

Life History of *Taenia Solium* - ①

Taenia Solium is a parasite found in digestive tract of human being it is a digenetic cestode of phylum platyhelminthes. The life cycle passes in two hosts the Primary host is human being, while the Secondary host is Pig. Life cycle starts with passing of some gravid proglottids with human faeces throughout the year, these proglottids may show a little muscular contractions, development begins in the uterus, the fertilized egg divides to form a morula which is a solid ball of cells. The outer cells of the morula secrete a thick striated coat formed of chitin which hardens into a secondary shell or embryophore. Inside the capsule shell. lining the embryophore is a thin basement membrane. The inner cells of the morula form an embryo which acquires 6 chitinous hooks posteriorly, this six hooked embryo is called a hexacanth and is typical of all Tapeworms, It is enclosed in a onchospherical membranes.

The hexacanth with its Primary shell, embryophore and two onchospherical membranes is known as onchosphere. The gravid proglottids which pass out of the host contain embryos in the onchosphere stage.

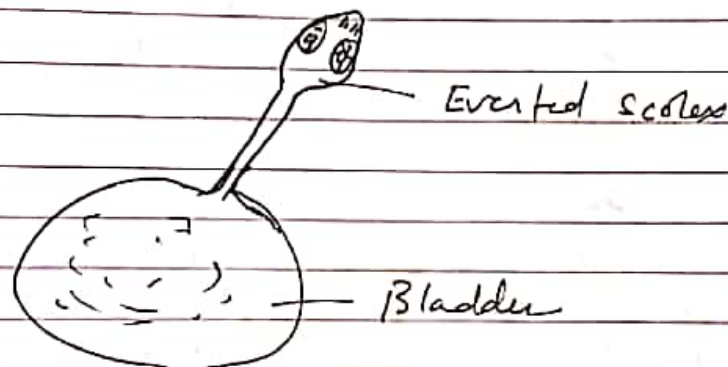
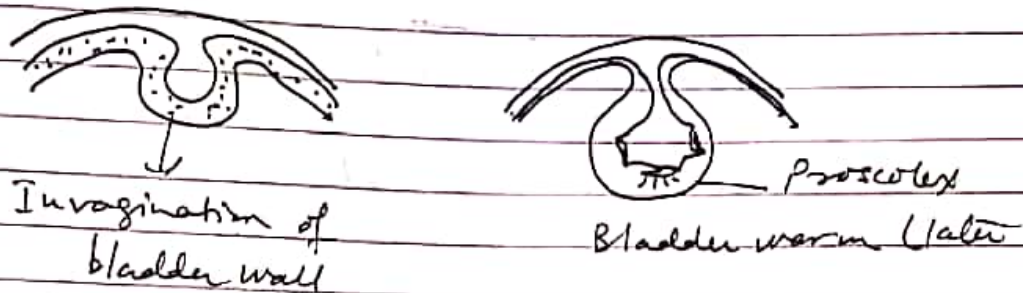
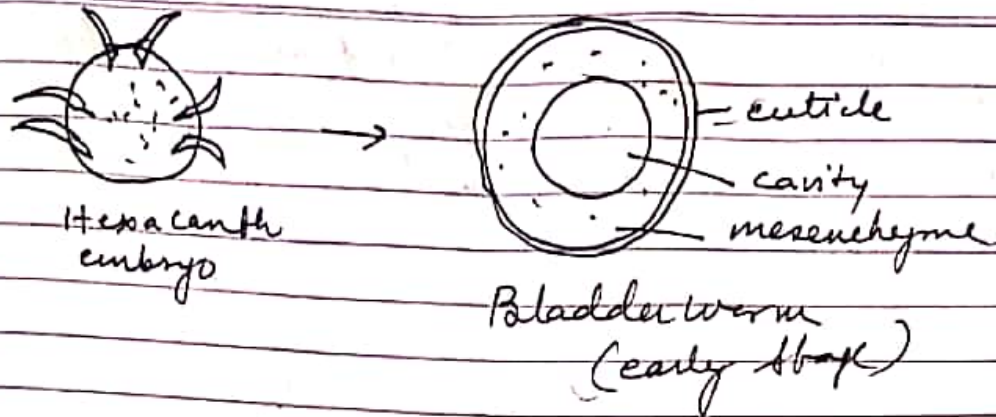
The onchosphere comes out by the disintegration of proglottids it may be eaten by the intermediate host which is generally a pig, it may be a dog, camel, monkey or even man. In man infection by the larval stage takes place through contaminated hands or by pushing of mature proglottids by reverse peristalsis.

