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THE "BURNING" OF WINTER HERRING FROM LITTLE BAY DE NOC, LAKE MICHIGAN

by

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For a number of years the winter herring from northern Lake Michigan have developed a condition known to commercial fishermen as "burning." This condition develops soon after the fish die; "burning" may occur within twelve hours if the fish are not properly disposed of. If the nets are not lifted daily, "burned" fish occur in the nets.

In general practice, the herring are placed on ice soon after they are brought in from the nets, and are marketed in the round. People buying herring from the stores have returned many fish which were said to be "spoiled." The flesh of the abdominal wall becomes soft and turns deep red-brown in color. The flesh becomes detached from the ribs. It is this condition which is known as "burning," and in severe cases the entire body wall becomes soft and the red color shows through to the exterior.

On February 11-13, 1943 Dr. Roelofs visited Little Bay de Noc and secured samples of herring. Fifty fish were frozen immediately by Hansen and Jensen Fish Co. Sixteen were placed on ice in the usual marketing manner. The latter were examined for burning at various intervals. The frozen fish were transferred to a freezing compartment at the Nelson Dairy Co. in Manistique.

The following table gives the information obtained from the sample of 16 fish.

	Condition	Sex	Time*	Burning	Spleen Exposed
1	Dressed	♀	10 days	No	?
2	"	♀	10 days	No	?
3	Round	♀	2 days	Yes	?
4	"	♀	2 days	Yes	?
5	"	♀	2 days	Yes	?
6	"	♀	4 days	Yes	Yes
7	"	♀	4 days	Yes	Yes
8**	"	♀	4 days	No	No
9	"	♀	10 days	Yes	Yes
10	"	♀	10 days	Yes	Yes
11	"	♂	10 days	Yes	Yes
12	"	♀	19 days	Yes	Yes
13	"	♀	19 days	Yes	Yes
14	"	♀	19 days	Yes	Yes
15	"	♀	19 days	Yes	Yes
16	"	♀	19 days	Yes	Yes

*Time interval between collection date and date of examination.

**The entire viscera was left intact within the fish. It showed no burning 10 days later.

Fish 1 and 2 were dressed 24 hours after they were brought into the "fish house." They showed no burn 10 days after being dressed. Apparently fish that are dressed before burning starts will not become affected.

Fish 3, 4, and 5 were dressed two days after being placed on ice. They were all slightly burned. At this time no attention was given the position of the spleen or other organs. Examination of these fish at daily intervals showed that the burning continued to spread after being dressed.

Numbers 6, 7, and 8 were slit along the belly and the body wall was pulled back from the viscera (internal organs) very carefully. It was noted here that the burning occurred at the point where the spleen contacted the abdominal wall in 6 and 7. In No. 8, the spleen was embedded in fat and was not contacting the body wall. There was no burning in this fish. The viscera was left within the body cavity of these fish. The burning in 6 and 7 became progressively worse, whereas 10 days later No. 8 still showed no burn.

Numbers 9-16 were all burned. Numbers 10 and 11 were burned only where the spleen contacted the abdominal wall; the others were severely burned but it was noted that decomposition was more advanced in the region of the spleen, indicating that the infection began at that point.

On March 10, a sample of fish which had been frozen in the round for four weeks, was examined and showed no sign of burning. Another sample of 11 of these frozen fish was sent to Dr. Allison for study.

They were dressed on the 11th and the following data were obtained.

Length (mm.)	Sex	Burning	Spleen Exposed
270	♀	-	-
250	♀	X	X
275	♀	-	-
250	♀	-	-
254	♀	X	X
272	♀	-	-
255	♂	X	X
290	♀	-	-
270	♀	-	X
269	♀	-	-
282	♀	X	X
281	♀	X	X

It will be noted that in every case of burning but one, the spleen was exposed to contact with the body wall.

Bacteriological cultures were attempted but no growth resulted. Dr. Edward Schneberger, Chief Biologist, Wisconsin Conservation Department said that they had found rod-shaped bacteria in the flesh of burned herring but were unable to culture it.

On March 19, 1943, Drs. Schneberger and Allison collected a number of herring from a fisherman on the ice of Little Bay de Noc. These fish were freshly caught in gill nets and were made available to us through the courtesy of Hansen and Jensen Fish Co. The following experiment was performed in the hopes of determining which organ, if any, caused the burning.

Twenty-five herring were completely eviscerated. The spleen was replaced in 14 of these and the liver with gall bladder ruptured was replaced in 11. Eleven fish were flat-dressed, six of these being thoroughly washed in water. Five were round-dressed and 22 were left in the round as controls. The fish were placed in a cardboard carton and kept in a cool place (not iced or frozen) for 70 hours before examination. The results of the examination are as follows:

	Flat-dressed					
	Spleen	Liver	Washed	Unwashed	Round-dressed	Controls
Burning	0	0	0	0	0	11
Normal	14	11	6	5	5	11

Burning did not occur in any fish that was dressed, regardless of whether the spleen or liver had been replaced. Only 50 per cent of the control fish showed burning although the fish were neither iced or frozen. This experiment indicates that the burning is not caused

by either the spleen or liver, and that not all herring burn. The burning in the controls occurred most frequently when the spleen was in contact with the peritoneum, although the spleen was found to be so situated in specimens showing no burning. If further opportunity is afforded for similar experimentation, the stomach and intestines should also be considered. In the present experiment, the kidney was removed from some specimens and left in others with no noticeable change in results.

According to Hansen and Jensen and other commercial fishermen of Escanaba, the burning in winter herring has been known for many years but not in other herring. Winter herring run smaller in size than other herring but are the same species, in the opinion of Dr. John Van Oosten. Scale samples and lengths of both types of herring are being studied in Dr. Van Oosten's laboratory in an effort to determine whether winter herring are a particular age group of the common herring or whether a different type of herring is represented.

The cause of burning in winter herring has not been determined but it is evident that the condition can be eliminated by immediate dressing or freezing, since fish so treated show no sign of burning.

INSTITUTE FOR FISHERIES RESEARCH

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