

Topic
On
Genus – Echinococcus

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- *Echinococcus granulosus*
- *Echinococcus multilocularis*
- *Echinococcus vogeli*
- *Echinococcus oligarthus*

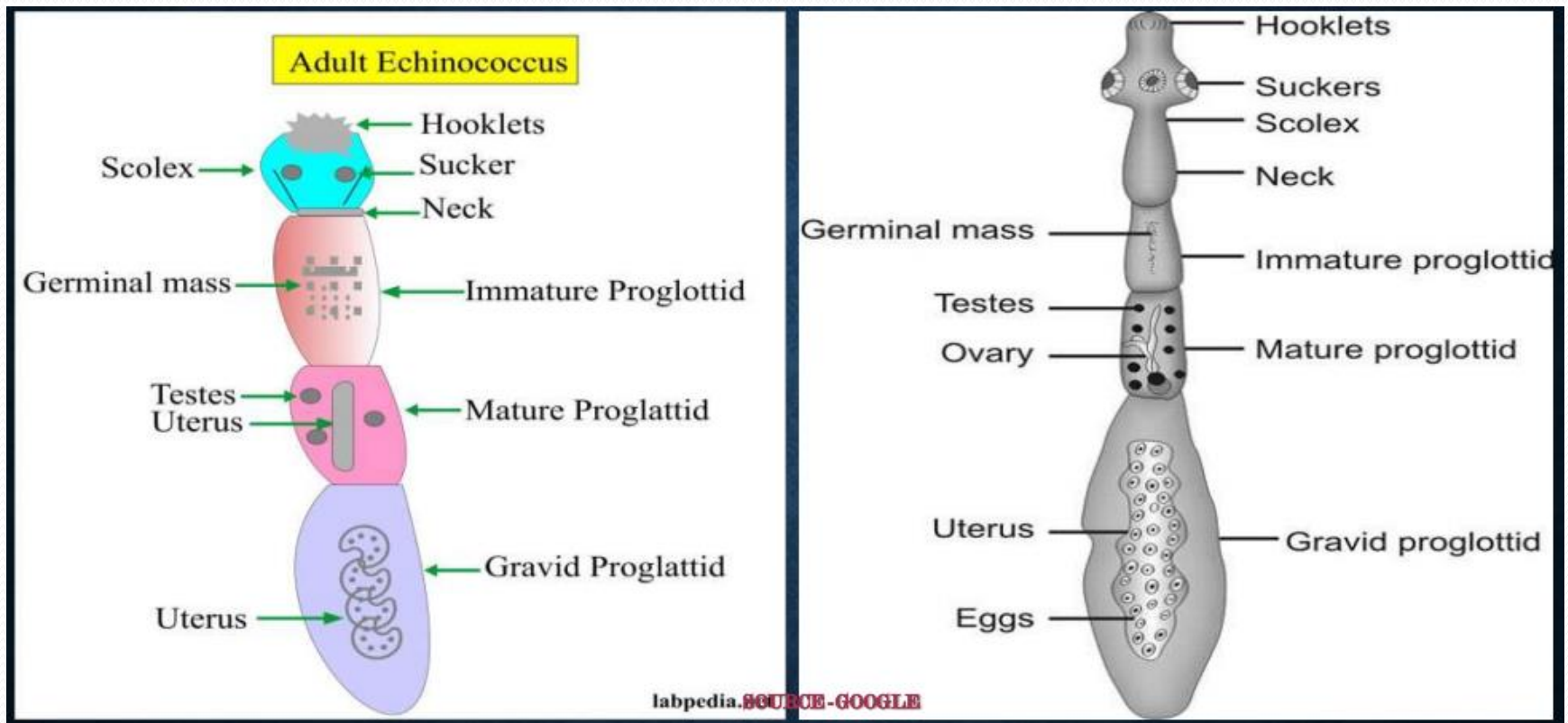
Organism	Definitive Hosts	Intermediate Hosts
<i>E. granulosus</i>	Dogs and other canidae	Sheep, goats, cattle, camel, buffalo, swine, kangaroos, and other wild herbivores
<i>E. multilocularis</i>	Foxes, dogs, other canidae and cats	Small rodents
<i>E. vogeli</i>	Bush dogs and dogs	Rodents
<i>E. oligarthrus</i>	Wild felids	Small rodents