In the stomach of pig, the egg shells are digested and hexacanth is released. The hexacanth bores through the intestine and

enters blood vessels and passes through the heart and finally enters to lie in the muscles in any part of the body; generally it is found in foreleg, neck, elbow, shoulder and ham. In the muscles the haccanth loose their hooks, increase in size and acquire a fluid filled ventral cavity, and become encysted in a ~~adventitious~~ cuticular covering to become Cysticerci or bladder worms. The ~~cellulosa~~ cellulosa of Paenia is called Cysticercus cellulosa. The Cysticerci are oval, whitish and about 6-28 mm long. Pork containing these Cysticerci are called "measly" because Cysticercus appears as measles. A Cysticercus has a bladder wall containing an outer cuticle and inner mesenchyme and it is filled with a watery fluid which is largely composed of host's blood plasma. A thickening arise on the bladder wall which invaginates as a hollow knob. Inside the invagination suckers and hooks are on the inner surface of the proscotex and are inverted, facing the cavity. If insufficiently cooked pork containing Cysticerci is eaten by man, the final host, the bladder is digested in the stomach and the proscotex gets evaginated or turned inside out, so that the suckers and rostellum come to lie on the outer surface as in adult, thus testes and a small neck are formed.

The testes anchors itself to the wall of the intestine and the neck buds off a chain of proglottids to form an adult tapeworm which becomes an adult in two to three months.

(3)



Cysticercus larva.

Life stages of *Taenia solium*

Disease \rightarrow Cestodiasis is the disease caused by tapeworms in human beings which gets infected by eating raw pork meat or improperly cooked meat of pork.

Effect of Adult worm \rightarrow The adult tapeworm cause Taeniasis indicated by pain in abdomen, nausea, anaemia, increased appetite, indigestion, rise in eosinophil cells in blood and epilepsy. Hooks and suckers damage the lining of intestine and the parasite produces toxins which causes the disease, it also drains the nutrients from host.

Cysticercosis - It is more dangerous since encystment of bladder worm may take place in host's voluntary muscles, cardiac muscles and other vital organs like liver, eyes and brain resulting into degenerative changes and necrosis in the organs concerned.

- Prevention -
- 1) Proper disposal of faeces
 - 2) Preventing the pigs to eat human excreta
 - 3) Prevention of eating measily pork.

Treatment - Infection of tapeworm can be prevented by taking anti helminthic drugs such as Praziquantel, Albendazole. Removal of scolex and cysticerci by surgery from organs like brain, eyes, liver etc.

Parasitic adaptations of Taenia Solium -

- 1) Body wall made up of tegument which is freely permeable to water and nutrients, but protects against digestion by host's digestive juices.
- 2) Internal osmotic pressure higher than surrounding, High pH tolerance from 4 to 11.
- 3) Scolex with suckers and hooks for tight anchoring of host intestine
- 4) Digestive system totally absent
- 5) No organ of locomotion
- 6) Circulatory, respiratory and sensory organs absent, poorly developed nervous system
- 7) Reproductive system highly developed, hermaphrodite animal
- 8) Very large no of eggs (40,000 per gram of proglottid) which increases its chances of survival.

