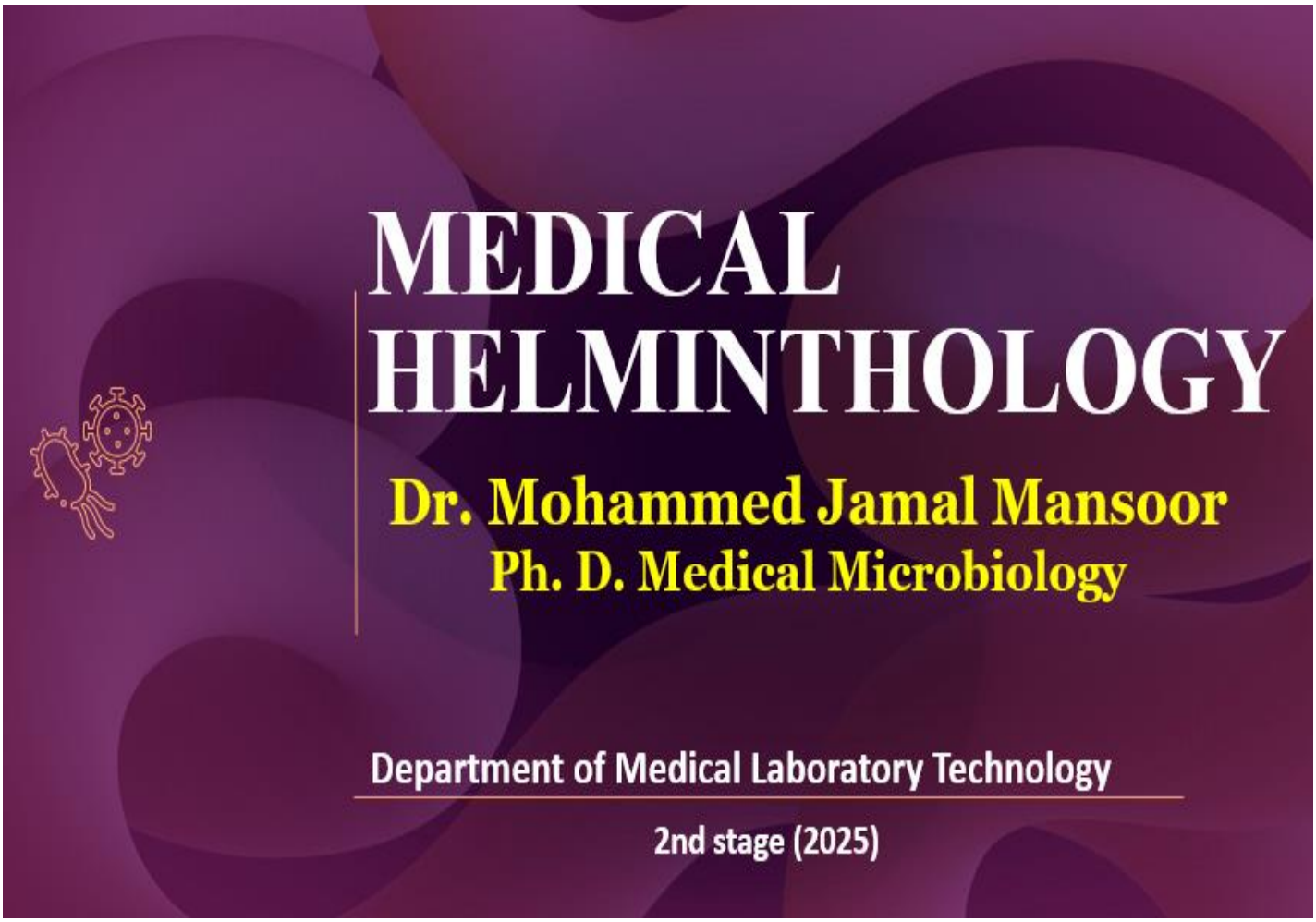

MEDICAL
HELMINTHOLOGY
Dr. Mohammed Jamal Mansoor
Ph. D. Medical Microbiology
Department of Medical Laboratory Technology
2nd stage (2025)

