# Tapeworms of dogs (Continued...)

**Dr.A.Sangaran, M.V.Sc., Ph.D.,**
Professor
Department of Veterinary Parasitology
Madras Veterinary College,
Chennai - 600 007.

# *TAENIA MULTICEPS* PATHOGENESIS

## Diagnosis

- By PM examination.
- X – ray.

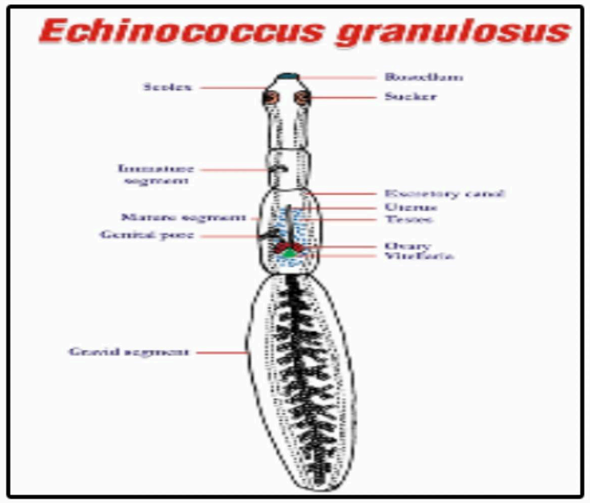
## Treatment

- Uneconomical.

# ECHINOCOCCUS GRANULOSUS

**Common name**

- Smallest dog tapeworm (Important Zoonotic tapeworm).




