Diphyllobothrium letum

and

Diphylidium caninum

Presented by:

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Diphyllobothrium latum

Introduction:

- *Diphyllobothrium* is a genus of tapeworm which can cause Diphyllobothriasis in humans.
- The principal species causing diphyllobothriosis is *Diphyllobothrium latum*, known as the broad or fish tapeworm, or broad fish tapeworm.
- The fish tapeworm has a long documented history of infecting people who regularly consume fish and especially those whose customs include the consumption of raw or undercooked fish.

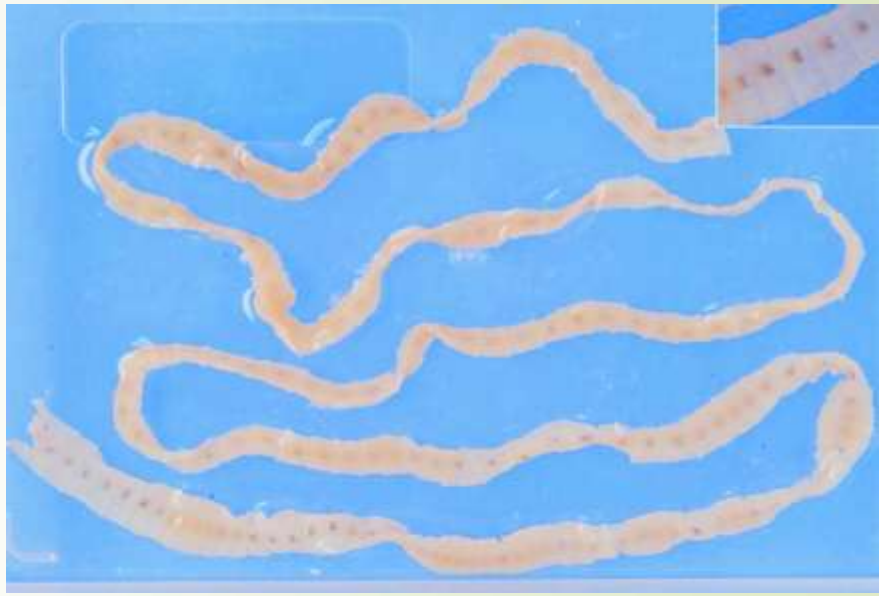


Fig 1: *Diphyllobothrium latum*

https://www.researchgate.net/figure/A-complete-strobila-without-scolex-and-neck-of-Diphyllobothrium-latum-parvum-type_fig1_284736588

Morphology of the Eggs of *Dyphyllobothrium latum*

- Pale yellow and ovale in shape.
- Measuring about 70-45 micro meter.
- Has an operculum(lid).
- Contains amass of granulated yolk cells surrounding an undeveloped ovum.
- Small projection is seen at the non-operculated end of the egg.

Fig 3: Egg of *D.latum*
https://www.cdc.gov/dpdx/diphyllobothriasis/index.html

Morphology of adult *Dyphyllobothrium latum*

- Greyish white and long.
- Measuring 3-10 meters with 3000-4000 segments.
- Elongated scolex it has two slit-like suckers with grooves but no hooks.
- Mature segments are wider than they are long are broader than long .