Lec.7 *Ascaris Lumbricoides*

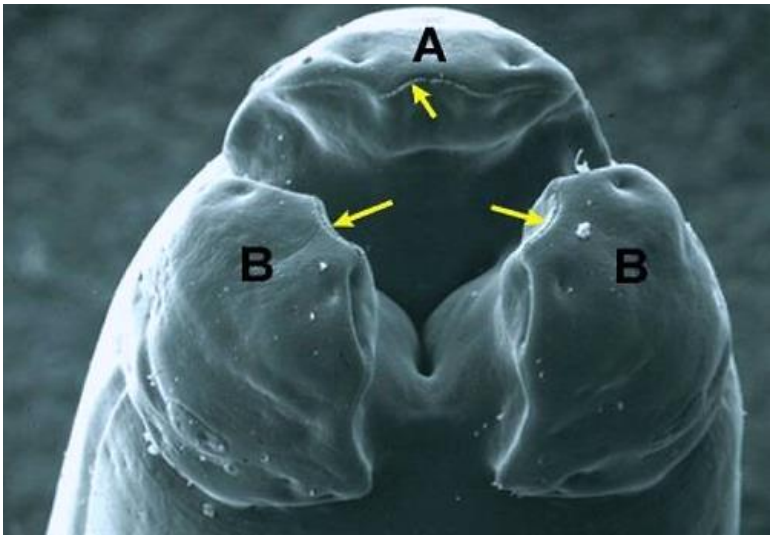
Common name: Roundworm

*Its specific name ***lumbricoides*** is derived from its resemblance with **earthworm** (*Lumbricus*, meaning *earthworm* in Latin).
***It is the most common of human helminths and is distributed worldwide**. A billion people are estimated to be infected with roundworms.
An editorial in the Lancet in 1989 observed that if all the roundworms in all the people worldwide were placed end-to-end, they would encircle the world 50 times.
*The incidence may be as high as 80–100% in rural areas with **poor sanitation**.

Habitat
Adult worms live in the **small intestines** **(85% in jejunum and 15% in ileum).**

Morphology

Adult Worm
They are **large cylindrical** worms, with **tapering ends,** the anterior end being more **pointed** than the posterior.
*They are **pale pink or flesh colored** **when freshly passed in stools, but become white outside the body.**
*The **mouth** at the **anterior end** has 3 **finely toothed lips**, 1 **dorsal** and 2 **ventrolateral.**

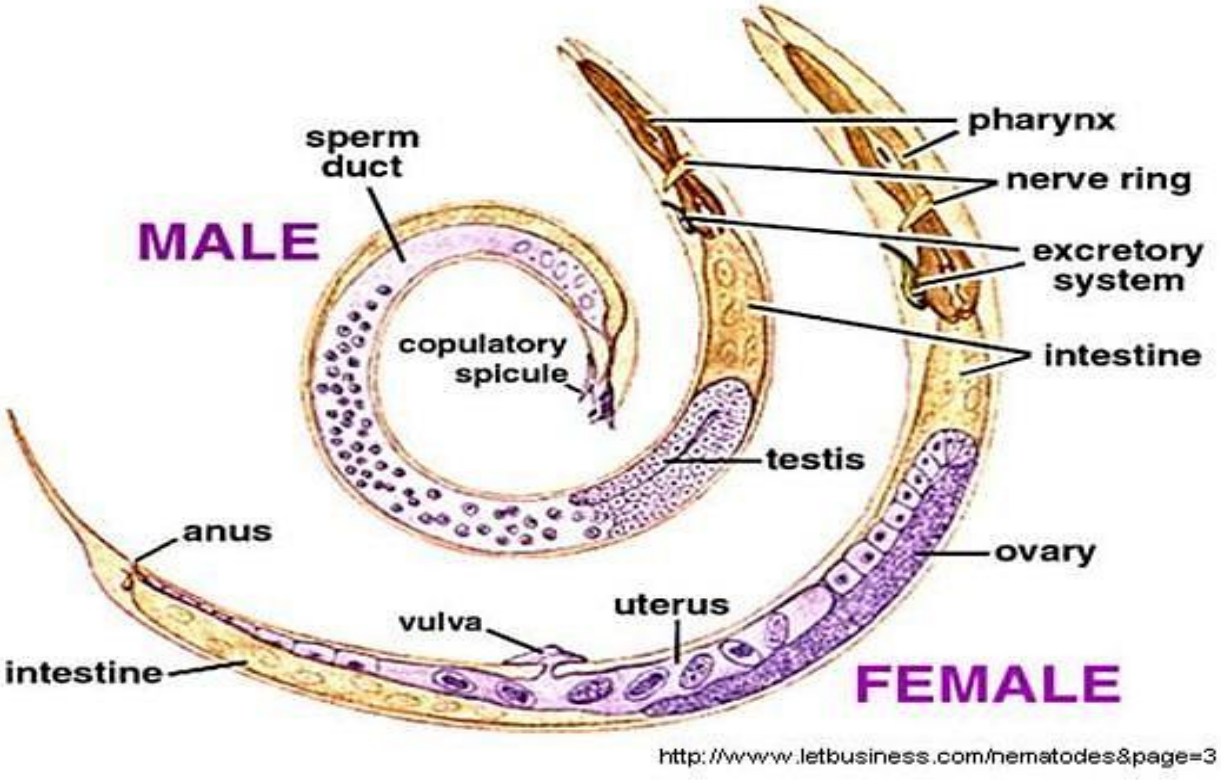


Male Worm:

1- **smaller** than **female**.
2- It measures **15–30 cm** in **length**
3- Its **posterior end is curved ventrally** to form a **hook** and carries **2** **copulatory spicules.**

Female Worm:

1- The female is **larger** than male, measuring **20–40 cm** in **length.**
2- Its posterior extremity (end) is **straight** and **conical**.
3- A single worm **lays** up to **200,000** eggs **per day**. **The eggs are passed in feces**.



Eggs:

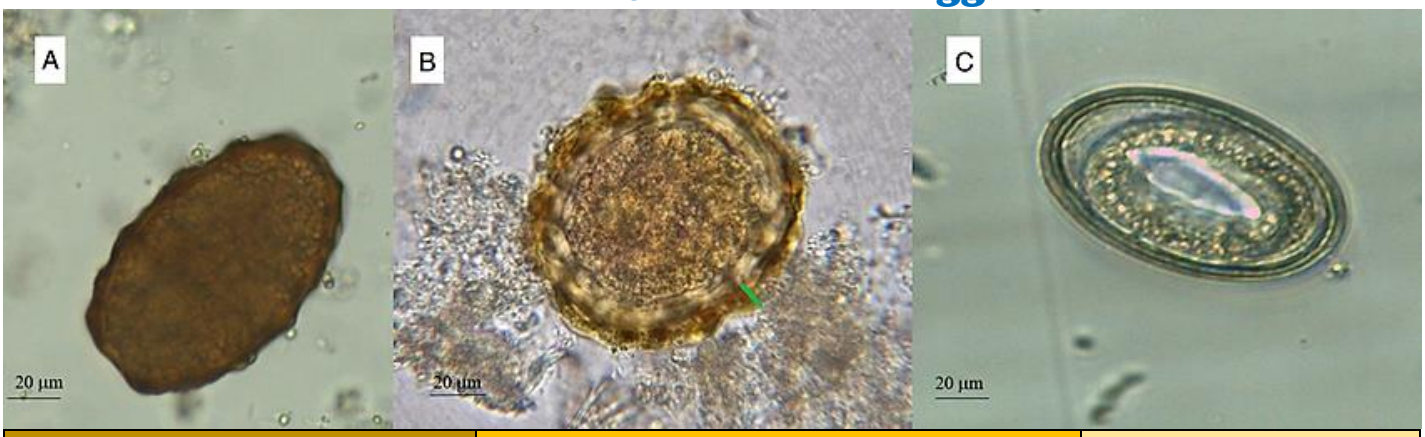
Two types of eggs are passed by the worms; fertilized and unfertilized.

*__**The fertilized eggs**__, laid by females, __**inseminated by mating with a male**__, are **embryonated** and develop into the **infective eggs** معدية.

*__**The unfertilized eggs**__, are laid by **un inseminated female**. These are **non-embryonated** and **cannot become infective.**

Note: **Stool samples may show both fertilized and unfertilized eggs, or either type alone.**