**Host**

- Dogs

**Location**

- Small intestine

**Intermediate Hosts**

- All mammals including man

**Larval stage**

- Hydatid cyst

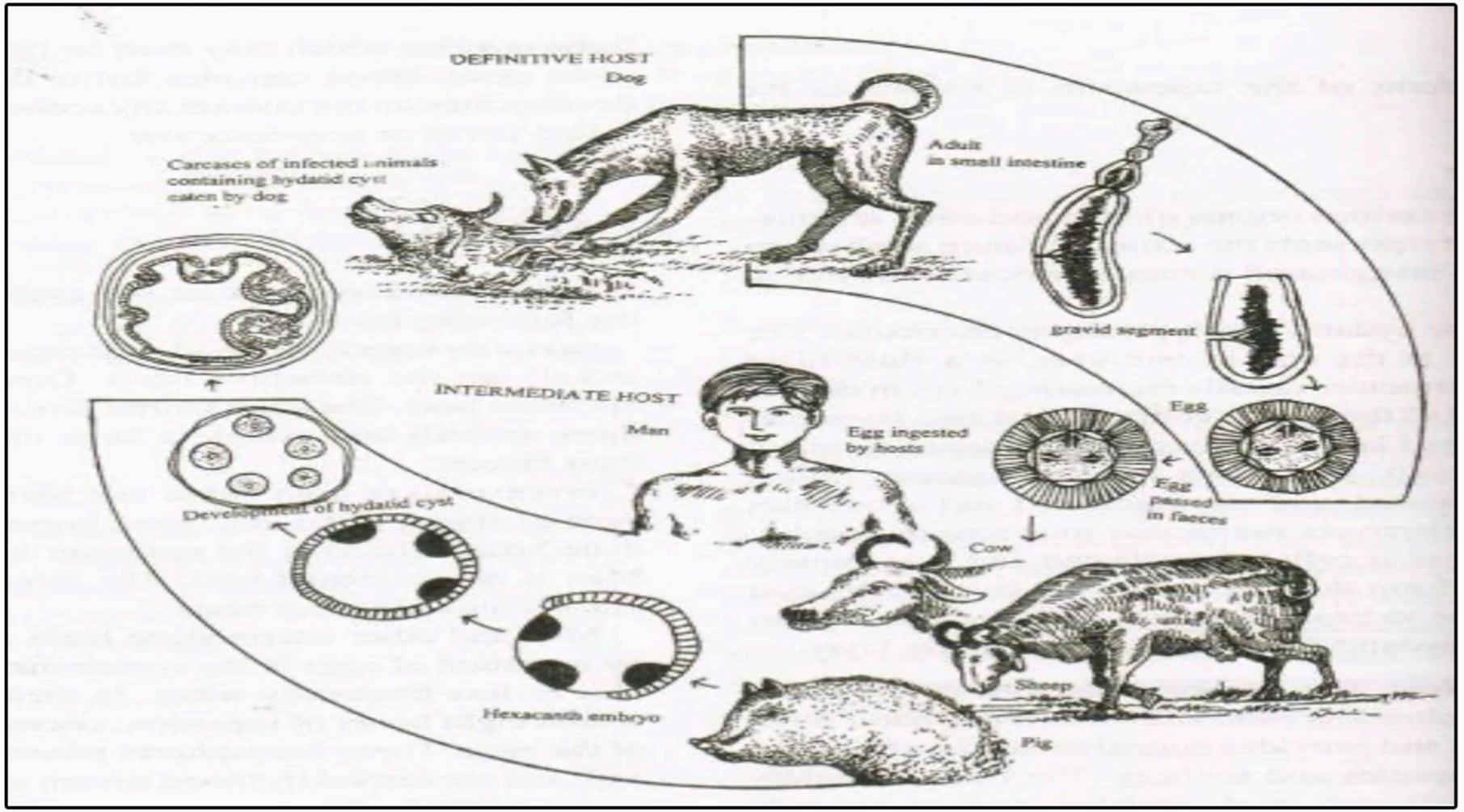
**Morphology**

- Worms are 3 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.
- Each segment has a single set of reproductive organ. Genital pore irregularly alternate.
- Ovary is kidney shaped. In the gravid segment number of lateral branches of uterus may occur.
- Eggs are taenid type.

# LIFE CYCLE

- Eggs are ingested by I/H (Sheep, cattle, goat, pig, horse and man) and these hatch in the small intestine and upon hatching the onco-sphere 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.

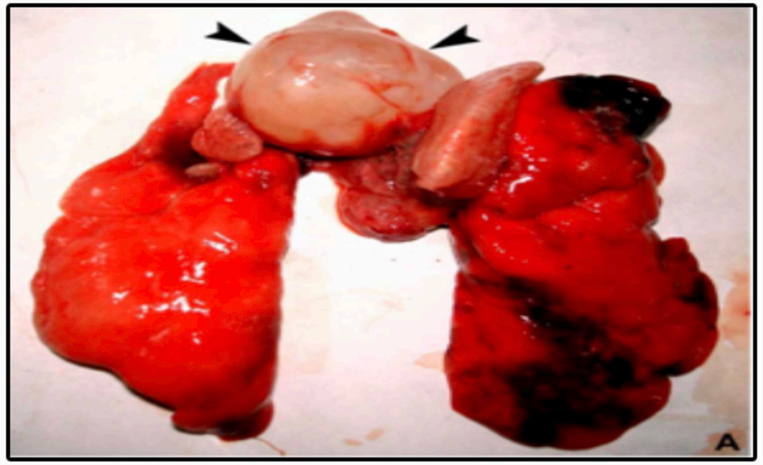
# Life cycle

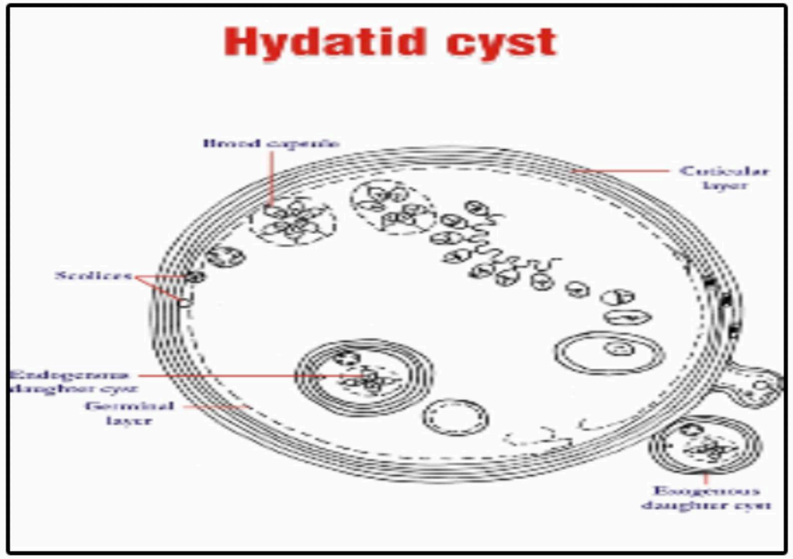

DEFINITIVE HOST
Dog
Carcases of infected animals containing hydatid cyst eaten by dog
Adult in small intestine
gravid segment
Egg
Egg passed in faeces
INTERMEDIATE HOST
Man
Egg ingested by hosts
Development of hydatid cyst
Cow
Sheep
Hexacanth embryo
Pig

