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MORTALITY OF EASTERN BROOK TROUT CAUSED BY PLEROCERCIDS
(CESTODA: PSEUDOPHYLLIDEA: DIPHYLLOBOTHRIDAE)
IN THE HEART AND VISCERA

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It is well known that migrating helminth larvae do a great amount of damage to the host. Often, however, the host is relatively large and the damage done by few larvae is not serious. When the host is very small the mechanical damage, at least, must be proportionately greater for each larva present. An unusual case of mortality of small brook trout (*Salvelinus fontinalis*) roughly 2 to 4 inches long was brought to our attention. Examination of the mortalities, as well as survivors, revealed relatively large diphyllbothrid larvae (fig. 1) in the chambers of the heart, liver, pericardial sac, and body cavity. Death of the fish was attributed to hemorrhaging caused by the migrating larvae. Some larvae appeared to be quiescent and were surrounded with sparse connective tissue and very little white cell infiltration. There was some tissue necrosis adjacent to some of the worms, and the livers were "fatty" with foam fat and sparse fat vacuoles. We do not believe that either of these conditions contributed to the mortalities. No other disease entities could be found. Proteocephalid larvae were present in the intestine, but there was no evidence that they contributed to the mortalities.

The epizootic has been well recorded by Mr. J. L. Jorgensen, Fisheries Manager, Canadian International Paper Co., Woodlands Division, Three Rivers, Quebec, Canada, and a summary of his 1958 report, "Growing Trout on Plankton at La Tuque Mill", is given here. This unique hatchery is located at La Tuque Mill, La Tuque, Quebec, which draws its water supply from Lake Wayagamack at the 50 ft-depth level. The filter reject water from this water supply is the exclusive water supply for the hatchery. It contains such large quantities of plankton, mostly copepods, that no other food is needed.

In 1956, 1000 fingerlings were successfully raised with little mortality. Fingerlings were

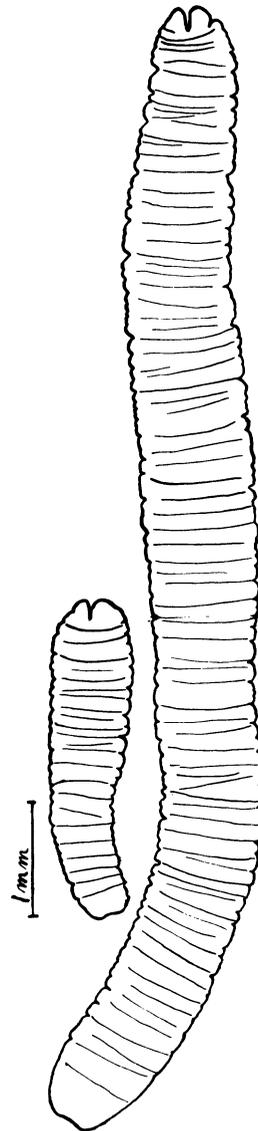


FIGURE 1. Largest and smallest diphyllbothrid plerocercoids found in the brook trout epizootic (drawn to scale with microprojection).

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obtained in September and kept until November with over 50 percent weight gain. In 1957 Mr. Jorgensen started with eggs in January but lost 80 percent of the fish by November. Cause of death was determined by R. T. Reppert, biologist, to be due to the tapeworm larvae. Hemorrhage from parasitized hearts was visible in the intact fish as "red blotchy markings" anteroventral to the heart. A similar outbreak occurred in 1958.

Four larvae, fixed in situ with formalin and stained and mounted in Permount measured 2.9, 4, 9, and 10.6 mm in length and 0.28, 0.4, 0.42, and 1 mm, respectively, in greatest width. This larva is about the same width throughout most of its length and is transversely wrinkled, not segmented. The gonads are not developed. Bothria are shallow and connected by a deep dorsal-ventral groove or invagination over the anterior end, somewhat like *Schistocephalus*, but the strobila more nearly resembles *Diphyllobothrium*. In cross sections the thick cuticle, 5 to 10 microns thick, and the cuticular bristles can be seen. The thick cuticle is eosinophilic when stained with hematoxylin and eosin and is light blue when stained with Mallory's triple stain. This worm belongs in the family Diphylobothriidae Lühe, 1910, but cannot be further identified until life history studies are made.

To our knowledge the only other North American record of diphylobothrid larvae in the heart of fish is that of Moore, E. (1925, 1926). She reported an interesting epizootic of

frost fish (*Coregonus quadrilateralis*) infected with a *Bothriocephalus* sp. Mortalities were caused by perforation of the auricle of the heart and adjacent veins. The specific identity of the worm could not be determined.

Dr. Marvin C. Meyer and Dr. Roth Vik (personal communication) occasionally found diphylobothrid plerocercoids in the heart ventricles of the few adult salmonids available to them in Maine during the summer of 1960.

In Europe plerocercoids involving the heart of fish have been recorded by Vogel (1929), who found them on the heart and in the head of burbot, and Bergman (1923) also found them involving the heart.

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