Features of Round Worm Egg



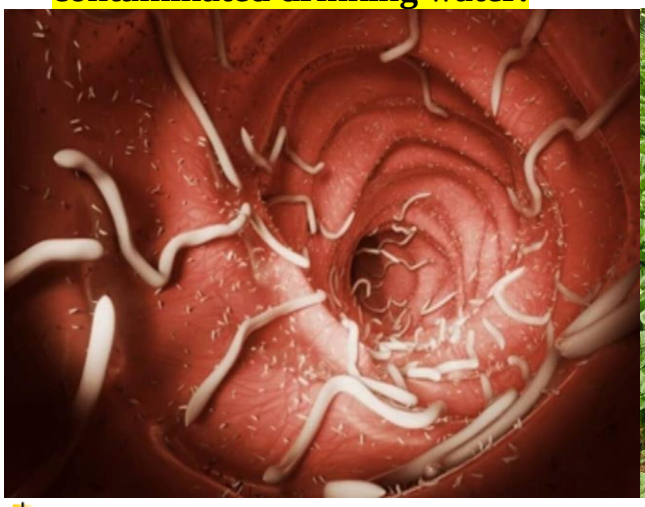
Unfertilized eggs	Fertilized eggs	Decorticated eggs
1 Elliptical in shape	1 Round or oval in shape	1 Generally, like fertilized eggs
2 Narrower and longer	2 Wider and shorter	
3 80 µm x 55 µm in size	3 Size 60-75 µm X 40-45 µm	
4 Has a thinner shell with an irregular coating of albumin	4 Always bile-stained	2 Some eggs are found in feces without the outer mamillated coat, they are called the decorticated eggs
5 Contains a small atrophied ovum with a mass of disorganized highly refractile granules of various size	5 Golden-brown in color	
6 Does not float in salt solution.	6 Surrounded by thick smooth translucent shell with an outer coarsely mamillated albuminous coat, a thick transparent middle layer and the inner lipoidal vitelline membrane.	
	7 In the middle of the egg is a large unsegmented ovum, containing a mass of coarse lecithin granules, it nearly fills the egg except for a clear crescentic area at either poles.	
	⑧ Floats in saturated solution of common salt	

Life Cycle

- Life cycle of *Ascaris* involves **only 1 host.**
- **Natural host: Man. There is no intermediate host**.
- **Infective form: Embryonated eggs**

***Mode of transmission:**

- **Infection** occurs when the **egg** containing the **infective rhabditiform** larva is **swallowed**. A frequent mode of transmission is through **fresh vegetables grown in fields manures with human feces (night soil).** Infection may also be transmitted through **contaminated drinking water.**



- **Children playing about in mud** can **transmit eggs** to their **mouth through dirty fingers** (**geophage: eats earthy substances such as clay**), where **soil contamination** is heavy due to **indiscriminate defecation**, the eggs sometimes get airborne along with windswept dust and are **inhaled**. **The inhaled eggs get swallowed.**

*They **penetrate** the **intestinal mucosa**, enter the **portal vessels** and are carried to the **liver**, then pass **via** the **hepatic vein**, inferior vena cava **الوريد الأجوف السفلي**, and the **right side of the heart** and in about **4 days** reaches the **lungs**, where they **grow** and **moult twice.**

***After development in the lungs**, in about **10–15 days**, the **larvae pierce** the **lung capillaries** and reach the **alveoli**. **They crawl up or are carried up the respiratory passage to the throat and are swallowed.**

***The larvae moult finally** and develop into **adults** in the upper part of the **small intestine**. **They become sexually mature in about 6–12 weeks and the gravid females** start laying eggs to repeat the cycle.