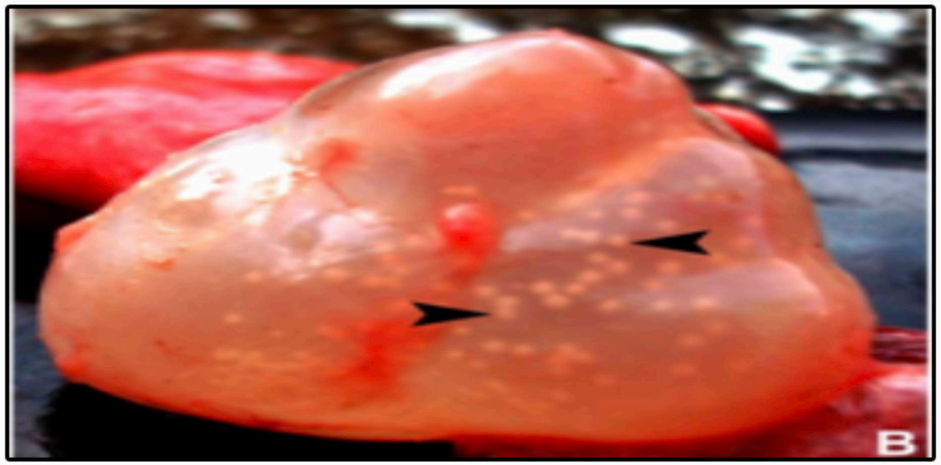
# HYDATID CYST

- Meausres 5 to 10 cm in diameter, unilobular 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”.
- 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.

# HYDATID CYST



# 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.

# DIAGNOSIS

## Diagnosis in dog

- Examination of faeces for presence of eggs but *E. granulosus* eggs cannot be differentiated from other taenid eggs such as *T. multiceps* and *T. hydatigena* .
- 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.

## Diagnosis in man (Hydatidosis)

- CASONI's skin test – 1903 – Outdated.
- Counter immuno electrophoresis.
- ELISA
- AGPT

# *ECHINOCOCCUS GRANULOSUS*
# TREATMENT AND CONTROL

## Treatment in dogs

- Similar to *Dipylidium caninum*

## Treatment in Humans (Hydatid Cysts)

- Surgical removal.
- Aspiration of cyst fluid, Marsupilization and Sterilization of cyst.
- Inject 2.5 to 10% formalin which will destroy the germinal membrane and protoscolices. However, this procedure is dangerous, because spillage of hydatid fluid may cause anaphylatic shock and dissemination of protoscolices to various parts.
- Albendazole – 10 mg/kg bwt. Two divided dose.
- Mebendazole – 400 to 600 mg/kg b. wt. thrice for 21 to 30 days.

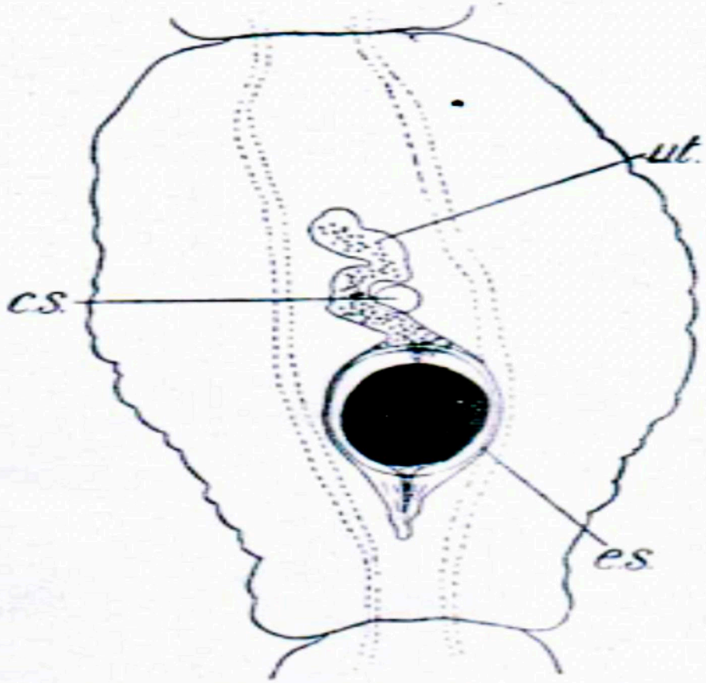
## Control of tapeworm infection in dogs

