source and reservoir of infection, and incubation period and control.


Description of Edwardsiella ictaluri infection of channel catfish, including clinical signs, pathology, severity, and chemotherapy.

NOTE: A fish disease specialist should be consulted for diagnostic assistance whenever a disease is suspected and before chemical treatments are used.

The use of chemicals or drugs on fish intended for human or animal consumption must be in accordance with current laws and regulations.

Use of trade names does not imply U.S. Government endorsement of commercial products.

Some Fish Hosts of Edwardsiella tarda and Edwardsiella ictaluri.

**Edwardsiella tarda**

Atlantic salmon
Black tetra
Brown bullhead
Channel catfish
Chinook salmon
Japanese eel
Emerald shiner
Hirame flounder
Goldfish
Grass carp
Largemouth bass
Striped mullet
Striped bass
Nile tilapia
Yellowtail
Salmo salar
Gymnocyemrus ternetzi
Ictalurus nebulosus
Ictalurus punctatus
Oncorhynchus tshawytscha
Anguilla japonica
Notropis atherinoides
Paralichthys olivaceus
Carassius auratus
Ctenopharyngodon idella
Micropterus salmoides
Mugil cephalus
Morone saxatilis
Tilapia nilotica
Seriola quinqueradiata

**Edwardsiella ictaluri**

Brown bullhead
Channel catfish
Danio
Blue tilapia
White catfish
Ictalurus nebulosus
Ictalurus punctatus
Danio devario
Tilapia aurea
Ictalurus catus
INTRODUCTION
Cultured fish are often under stress from crowding, low levels of dissolved oxygen, presence of excretory products, etc. and are susceptible to infection by many types of bacteria. Two important disease causing bacteria are Edwardsiella tarda and E. ictaluri, the cause of enteric septicemia of catfish (ESC). Mortalities in cultured eel and catfish are caused by the adaptable and opportunistic E. tarda. However, E. ictaluri is more prevalent in catfish and often produces devastating mortalities on catfish farms.

ORIGIN AND DIAGNOSIS
The diagnosis of either bacteria is based on observed signs and isolation and identification of the bacteria in the laboratory. A sophisticated laboratory test is available to confirm the preliminary diagnosis.

PATHOLOGY
Edwardsiella tarda
Fish infected with E. tarda sometimes become lethargic, “hang” at the surface, and swim in a spiraling or erratic pattern. External lesions or sores vary with species. Channel catfish often develop small skin ulcers; in advanced cases, however, larger, colorless areas mark the sites of deep muscle abscesses. Other fish species exhibit other signs of infection. For example, flounders and tilapias develop swollen abdomens due to a buildup of fluid and bream develop ulcers on the head. Diseased common carp, Japanese eel, and striped bass show hemorrhages on the body and fins. In eels, lesions on internal organs may pierce the body wall and in striped bass the effect on the surface tissue sometimes gives the fish a tattered appearance.

Internally, the most common lesions are light-colored nodules on the kidneys, spleen, or liver. Large abscesses that develop in muscles of channel catfish and striped mullet and in internal organs of Japanese eels emit a foul odor when punctured.

Edwardsiella ictaluri
Channel catfish infected with E. ictaluri refuse feed, tend to hang at the surface, and swim with a spiral movement that includes erratic bursts. External lesions include hemorrhages around the mouth, on the sides and underside of the body, and on the fins. Other signs include pale gills, “pop-eye,” and small ulcers on the body. Ulceration in the frontal bones of the head gives the disease one of its common names, “hole-in-the-head disease.” Internally, small hemorrhages develop throughout the organs and in the membrane lining the body cavity and muscles. In some fish the body cavity fills with fluid, and the liver, kidneys, and spleen are enlarged.

HOST AND GEOGRAPHIC RANGE
Edwardsiella tarda has been isolated from many warmwater fishes and some coldwater fishes, whereas E. ictaluri has been isolated only from a few species of warmwater fishes listed in the table. Additionally, E. tarda causes disease in other animals such as marine mammals, pigs, turtles, alligators, ostriches, skunks, snakes, and (occasionally) in humans. In contrast, E. ictaluri is limited to fish.

The geographic range of E. tarda is worldwide, whereas that of E. ictaluri is still confined to the catfish growing areas of the United States where annual losses of fish are substantial.

SOURCE AND RESERVOIR OF INFECTION
Because E. tarda is widespread, many animals can serve as reservoirs of infection. Furthermore, the environment can be a source of infectivity because this bacterium survives as long as 76 days in pond water and mud. Fish that survive disease outbreaks serve as carriers and because E. tarda is prevalent in the intestines of turkey vultures, birds may also be an important reservoir of infection.

Catfish that survive epizootics of E. ictaluri probably also serve as reservoirs of infection, because fish are the only known host and the bacterium survives up to 8 days in pond water.

INCUBATION PERIOD
Incubation time is related to temperature; channel catfish infected with E. tarda and held at 81 F (27°C) died within 10 days; striped bass held at 72 F (22°C) began dying within 72 hours after exposure in a laboratory setting.

In another laboratory experiment, channel catfish infected with E. ictaluri died within 96 hours and fish exposed to this bacterium in aquarium water died within 2 weeks.

CONTROL
Prevention
Because both E. tarda and E. ictaluri are principally pathogens of warmwater fishes held in ponds, it is difficult to prevent disease outbreaks. Outbreaks of E. ictaluri infections occur at water temperatures of 75-82 F (24-28°C), and are thus restricted essentially to May–June and September–October. Management procedures that reduce stress during these months may lessen the severity of outbreaks.

Commercial production of a vaccine for E. ictaluri is feasible, but has not as yet been developed.

Treatment
Outbreaks of E. tarda or E. ictaluri can be controlled by feeding Terramycin (oxytetracycline) at the rate of 2.5-3.0 g/100 lb of fish per day for 10 days. However, a strain of Terramycin-resistant E. tarda from channel catfish has been reported. Romet has proven to be effective in controlling E. ictaluri outbreaks. The drug has been registered with the U.S. Food and Drug for use on E. ictaluri infections in catfishes at a daily rate of 2.5 g/100 lbs. of fish for 5 days.

SUGGESTED READING
A technical description of Edwardsiella tarda and E. ictaluri infections in fish. Topics include diagnosis, pathology, host and geographic range,