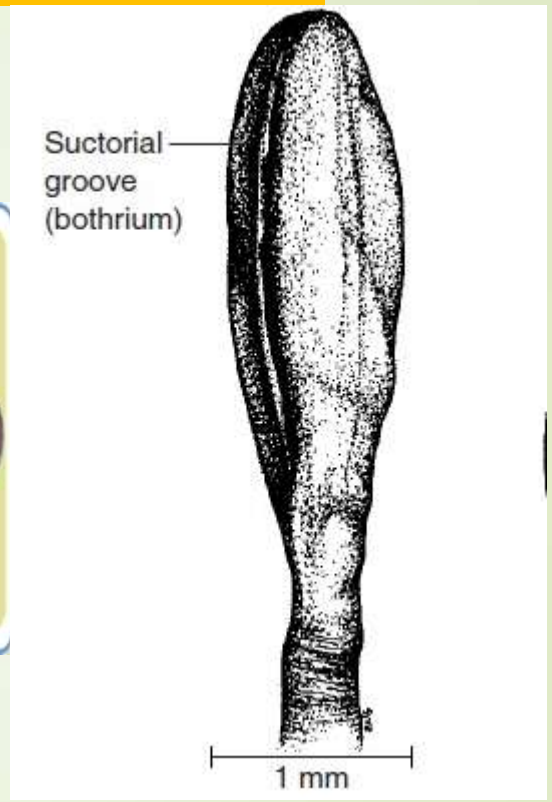
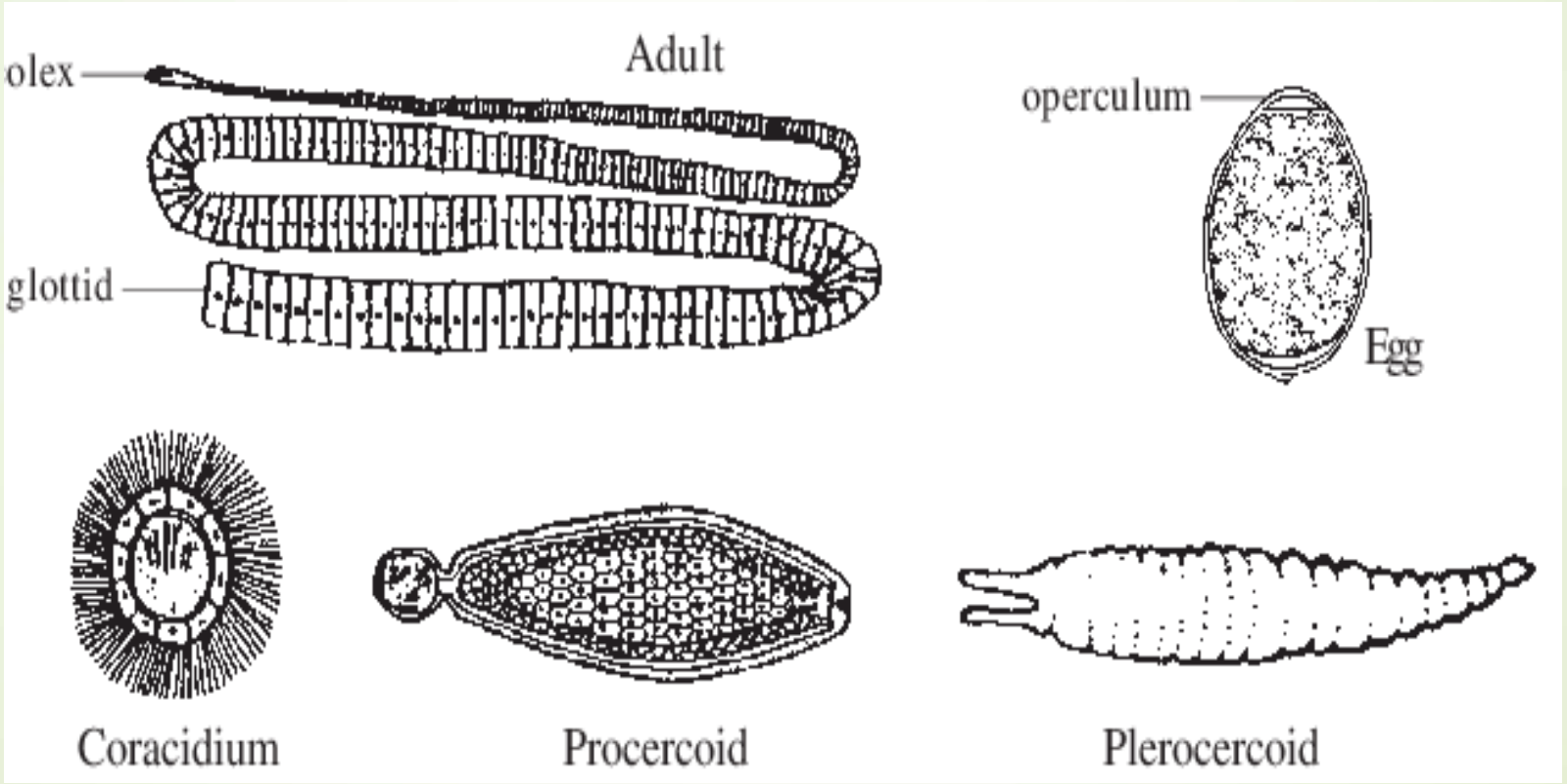


Fig 4: Adult *D.latum*

https://www.brainkart.com/article/Fish-Tapeworm--Diphyllobothrium-latum---Parasitology_20775/