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

## Control of hydatid cyst in man

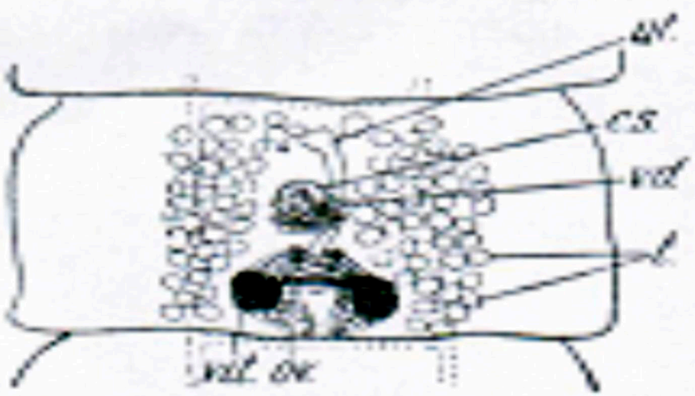
- Personal hygiene.
- Public education and awareness.

# MESOCESTOIDES LINEATUS




Dorsal view of gravid segment of *Mesocestoides lineatus*, (*After Baylis*)

cs cirrus-sac
es egg-sac
ut uterus




Dorsal view of mature segment of *Mesocestoides lineatus*. (*After Baylis*)

cs cirrus-sac
ov ovary
t testes
ut uterus
vd vas deferens
vit vitellarium

# M.lineatus

**Host**

- Dog, cats, wild carnivores and also humans.

**Location**

- Small intestine

**Intermediate Host**

- Oribatid mite or coprophagus beetles - 1st I/H.
- Amphibia, reptiles, birds, dog and cat – 2nd I/H.

**Larval stage**

- Cysticercoid and Tetrathyridium.

**Morphology**

- Small to medium sized worm.
- Scolex has four elongate oval suckers which are unarmed
- Rostellum is absent. Genital pore is situated on the mid ventral line of the ventral aspect.
- Ovary is bilobed.
- Testes are 50 in number.
- In the gravid segment uterus is replaced by par-uterine organ.
- No separate uterine pore.

# LIFE CYCLE

- Not fully known. Only based on experimental infection the scientists suggested that it requires two I/H.
- Oribatid mite or coprophagus beetles act as 1st I/H in which cysticercoid like developmental stage occur.
- When infected mite or beetles are ingested by 2nd I/H in which tetrathyridium is formed. It mainly occurs in the peritoneal cavity of 2nd I/H and they multiply asexually by longitudinal splitting of parent scolex.
- The final host acquire infection by ingestion of infected 2nd I/H. Prepatent period is 16 to 20 days

# PATHOGENESIS AND TREATMENT

## Pathogenesis

- Adult worms are not pathogenic. But heavy infection causes severe diarrhoea in man.
- If dog act as 2nd I/H, the tetrathyridium causes peritonitis and ascites.

