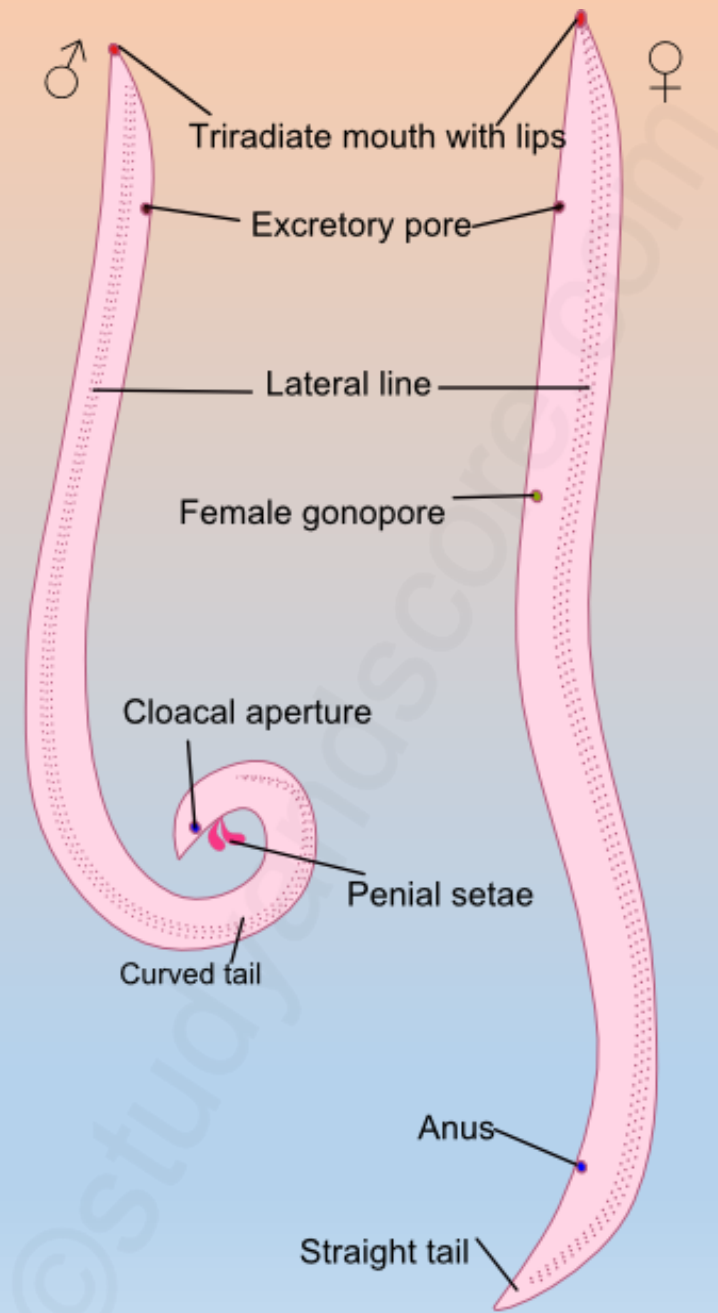


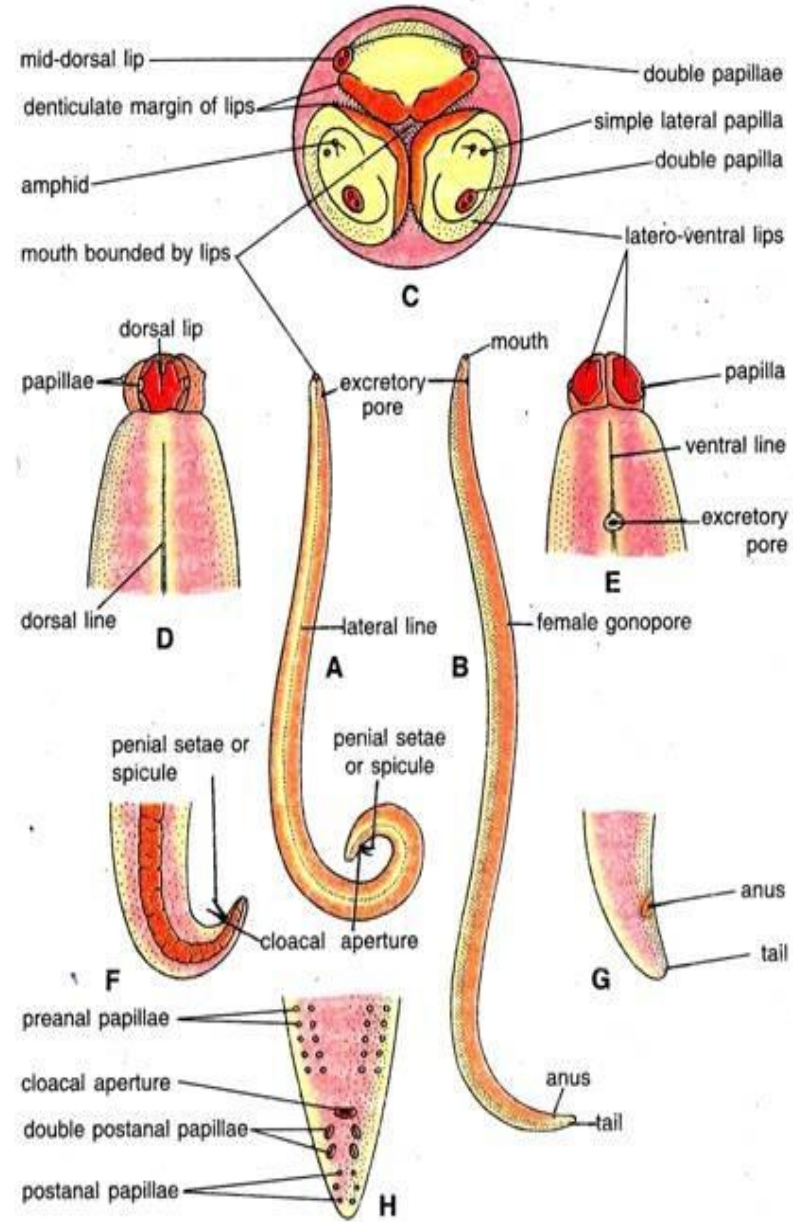
Ascaris lumbricoides

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- ***Acaris lumbricoides*** is an elongated cylindrical round worm found in the small intestine of human.
- They belong to class Nematoda of the
- Phylum Nemathelminthes.
- It is one of the largest nematode parasites.
- Attaining a length of 10 to 14 inches
- Causes Ascariasis in human.



ASCARIS - ADULT MALE AND FEMALE



Ascaris lumbricoides. A—Male; B—Female; C—Entire view of mouth and lips; D—Anterior end in dorsal view; E—Anterior end in ventral view; F—Posterior end of male; G—Posterior end of female; H—Posterior end of male in ventral view showing

External Feature:

- 1) The animal is narrow, elongated and unsegmented body with dull redish yellow in colour when alive and generally milky white in colour.**
- 2) The body is long and cylindrical in shape with pointed extremities at both the ends.**
- 3) Four whitish longitudinal lines are present extending from end to end of the animal, one mid-dorsal, one mid-ventral and two lateral. The dorsal and ventral lines are narrow and pure white in living condition while the lateral ones are thick and brown in colour.**
- 4) The body is covered with smooth, tough and elastic cuticle bearing minute striation.**

- 5) The mouth lies as the anterior part of the body and terminal in position which is guarded *by three finely toothed lips. One lip is median and dorsal and other two are ventrolateral in position.*
- 6) A little behind the mouth, lying ventrally is a median excretory pore.
- 7) A little up on the ventral side of the posterior end is situated the anus. Which is transverse in position and in male it serves as the reproductive aperture.
- 8) In males , a pair of needle-like chitinoid bodies known as penial setae project from this aperture.
- 9) The female genital aperture is situated on the ventral surface at about one third of the body length from the anterior end.

