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INFECTIOUS PANCREATIC NECROSIS OF SALMONID FISHES

(Acute catarrhal enteritis)

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INTRODUCTION

This disease was first described by M'Gonigle in 1940 as acute catarrhal enteritis. It is believed, on the basis of the gross symptoms, that it is identical with infectious pancreatic necrosis as described by Wood, Snieszko and Yasutake in 1955. The newer name infectious pancreatic necrosis was given on the basis of histopathological investigations and the establishment of its infectious character. It is an acute disease of very young salmonid fishes, eastern brook trout in particular, causing mortalities as high as 80 percent. Whirling has been described as a symptom of both infectious pancreatic necrosis and octomitiasis. It is probable that many cases of octomitiasis were actually infectious pancreatic necrosis. Therefore careful microscopic examination is necessary for correct diagnosis. In one investigated outbreak of octomitiasis which was complicated by infectious pancreatic necrosis, whirling continued in the infected population even after the removal of Octomitus with calomel (E.F.D.L)[1/]

IDENTIFICATION

Sudden increase in mortality among young trout which have only recently begun to feed is often the first indication of trouble. The largest and best appearing fish are usually first affected. Some fish will swim in a horizontal plane, but follow a spiral pattern - the "whirling" symptom; this is common among the larger, older fingerlings. At times fish will exhibit a frenzied swimming suggestive of severe pain; this will alternate with periods of quiescence when the fish comes to rest on the bottom. This symptom may be wholly lacking among very young fish and pinheads. Internally a thick, water clear or slightly whitish mucous material fills the stomach and anterior intestine, which is distended and food is typically absent. Spleen and liver may be almost colorless. Recent histological examinations have found that severe necrosis of pancreas and hyaline degeneration of striated (skeletal) muscle are characteristic of infectious pancreatic necrosis.

CAUSE OF THE DISEASE

Microscopic lesions of infectious pancreatic necrosis do not show microorganisms; the lesions are almost identical to those of Coxsackie virus in mice. The disease is clearly an infectious condition, and it shows a definite tendency to attack the largest and healthiest fish

1/ Research on this disease was in progress at Eastern Fish Disease Laboratory while this leaflet was being prepared. Therefore some information is here reported for the first time. This is indicated by E.F.D.L. (Eastern Fish Disease Laboratory).

first. Filtered inocula (bacteria-free) prepared from typically diseased fry produce cytopathic degeneration in tissue culture preparations of trout fin and swim bladder. Ability of inocula to produce degeneration in established tissue cultures is destroyed by heating at 60° C for 1 hour and definitely reduced by treatment with ether. Initial inocula can be diluted at least a thousandfold and still produce degeneration. The effect of degeneration can be transferred in tissue culture passage (E.F.D.L). These facts indicate the probability that a virus causes infectious pancreatic necrosis.(E.F.D.L.).

SOURCE AND RESERVOIR OF INFECTION

Unknown. Circumstantial evidence indicates a strong possibility of egg transmission. Inapparent infection of adults or other fish is not excluded.

MODE OF TRANSMISSION

Under experimental conditions it was possible to infect healthy fish by placing them in water with (but separated by a screen) from diseased fish. Transmission was repeatedly effected by adding infected material with the food.

INCUBATION PERIOD

Under experimental conditions, at 54° F, very young eastern brook trout fingerlings developed mortality 6 days after exposure. Older fry did not begin to die until about 10 days. In both cases peak mortality occurred in about 10 days to 2 weeks and subsided during the following 2 to 6 weeks (E.F.D.L.).

PERIOD OF COMMUNICABILITY

Unknown.

SUSCEPTIBILITY AND RESISTANCE

Eastern brook trout are particularly susceptible, but the disease has also been identified (symptomatically) in cutthroat, rainbow and brown trout and in Atlantic salmon. There appear to be strain differences in brook trout, and within a strain diet plays an important role. Fish which have been fed brine shrimp have tended to be more severely affected than those which had been fed liver (E.F.D.L.). The influence of diet was also observed by M'Gonigle who stated that the addition of fresh fish to the diet resulted in an aggravated condition.