***The adult worm has a lifespan of 12–20 months.**

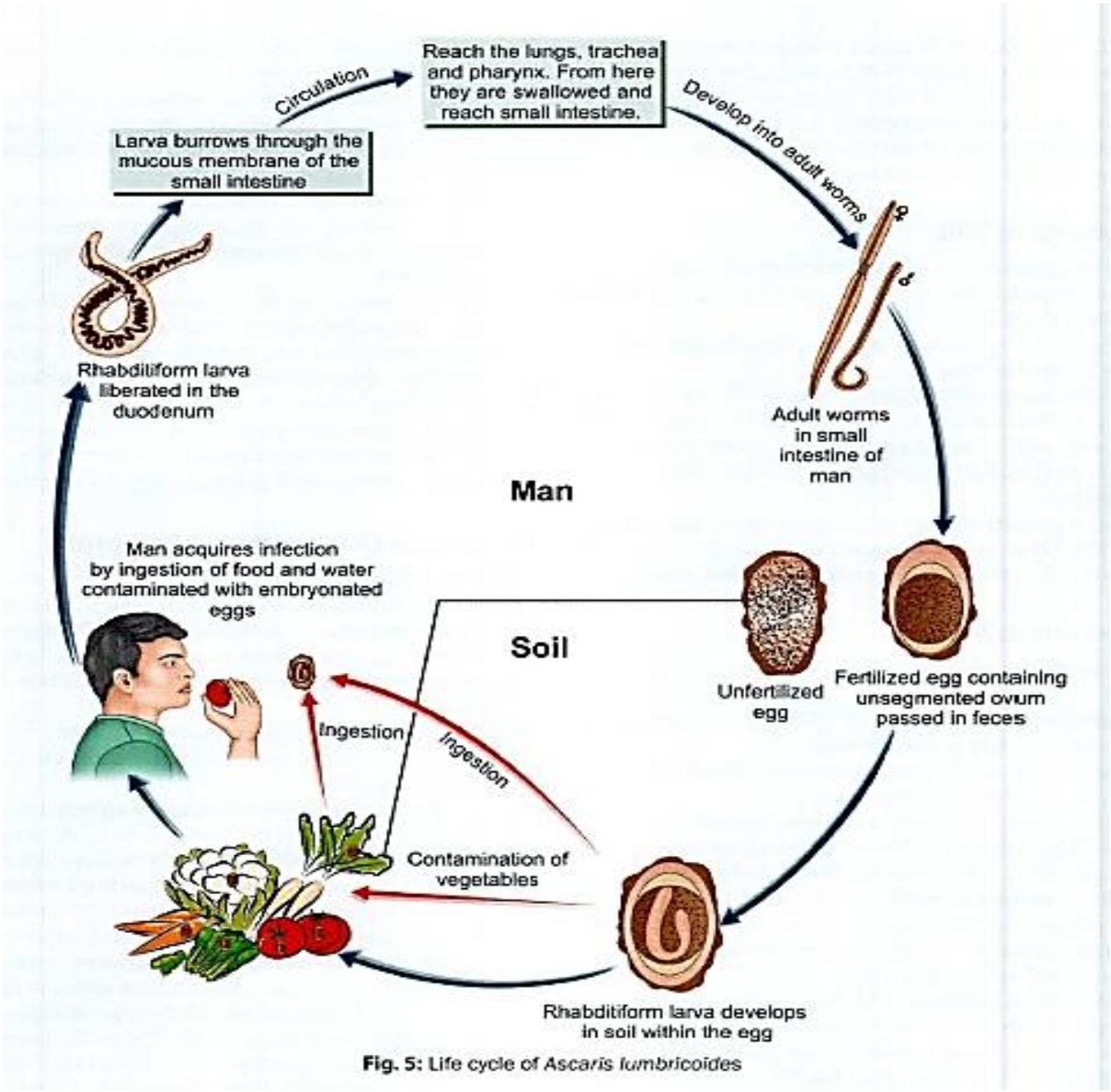


Fig. 5: Life cycle of *Ascaris lumbricoides*

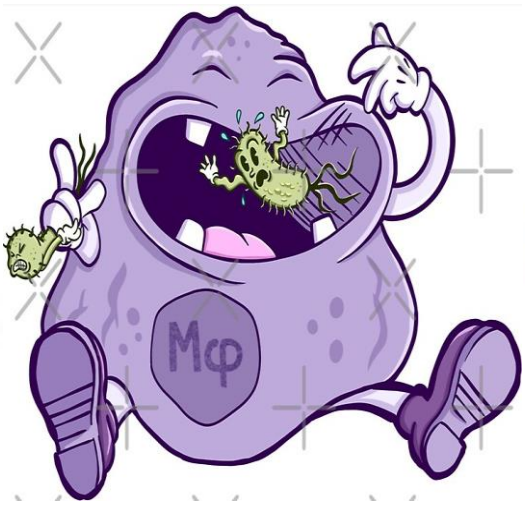
Pathogenicity and Clinical Features

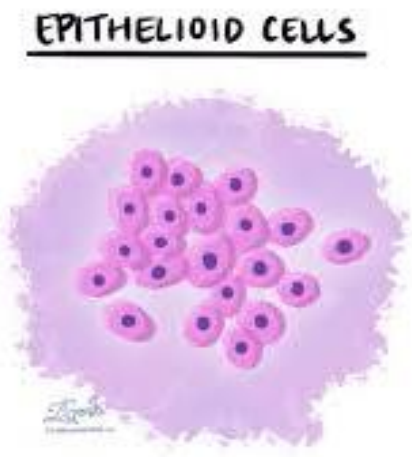
Disease caused by A. lumbricoides is called as ascariasis.

⊛ **Clinical manifestations in ascariasis can be caused either by the migrating larvae or by the adult worms.**