Different stages of *D.Latum*

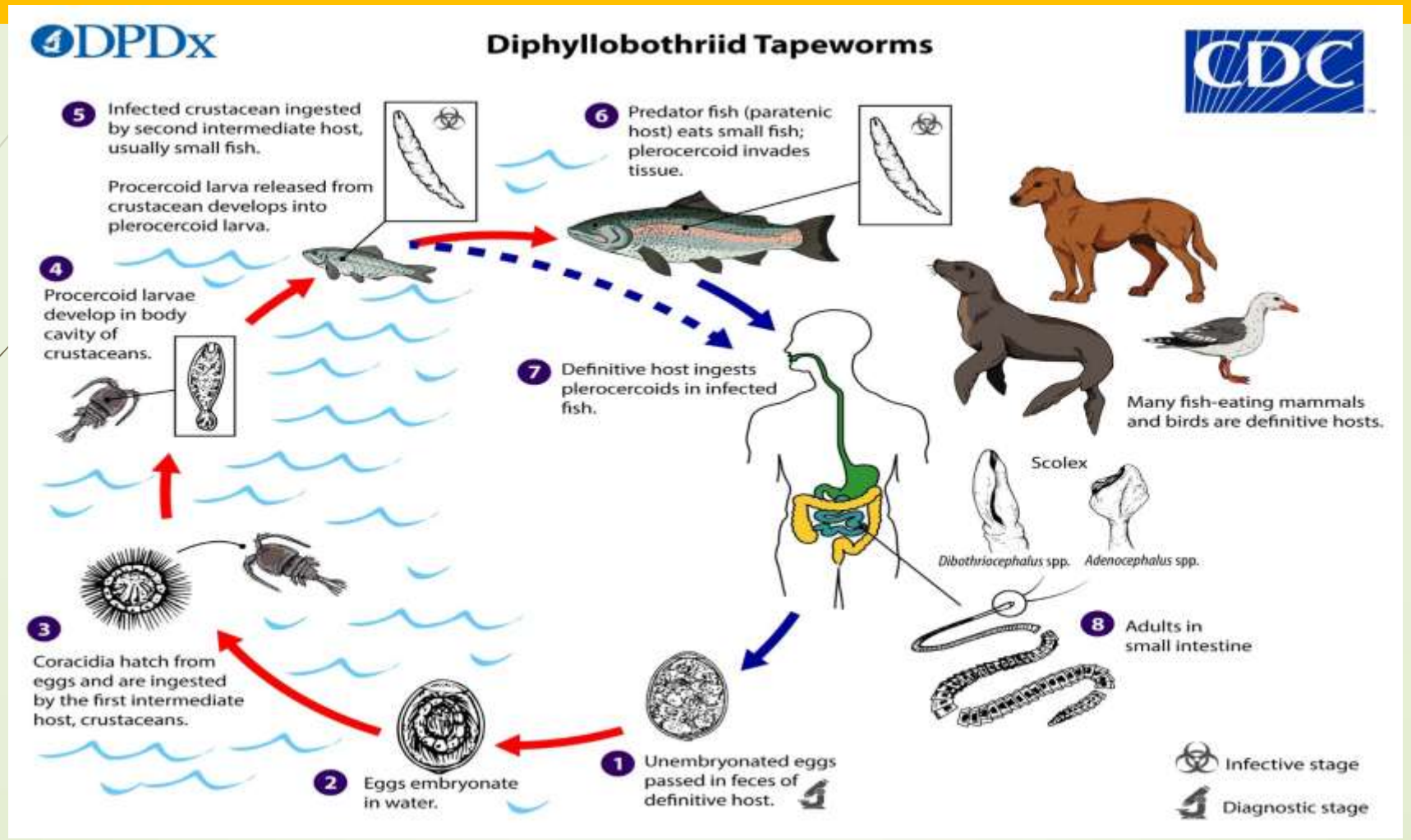


https://www.researchgate.net/profile/Catherine_Yule/publication/233727096/figure/fig12/AS:349599916150819@1460362523671/Diphyllobothrium-latum.png

Life cycle of *D.latum*

- The adult worm resides in the small intestine laying upwards of 1,000,000 eggs daily.
- When egg laying is complete the proglottid degenerates.
- The eggs are released with the feces in fresh water and hatch to form a ciliated coracidium which is ingested by the copepod, Cyclops.
- In the gut of Cyclops a proceroid develops. Cyclops are a food source for many small fresh water fish.
- When the fish eats the infected cyclops the proceroid penetrates the intestinal wall, migrates to muscle tissue and forms a pleroceroid.
- When undercooked fish is ingested by man the scolex of the pleroceroid attaches itself to intestinal mucosa and matures into the adult worm.

Life cycle of *D.Latum*



https://www.cdc.gov/parasites/diphyllobothrium/biology.html

Epidemology

- Occurs in Northern Hemisphere (Europe, North America, Asia) and South America (Uruguay and Chile).
- Epidemiologic studies have concluded that in the 1970s, this infection was estimated to have affected 9 million individuals globally with newer data estimating 20 million people currently infected worldwide.
- *D. latum* is reported for the first time from a man with no obvious symptoms of infection, from Karachi, Pakistan. But the ratio of having infection is less than northern countries.