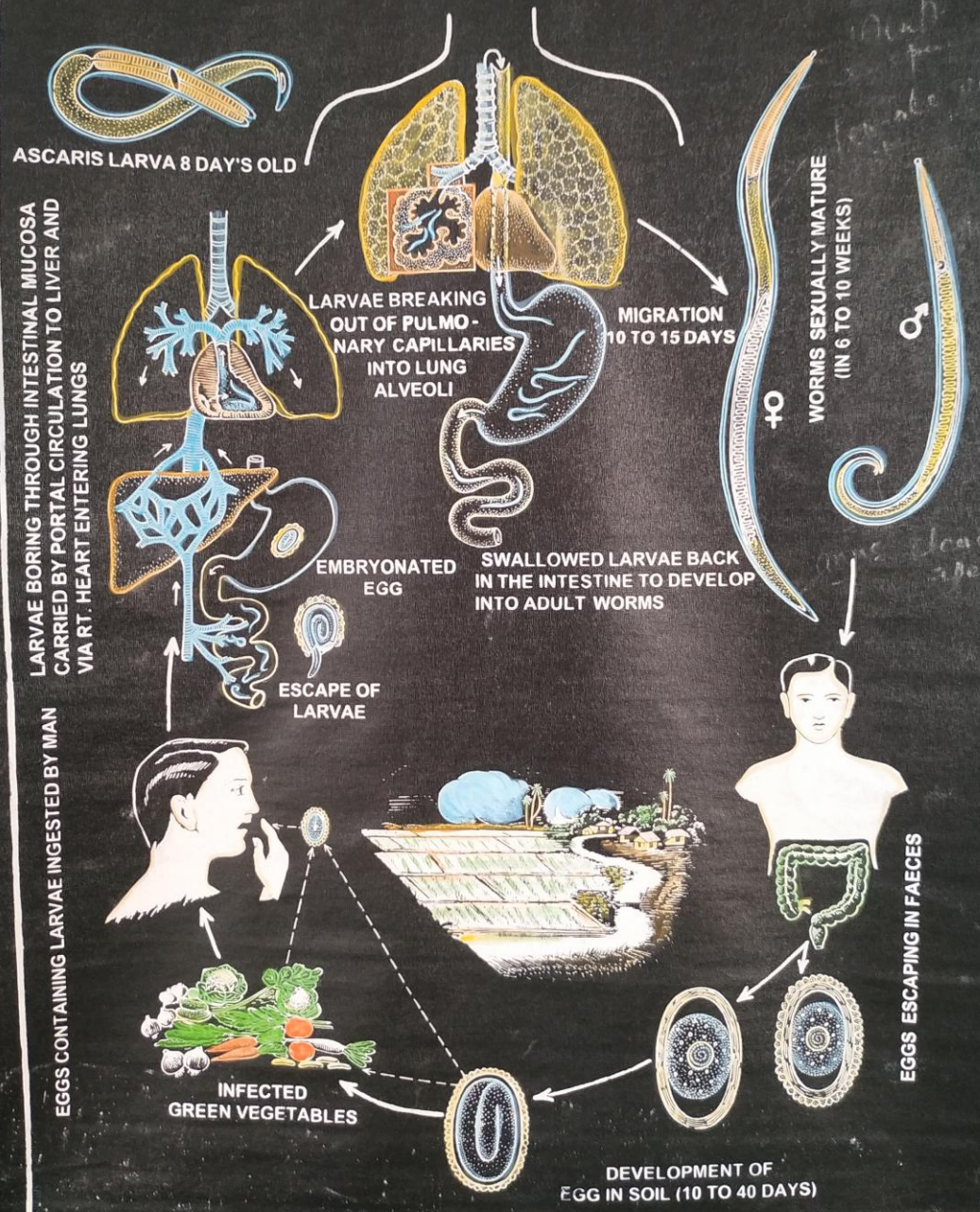
Distinction between Male and female:

- 1) Male is smaller**
- 2) The posterior aperture is the cloacal aperture into which anus, genital aperture open. Copulatory spicules are present.**
- 3) Many ventral anal papilla are present.**
- 4) The tail end is curved ventrally in the form of a hook with a conical tip.**
- 5) No vulval aperture in the mid-ventral line, one-third from the anterior.**

- 1) Female is larger than male.**
- 2) The posterior aperture is the anal aperture where the duct of a alimentary canal opens here.**
- 3) Only a pair of caudal papillae are present.**
- 4) The tail end is straight.**
- 5) The genital or vulval aperture is situated at about one-third from the anterior side on the mid-ventral line.**



L.H.ASCARIS LUMBRICOIDES



Life cycle of *Ascaris lubbricoides*

Copulation and Fertilization:

- **The male and female organisms copulate inside the host intestine.**
- **The sperms are passed into the vagina.**
- **These ascend up in the uterus and fertilize the egg in the oviduct or upper part of uterus.**
- **The fertilized eggs are laid in the alimentary canal of the host and passed out along the faeces.**
- **The eggs are oval with an albuminous coat which is protected by a thick chitinous highly resistant egg-shell.**

Segmentation:

- The development of eggs starts outside of the body of the host.
- The segmentation is spiral and determinate.
- The first division is *transverse* producing an *upper dorsal and lower ventral cells*.
- The dorsal cells divide ventrally into an *anterior cell and a posterior cell*.
- The ventral cell divides horizontally into *upper cell and lower cell*.
- Thus the four-celled embryo has 'I' or 'J' shaped appearance.
- These cells form the primordial germ cell and thus blastula stage is attained.
- It undergoes gastrulation by invagination and finally develops into an active juvenile representing the *rhabditoid stage*.

- Under favourable conditions of temperature, moisture and oxygen supply, the embryos develop inside egg and requires 10 to 14 days to reach the first stage larva

Infection of the New Host(Human):

- The infection in the new host i.e. human occur when the eggs containing the embryo are swallowed by the human host along with the raw vegetables, improper cooked vegetable or with drinking water contaminated with them.

Entry in the Small Intestine:

- When the eggs are swallowed the embryos have a cylindrical oesophagus with a posterior club-shaped part and a intestine.
- They resemble a free-living nematode called *Rhabditis* and are hence known as *Rhabditiform larva*.
- This larva do not directly develop into maturity in the intestine.

Extra-Intestinal Migration:

- This phenomenon is essential for the complete metamorphosis into adult stage.
- Rhabditiform larva penetrates through the intestinal wall
- into the lymphatic and blood vessels
- and are carried to the heart either by the thoracic duct or by the inferior vena cava.
- and through the circulation to the lungs here they grow.

In the Lung:

- The larva leave the blood stream and burrow into the alveoli and moult there two to three times.
- Then they pass through the trachea with the cough
- and when the cough is swallowed, pass to oesophagus, stomach and finally to the intestine.

- The larva here moults two times and become adult.
- The period of migration from the time of infection that of reaching the intestine is said to be about 10 days.
- The sexual maturity is attained in two months from the time of infection.

Sexual maturity and Egg liberation:

- The larvae on reaching their habitat grow into adult worm and become sexually mature in about 6 to 10 weeks' time.
- The gravid female begin to discharge eggs in the stool within about two months from the time of infection.
- The cycle is again repeated.

Mode of Infection:

- The infection is effected by swallowing ripe ascaris eggs with raw vegetables cultivated on a soil fertilized by infected human excreta.
- The infection may occur through drinking contaminated water.
- The eggs may directly conveyed to the mouth by dirty fingers through soil-pollution.
- The infection may also occur by inhalation of desiccated eggs in the dust reaching the pharynx and swallowed.