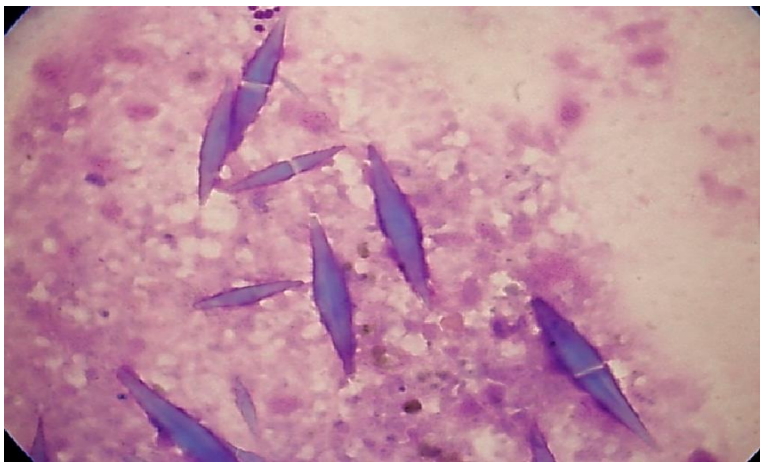
Symptoms due to the Migrating Larvae

- The pathogenic effects of larval migration are due to allergic reaction and not the presence of larvae as such. Therefore, the initial exposure to larvae is usually asymptomatic, except when the larval load is very heavy.
- When reinfection occurs subsequently, there may be intense cellular reaction to the migrating larvae in the lungs, with infiltration of eosinophils, macrophages, and epithelioid cells.





- Ascaris pneumonia, also known as Löffler's syndrome, is caused by the migration of *Ascaris lumbricoides* larvae through the lungs. Characterized by low grade fever, dry cough, asthmatic wheezing, urticaria, eosinophilia, and mottled (spotted) lung infiltration in chest radiograph. (Case study????) انتبه
- Sputum is often blood-tinged and may contain Charcot-Leyden crystals.



Symptoms due to the adult worms

- The mechanical effects are the most important manifestations of ascariasis. Mechanical effects can be due to masses of worms causing luminal occlusion (obstruction) or even a single worm infiltrating into a vital area.
- Vitamin A deficiency.

⊛ Ectopic ascariasis (Wanderlust):

1. Biliary obstruction or pancreatitis.
   It may enter the liver parenchyma, where it may lead to liver abscesses.
2. obstructive appendicitis.

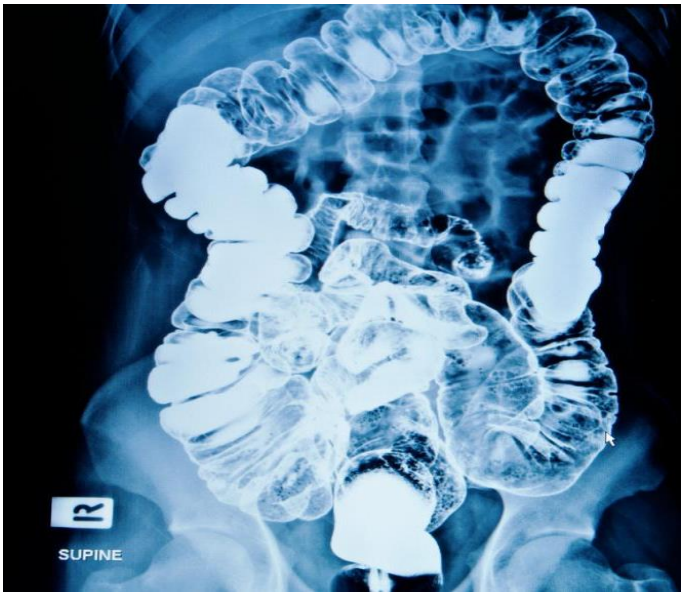
Laboratory Diagnosis

A)Detection of parasite (Adult worm)

The adult worm can occasionally be detected in stool or sputum of patient by naked eye.

- Barium meal may reveal the presence of adult worm in the small intestine.

(i.e., A barium meal is a diagnostic test used to detect abnormalities of the esophagus, stomach and small bowel using X-ray imaging. X-rays can only highlight bone and other radio-opaque tissues and would not usually enable visualization of soft tissue. However, infusion of the contrast medium barium sulfate, a radio-opaque salt, coats the lining of the digestive tract, allowing accurate X-ray imaging of this part of the abdomen.)



⊛ A plain abdominal film may reveal masses of worms in gas-filled loops of bowel in patients with intestinal obstruction.

⊛ Pancreaticobiliary worms can be detected by ultrasound (more than 50% sensitive) and endoscopic retrograde cholangiopancreatography (ERCP; 90% sensitive).

B) Detection of parasite (Larvae)

⊛ In the early stages of infection, when migrating larvae cause Loeffler's syndrome, the diagnosis may be made by demonstrating the larvae in sputum, or more often in gastric washings.

⊛ Presence of Charcot-Leyden crystals in sputum and an attendant eosinophilia supports the diagnosis. At this stage, no eggs are seen in feces.

