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Fish Division

August 31, 1937

REPORT NO. 430

EXAMINATION OF SUCKERS AND A MINNOW FROM THE RAISIN RIVER
TO DETERMINE CAUSE OF DEATH

On August 27, 1937 the Gerrity-Adrian Manufacturing Company is reported to have emptied a 200 gallon tank of some type of cyanide solution into the south branch of the Raisin River. This event occurred at 7:30 A.M. At 10:00 A.M. fish downstream from the plant began to show signs of distress, thrashing violently about, and numerous fish died.

Several of the dead fish were recovered by conservation officer Harkness and by L. F. Cleming and G. Kenyon. These fish were submitted to the undersigned with a request for diagnosis as to cause of death.

Examination of fish

Common shiner
Notropis cornutus chrysocephalus: only one specimen of this species, 4.8 inches in total length, was submitted. On the whole this fish seemed to be in excellent health and condition. The viscera were embedded in fat and there were no pathological changes apparent in the abdominal cavity. About 60 black spot parasites (Neascus sp.) were encysted in or under the skin of the body. No significance can be attached to their presence.

The gills were a dark red, abnormally so, and the blood in the sinus venosus appeared much darker than normal.

Black mullet

Moxostoma duquesnii: two specimens of this species, one 13.5 inches and one 15 inches in total length, were available and in both the pathological manifestations consisted of very dark red gills covered with excessive mucus and accompanied by inflammation on the inside of the opercle. Otherwise the fish apparently normal and in good condition.

White sucker (black sucker or common sucker)

Catostomus commersonnii commersonnii: seven specimens, ranging in length from 8.6 inches to 13.4 inches in total length, were available, and the pathology was essentially the same in all of them.

The gills were a dark red color and the opercle was inflamed. In some cases both the outside of the head and the pectoral fins ~~were~~^{were} inflamed.

Aside from these conditions the fish appeared in good health.

Summary of Pathology

The general picture is the presence of abnormally dark red gills accompanied usually by excess mucus, and opercular inflammation. The individual gill filaments were normal except as to color.

No indications of bacterial or parasitical disease capable of causing illness or death were found.

General Discussion

The condition of an abnormally dark red blood is usually taken to indicate oxygen deficiency and applies where there is either an actual deficiency of oxygen in the water or some toxic substance present which prevents the gills or blood from extracting oxygen from the water. A number of substances may cause this condition, such as:

- (1) Substances which interfere with respiration because of combination with the haemoglobin of the blood such as carbon monoxide and probably cyanide ~~etc.~~.
- (2) Substances which combine with the mucus over the gill to form an impermeable membrane such as the various copper and lead compounds and other heavy metals.

(3) Substances which are direct poisons to the gill tissue and may either destroy it or kill the cells so that they are non-absorptive. Under this heading may be listed various corrosive agents, direct tissue poisons, certain organic dyes, etc.

(4) Physical agents, oils, etc. which coat the gill filaments rendering respiration impossible.

The presence of excess mucus is usually indicative of some strong irritant in the water.

That the gills were anatomically normal indicates that the fish had not been exposed to chronic pollution.

The inflammation of the opercle and in some cases of the head plus the lack of a chronic irritant of long standing indicates the presence of some strong lethal irritant in the water which caused the fish to die in a comparatively short period of time.

Diagnosis

The cause of death may be ascribed to interference, by some toxic substance, with the respiratory function resulting in suffocation.

The fact that 200 gallons of a cyanide solution was placed in the stream at 7:30 A.M. and that at 10:00 A.M. fish downstream began to die is strongly indicative of cyanide as the killing agent. Cyanide is capable of causing death of fish in concentrations as small as 1/20,000,000 and is, to the best of my knowledge, fully capable of causing the above noted pathology in the fish examined.

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Pathologist