejection

Although fish grubs are not a threat to human health, the ugliness of the yellow grub causes rejection by the fishermen or consumer. The other grubs are usually removed by conventional dressing.

Acknowledgment

Ray Telfair, Department of Wildlife and Fisheries Sciences, Texas A&M University, provided the photograph shown in figure 10 and the specimens shown in figure 11.