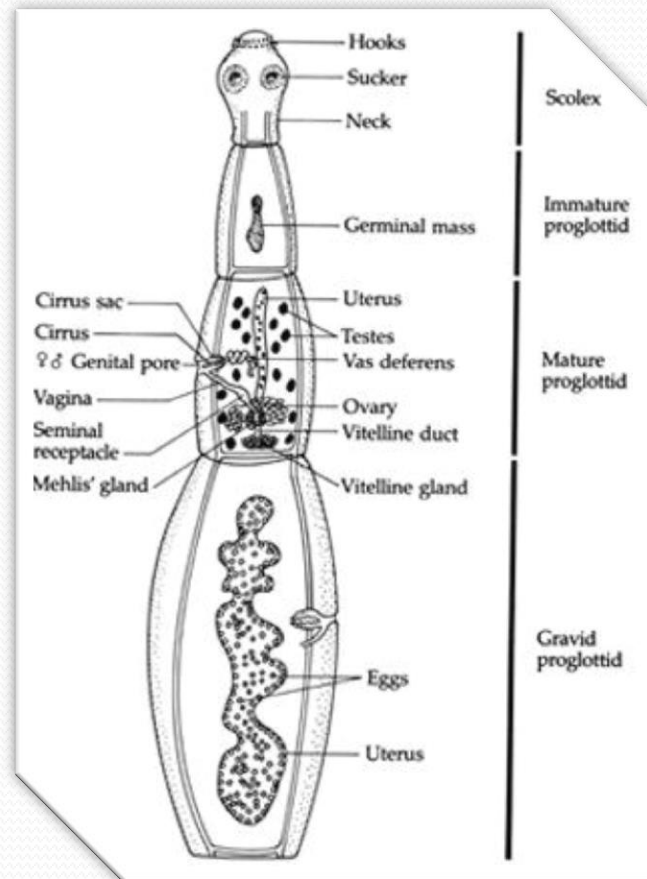
Adult and larval infection of Echinococcus	Echinococcosis
<i>E. granulosus</i>	Cystic echinococcosis/ Cystic hydatidosis
<i>E. multilocularis</i>	Alveolar echinococcosis/ Alveolar hydatidosis
<i>E. vogeli</i> and <i>E. oligarthrus</i>	Neotropical echinococcosis

Echinococcus granulosus

Common name	Smallest dog tapeworm / Dwarf tapeworm of dog (Important Zoonotic tapeworm)
Host	Dog
Location	Small intestine
I/H	All mammals including man
Larval stage	Hydatid cyst

Morphology





- Worms are 2 to 7 mm in length and have 3 to 4 segments.
- The rostellum has two rows of hooks.
- The penultimate segment is the mature segment and the last one is gravid.
- Ovary is kidney shaped. In the gravid segment number of lateral branches of uterus may occur.
- Eggs – 32 to 36 μm \times 25 to 30 μm

Echinococcus multilocularis

- Adult tapeworms, which primarily occur in foxes, measure 1.2 to 4.5 mm in length.
- There are 3 to 5 proglottids and number of rostellar hooks vary from 14 to 34.
- Size of the rostellar hooks varies from 20 to 21 μm (smaller) and 25 to 35 μm (larger).
- Uterus is sac-like and lacks lateral pouches.
- The ante-penultimate proglottid is mature containing 14 to 35 testes.
- The genital pore is situated anteriorly.
- The adult tapeworms develop in 1.5 to 2 months.

Echinococcus oligarthus


- It occurs in wild felids like puma, jaguar in Central and South America.
- Adult tapeworms measure 1.9 to 2.9 mm and each possesses only three proglottids.
- The number of rostellar hooks vary from 26 to 40 and measure 43 to 60 μm (larger) and 28 to 45 μm (smaller).
- The mature proglottid (the penultimate one) bears 15 to 46 testes.
- Uterus in gravid segment is sac-like.
- The genital pore is placed anteriorly.
- Human infection with this species has not reported.