World wide distribution of *Dyphllobothrium latum*

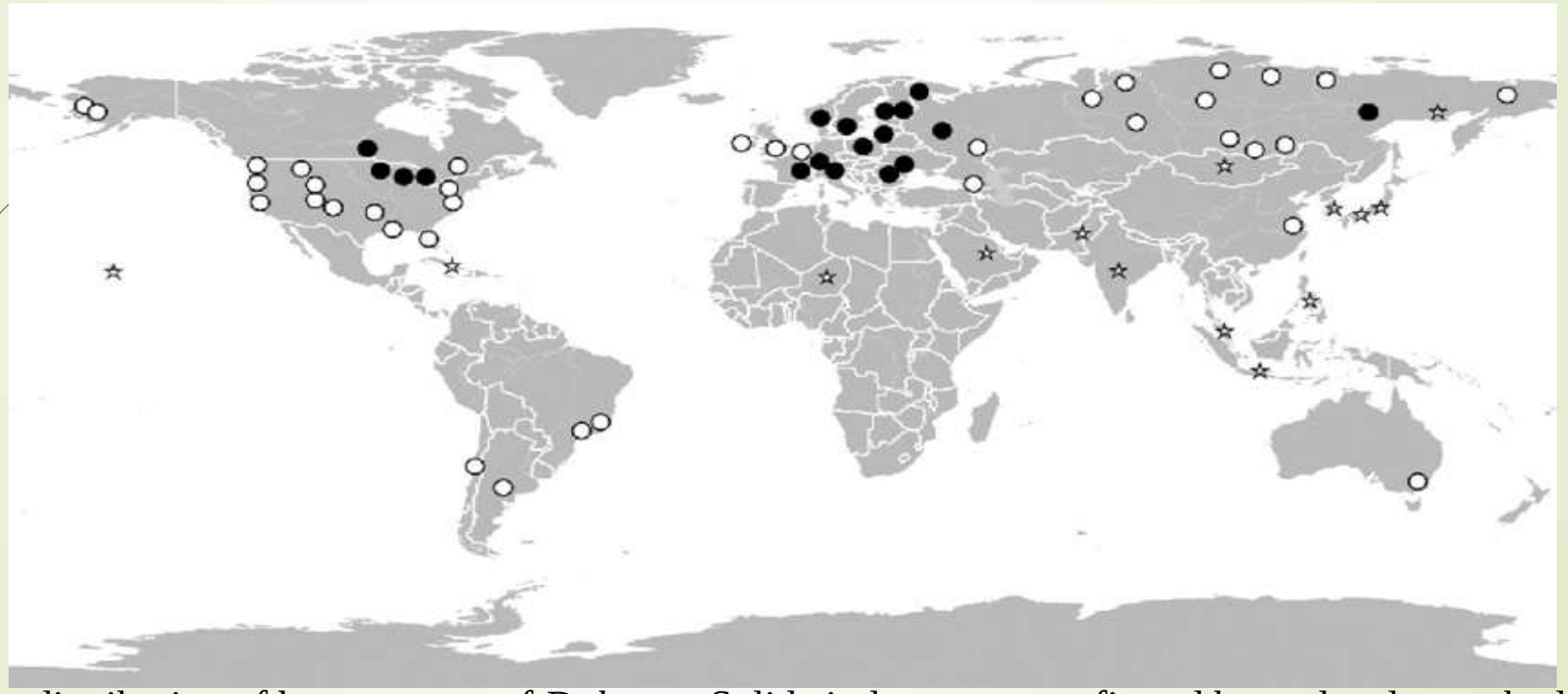


Fig 5: The distribution of human cases of *D. latum*. Solid circles, cases confirmed by molecular methods; empty circles, cases not confirmed by molecular data; and asterisks, sporadic cases.

https://www.researchgate.net/figure/The-distribution-of-human-cases-of-D-latum-Solid-circles-cases-confirmed-by-molecular_fig5_277667508

Disease prevalence

- In recent years there has been a re-emergence of diphyllobothriasis by *Diphyllobothrium latum* (Cestoda: Diphyllobothriidae) in Italy, France and Switzerland, where in the past this fish-borne zoonosis was widespread and then virtually disappeared.
- The presence of *D. latum* plerocercoid larvae was detected in 6.6%, 25.4% and 7.6% of perch (Perca fluviatilis) from Lakes Maggiore, Como and Iseo respectively. The parasite was also present in pike (Esox lucius) with prevalence values ranging from 71.4 to 84.2% and in 3.6-3.8% of burbot (Lota lota) from Lakes Iseo and Como. (Gustineli *et al.*, 2017).
- A high prevalence of *D.latum* has been reported in Finland and Scandinavia, and known as "Jewish or Scandinavian housewife's disease“.

Transmission

- By ingesting the infective larva of *D.latum* which is knowing as plerocercoid in raw or insufficiently cooked freshwater fish.

