

Nutrition and Respiration

- ❑ Alimentary canal absent
- ❑ Absorbs digested liquid food from the intestine of the host through its general body surface
- ❑ Glucose, amino acids, glycerol, etc., diffuse directly through its general body surface
- ❑ Scolex is deeply anchored into the intestinal mucosa, hence, it also absorbs tissue fluids
- ❑ Respiration is anaerobic
- ❑ Energy is derived from the breakdown of glycogen
- ❑ Whenever free oxygen is available to tapeworm, it consumes the oxygen

Nervous and excretory system

Nervous system

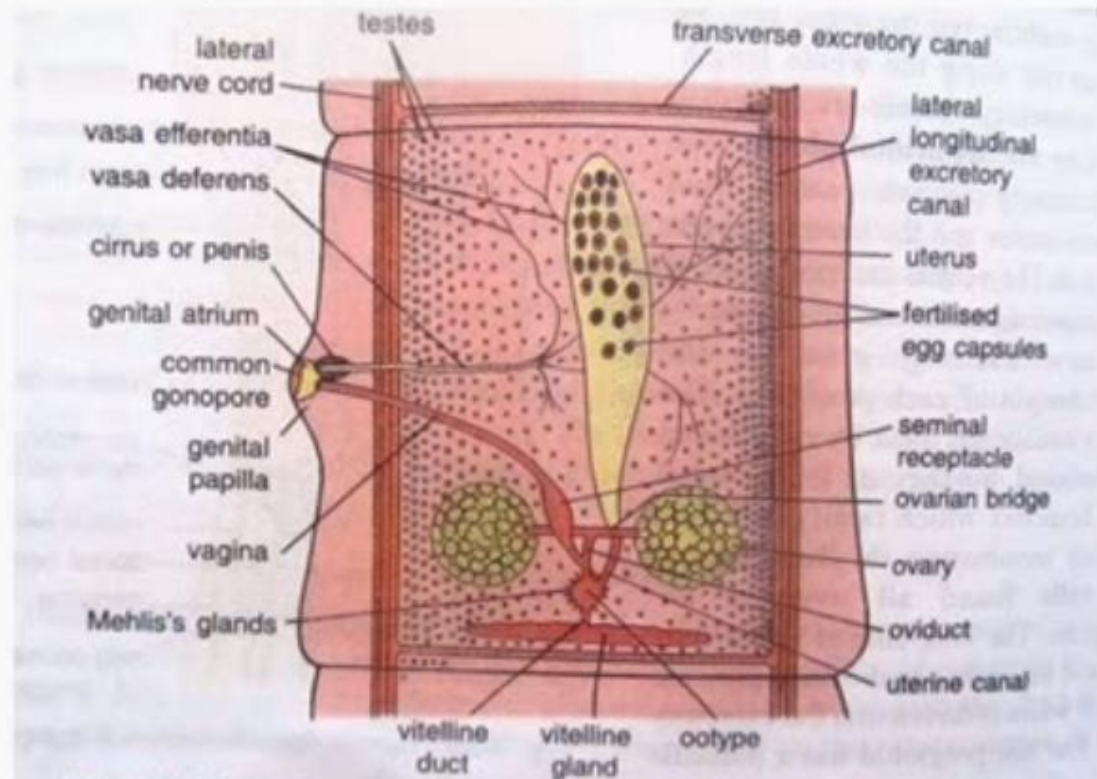
- ❑ Two small cerebral ganglia in the scolex
- ❑ Two lateral longitudinal nerves are best developed, they run along the entire length of strobila
- ❑ Special sense organs are absent but free nerve endings are abundant in the scolex and rest of the body

Excretory system

- ❑ There are four longitudinal excretory vessels (dorsal and ventral), two on each side, along the margins and they join in the scolex by the nephridial plexus
- ❑ Excretory canals have flame cells
- ❑ Metabolic waste products like fatty acids, organic acids, etc., are removed
- ❑ Regulate the fluid contents of the body

Reproductive system

- Every mature proglottid contains a complete set of male and female reproductive organs
- Male organs differentiate before the female organs (protrandous condition) so the anterior 100-150 proglottids possess only male system while the remaining posterior ones possess both male and female systems
- Mature proglottid loses all its genital organs except the highly-branched uterus filled with fertilized eggs and are called gravid