Echinococcus vogeli

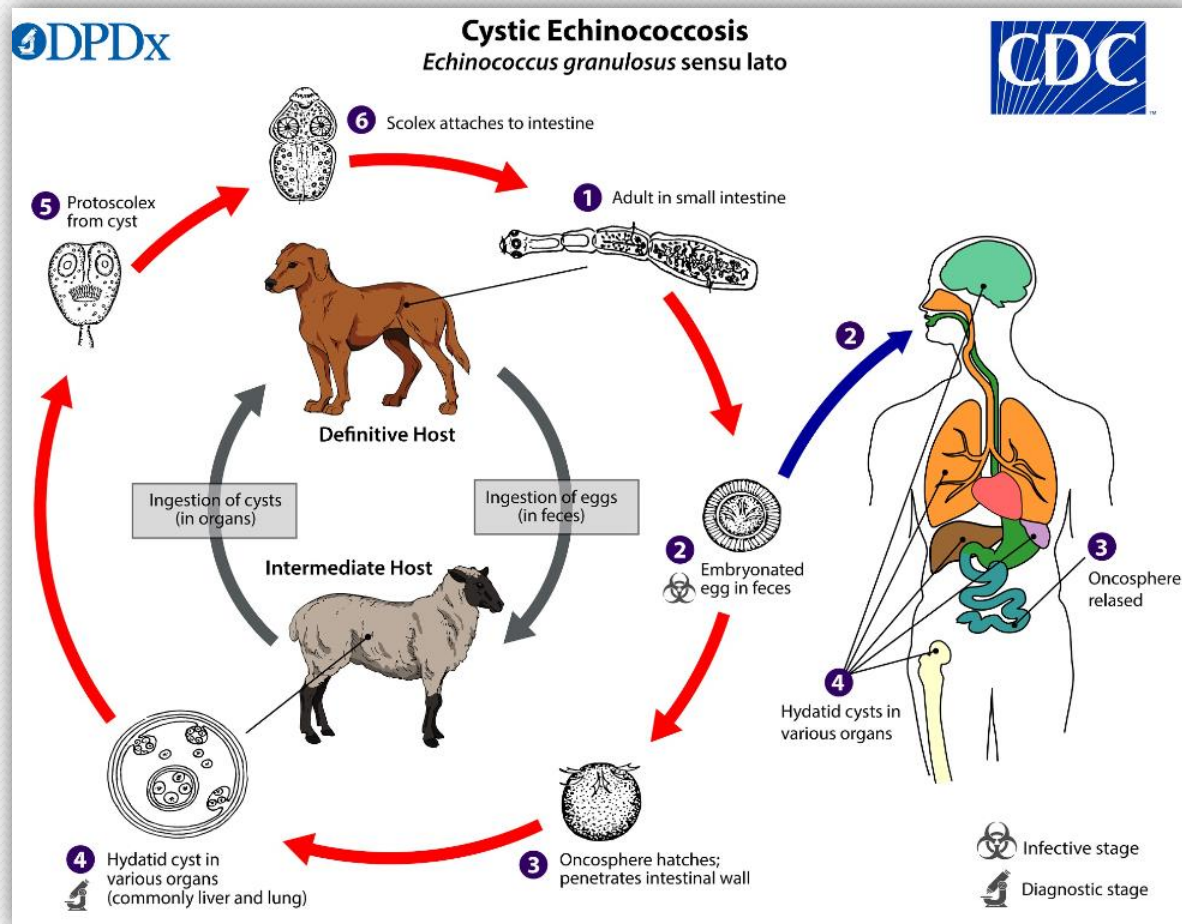
- It occurs in bush dog and domestic dog in central and northern South America.
- The adult tapeworm measures 3.9 to 5.6 mm in length, with three proglottids in each.
- The penultimate proglottid is the mature one.
- The rostellar hooks are 28 to 36 in number, measuring 49 to 57 μm (large) and 30 to 47 μm (small).
- The lateral branches of the uterus are long and tubular.
- The genital pore is posteriorly placed.
- The hydatid cysts develop in pacas (*Cuniculus paca*) other rodents.


Echinococcus : mode of transmission

- Infected dogs shed tapeworm eggs in their faeces which contaminate the ground.
- Echinococcus eggs deposited in soil can stay viable for up to a year.
- Sheep, cattle, goats and pigs ingest tapeworm eggs in the contaminated ground.
- After hatching the eggs develop into cysts in the internal organs.

