

Killifish Parasite Mind Games

Parasites affect California killifish brain chemistry.

By David Alderton

Posted: December 20, 2008, 5 p.m. EST

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Euhaplorchis californiensis.

Photo courtesy Todd Huspeni, University of California. A mind-bending parasite that alters a fish's natural behavior has been discovered in the salt land marshes of Southern California. By acting in this way, the parasite significantly increases its own chances of survival at the expense of the fish. A team of scientists headed by Jenny Shaw from the University of California in Santa Barbara has been investigating the relationship between this parasitic fluke or trematode, *Euhaplorchis californiensis*, and the California killifish (*Fundulus parvipennis*).

Infected killifish come up to the water surface more frequently than normal, which in turn makes them more conspicuous to predatory birds. Such fish are thirty times more likely to be eaten by birds than those which are not suffering from the parasite.

Being able to modify the fish's behavior in this way plays a critical part in the parasite's lifecycle. Once the fish has been eaten, the trematode then completes its development in the bird's gut. It is able to start laying eggs which are passed through the host's droppings. These eggs are consumed by aquatic snails, with the immature parasites ultimately leaving the mollusks and attacking other fish, thus completing the lifecycle.

The study has revealed that these trematodes actually produce a chemical blocker which inhibits the production of a chemical called serotonin in the killifish's brain. This normally helps to reduce aggression. The other brain chemical affected by the parasite is dopamine. Its output is increased, making the fish more restless. The combined effect of these changes is to make infected killifish lose their natural caution, explaining why they become more susceptible to being caught by birds.

The next stage in this research is to see how Prozac and similar drugs which naturally raise the level of serotonin in the brain may impact infected killifish. Although it has been recognized for some time that parasites can affect the behavior of invertebrates, very little is still known about their corresponding impact on vertebrates, and ultimately, this research could be significant as far as human medicine is concerned.