⊛ Chest X-ray may show patchy pulmonary infiltrates.

⊛ by demonstrations the larvae in sputum, or more often in gastric washings.

C) Detection of parasite (Eggs)

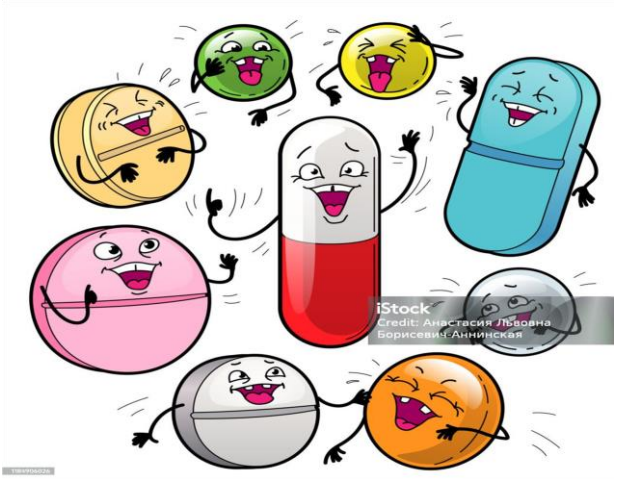
Definitive diagnosis of ascariasis is made by demonstration of eggs in feces.

⊛ Eggs may not be seen if only male worms are present, as may occasionally be the case. Fecal films often contain many artifacts resembling Ascaris eggs and care must be taken to differentiate them.

⊛ Eggs may be demonstrative in the bile obtained by duodenal aspirates

Treatment

1- Pyrantel pamoate
2- Albendazole



Important Questions

Q: Roundworm is:

A- *Taenia solium*
B- *H. nana*
C- *Ascaris lumbricoides*
D- *Taenia saginata*
E- *Toxoplasma gondii*

Q: The infective stage of *ascaris lumbricoides*:

A- Fertilized egg
B- Tachyzoite
C- Bradyzoite
D- Amastigote
E- Promastigote

Q: The pathogenesis of ascariasis in human:

A- Black fever
B- Abortion
C- Liver ulcer
D- Intestinal obstruction
E- None of the above

Q: *Ascaris lumbricoides*:

A- Pin worm
B- Pork tape worm
C- Beef tape worm
D- Small cestode
E- Nematode

Q: The common name of *Ascaris lumbricoides*:

A- Threadworm
B- Hookworm
C- Whipworm
D- Giant roundworm
E- Pinworm

Q: Adult worms of *Ascaris lumbricoides* live in the:

A- Intestine
B- Liver
C- Heart
D- Lung
E- Brain

Q: What is the specific name "lumbricoides" derived from?

a) Its size compared to other worms
b) Its habitat preference for moist soil
c) Its resemblance to an earthworm
d) Its preference for rural areas

Q: According to the editorial in the Lancet in 1989, what interesting observation was made about the cumulative length of all roundworms worldwide?

a) They would reach the moon and back
b) They would encircle the world 50 times
c) They would stretch across the Atlantic Ocean
d) They would cover the Sahara Desert

Q: In which part of the body do adult roundworms primarily reside?

a) large intestine
b) Stomach
c) Small intestine
d) Colon

Q: What distinguishes fertilized eggs from unfertilized eggs laid by female roundworms?

a) Fertilized eggs are larger in size
b) Fertilized eggs are passed by male roundworms
c) Fertilized eggs are embryonated and infective
d) Fertilized eggs are laid by un-inseminated females

Q: Which part of the female roundworm's body is described as "straight and conical"?

a) Anterior end
b) Middle section
8c) Mouth
d) Posterior extremity

Q: How many hosts are involved in the life cycle of Ascaris?
a) One host
b) Two hosts
c) Three hosts
d) Four hosts

Q: What is a frequent mode of transmission for Ascaris infection?
a) Consumption of contaminated meat
b) Inhalation of airborne larvae
c) Contact with infected animals
d) Ingestion of vegetables grown in human feces

Q: How do larvae of Ascaris reach the lungs after being swallowed?
a) They migrate through the bloodstream
b) They travel through the lymphatic system
c) They burrow through the intestinal wall
d) They are carried by air currents during breathing