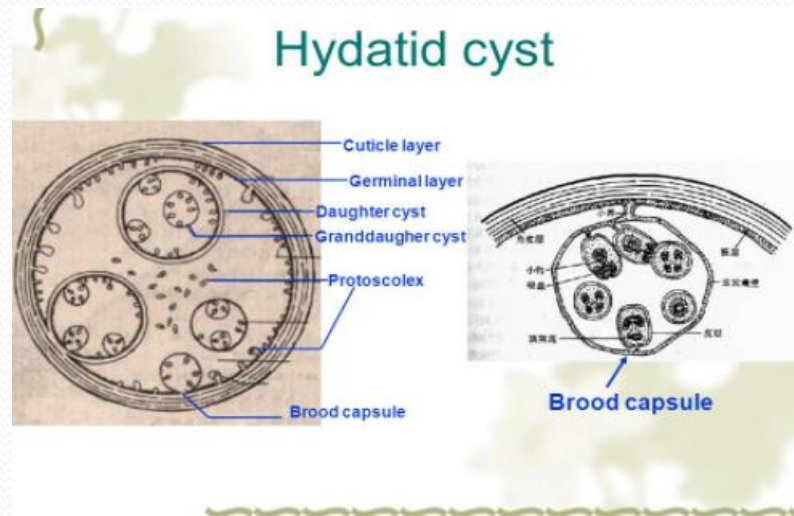
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- The most common mode of transmission to humans is by the accidental consumption of soil, water, or food that has been contaminated by the faecal matter of an infected dog.
 - The disease is most commonly in people involved in raising sheep.

Life cycle




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- Eggs are ingested by I/H (Sheep, cattle, goat, pig, horse and man) and these hatch in the small intestine and upon hatching the oncosphere penetrates the intestine wall and reach the liver via blood and lymphatic circulation.
 - In liver and lungs, oncosphere develops into a cyst - hydatid cyst.
 - Cyst may also occur in other organs.
 - Cyst develops slowly and takes several months to attain maturity.

