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INVESTIGATION OF BROWN TROUT MORTALITY

AT THE ALMENA REARING STATION

by

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The writers visited the Almena Rearing Station on May 15, 1944 at the request of Mr. Jay Marks, Regional Fisheries Supervisor, Wolf Lake Hatchery, and examined a stock of yearling brown trout in which a heavy mortality was occurring. These trout in question (estimated stock of 33,000) had been removed from raceways 1 and 3 at the nearby Wolf Lake Hatchery a few days prior to the inspection, and placed in four raceways at the Almena Station. According to Mr. Marks, some of these fish began dying shortly after the transfer and the death rate increased hourly, reaching several hundred a day by the time we arrived. We noted immediately several dead trout in each of the races, some of which were floating on the surface and others lying on the bottom. Many fish were observed to be swimming about feebly or lying motionless on their sides at the bottom and appeared to be near death. Several of the dead and dying fish were collected and examined under a lens.

In most cases, lesions were present on the bodies of the infected trout. These areas were irregular in outline, slightly raised above the normal tissue and were of a lighter color than the adjacent area. Closer

examination showed that many of these lesions had the appearance of open sores; some were ruptured and were discharging a red pus-like substance. In other instances, the only indication of infection was a light colored area, somewhat swollen in appearance. Incisions were made about these infected areas and the deeper lying structures were examined. In all cases when lesions were evident externally, the deep seated muscular tissue was involved, large areas being eroded away.

Internal examination of the viscera showed the presence of irregularities, not normal for healthy trout. Small red foci were present on the liver and the kidney was a very deep red. The hind gut was highly inflamed and greatly constricted.

Microscopical examination of smears prepared from pus taken from the open sores showed the presence of disintegrated muscle fibre and other eroded tissues. A multitude of bacteria were present, but no attempt was made as to the identify of these forms.

Water temperatures of the races in which the brown trout were being held were taken as well as those at the Wolf Lake Hatchery where the trout had been originally stationed. Water temperatures at the Almena races were found to be 68° F. at the inlet and 72° F. at the outlet. At the Wolf Lake Hatchery temperatures at races 1, 3, 4, 5 and 6 were recorded as 57°, 59°, 60°, 61° and 63° respectively. Races 1 and 3 were where the trout were held prior to moving. The above temperatures were taken at 5:30 to 6:00 p.m. and ~~xxx~~ probably represent the maximum temperatures for that day.

Comparing our field observations with descriptions of various trout diseases cited in the literature, we diagnosed the infection as furunculosis and recommended that all of the fish be destroyed (buried or burned) as no known satisfactory treatment was available and the disease is highly contagious. Dr. H. S. Davis and other workers in fish diseases place

particular emphasis upon the desirability of destroying all fish infected or directly exposed to furunculosis as it is the only safe means of controlling this epidemic. It is believed by many workers that some fish may harbor the infective organisms and yet never develop symptoms of the disease. These fish it is thought may act as carriers in spreading the infection.

For further verification of our field diagnosis, as symptoms of this disease sometimes resemble "fin rot" and "ulcer disease," a sample of these infected trout were returned to Ann Arbor on the same date and turned over to Dr. J. Youngner, Instructor in Bacteriology, School of Medicine at the University of Michigan.

Results of Dr. Youngner's laboratory studies are quoted as follows:

"Gram negative bacillus, bipolar staining. Non-motile.

"On plain nutrient agar - at 55°F - raised, glistening colonies, slightly mucoid, brown pigment appearing after 4-5 days incubation.

"Direct observation and stain of pus, spleen and kidney from infected trout revealed the presence of the same organism. Culture in all cases yielded the above described organism. Controls, incubated at 98°F uniformly were negative.

"Sugar reactions of isolated organism after 72 hrs. at 55°F. Controls at 98°F. Negative for growth.

Glucose +
Maltose +
Sucrose (?)
Lactose -

"To this point, the findings are compatible with those recorded for Bact. salmonicida.

Dr. J. S. Youngner
Instructor (Bacteriology)
Medical School"

(Note: Bacterium salmonicida is the causative organism in producing furunculosis.)

According to our knowledge, the furunculosis epidemic continued among the brown trout for several days following our diagnosis and then disappeared. The remaining trout were later removed from the Almena races and planted in trout streams. Many of these trout which were planted in the streams undoubtedly were still infected with Bacterium salmonicida and capable of producing symptoms of furunculosis if conditions become favorable. It has been demonstrated in laboratory research ^{that} ~~the~~ the causative organism of furunculosis will not become manifest and produce symptoms of this disease at temperatures below 50°F. Nor will the organism withstand high temperature approaching that of warm-blooded animals.

Undoubtedly these brown trout at the Almena Ponds were already infected with the causative organism while they were at the Wolf Lake Hatchery, but due to the low water temperatures furunculosis never reached fatal proportions. However, when these fish were transferred to Almena where higher water temperatures prevailed and coinciding with unseasonably hot weather, the disease reached epidemic proportions and high mortality followed.

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