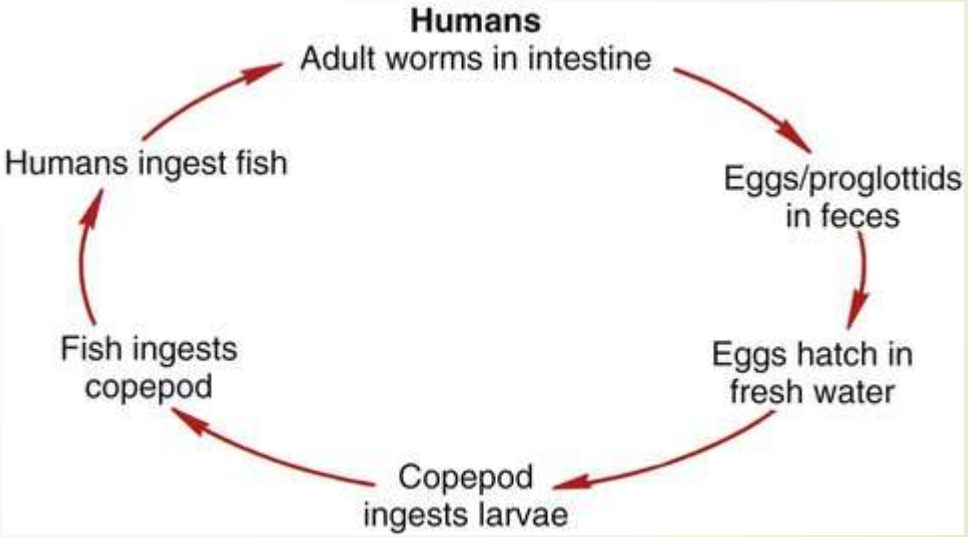


Fig 6: Raw fresh water fish
https://www.healthline.com/health/diphyllobothriasis

Clinical symptoms

- Are generally mild, and can include diarrhea, abdominal pain, vomiting, weight loss, fatigue, constipation and discomfort.
- Approximately four out of five cases are asymptomatic and may go many years without being detected.
- In a small number of cases, this leads to severe vitamin B12 deficiency due to the parasite absorbing 80% or more of the host's B12 intake, megaloblastic anemia neurological symptoms appear.

Treatments

- A single dose of Praziquantel 5–10 mg/kg.
- Alternative treatment is Niclosamide.
- Mild vitamin B12 deficiency is reversed by eradicating the tapeworm. Severe vitamin B12 deficiency should be treated with parenteral vitamin injections. If a patient presents with B12 deficiency and epidemiologic risk factors for fish tapeworm infection, one should maintain a high index of suspicion for possible infection.

Laboratory diagnosis

- Definitive diagnosis of D. latum infection is made by detection of 45 × 65-mm operculated parasite eggs on stool examination. Recovery of proglottids (with a characteristic central uterus) also establishes the diagnosis.
- PCR on DNA extracted from concentrated eggs or proglottids (either fresh or preserved with a PCR-compatible fixative) is usually necessary for species-level identification.

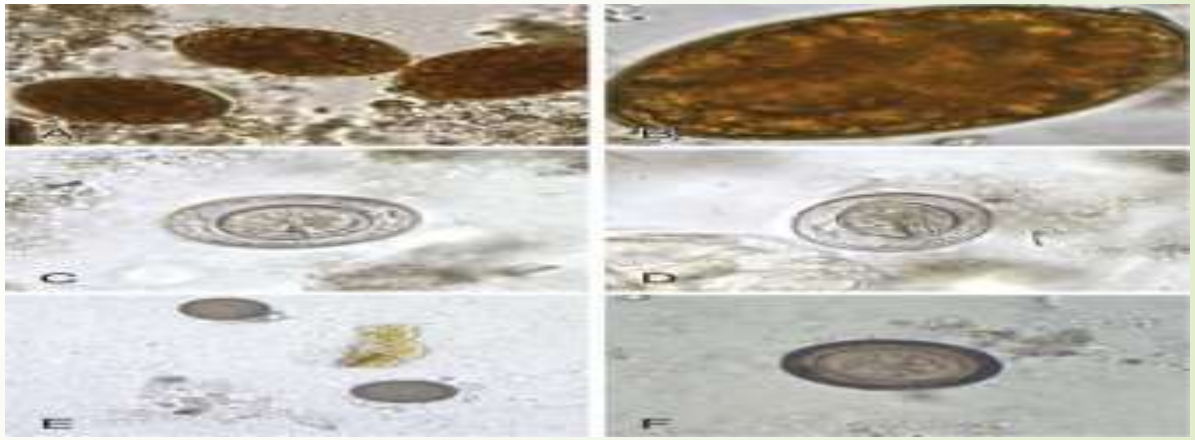


Fig 7: Eggs *of Diphyllobothrium latu*m in an iodine-stained wet mount.

https://www.sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceutical-science/diphyllobothrium-latum

Prevention and control

- Avoiding eating raw or insufficiently cooked freshwater fish which may contain plerocercoieds.
- Fish that is thoroughly cooked, brined, or frozen at -10°C for 24–48 hours can be consumed without risk of *D. latum* infection.
- Preventing the eggs reaching water by providing adequate latrines combined with health education.

Diphylidum caninum

Introduction:

- *Dipylidium caninum* is a tapeworm that commonly infects dogs and cats. And occasionally affects humans, especially children.
- The first cases of *D. caninum* in humans were discover in 1903 with several cases in Europe and one in the U.S.
- Its common name is Dog or cat tapeworm; double-pored dog tapeworm.