Hydatid cyst

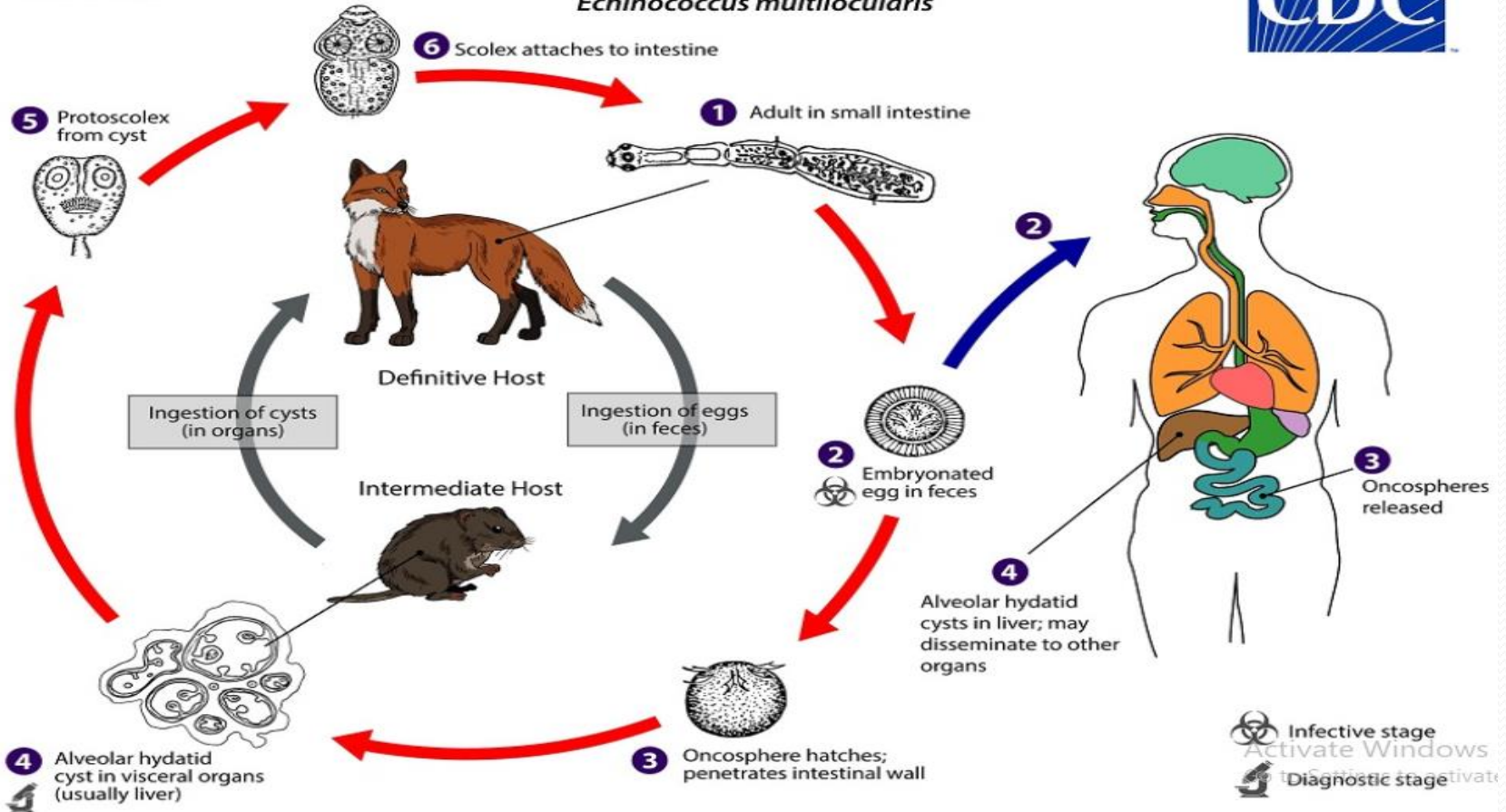


- 5 to 10 cm in diameter, unilocular and consists of two layers **Outer laminated membrane** and **Inner germinal membrane**.
- From the germinal membrane, brood capsules develop in about 5 months after infection.

- Each capsule contains a number of protoscolices.
- Sometimes, the brood capsule detaches and float free in the hydatid fluid which is called as “hydatid sand”.
- If the cyst is ruptured, the brood capsule and protoscolices produce “external daughter cysts”.
- All cysts do not produce brood capsules and protoscolices. Cysts which does not have brood capsules and protoscolices are known as “sterile cysts”.
- In sheep, 51% of cysts are sterile.

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- D/H acquires infection by ingestion of protoscolices along with infected meat.
 - In dog, the protoscolices penetrate between the villi and reach maturity in about 4 to 7 days.
 - Man can acquire infection by ingestion of eggs along with contaminated food or entry of protoscolices through cut wounds during slaughter.

Alveolar Echinococcosis *Echinococcus multilocularis*



Pathogenesis

- In dogs, adult tapeworms are not pathogenic whereas in humans and other domestic animals, the pathogenesis vary and may be severe, owing to larval tapeworms i.e., hydatid cyst.
- Clinical signs depend upon the location of the cyst. The function of affected organ is impaired. If the cyst is ruptured, it results in anaphylactic shock.



Hydatid cyst of liver

Diagnosis

Diagnosis in dog

- It is difficult to differentiate the egg of *Echinococcus* in the faeces of dogs from the species of *Taenia*.
- So confirmation is only based upon the demonstration of adult worm.
- For collection of adult worms from the infected animals, the dogs must be treated with **Arecoline hydrobromide**, 1 to 2 mg/Kg b wt. The treated dogs will purge out the intestinal contents and expel all the adult worms.
- Examine the mucous portion of the faecal sample to obtain the adult worms.
- Autopsy



Echinococcus sp. eggs

Diagnosis in man (Hydatidosis)

- **CASONI's skin test**
- Counter immuno electrophoresis
- ELISA
- AGPT

Treatment

- Arecoline hydrobromide - 1 to 2 mg/Kg b wt.
- Praziquantel – 5 mg/Kg b wt.
- Niclosamide – 100 to 150 mg/Kg b wt.
- Mebendazole – 100 to 200 mg/Kg b wt. Twice daily fo 5 days.
- Bithionol – 200 mg/Kg b wt.

Control

❖ Control of tapeworm infection in dogs

- Control of lice and fleas using deltamethrin 1% [Butox] or by using flea collar.
- Hygienic maintenance of kennel.
- Avoid providing raw meat or offals to dogs.
- Periodical deworming.

❖ Control of hydatid cyst in man

- Personal hygiene.
- Public education.

