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Streptococcal Fish Pathogen

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Gram-positive bacteria have rarely been reported as the etiological agents of warm-water fish diseases. Although hundreds of bacterial infections have been examined at our laboratory, only two epizootics, both involving golden shiners (*Notemigonus crysoleucas*), were caused by a gram-positive organism. Diseased fish were received on separate occasions from a private fish hatchery. All specimens examined were found to be infected with a group B, γ-hemolytic *Streptococcus* sp. Inoculation-reisolation testing established the organism as the etiological agent of the disease. Serological typing of the organism was confirmed by the Communicable Disease Center, Atlanta, Ga.

Diseased fish exhibited numerous raised, inflamed areas along the dorso-lateral portions of the body. The area just anterior to the caudal peduncle was most frequently affected, but lesions developed on other areas of the body in advanced cases. These lesions erupted as the disease progressed. The disease was highly contagious and, in most instances, proved fatal to all individuals in infected lots of fish within 48 to 72 hr.

The pathogen was isolated from the kidney of diseased fish by streaking Trypticase Soy Agar (TSA). Numerous punctiform, convex, translucent colonies developed after 48 hr of incubation at 30 C. However, the incubation time was decreased to 18 hr when fish blood or water extracts of catfish muscle tissue were added to TSA. The isolate was inert to production of hydrogen sulfide, ammonia, gelatinase, urease, and amylase and to reduction of methylene blue milk, litmus milk, and nitrates. From 14 carbohydrates tested, acid was produced with maltose and saccharose. No growth occurred on 10 and 40% bile-agar or in Trypticase Soy Broth containing 4 and 6.5% sodium chloride.

The disease was readily transmitted by introducing a diseased individual into an aquarium containing healthy fish. Typical symptoms, swelling and lesions in the mid-dorsal body region, developed within 3 days, followed by death on the 4th or 5th day. Intraperitoneal and intramuscular injections of the organism into healthy fish produced 100% mortality within 4 to 5 days. Infection could not be established by adding washed-cell suspensions directly to 15-gal aquaria containing healthy fish. Infection was successfully induced, however, when healthy fish were placed in a suspension of 10^6 cells per milliliter for 10 min and then returned to aquaria.

Sensitivity to penicillin, chloramphenicol, erythromycin, tetracycline, novobiocin, and oxytetracycline was demonstrated with a Unidisk (Difco). The organism would not grow on Mueller Hinton Medium, recommended for testing sensitivity to sulfonamides. All sulfonamides tested were not inhibitory when tested on TSA. Oxytetracycline (50 mg/gal) and chloramphenicol (50 mg/gal) were used effectively in aquaria to control the disease. Acriflavine (3 ppm), a standard disinfectant routinely used in fish culture, also prevented the spread of infection.

Intraperitoneal injections of the organism were lethal to the following hosts: golden shiners (*Notemigonus crysoleucas*), bluegills (*Lepomis macrochirus*), green sunfish (*Lepomis cyanellus*), and American toads (*Bufo americanus*). Bigmouth buffalo (*Ictiobus cyprinellus*), goldfish (*Carassius auratus*), black crappie (*Pomoxis nigromaculatus*), largemouth bass (*Micropterus salmoides*), and channel catfish (*Ictalurus punctatus*) proved refractile. Homoiothermic animals (chicks, white mice, and hamsters) were not susceptible.

The source of infection has not been established. However, strains similar to this organism were isolated by J. M. Sherman, E. C. Greisen, and C. F. Niven (J. Infect. Diseases **69**:271, 1941) from bovine and human sources.