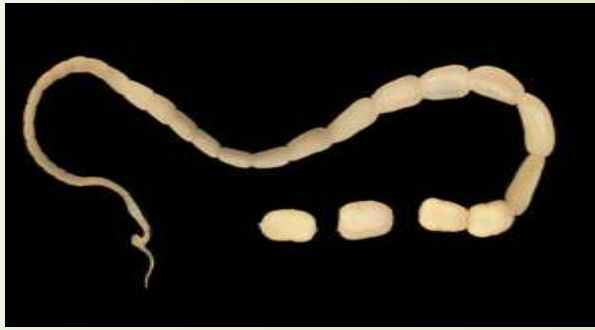


Fig 1: Adult *D. caninum*:
http://www.dpd.cdc.gov/DPDx/HTML/ImageLibrary/Dipylidium_il.htm

Diseases

- Name of disease: Dipylidiasis caused by *Diphylidium caninum.*
- Final Hosts: Dogs, Cats, Humans.
- Reservoir: unknown
- Intermediate Host: larva of dog fleas (Ctenocephalide species)
- Infective stage: cysticercoid for final host & egg for intermediate host.
- Incubation Period: approximately 20 days.

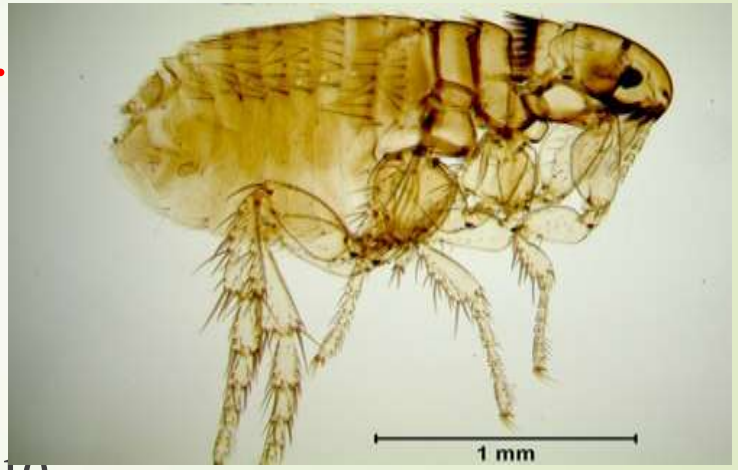
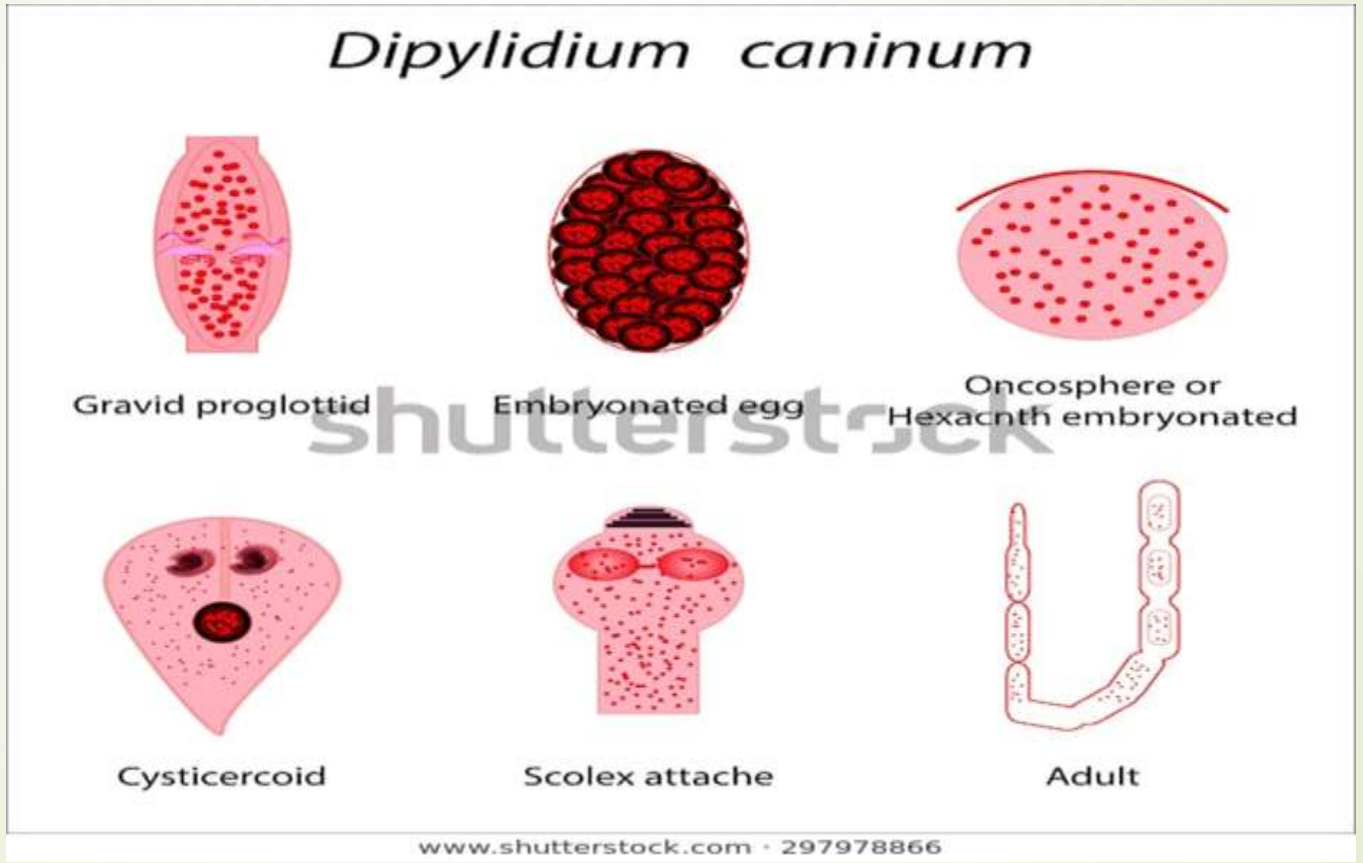