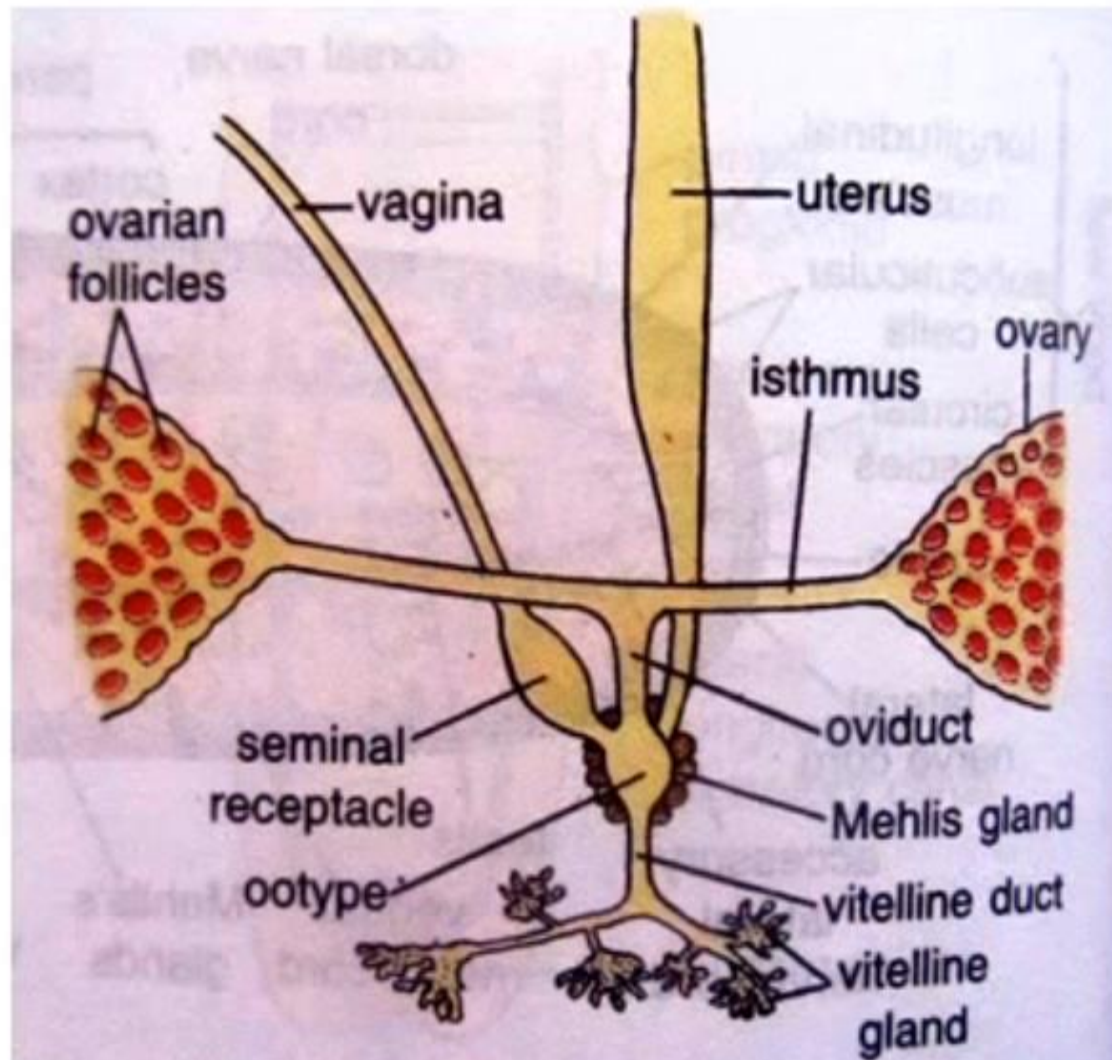


Fig. 42.11. *T. solium*. Details of the arrangement of ducts of female reproductive organs.

Life History

- ❑ Copulation and fertilization
- ❑ Formation of egg capsules
- ❑ Development
- ❑ Transmission to secondary host
- ❑ Cysticercus or bladderworm
- ❑ Transmission to primary host