RANGE

The disease has been reported from Alberta and the Canadian maritime provinces and the trout producing areas of the Eastern United States. M'Gonigle states that it is less common in hatcheries having constant-temperature spring water.

OCCURRENCE

To date known occurrences have been reported during fall, winter and spring. This, in all probability, is dictated by the season during which fish hatch and begin to feed.

METHODS OF CONTROL

The cause of infectious pancreatic necrosis is reasonably established to be a virus. Few virus diseases respond to chemotherapy. It is doubtful whether such small fish, especially fish which have a serious gastro-intestinal disturbance, could take effective quantities of any drug. For these and other reasons, control of infectious pancreatic necrosis is not apt to be found in chemotherapy. Effective control must come about by prevention and perhaps to a degree through propagation of resistant strains of trout. When the source of infection is determined and the means by which the disease is transmitted is known, then, and perhaps then only, can prevention be effected. If an occurrence of the disease is diagnosed early and it is in reality confined to a single trough or two it may be possible to prevent spread to apparently normal fish by most diligent sanitation. If there are many troughs of seemingly healthy fish and the hatchery history indicates high mortality from infectious pancreatic necrosis, the safest procedure would be to kill all fish in the infected troughs and thoroughly disinfect them and all equipment. Infectious pancreatic necrosis should be considered one of the most contagious diseases of trout. Under experimental conditions it was possible to prevent the spread of this disease from one trough to another by strict sanitation (E.F.D.L.).

ANNOTATED BIBLIOGRAPHY

* Davis, H. S.
1953. Culture and Diseases of Game Fishes. Univ. of Calif. Press, Berkeley and Los Angeles, 332 pp., illus.

(page 291) The author has summarized the work of M'Gonigle in an excellent manner. Symptoms and pathology are described. M'Gonigle, however, did not consider the disease to be infectious.

* M'Gonigle, R. H.
1940. Acute catarrhal enteritis of salmonid fingerlings. Trans. Am. Fish. Soc., Vol. 70, pp. 297-303.

Occurrence in the maritime provinces of Canada is described. Symptoms are given in detail. The author concludes that the basic cause is physiological and that the whirling of octomitiasis is in reality a symptom of acute catarrhal enteritis. The author considers acute catarrhal enteritis to be non-infectious, in this errs. M'Gonigle also believes this condition is the same as the catarrh of trout fry described by Bruno Hofer the early German fish pathologist.

* Snieszko, S. F.
1953. Virus diseases in fishes: Outlook for their treatment and prevention. Prog. Fish-Cult., Vol. 15, No. 2, pp. 72-74.

The nature, biology and challenge of viruses as causes of disease are discussed. Problems which fish viruses present in research and fish culture are indicated. Recommendations are made for control of virus-caused diseases.

Snieszko, S.F., E.M. Wood, and W.T. Yasutake
1957. Infectious pancreatic necrosis in trout. A.M.A. Archives of Pathology, Vol. 63, pp. 229-233, illus.

An outbreak of infectious pancreatic necrosis is described. Fish from different stages of infection were examined histologically. In addition to the previously reported pancreatic lesions, skeletal muscle was found to exhibit typical hyaline degeneration.

Wood, E.M., S.F. Snieszko, and W.T. Yasutake
1955. Infectious pancreatic necrosis in brook trout. A.M.A. Archives of Pathology, Vol. 60, pp. 26-28, illus.

An occurrence of an infectious disease of young brook trout is described. The symptoms are those of "acute catarrhal enteritis" described by M'Gonigle. The disease was shown to be transmitted to healthy fingerlings by keeping them separate from but in the same trough with infected fingerlings. Histological examination showed severe pancreatic necrosis of a type found in Coxsackie virus infections. Photomicrographs of pancreatic lesions are included.

* Papers indicated by an asterisk are of special importance to fish culturists.

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