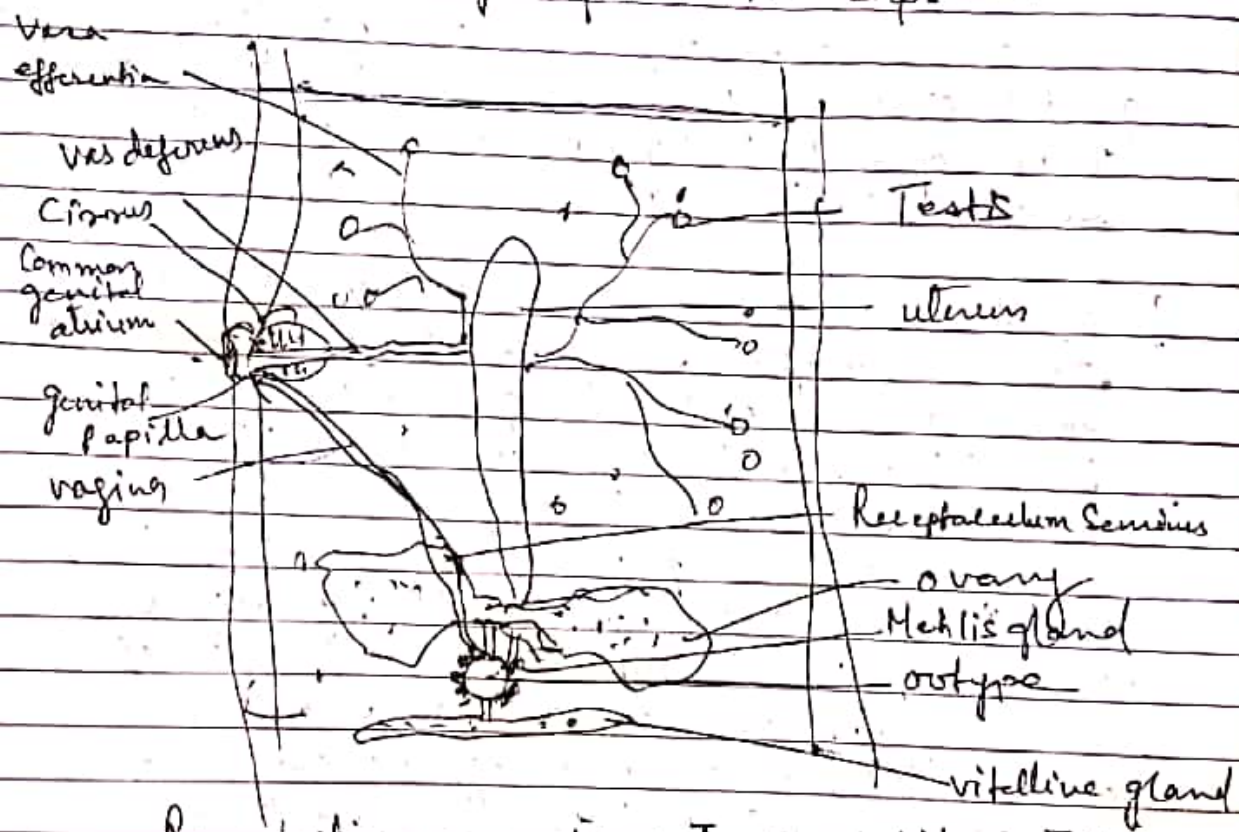
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The remaining Paraglottids lose the sex organs and have a distended uterus filled with eggs, these are gravid paraglottids.

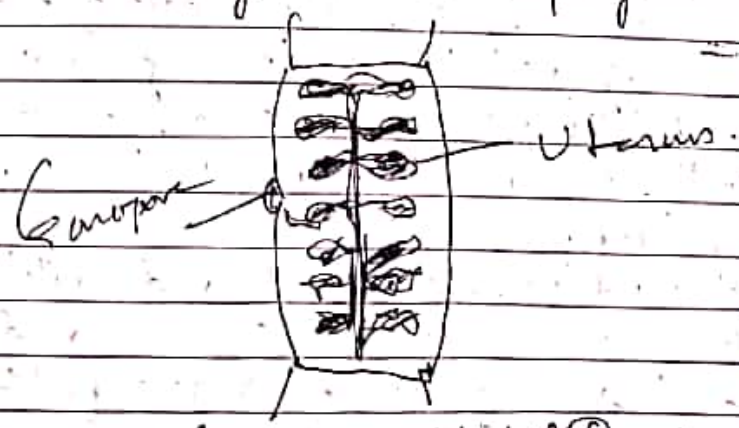
Male Reproductive organ - Male reproductive organs consist of numerous testes of many small lobes lying scattered in the greater part of the Paraglottids towards the dorsal side. Efferent ducts arise from the testes and unite to open into a convoluted vas deferens which passes through a cirrus surrounded by Cirrus sac. The cirrus open by the male genital pore into genital atrium lying on the margin. The genital atrium opens by a gonopore situated on the swollen genital papilla.

Female reproductive organs - Female reproductive organs have a simple single bilobed ovary with two lobes joined by a bridge. The ovary has branching tubercles and lies towards the posterior border. The bridge of the ovary leads into an oviduct posterior to the ovary is lobellate vitelline gland from which arises a vitelline duct to join the oviduct. The junction of the oviduct and vitelline duct has a swollen ootype where the parts of an egg are assembled and egg is shaped. The ootype leads into a cylindrical uterus lying in the middle of the Paraglottids but having no external opening. Many unicellular Mehlis' gland surround the ootype and open into it. The marginal genital atrium has a female genital pore leading into a narrow tubular vagina, which runs inwards and dilates into a receptaculum seminis which receives and stores sperm and from which a narrow fertilization duct arises to join the oviduct.

Fertilization - As tapeworms are hermaphrodite self fertilization occurs in the same proglottids by insertion of the Cirrus into vagina and sperms reach the receptaculum seminis from where they fertilise the eggs in the oviduct. fertilized eggs are surrounded by yolk cells from vitelline glands. The completed eggs are called capsules. The first capsules are seen the uterus between 400th and 500th proglottids. The uterus enlarges in the gravid proglottids and forms 7 to 10 lateral branches on each side and it gets filled with capsules.



Reproductive organs in mature proglottid of Taenia



Gravid proglottid of Taenia.

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