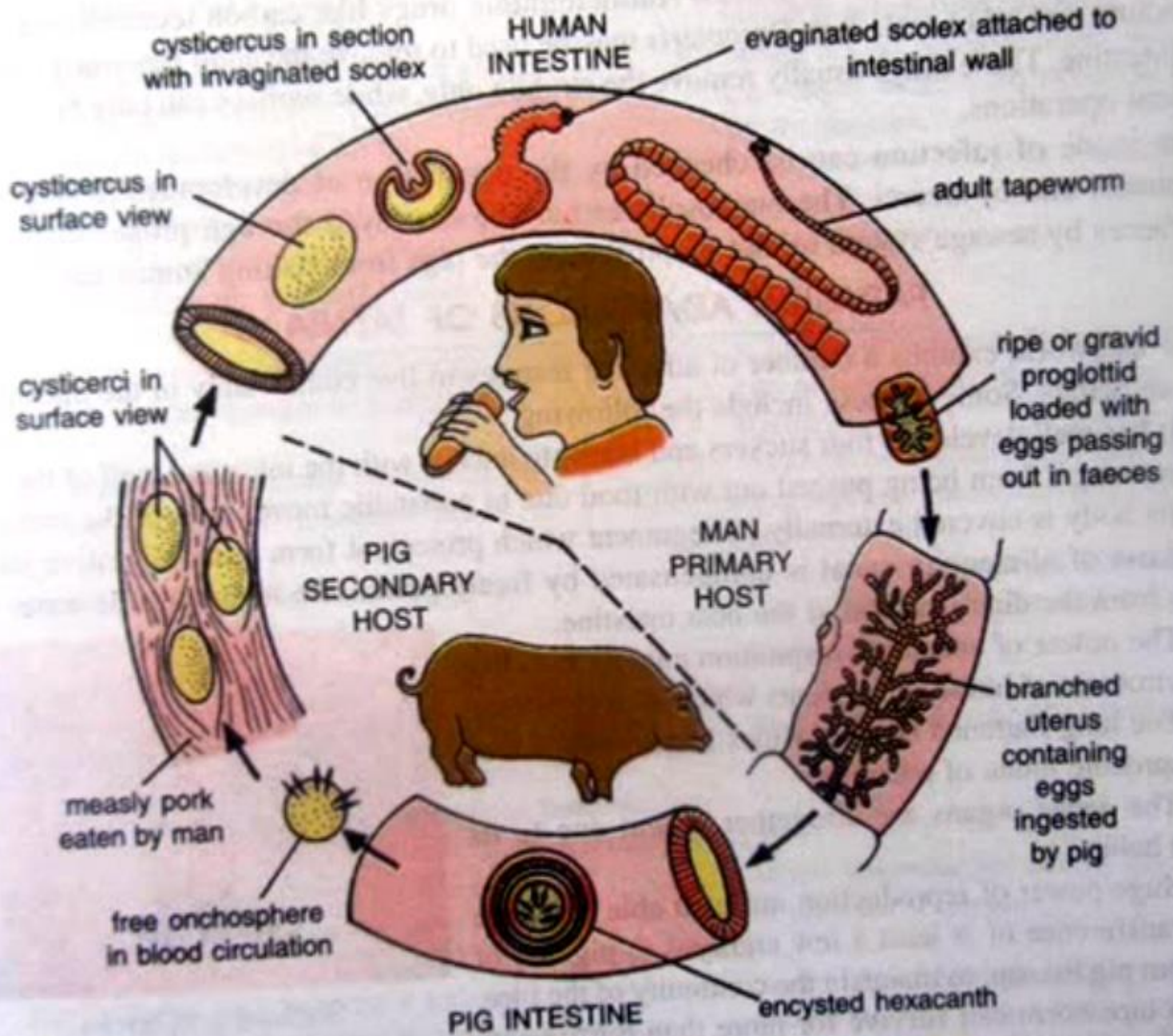


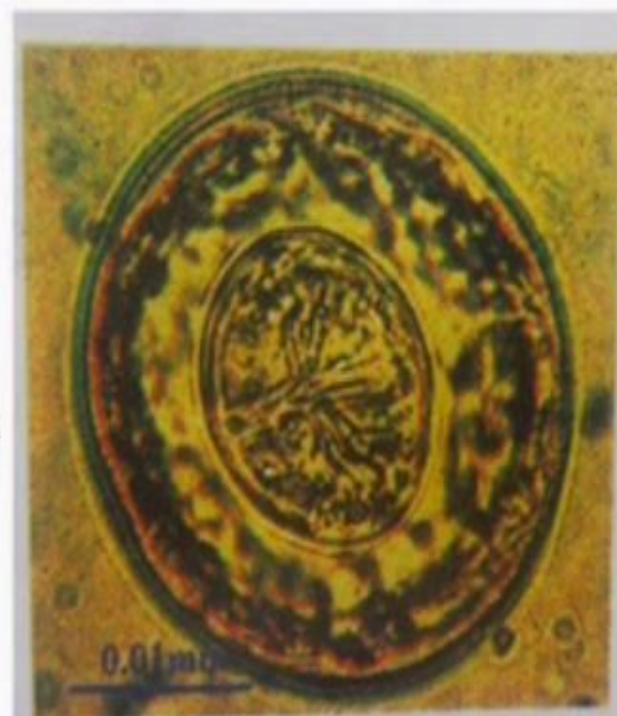
Fig. 10.15. *Taenia solium*. Diagrammatic life cycle.

