

INSTITUTE FOR FISHERIES RESEARCH
UNIVERSITY MUSEUMS
UNIVERSITY OF MICHIGAN
ANN ARBOR, MICHIGAN

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FISH DIVISION

July 25, 1930

Report No. 14 A

**SECOND INSTALLMENT: DISEASE AT THE RAPID RIVER REARING STATION,
KALKASKA COUNTY**

On July 19, I learned from Guy Lincoln at Oden that a serious loss of brook trout fingerlings was showing up at the Rapid River Rearing Station in Kalkaska County. Last year this station is said to have turned out fine healthy fingerlings, but this year, about two weeks after the trout were brought down from the Oden Hatchery, sickness developed, and increased in seriousness, as it had in the other rearing stations administered from Oden (see first installment of Report 14).

Early on the following day I visited the station, and learned that the losses were continuing serious, saw many dead fingerlings recently removed from the screens and saw many sick fish. A considerable number of small, weak "pin-heads" were seen, and a few pop-eyed ones, but the larger well-fed fish seemed about as heavily affected with the fatal malady as the small weak ones. A high incidence of fin disease was also apparent, and a considerable proportion showed fungus infestation apparently centering about the wounded dorsal fins. Others had fungus patches which appeared to originate from the gill region, as happens at Oden. The gills of these sick trout mostly showed largely white, or an extra amount

of mucus, or an accumulation of debris. The sick fish showed considerable loss of equilibrium but no wild whirling, and those in advanced stages were being washed against the screen.

A peculiar circumstance here is that the fingerlings were seriously affected in the two upper ponds of the three in series, for few dead ones were being removed from the lowest pond, which might be expected to show the highest loss. This lowest pond had cleaner bottom and more current than the other two. Apparently the better condition of the pond has been sufficient to keep down the disease, despite the fact that the water feeding it comes from the ponds above in which the fish were fast dying.

The two upper ponds are fairly deep (about 2 to 3 feet) and have a considerable accumulation of organic silt on the bottom, and a moderate growth of Chara. A few holes bored into the bottom of the slash boards would help sweep out this accumulating dirt.

As to the conditions of water supply, Mark Crow reports under date of July 17:

"(1) We found the flow of water in the stream irregular due to the use of water in the Rugg dam above by the Powey Company. When the Power Co. are 'using' the water in the Ricker Bros. pond above the States rearing ponds is low and would naturally be most subject to a sudden rise in temperature. At times the bottom of their pond is exposed to the sun and considerable water lay in shallow pools that drain into the stream, all this warm water passes thru the Ricker Pond and into this State rearing pond # One. Where our trouble appears.

"(2) We tied a weight to a thermometer and submerged it, in what appeared would be the coolest place in Pond # One, for three minutes, by the watch, and the coldest temperature we could find at the bottom was 64° at 4 P.M.

"(3) There is no natural shade along this pond and no shade other than the, I think, four raised platforms. The south sun shines under one third of these platforms.

"(4) There is no aeration except at the up stream end of the pond, where the water enters with fair force and fall. There is a considerable stretch below that to me looked rather inactive and shallow."

Very probably the high temperature has had something to do with this epidemic. There is a cold feeder stream near the head gate of the ponds that could be diverted into the ponds to condition the water and hold the temperature down. We recommend that this be considered if the rearing station is continued. We also recommend that an effort be made to hold a better current through the ponds, at least occasionally by lifting the lower slash boards at the lower end of the ponds so as to sweep the bottom cleaner.

If the trouble continues without improvement or becomes worse, we recommend that most of the fish be planted at once. But before planting the fish should all be given a thorough salt treatment, first in an effort to cure the disease, and secondly in an effort to hold down the chance of spreading the disease to natural waters.

I managed despite the extreme heat of July 20 to bring some of the sick fish alive to Ann Arbor, where they were examined the same night by Dr. W. H. Krull, our Fish Pathologist, whose report is appended hereto.

Carl L. Hubbs
Director

Report by W. H. Krull on the diseased trout from
Rapid River Rearing Station

The examination made July 20, 1930, is based on twelve living specimens. The fish appeared to be in splendid condition as far as nutrition was

concerned. External appearance presented a congested condition of gills or gills with an accumulation of debris. A number of the specimens had fins which were somewhat frayed or portions of the edges were opaque or whitish. Two fish had a portion of a single pectoral fin missing. They were completely healed and suggest earlier injury or disease. Otherwise the fish were normal.

