Parasites in Marine Fishes

All living organisms, including fish, can have parasites. Parasites are a natural occurrence, not contamination. They are as common in fish as insects are in fruits and vegetables. Parasites do not present a health concern in thoroughly cooked fish.

Parasites become a concern when consumers eat raw or lightly preserved fish such as sashimi, sushi, ceviche, and gravlax. When preparing these products, use commercially frozen fish. Alternatively, freeze the fish to an internal temperature of -4°F for at least 7 days to kill any parasites that may be present. Home freezers may not be cold enough to kill the parasites.

The health risk from parasites is far less than the risk from "unseen" illness causing bacteria which are present on almost *all foods*. Here are some commonly asked questions about fish parasites.

What are the worms that I sometimes see in fish I catch or buy?

Roundworms called *nematodes* are the most common parasite found in marine fishes. Some people call these nematodes *herring worms* or *cod worms*. Actually, several different species exist and it is hard to distinguish between them. All are in the family *Anisakidae* and are *anisakid nematodes*.

Freshwater fish like trout and fish that spend part of their life in freshwater such as salmon may carry *Diphyllobothrium* tapeworm larvae. These small, whitish, and somewhat flabby worms are common in salmon from some areas of Alaska.

How do fish get parasites?

The life cycle of an anisakid nematode begins when seals or sea lions eat infected fish (Figure 1). The larval nematodes grow to maturity, and the marine mammal excretes the nematode eggs into the sea where they hatch. Shrimp-like animals eat the larvae, and fish eat the shrimp-like animals. The larvae then develop into the form we see in fish.

The life cycle for a tapeworm is similar. Mammals or birds eat infected fish. The eggs hatch in freshwater. Crustaceans eat the eggs, freshwater and anadromous fish eat the crustaceans, and we eat the fish.

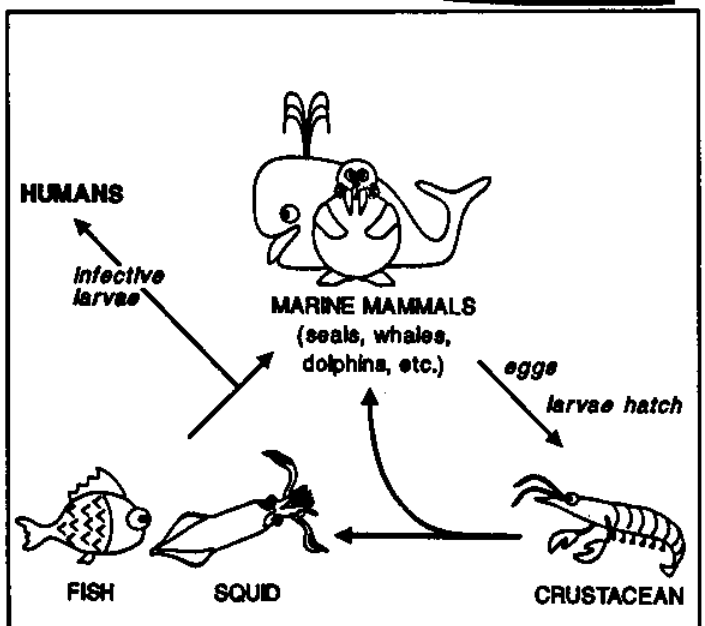

Figure 1. Simplified anisakid nematode life cycle.

Will parasites hurt me if I accidentally eat one?

Nematodes rarely cause health problems because they are uncommon in fish fillets and normal cooking easily destroys them. In most cases, swallowing a live nematode is harmless. The nematode passes through the intestine without causing problems.

In rare cases, swallowing a live nematode larva can cause severe gastric upset called *anisakiasis*. This happens when the nematode attaches to or penetrates the intestinal lining. Nematodes do not find humans to be suitable hosts and will not live longer than 7-10 days in human digestive tracts.

Swallowing live tapeworm larvae can cause a tapeworm infestation. The tapeworms may live in the human intestinal tract for several years. Symptoms can include abdominal pain, weakness, weight loss and anemia. Doctors successfully treat tapeworm infections with medicines.

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How long should I cook fish to kill parasites?

Cooking fish to an internal temperature of 140°F will kill all fish nematodes and tapeworms. Normal cooking procedures generally exceed this temperature.

How about smoking, pickling, and salting fish?

Heating hot-smoked fish to an internal temperature of at least 140°F will kill all fish nematodes and tapeworms. Normal hot-smoking procedures generally exceed this temperature.

Dry-salting fish, or curing them in a saturated salt brine, for 5-7 days before pickling will kill nematodes and tapeworms. Pickling without salt curing may not destroy some nematodes.

Are raw and lightly marinated recipes safe?

Eating raw fish, just like eating raw meat or poultry, is riskier than eating cooked products. To minimize the risk, avoid eating raw or lightly marinated seafood unless the fish is free of parasites, or has been properly frozen.

It is a common practice to use frozen fish in countries where raw fish dishes are traditional. Japan's National Health Institute recommends freezing fish to -4°F for several hours when preparing raw fish, or avoiding fish that are susceptible to parasites.

Canada's Health Protection Branch recommends using only commercially frozen fish in raw fish dishes because home freezers will not kill the parasites. The U.S. Food and Drug Administration recommends using fish frozen commercially for 7 days at -10°F or 15 hours at -31°F for raw fish dishes.

Why don't processors remove parasites from fish?

Good handling practices on-board fishing vessels and in processing plants minimize nematode infestation. Many seafood processors inspect seafood fillets of species likely to contain parasites. This process called candling involves examining fish fillets over lights. Candling detects surface parasites. Unfortunately, they cannot always see parasites embedded deep in thick fillets or in dark tissue.

What can consumers do if they find a worm in fish?

If a parasite is present in a fish, you have several options:

- Remove the parasite, examine the fish for others and cook the fish. Thorough cooking kills all parasites.
- Notify the store where you bought the fish so that the store can carefully inspect remaining fish.
- Depending on the return policy of the particular store, you may wish to return or exchange the unused portion.

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