

## Illness-Causing Fish Parasites (Worms)

Finding a worm in fish is considered a natural occurrence and not a form of contamination. Parasitic worms are described medically as *helminths*, and divided into two broad categories: **roundworms** (*nematodes*) and **tapeworms** (*cestodes*).

Fish parasites – roundworms and tapeworms – can be a health concern to humans if ingested in their live state. The parasitic helminths of concern in BC fish are anasakid roundworms found in marine-water fish (*Anisakis simplex*, *Pseudoterranova decipiens*), and fresh-water fish tapeworms (*Diphyllobothrium* spp.). These worms are very common in BC fish.

### Diphyllobothrium on trout



**Thorough cooking and/or freezing will kill these parasites.**

*Photo courtesy of Jeff Burrows, Fish Biologist*

In BC, the incidence of anasakid and *Diphyllobothrium* human infections is quite low. A survey between 1997 and 2007 revealed the case rate for *Diphyllobothrium* infections averaged 0.8 per population 100,000 over the 10-year period.<sup>1</sup>

### How can fish parasites be killed?

There are two reliable techniques that may be followed:

1. **Cook fish to an internal temperature of 63°C (145°F)**; for stuffed fish increase internal temperature to 74°C (165°F) and cook for 10 minutes per inch thickness. Fish muscle should turn from translucent to white (e.g. cod) or orange (e.g. salmon), flake at the center and separate easily from the bone.
2. **Freezing fish or fish products** to an internal temperature of -35°C for 15 hours, -20°C for at least 7 days, or to -35°C until frozen, and held at -

20°C for a minimum of 24 hours.<sup>2</sup> The critical factor is **to ensure that the center of the fish is solidly frozen**. Not all home freezers can freeze to these temperatures.

### Fish processing plants and Sushi Grade Fish

Fish processing plants have a control program for species likely to contain parasites. Cleaning fish soon after they are caught will reduce larvae from infecting the flesh. Candling tables (lighted tables) are often used to locate and extract any worms found in the flesh. Unfortunately not all worms can be found when they are embedded in thick fillets.

Sushi grade fish must be previously frozen as described, or be exempt from freezing if the fish species is unlikely to be contaminated by parasites (i.e., some species of tuna and farmed salmon). For more information, see the [Guidelines for the Exemption of Tuna from Parasite Destruction](#).

### There's a worm in my fish!

Anisakid roundworms are the most common parasite found in marine fishes. Other names for these threadlike nematodes are *herring worms*, *cod worms* and *seal worms*.

### Anisakis worm in fish



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**BC Centre for Disease Control**

An agency of the Provincial Health Services Authority

For further information please contact your Fish Safety Officer at 604.707.2458 | [fpinfo@bccdc.ca](mailto:fpinfo@bccdc.ca) or your local Health Authority

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Anisakid nematodes are present in most species of fish and are more frequently found in bottom feeding fish such as cod, sole and rockfish. They also occur in squid and octopus.<sup>3</sup> Anisakid nematodes have been found in up to 75% of some species of Pacific wild-caught salmon.<sup>4</sup>

Freshwater perch, trout, and salmon (that spend part of their life in freshwater), may carry the tapeworm larvae of *Diphyllobothrium*. These worms are grey-white, with a soft flabby appearance.

## How do fish get parasites?

The life cycle of an *anisakid nematode* begins when sea mammals (e.g. seals or sea lions) eat infected fish. The larval nematodes grow to maturity, and the sea mammal excretes the nematode eggs into the water. Shrimp-like animals eat the hatched eggs (larvae), and fish or squid or octopus eat the shrimp-like animals. The larvae then develop into the form we find 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, fish eat the crustaceans, and we eat the fish and get infected.

## What happens if I eat one of the worms?

Worm parasites only cause health problems when inadequately prepared fish are eaten (proper freezing and normal cooking kill the worms). The worms are not passed from person to person.

Swallowing a live parasitic worm may not cause any illness if it passes through the intestine and is excreted. If the worm attaches to the stomach it can cause “anisakiasis” or “diphyllobothriasis”. Gastric symptoms may develop within a few hours or a few weeks. Anisakiasis can cause nausea, vomiting, abdominal cramps, epigastric pain and cough. Diphyllobothriasis infections may not cause any symptoms, but can last for long periods. Large infections may cause diarrhea, vitamin B-12 deficiency anaemia or blockages in the intestine or bile duct. Consult your doctor if you have any symptoms associated with eating under prepared fish, octopus or squid.

## Are recipes using raw or lightly marinated fish “safe”?

**No.** Eating raw fish, just like eating raw meat, raw poultry, or raw shellfish is riskier than eating cooked products. To minimize the risk, avoid eating raw or lightly marinated seafood (i.e., sushi, ceviche, cold smoked fish products) unless the fish has been properly frozen.

Even though salt curing and/or pickling processes do have a partial killing effect on parasitic worms, their destruction is often not complete and is not adequate for parasite control.

## What do I do if I find a worm in fish?

- Remove the worm, examine the fish for others and cook or freeze the fish. Thorough cooking or freezing (as outlined earlier) kills the worms.
- Notify the store where you bought the fish so that the store can inspect remaining fish.
- Ask about the return policy at the store - you may wish to return or exchange the unused portion.

## References

- <sup>1</sup> L. Hoang on behalf of BCCDC Laboratory Services, PHSA & BC Assoc. of Med. Microbiol. pers. comm. July 2, 2008
- <sup>2</sup> USFDA Food Code 3-402.11
- <sup>3</sup> Heymann, D. 18<sup>th</sup> Ed. Control of Communicable Diseases
- <sup>4</sup> JFP 2008; 71(6):1287-1308
- <sup>5</sup> UC Davis Seafood Network Information Centre
- <sup>6</sup> CDC Website <http://www.dpd.cdc.gov>
- <sup>7</sup> [www.idfellowship.com](http://www.idfellowship.com)

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