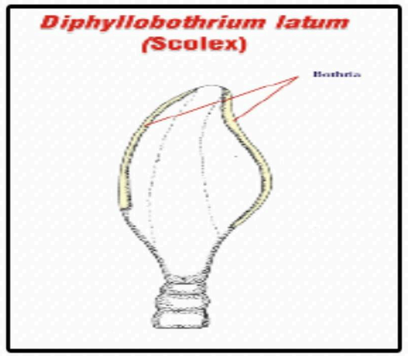
## Treatment

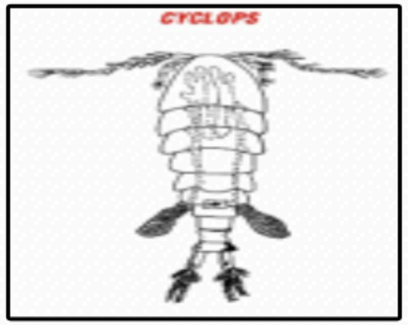
- Similar to *Dipylidium caninum*

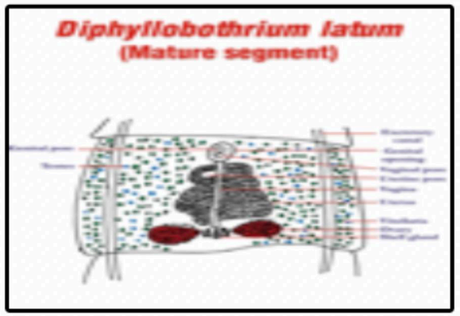
# TAENIA HYDATIGENA

**Broad fish tape worm**

- Man, dog, cat, pigs, and other fish eating mammals
- Small intestine
- 1st I/H - Cyclops (Diaptomus gracilis – copepod crustaecean).
- 2nd I/H – Fresh water fish. (Pike, trout and perch)
- Worms are medium to large in size, scolex has a narrow week, deep muscular groove known as “Bothria” (hold fast organ) situated on both dorsal and ventral side.
- Scolex is unarmed and almond in shape.
- Each segment contain single set of reproductive organs.
- Genital pore and uterine pore open separately on the ventral aspect, whereas in mesocestoides, there is no separate uterine pore.
- Ovary is bilobed. Vitelline gland and testes distrib-uted in the lateral margin of segment.
- In the gravid segment uterus is spiral tube in shape.