Fig 3: Dog flea
http://entnemdept.ufl.edu/creatures/URBAN/OCCAS/dogflea.htm

Morphology of *Diphylidum caninum*

- The length of adult *D.caninum* is 10-70 cm.
- Scolex is conical-shaped and has four suckers. There is a rostellum armed with several rings of small hooks.
- 5 Segments(stroblia) 200) segments ,diagnostic feature(pumpkin-seed shape).
- They contain two sets of male and female reproductive organs. They therefore demonstrate two genital pores that lead to their name as the “double-pored”.
- 6 gravid segments :contain egg capsule, The number of eggs can range from 5 to 30.
- Egg similar to egg of taenia spp. (hexacanth embryo, embryophore, outer membrane). The larvae of *D. caninum* are known as cysticercoids because the scolex is enclosed in a fluid-filled cyst at this stage.

Stages of *Diphylidium caninum*

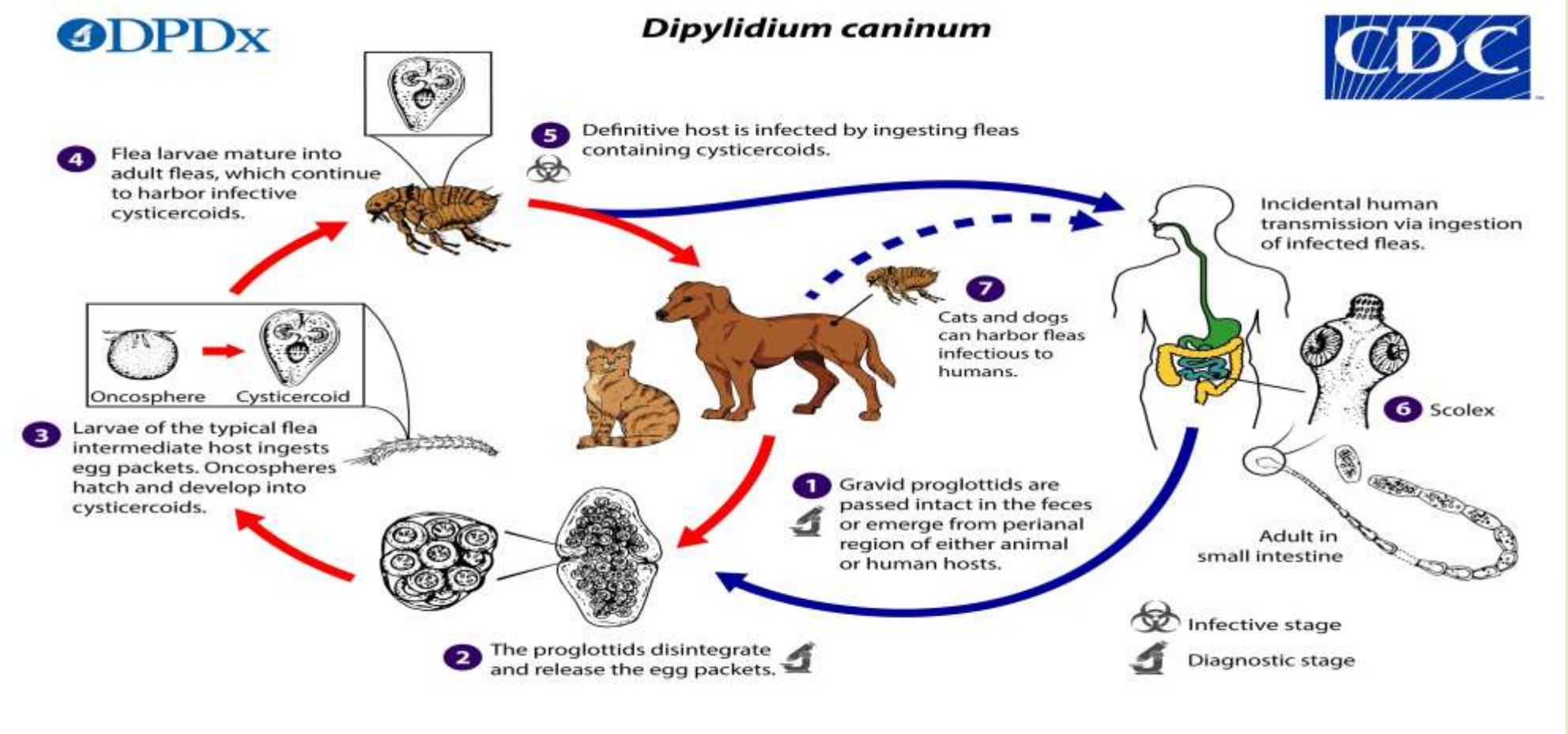


https://www.shutterstock.com/image-photo/dipylidium-caninum-proglottid-cats-perianal-region-1275269095

Life cycle of *Diphylidium caninum*

- Proglottid releases egg in feces packet containing oncospheres.
- Ingestion of egg pack by flea larva Ingestion of egg pack by flea larva Oncopheres hatch in larva, passes through intestinal wall and developes into cysticercoid in body cavity.
- Larva mature into adult flea (with infective cysticercoid) Ingestion of infected flea by cat, dog, or human Ingestion of infected flea by cat, dog, or human.
- Digestion of flea releasing cysticercoid Digestion of flea releasing cysticercoid.
- Cysticercoid develope into adult worm in small intestine and attaches to intestinal wall.
- Eventually develope gravid proglottids which are passed in feces.