Temporary microscopic mounts of the gills of several specimens revealed the heaviest growth of bacteria, which we have seen thus far. These bacteria form filaments and are in such intimate association with the epithelial cells that it looks as if the tissues were stuck full of exceedingly fine needles. It follows from the foregoing statement that the individual bacteria making up these filaments are rather long, and exceedingly slender bacilli (rods). Stained smears reveal another type of rod which is morphologically distinct from the other in being shorter, thicker, difficult to see without staining, and staining more deeply with anilin dyes. A third form, coccus type, is also present in abundance as shown in gill smears, but from what is known in general concerning the various forms we conclude that it is a secondary or an associate infection. By the artificial culture of these gill bacteria, several species of Bacillus have been isolated.

These organisms have a marked effect on the gills as shown by the condition of the capillaries and the very decided proliferation of epithelial cells.

In addition to the bacterial disease of the gills most of the fish were carrying an infection of Gyrodactylus (worms) on the fins. The worms were common, but not abundant, on the fins. The active living worms were observed on all fins except the caudal and on the edges of the opercula.

While they do not seem to be abundant enough to produce fatal results they inflict exceedingly numerous injuries to the skin of the fish furnishing portals

of entry for bacteria, fungi, and perhaps other disease producing organisms. Their significance quite likely bears a ratio to the temperature. Their numbers will increase rapidly and the seriousness multiplied if the fish are crowded.

For Gyrodactylus, Davis (see "Care and Diseases of Trout") recommends the formula adopted by Dr. G. C. Embury, who has worked this treatment out scientifically. The solution consists of 1 part of glacial acetic acid to 500 parts water. The fish are immersed in this solution for one minute. The solution should be changed quite often since the dipping of the fish into the solution dilutes or weakens it.

The German workers also use the acetic acid treatment but unfortunately their method of treatment is not practical for the treatment of trout.

As to the bacterial diseases, we can only say that all treatments recommended up to the present time are unscientific, hit-and-miss or chance methods, and a change in the situation can only be brought about by hard, drawn out experimental means. We do not know whether they are ordinary saprophytes (i.e. living on decaying vegetation), which are able to live as parasites or true obligate parasites. They cannot under any consideration be distinguished on a morphological basis although the ones with which we have had experience this spring seem to have distinguishing characteristics.

In the face of these rather discouraging conditions we are attempting to culture these organisms on artificial media and when we have succeeded in producing the disease in susceptible fish by the use of these organisms we shall have a basis from which to work. This procedure will result in a positive identification, in finding the conditions most favorable for growth, source of the organism, and finally a treatment or preventative measure.

In this connection it is interesting to note that the specific identity of many of the larger parasites involved in fish diseases have never been established. It is, however, safe to say that it is not so vital as it is in the case of bacteria on the basis of control measures.

From these facts it seems that in this particular case salt may give some beneficial results. We do not think that copper sulphate should be resorted to because it is quite apparent that severe lesions are produced and the sulphate would probably poison many.

Keeping the ponds clean and allowing the water to run through at a fairly rapid rate would no doubt be beneficial if the fish are not planted at the present time.

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October 14, 1930

Supplement to Report No. 14 A

REPORT ON TWO SPECIMENS OF DISEASED BROOK TROUT
TAKEN AT THE RAPID RIVER TROUT REARING STATION.

Two brook trout, 90 mm. and 140 mm., respectively, were received in preserving fluid on August 7, 1930.

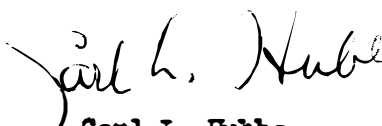
These trout were taken during an epidemic at the Rapid River Trout Rearing Station on July 30, 1930. The note accompanying them, written by the caretaker of the station, is as follows:

"Rapid River Trout rearing Station. July 30th, 1930. This Trout shows plainly where the disease is located. It is internally, belly much extended. The trout was still alive when taken out. Please analyze, and give a remedy. (We lose many this way). J. N. Rickers."

W. H. Krull, Fish Pathologist, reports that both trout showed distention of the visceral (body) cavity due apparently to accumulation of gas. The visceral cavity of the smaller fish had collapsed due to bursting.

Examination of the external parts, including mouth cavity and gills shows no evidence of disease. The contents of the body cavity was in such poor state of preservation that it was impossible to make an examination. It appears probable, however, that this material indicates that some internal disease, probably bacterial, existed at the Rapid River Rearing station this year—in addition to the gill disease.

No further material has been received to date, and this report is now submitted as a matter of record.


Carl L. Hubbs
Director