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EFFECTS UPON FISH LIFE OF METHODS USED BY THE MICHIGAN STREAM CONTROL COMMISSION IN THE TREATMENT OF BEACHES FOR SWIMMER'S ITCH DURING THE SUMMER OF 1939

by

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The cause of water itch was discovered in Michigan in 1928 by Dr. W. W. Cort, working at the University of Michigan Biological Station, Douglas Lake. A larval form of a blood fluke, or schistosome, lives in certain snails and emerges into the water in great numbers during the latter part of June, through July, and in some lakes, during the first part of August. When it seeks to find its normal warm blooded host, a muskrat, duck, tern, grebe, or other water bird, it comes into contact with man, burrows through the skin, and finding itself in an unsuitable environment, dies. A disturbing itching sensation is set up when each larva, or cercaria, has entered, and a reaction is set up by the tissues to destroy this foreign body.

The method of control employed was to poison the snail host. This involved the use of chemicals known to be lethal to fish and fish life if used indiscreetly.

The treatment of beaches with copper sulphate and copper carbonate has been closely checked for possible injury to fish life. This work consisted of pre-treatment and post-treatment examinations for plankton, small organisms that swim freely in water and are carried from place to place by water currents, and for bottom organisms, or forms inhabiting the bottom of lakes. These small plants and animals serve as food for fish and thus are important to fish life. The collections were made with a plankton net and a small wire screen with mesh of about 17 to the inch. The shore line was also checked before and after each treatment for dead fish.

In all cases, plankton were considerably less, although never completely absent, immediately following treatment, but the area was normally repopulated within 24 hours and in some cases within 12 hours after treatment.

The bottom organisms are very much affected by the treatment and in many cases, die. Crayfish, leeches, tubificids (aquatic earthworms) and some insect larvae are usually killed by the chemicals. All are fish food but the beaches treated were only very limited areas of the total shore line, were sandy and supported only a small population. Thus the relation to fish life here is negligible.

In one case, Community Beach, Oden, ten fish (6 common shiners, 3 small large-mouth black bass, and 1 small perch) were found dead after treatment. The area was treated in such a manner as to trap these fish in a small cove where they could not escape. If the fish are given an opportunity, they will swim away from the treated area and stay out until sufficient dilution has taken place and most of the copper sulphate converted to copper carbonate, a chemical exerting little affect on fish.

At Interlocken State Park, minnows in a live-box located on the border of one treated area, were found dead 12 hours after treatment. Death may have occurred either during or immediately after treatment, but since the treatment was administered in the late evening, no check was made until morning. In this same area, unconfined fish showed no ill effects, either immediately or several days after treatment.

A test area in Douglas Lake, 100 feet by 150 feet, was treated with 100 parts per million of copper sulphate crystals at 8 p.m. At 10 p.m. only two fish were observed swimming in the area, while many were seen on both sides. The water as well as the bottom was still distinctly colored from the treatment. The area was examined one and three days later but no dead fish were found. Fish were seen swimming around as though nothing out of the ordinary had happened.

A qualitative experiment to determine the effect of various chemicals in various concentrations used in the control work on plankton was carried out at the University of Michigan Biological Station. Two liters of lake water were placed in each of six aquaria. Plankton were introduced into each and with one aquaria for control, various amounts of chemicals were added to the remaining five aquaria. The following table gives the concentrations used and the results obtained (Table 1).

Table 1

#1.	Control		
#2.	Copper sulphate -- 20 p.p.m.		
#3.	Copper sulphate -- 2 Copper carbonate - 1	15 p.p.m.	11:30 a.m.
#4.	Copper sulphate -- 2 Copper carbonate - 1	20 p.p.m.	8/23/39
#5.	Copper carbonate -- 15 p.p.m.		
#6.	Copper carbonate -- 20 p.p.m.		

Table 1 (Continued)

3:30 p.m. 8/24/39 -- Elapsed time -- 28 hours

Copepods living in all aquaria.

No aquaria with all of any one species killed.

Greatest mortality in #2 -- $CuSO_4$ -- 20 p.p.m.

4:00 p.m. 8/29/39 -- Elapsed time -- $240\frac{1}{2}$ hours

Copepods living in all aquaria.

No aquaria with all of any one species killed.

Greatest mortality in #2. Copper sulphate -- 20 p.p.m.

Summary

The treatment of beaches for swimmer's itch has been accomplished thus far with little damage to fish life.

Only fish that were confined in enclosures or trapped by hasty application of chemicals were killed.

Fish were observed to swim away from treated areas and to stay out until conditions were no longer lethal.

Laboratory experiments show that plankton is affected by the treatment but is not entirely eliminated. Field experience proves that the normal population is reduced for not more than 24 hours.

The treatment is usually fatal to most bottom organisms.

The relation of bottom organisms to fish life is negligible in the areas treated since comparatively few are present.

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