Life cycle of *Diphylidium caninum*



https://www.cdc.gov/dpdx/dipylidium/index.html

Epidemiology

- Worldwide, this worm is one of the most common tapeworms of dogs and cats. Since this worm is also able to infect humans, especially families with dogs and cats are endangered.
- Human infections have been reported in Europe, the Phillipines, China, Japan, Argentina, and the United States.
- In Pakistan the intestinal helminths detected were Dipylidium caninum (n =18, 11.8%) in Dir District.
- In Germany this worm is the most common tapeworm in children.

Clinical symptoms

- Most cases are asymptomatic Including cats/dogs.
- Severe infections can exhibit: Such as Abdominal pain, Diarrhea, Itchy anus, Urticaria, Red rash / welts and extremely itchy Caused by body’s allergic reaction to worm antibodies.

Laboratory Diagnosis

- Observe gravid proglottids in stool, or near anus.
- White White Shaped like cucumber seed usually intact.
- Observe ova in fecal smear.

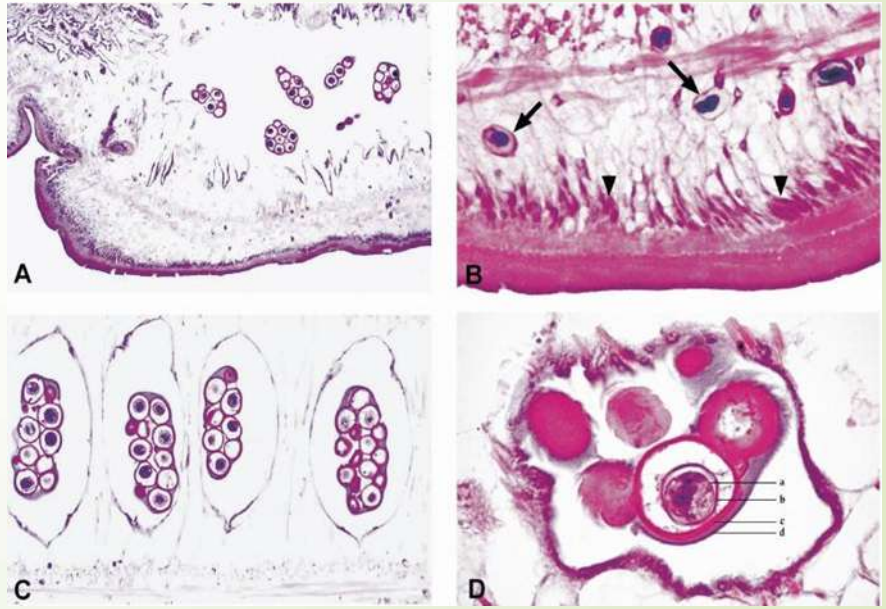


Fig 4: Proglottids and egg packets
www.satprints.com

Treatment

- Praziquantil
- Very effective
- Tolerated well in both pets and humans.
- In humans = oral
- In pets = injection

Can dissolve worm so it may not be seen in stool.

- Epsiprantel can be administered at 5.5 mg/kg orally (dogs) and 2.75 mg/kg orally (cats) to eliminate infections with Dipylidium caninum.

Prevention and control

- Vector control! Control fleas on pet and in pets environment.
- May take up to a month to get rid of all fleas.
- Pet may need more than one treatment.
- Teach children to wash hands after playing with pets.
- Dispose of pet waste properly.


Thank you !!!