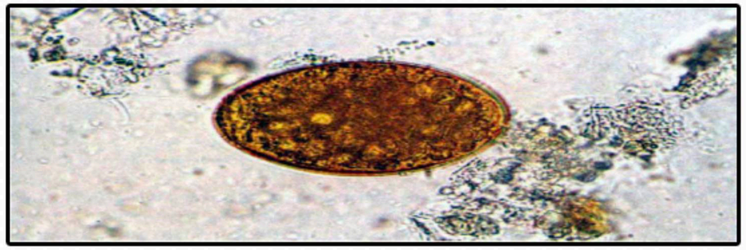


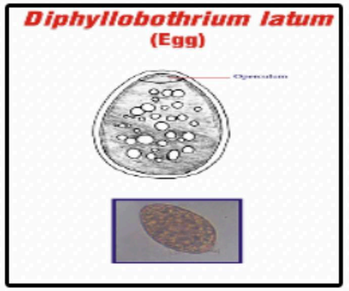



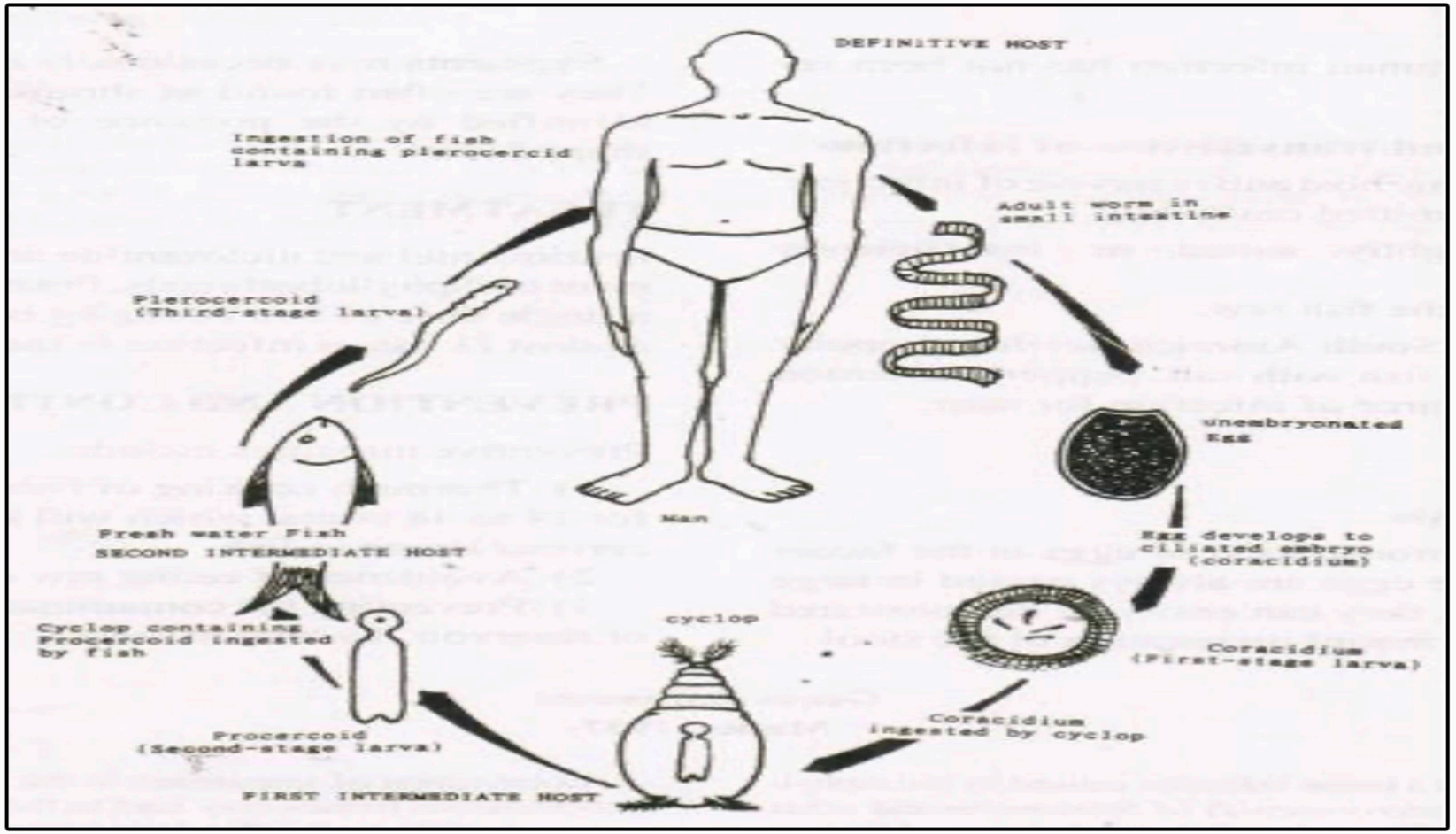
# LIFE CYCLE

- Eggs are passed in the faeces of host, they are light brown in colour, operculated and unembryonated when laid.
- Development of eggs occur in the environment, takes several weeks for the development of ‘coracidium’. It is a six hooked oncosphere covered with ciliated embryosphore.
- The fully developed coracidium hatch out and swim in the water for short period, the coracidim is then ingested by 1st I/H – Cyclops, develops into “Procercoid” in about 3 weeks time. These infected 1st I/H are ingested by fish (2nd I/H).
- Within the 2nd I/H it develops into plerocercoid in the viscera and musculature.
- D/H acquire infection by eating the infected raw fish. Prepatent period is 4 weeks.





# LIFE CYCLE


DEFINITIVE HOST
Ingestion of fish containing plerocercid larva
Adult worm in small intestine
Plerocercoid (Third-stage larva)
Man
unembryonated Egg
Fresh water Fish
SECOND INTERMEDIATE HOST
Egg develops to ciliated embryo (coracidium)
cyclop
Cyclop containing Procercoid ingested by fish
Coracidium (First-stage larva)
Coracidium ingested by cyclop
Procercoid (Second-stage larva)
FIRST INTERMEDIATE HOST

# PATHOGENESIS AND DIAGNOSIS

## Pathogenesis

- In man: It causes non-specific abdominal symptom and macrocytic hypochromic anaemia - pernicious anaemia due to competition between the host and parasite for vitamin B12.

## Diagnosis

- Based on clinical signs.
- Faecal examination for the presence of eggs.

## Treatment

- Praziquantel – 25mg/Kg b wt.
- Niclosamide – 75 – 150mg/Kg b wt.
- Quinacrine – 7 – 10mg/Kg b wt.

## Control

- Avoid eating of raw fish.



# *Thank you*