

Quadrant II – Transcript and Related Materials

Programme: Bachelor of Science (Third Year)

Subject: Zoology

Paper Code: ZOC 110

Paper Title: Parasitology

Unit: 4

Module Name– *Ascaris lumbricoides* - Study of Morphology and Life cycle.

Module No: 28

Name of the Presenter: Ms. Juliana Silveira e D'Souza.

Notes:

Ascaris lumbricoides

- Phylum: Nematelminthes
- Order : Ascarioidea
- Genus : *Ascaris*

Species: *lumbricoides*

Common name - the common roundworm. It is the largest nematode parasite of human intestine.

Geographical distribution: It is cosmopolitan, world wide in distribution, prevalent in the tropics such as China, India and South - East Asia. Occurs in people with unhygienic habits. Present in about 25% human population.

Habitat

The adult worm lives in the lumen of the small intestine(jejunum) of man. The parasite maintains its position by its muscle tone. They can move forward by means of spiral movement.

Morphology -Adult worm *Appearance – it resembles an ordinary earthworm. When freshly passed from intestine, it is light brown or pink in colour but gradually changes to white.*

Shape – the adult is rounded in shape and tapering at both the ends. The anterior end is more pointed and thinner. The mouth opens at the anterior end and possesses three finely toothed lips- one dorsal and two ventral. The body is filled with an irritating fluid called ascaron or ascarase in which the digestive and reproductive organs float. The life span of adult worm is 1 – 2 years.

- **Male** - It measures about 15 to 25 cm in length. The tail end is curved ventrally in the form of a hook having a conical tip. The genital pore opens into the cloaca from which two curved copulatory spicules protrude. The anus opens with the ejaculatory duct into the cloaca.
- **Female** - Is longer and stouter, measures 25 to 40 cm in length. The posterior extremity is neither curved nor pointed but is conical and straight. The anus is subterminal and opens directly on the ventral side of the tail end in the form of a transverse slit. At the junction of the anterior and the middle third of the body on the mid ventral side the vulva opens. This section is narrower and is called vulvar waist or genital girdle. Female liberates about 200,000 eggs daily.
- **Eggs** - The eggs liberated by the fertilized female pass out of the human host with the faeces. Characteristics of a fertilized egg -Round or oval in shape. Always bile stained and brownish (golden brown) in color. Surrounded by thick translucent shell consisting of three layers. The outer albuminous coat which is thrown into rugosities or mammillations. A thick middle layer and the inner lipoidal vitelline membrane. Sometimes the outer coat is lost (decorticated eggs). Contains a very large conspicuous, unsegmented ovum with a clear crescentic area at each pole. The nucleus is concealed by a large amount of coarse yolk granules. Floats in saturated solution of common salt
- **Unfertilised Egg** – the female can also produce unfertilised eggs when it is not fertilized. The characteristics are-

Narrower, longer and more elliptical. Brownish in colour. Has a thinner shell with an irregular coating of albumin. Contains a small atrophied ovum with a mass of disorganised, highly refractile granules of various sizes. Does not float in salt solution (heaviest of all helminthic eggs)

Life cycle –

The worm passes its life cycle in only one definitive host the man, there is no intermediate host.

Various stages are- **Eggs in faeces** – fertilized eggs containing the unsegmented ovum are passed with faeces. When they are freshly passed they are not infective to man.

Development in soil - a rhabditiform larva is developed from the unsegmented ovum within the egg shell in 10 – 40 days time, depending on the atmospheric temperature and humidity in the soil. The ripe egg containing the coiled up embryo(second stage larva) is infective to man.

Infection by ingestion and liberation of larvae –infection occurs when ingested with food, drink or raw vegetables or from faecally contaminated hands. The embryonated eggs pass down the duodenum, the digestive juices weaken the egg shell and also stimulate the enclosed embryo into activity. Splitting of the egg shell occurs and the rhabditiform larvae are liberated in the upper part of the small intestine

Migration through the lung -The newly hatched larvae burrow their way through the mucous membrane of the small intestine and are carried by the portal circulation to the liver, live in the liver for 3 to 4 days. The larvae enter the pulmonary circulation and moult twice (first on 5th or 6th day and second after the 10th day) and reach the lung alveoli. The time taken by the rhabditiform larvae for such migration is 10 – 15 days.

Re-entry into the Stomach and the Small Intestine- From lung alveoli the larva crawl up to the bronchi and trachea and are propelled into larynx and pharynx and are once again swallowed. The larva pass down through the oesophagus and stomach and return to the upper part of the small intestine, their normal abode. Another moulting takes place between twenty fifth and twenty ninth day of infection.

Sexual Maturity and Egg Liberation - The larvae on reaching their habitat grow into adult worms and become sexually mature in six to ten weeks time. Fertilization leads to the discharge of eggs by the gravid female in the stool within about two months from the time of infection. The cycle is again repeated.

Moultings- the larva undergoes four moultings, one outside within the eggshell, twice in the lungs and one in the intestine

Mode of infection- infection is effected by swallowing ripe *Ascaris* eggs with raw vegetables cultivated on soil infected by human excreta. Water supplies may be contaminated and infection may occur by drinking such water. The eggs may directly be conveyed to the mouth by dirty fingers. Infection may also occur by inhalation of desiccated eggs in the dust reaching the pharynx and swallowed.