Pathogenic Effect:

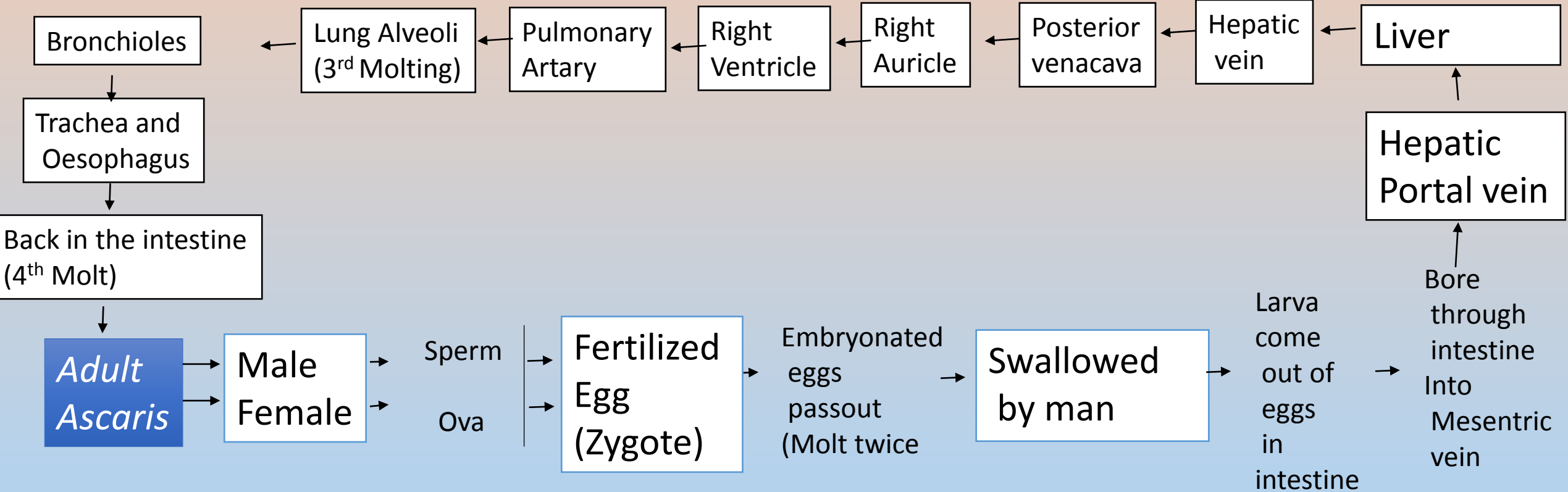
- The heavy infection of Ascaris produces
 - 1) Volvulus by aggregation and intestinal obstruction.
 - 2) Obstruction of Eustachian tube.
 - 3) Appendicitis, peritonitis etc.

- This inverted knob is called prosclex which bears suckers, hooks and rostellum.
- The embryo at this stage is called cysticercus or bladderworm.
- further development of cysticercus does not take place unless it reaches to the main host, the man.

Transmission to Primary Host(Human):

- Further development is not possible inside the pig and can take place if only if taken by definitive host human .
- When taken inside human stomach, the cyst wall dissolves
- The prosclex passes to the small intestine where it is everted with a bladder attached with it.
- The suckers and hooks come out-side and ready for attachment intestinal wall.
- After attachment the bladder is cast off and new proglotids appears by budding.

Life Cycle of *Ascaris lumbricoides* is summarized below in schematic form:



Copnclusion

- **The life-history of Ascaris involves four larval stages with four ecdysis or moulting, one after every larva.**
- **The fifth stage is the adult stage**
- **The eggs of human ascarid are eaten by other than the normal host(human), such as the rat, mice, guinipigs,rabits and pigs,etc. they may hatch and migrate through the liver and lung, but they fail to develop in the intestine to adulthood**