

Bulletin No. 22
December 4, 1981Fish Tapeworm (*Diphyllobothrium latum*) Infections From Uncooked Alaskan Salmon

In the fall of 1980 a large outbreak of fish tapeworm occurred along the Est Coast. The outbreak affected as many as 32 individuals and was thought to be due to the consumption of salmon brought fresh from Alaska. (*Morbidity Mortality Weekly Report*, 30: 331-338, July 17, 1981). In September and October, 1981, 4 separate outbreaks of fish tapeworm were documented in Alaska; Fairbanks (3 patients), Bethel (1 patient), Anchorage (1 patient), and Haines (1 patient). Epidemiologic investigation failed to uncover any common source linking these 4 outbreaks. In each case individuals had eaten raw or undercooked Red Salmon (Sockeye) in addition to other fresh water fish.

Diphyllobothrium latum is the longest tapeworm of man and occasionally reaches a length of 10 meters. The tapeworm usually resides in the ileum and jejunum and may have a life span as long as 20 years. The life of *D. latum* is complex and includes 2 intermediate hosts and a definitive host of man. Twenty-two mammals have been shown to be definitive hosts for the adult worm including dog, cat, walrus, bear, fox, and whale.

D. latum eggs hatch 9-12 days after reaching water and produce a free swimming ciliated coracidium. The coracidium are ingested within 1-2 days by suitable species of fresh water crustaceans (Copepods). After ingestion by the crustacean, the coracidium loses its cilia and penetrates the intestinal wall of the crustacean where it grows to form an elongated proceroid larva. When the infected crustacean (Copepods) is ingested by a suitable species of fresh water or anadromous fish, it is digested and frees the proceroid larva. The larva then penetrates the fish intestinal wall, and enters the body cavity, viscera, and muscle. In the fish the larva grows into a plerocercoid larva. When raw fish are eaten by a susceptible host, the larva attaches to the host intestinal wall and grows to maturity in 3-5 weeks.

Human infection is usually limited to a single worm, although numerous worms have occasionally been described. Anemia can be produced by infection of the worm high in the intestine as the worm competes for vitamin B¹². Studies have shown that *D. latum* absorbs 80-100 percent of an oral dose of radioactive B¹². Human infection is often asymptomatic, although abdominal discomforts occur.

Treatment of *D. latum* requires the elimination of the worm head (scolex). The drug of choice is Yomesan (Niclosamide), a drug which must be obtained from the Parasitic Disease Drug Service of the Centers for Disease Control, Atlanta, Georgia. Diagnosis of infection is made by examining stool for the presence of worm segments and eggs.

The growing popularity of raw fish dishes such as Japanese **sushi** and **sashimi** places humans at greater risk for helminthic infections. Fish tapeworm disease is acquired by ingestion of raw or incompletely cooked fish infected with the plerocercoid larva of *Diphyllobothrium* species. The usual sources of this infection in North America are fresh water fish. However, Dr. Robert Rausch clearly showed the high rate of infection of Red Salmon with *Diphyllobothrium* species in his zoological research studies in Alaska in 1970 to 1973. Several species of *Diphyllobothrium* occur in Alaska fish that can also occur in man. Fish tapeworm infection is not acquired from properly canned fish. Infection from eating fresh fish can be prevented by cooking until all the parts of the fish reach a temperature of at least 56° C (133° F) for 5 minutes. Freezing to -18° C (0° F) for 24 hours or to -10° C (14° F) for 72 hours can also prevent infection. Preparation by placing the fish in a brine solution may be effective if appropriate salt concentration, fillet size, and contact time is observed. Commercially prepared lox (smoked salmon) is usually brined before smoking and should not constitute a source of infection.

We urge all physicians and other health care providers to report all cases of diagnosed or suspected fish tapeworm to the Section of Communicable Disease Control, 272-7534. Assistance can be obtained in obtaining Yomesan from the Parasitic Disease Drug Service, Centers for Disease Control.