

Original: Fish Division
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REPORT NO. 425

AN EXAMINATION OF BLUEGILLS FROM DIAMOND LAKE, *Newaygo County*

A shipment of bluegills was received from Mr. Horace Telford, who in an accompanying letter dated June 16, 1937, says in part:

"We have encountered an interesting problem. . . . The bluegills, and to a lesser extent, perch and bullheads, at Diamond Lake near Bitely are dying from an undetermined disease. . . . Natives here say it has occurred every year for the last five or six years."

The shipment received June 18, 1937 consisted of 12 bluegills which were measured, weighed, sex and age determined and examined carefully for parasites, pathology and disease.

Results of Parasite and Disease Examination:

The general appearance of the fish was for the most part fairly normal. Detailed examination revealed, however, the presence of inflammation at the base of the various fins, occasional patches of fungus, frayed fins and occasional abrasions on the side of the body.

The inflammation varied from none at all (one specimen) to a very severe condition. It was confined entirely to the base of the fins and the muscles operating them. Microscopic examination by means of dissecting microscope, compound microscope, using both high dry and oil immersion and stained smears, failed to reveal any organisms present in the inflamed area.

The absence of organisms and the presence of frayed fins and abrasions in connection with the inflammation lead to the conclusion that the

inflammation is due to excessive fin activity in connection with spawning. This view is supported by the fact that all of the fish were either spent or ready to spawn. The fungus was secondary to the fraying of the fins.

Various parasites were present in the fish, but none of sufficient quantity or type to cause death.

The only diagnosis that can be made then is death while weakened by spawning due to a condition or conditions unknown.

While no definite diagnosis can be given, two alternative possibilities may be considered:

(1) Cercarial infestation. It is a well known fact that under the proper conditions a large group of trematode cercaria, especially Schistosomes, coming in contact and entering a fish, may cause death, possibly by protein shock, possibly for some other cause. The fish may die almost immediately or may live for a day or more. On first being attacked by the Cercaria they become restless and uneasy and then are stimulated to violent movement, which soon passes away. This may then be followed by a general malaise with some loss of balance and finally death. The symptoms and pathology are not known to any great extent and need investigation.

Unfortunately it cannot be determined whether the fish have been attacked by cercaria unless they are examined very soon after death, as the cercaria may degenerate and disappear.

(2) Upset of respiratory balance. The conditions under which a fish can breath have a fairly wide range, but occasionally this may be exceeded under natural conditions.

In the case of the oxygen and carbon dioxide relation this is especially true. Given sufficient carbon dioxide in the water, the fishes' blood will be unable to absorb oxygen no matter how high the concentration, and the fish will consequently smother.

Unfortunately the critical level of carbon dioxide is not very high, and a tension of 3% of an atmosphere will kill most fish, while values as low as 1.5% may kill.

The rise of the tension may occur in a weed grown lake after or during a period of cloudy weather, during which the plants' rate of photosynthesis decreases and the oxygen goes down and the carbon dioxide goes up.

Decrease in Growth Rate Due to Parasites

In connection with the examination to determine cause of death of this series of bluegills, attention was drawn to the presence of numerous Proteocephalus (bass tapeworm) larvae in the liver and peritoneal cavity.

A record made of the numbers present revealed an average number of 24.3 parasites per fish.

The growth of the fish since the formation of the last annulus was computed, divided by the length at the time of annulus formation and multiplied by 100 to give the per cent of increase during the past year. This was compared with the number of parasites per 100 grams of fish with the following results.

There was a rather definite tendency for the growth rate to decrease as the parasites increased. The correlation was -0.52 ± 0.21 . On the average in this group of fish, for each increase of 10 Proteocephalus per 100 grams of fish, the growth during the past year decreased 1.38%.

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