Life History

- ❑ Copulation and fertilization
 - ❑ Self-fertilization occurs by the insertion of the cirrus of one proglottid into the vagina of the same proglottid and sperms are deposited there
 - ❑ Sperms fertilise the eggs in oviduct
 - ❑ Cross-fertilisation between different proglottids of the same tapeworm is very common
 - ❑ *T. solium* is protandrous, i.e., the testes mature first
 - ❑ After copulation the sperms are stored temporarily in the seminal receptacle waiting for the maturity of the eggs
 - ❑ Fertilised eggs transformed into capsules and packed in the uterus
 - ❑ Various reproductive organs degenerate and the uterus becomes distended and branched having more than 30,000 to 40,000 egg capsules

- ❑ Development:
 - ❑ Development starts when the eggs enter the uterus
 - ❑ The zygote divides unequally to give rise a larger megamere and a smaller embryonic cell
 - ❑ Megamere divides an number of times and give rise several similar megamers
 - ❑ Embryonic cell divides repeatedly two types of cells, larger mesomeres and smaller micromeres.
 - ❑ Micromeres form an inner ball of cell mass called morula
 - ❑ The mesomeres are placed as an envelope around the morula
 - ❑ Megameres as an outer envelope around the mesomers
 - ❑ Megameres form the outer embryonic membrane which finally disappears

- ❑ The mesomers form the inner embryonic membrane or embryophore which is thick, hard, cuticularised and striated
- ❑ The inner cell mass of murula forms an embryo which develops six chitinous hooks at its posterior side
- ❑ This six hooked embryo is called hexacanth which possesses a pair of penetration glands and is surrounded by two hexacanth membranes
- ❑ The hexacanth, together with all the membrane surrounding it, is called onchosphere
- ❑ The gravid proglottids which pass out from the host body contain embryos in onchosphere stage



Hexacanth.

Transmission to secondary host:

- ❑ The gravid proglottids or sometimes when gravid proglottids disintegrate, the onchospheres are eaten up by the pigs with human faeces
- ❑ Reach in the stomach of a pig
- ❑ The capsule shell and other membranes around the hexacanth are dissolved resulting into the liberation of hexacanth
- ❑ Hexacanth bore through the intestinal wall with the help of a pair of unicellular penetration glands
- ❑ Hooks do not play any role in boring the tissue but they help in anchoring it
- ❑ Hexacanth enters the blood vessels of the intestine and passes through the heart and finally comes to lie in the striated muscles in any part of the body
- ❑ They usually settle in the muscles of the tongue, neck, heart and shoulder

- ❑ Loss their hooks, increase in size and acquire a fluid filled central cavity.
- ❑ They become encysted in a cuticles covering to become cystecerci or bladderworms
- ❑ The cysticercus of *T. solium* is called cysticercus cellulosae
- ❑ The flesh of pig or pork containing these cysticerci appears white spotted resembling something like that of measles, hence, it is characteristically called measly pork
- ❑ Cysticercus or bladderworm
 - ❑ It is the larval stage of *Taenia*
 - ❑ Bladder-like sac filled with a clear watery fluid having mostly blood plasma of the host

- ❑ Wall consists of an outer cuticle and inner mesenchyme
- ❑ There forms an invagination as a hollow knob
- ❑ The invaginated knob develops suckers in its inner surface and hooks are developed at its bottom
- ❑ The inverted knob is called pro-scolex
- ❑ The stage is called cysticercus or bladderworm whose further development does not take place unless it reaches to the main host, the man

Life History

- ❑ Transmission to primary host
 - ❑ When the primary host ingests raw or improperly cooked pork containing cysticerci or mealy pork, the cysticerci become active in the intestine
 - ❑ The bladder is digested in the stomach of the host and the proscolex gets evaginated or turned inside out
 - ❑ The suckers and rostellum come to lie on the outer surface as in the adult
 - ❑ A scolex and a small neck is formed
 - ❑ The scolex anchors itself to the mucous membrane of the intestine and the neck proliferates a series of proglottids to form the strobila
- ❑ The life history is not so complicated because it does not involve any asexual generation

Life History

- T. solium life history chart:

- Adult tapeworm → Fertilized eggs in mature proglottids → Egg capsules in gravid proglottids → Onchospheres in gravid proglottids → Gravid proglottids or onchosperes in human faeces → Out from the human body with faeces → Onchosphere in the gut of pig due to coprophagy → Hexacanth in the gut → Hexacanth in the intestinal blood vessels → Hexacanth in the heart → Hexacanth in the muscles → Cysticercus in the striped muscles → Measly pork → Cysticercus in the gut of human beings → Adult tapeworm in human gut