

INSTITUTE FOR FISHERIES RESEARCH
UNIVERSITY MUSEUMS
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April 28, 1930

Report No. 10. INVESTIGATION OF DISEASE IN TROUT FRY
AT HART HATCHERY.

At the Hart Hatchery, most of the troughs (138 out of 150) are not housed, but are out in the open. The greater part of each trough is covered. A very marked difference in the size of fish from the same batch of eggs was noticed in fish reared inside of the building and those outside, the former being the larger. According to Supt. Ervin Moody the ones inside show a smaller percentage of loss in comparison with those outside.

A general infection of fins of brook trout exists in this hatchery. According to Mr. Moody a disease of similar nature has existed here for three consecutive seasons. It apparently varies in severity in different seasons and at different times during the season. The disease may be confined to certain fins, may attack different fins at different seasons, or attack different fins at different times during the same season.

At the time of this visit the pectoral fins were suffering the most, and of the others perhaps the dorsal. Brook trout otherwise apparently normal, were seen with parts of the above-mentioned fins destroyed and in numerous cases nothing but mere "stubs" were left. The fin rays persisted longer than the membranes.

The affected fish were able to maintain their position in the water as well as the normal ones. According to Mr. Moody, death comes slowly in some cases, rapidly in others, and many live, and regenerate at least portions of their fins. Sick fish continue to eat until the time of their death.

Mr. Moody reported that the fish become affected about a month after they begin to feed. Fish usually die at a more or less regular rate throughout the season, and this rate is abnormally high. Sometimes the loss attains epidemic proportions.

According to shipments, the heaviest and steadiest loss due to all causes has been among those received from Cape Cod Trout Co. Out of 260,000 of these eggs 249,203 fry were hatched. The loss of fry in this shipment during February was 18,000 and the loss for March was as great.

The best success for the last two seasons has been had with the eggs from Lost Lakes, Creed, Colorado. These fish are affected by the disease but the death rate is very low.

Three shipments of eggs were received from the Trout Brook Company at Hudson, Wisconsin. The fish were slow in getting started to grow. One shipment consisted of very small eggs, but at the present time the resulting fry are making the best growth, while all of them are doing well.

Several fish in the troughs of Cape Cod fry which showed symptoms of gill disease were taken. Smears were made of their gill mucus, and the gill disease bacillus such as is causing heavy loss at Thompson was found in abundance at Hart. These bacilli were also found in gill smears of sick fish from the eggs of the American Fish Culture Co., Brook Trout Co., and others. In my numerous examinations of fins we found some patches of bacilli on the diseased fins, but I think that this is due to the fact that the diseased fins are apt to catch various foreign particles in the water. This gill bacillus no doubt is causing the death of many of

the fish suffering with the fin disease. Many fish were seen with fins completely destroyed, but were apparently otherwise normal and holding their places at the end of the trough and apparently were not suffering with the gill disease bacillus. The fin disease in itself may not always be sufficient to cause the death of the fish unless complications set in.

The fin disease at Hart is apparently due to a bacterium of the coccus type. This view is supported indirectly by the fact that it is recurrent, by its behavior, and because it has been investigated by previous individuals who reported negative findings. These investigators no doubt failed to determine the cause of the disease because of the minute size of the causative organism.

Microscopic examination of fins in the advanced stages of the disease presents a rather extensive bacterial flora. Smears of fins in earlier stages show a small bacterium, a coccus form which may possibly occur in pairs (diplococci), at least both forms are present, but the simple coccus is much the more numerous. This coccus is consistently present in diseased fins. When compared with the bacillus causing the gill disease reported from Thompson (Report No. 6) these of course are of a different type, are very much smaller and less numerous. They are intimately associated with the tissue cells; ~~and~~ in clumps of epithelial cells intact and relatively normal only an occasional coccus is found, but in a clump on the same slide // showing degenerative changes many are present. It appears ^{that} as if the bacteria attack only the cytoplasm of the cell, for the epithelial cells can be seen in various stages of disintegration, and many blotches suggesting the naked nuclei can be seen in places. In this way a fin once attacked is destroyed by the advance of the bacteria into the tissues. The resulting lesions form places of attack for secondary invaders which in this case seem to be rather numerous but, so far as apparent, of little direct significance.

To my knowledge no coccus form attacking fins on trout has been reported. H. S. Davis reports a bacillus type and while I find occasional clumps of bacilli, I do not feel justified in attributing this disease to them. Some of the occasional bacilli are morphologically like those causing gill disease, and others resemble those of the trough flora in which they are very abundant. Therefore, when a rough diseased fin with exposed rays comes in contact with the trough it may easily pick them up by mere contact.

During previous seasons copper sulphate treatment was used with no apparent success. No treatment was recommended since nothing better than copper sulphate could be suggested at the present time. Theoretically the copper sulphate treatment should give results when one considers that three treatments at Thompson made ^{o a} very nearly one hundred percent clean-sweep of the bacilli on the gills. I think that those using the treatment have been misled in some cases by the continuation or increase in number of deaths because in the first place I think the disease has been well grounded at the Hatchery before treatment was begun; in the second place the fish have died after treatment because of the extensive lesions produced by the bacteria, and in the third place reinfection may have taken place and no routine treatment has been used to combat it.

Experiments now being conducted at the Thompson Hatchery may throw some light on the use of routine copper sulphate treatment, even though the epidemic was severe and well established before anything could be done. Before we can be sure that a particular kind of bacterium is responsible for a certain disease it must be isolated, cultured in an artificial medium and the fishes infected with these bacteria. Since practically nothing has been done along this line with fish disease bacteria, the problem lies in the realm of experimental bacteriology with no promise of immediate success.

Problems like these must be attacked and solved in the near future, if trout culture is to continue in our present hatcheries. Otherwise it will be necessary to move to a new place whenever the bacteria have taken possession of an old hatchery.

In this connection an investigation of the cause of the abandonment of certain hatcheries for brook trout is desirable. We should like to find out why brook trout cannot be raised at the Paris Hatchery. It is probable the cause lay not in the character of the water but rather in bacteria. By conducting such an investigation we can possibly find out symptoms of diseases which have been present in the past, and if these suggest diseases of a bacterial nature, fish being raised at these hatcheries could be examined to see whether or not they are free from these bacteria or whether they are being raised in spite of the infection being present. In this connection, if possible, we would like to have fifty of the weakest and fifty of the strongest brown trout fry shipped alive to us soon from the Paris Hatchery, in separate containers. This would enable us to make and examine smears in order to ascertain what types of bacteria are found there at the present time. We think it possible that the brown trout are resistant to the gill disease, but may be carriers of the bacillus which causes this disease.

We also request that next year one or two troughs in the Paris Hatchery be allotted to brook trout, so that we may determine whether any bacterial disease of brook trout is persisting at that hatchery.

If we can determine the cause of the abandoning of certain hatcheries for brook trout, we may be able to suggest means to prevent the future abandoning of some of those now in use.

Wendell H. Krull
Fish Pathologist

Approved: *Earl H. Hubbs*
Director

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