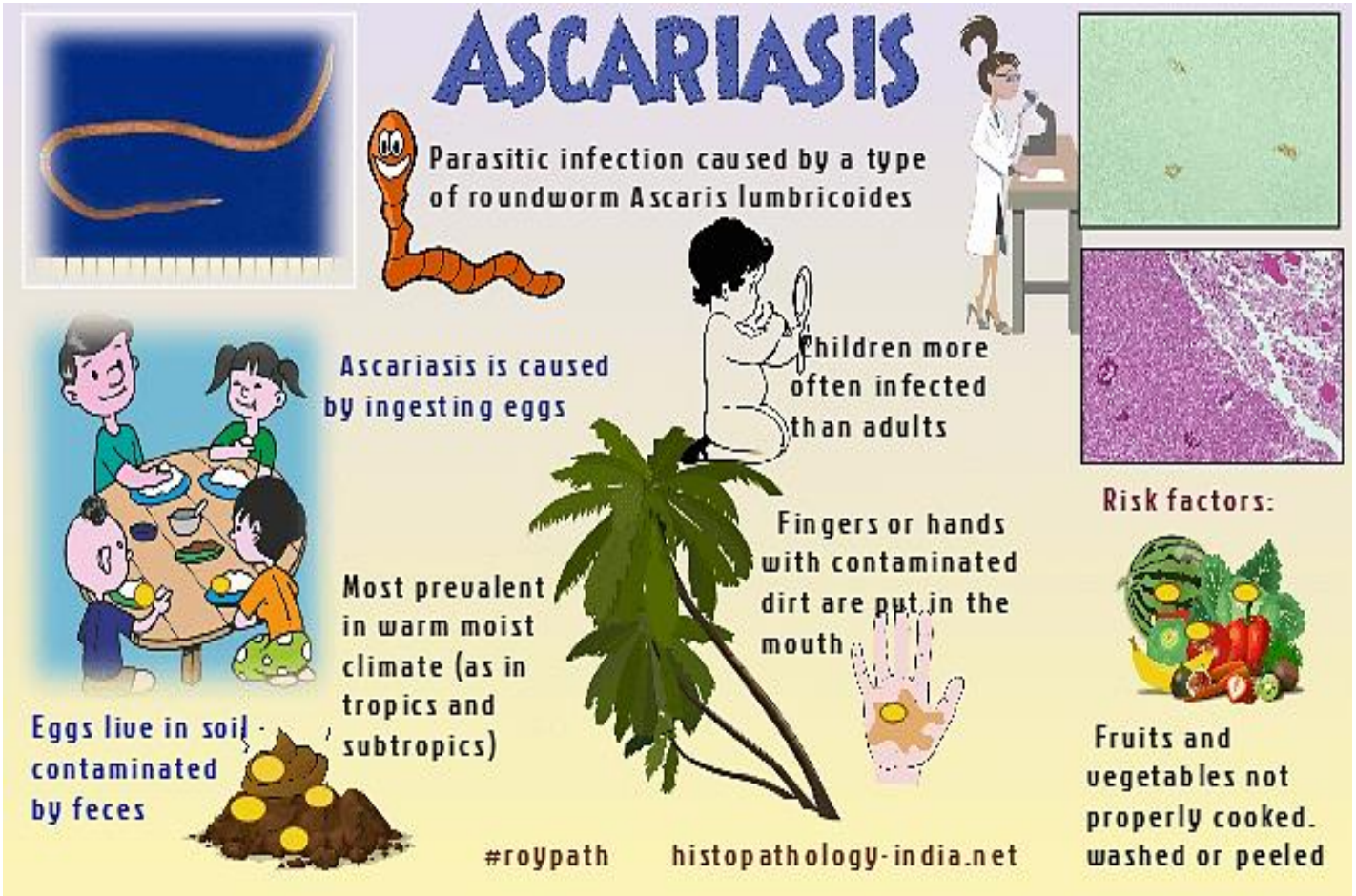
Q: What is the name of the disease caused by A. lumbricoides?
a) Ascariasis
b) Echinococcosis
c) Schistosomiasis
d) Trichuriasis

Q: What are the symptoms of ascaris pneumonia?
a) High-grade fever and productive cough
b) Dry cough, wheezing, and urticaria
c) Hemoptysis and pleuritic chest pain
d) Dyspnea and cyanosis

Q: What can be found in the sputum of patients with ascaris pneumonia?
a) Bacterial colonies
b) Charcot-Leyden crystals
c) Fungal hyphae
d) Protozoan cysts

Q: How can pancreaticobiliary worms be detected?

a) Plain abdominal film
b) Stool examination
c) Ultrasound and ERCP
d) Barium meal test



Dr. Mohammed Jamal Mansoor AL-taee
Theoretical teacher of medical parasitology- 2nd stage (2025)
University of ALmaarif - Department of Medical Laboratory Technology