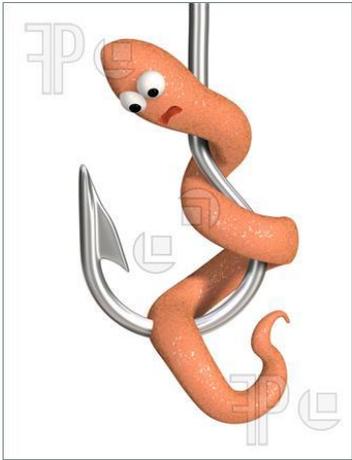


Intestinal nematodes

Part 2

Presented by

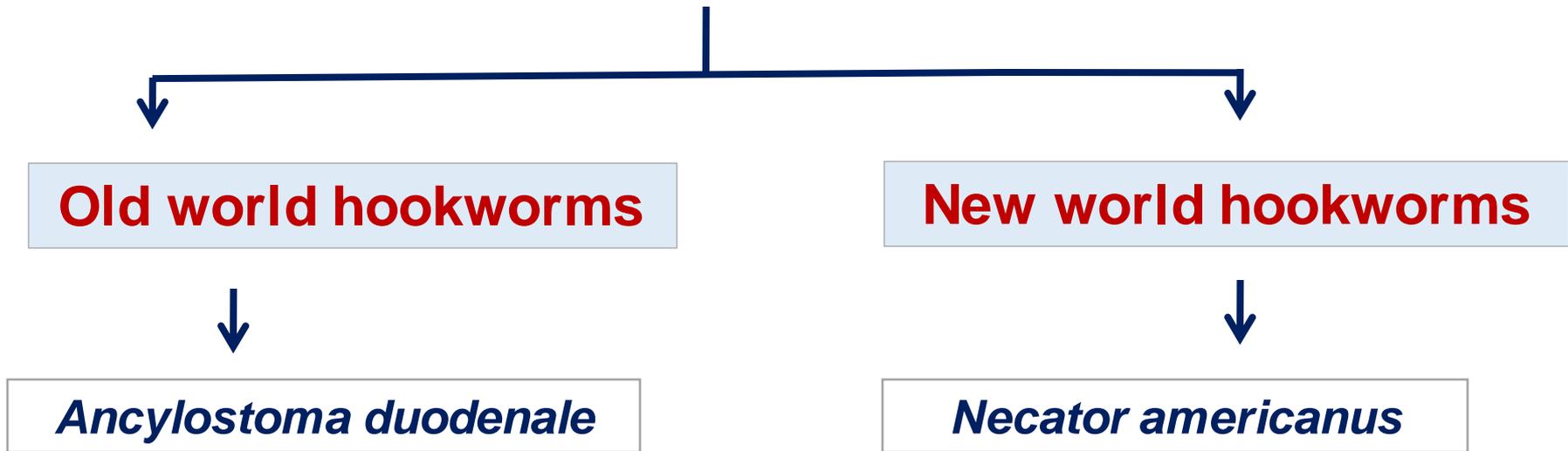
Professor Dina Abou Rayia



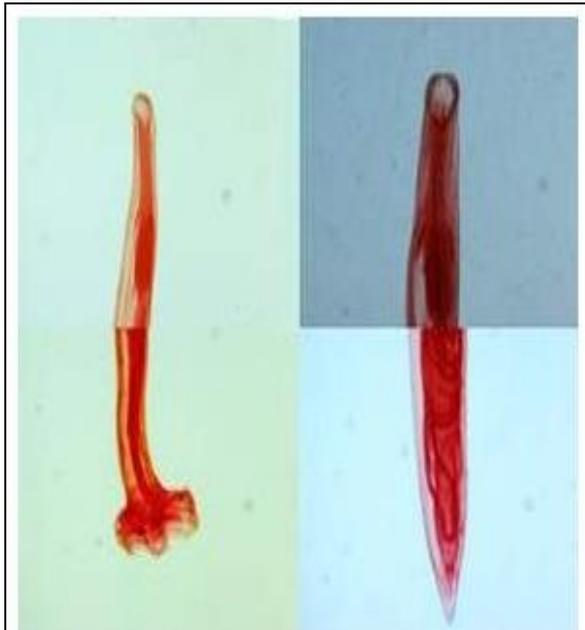
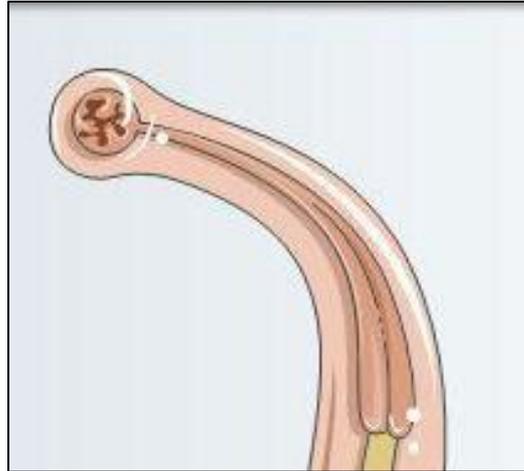
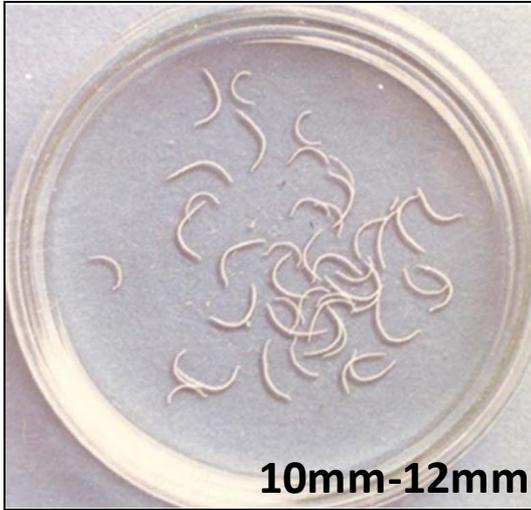
Hookworms



Human Hookworms

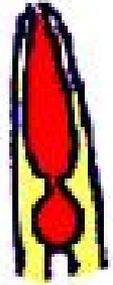
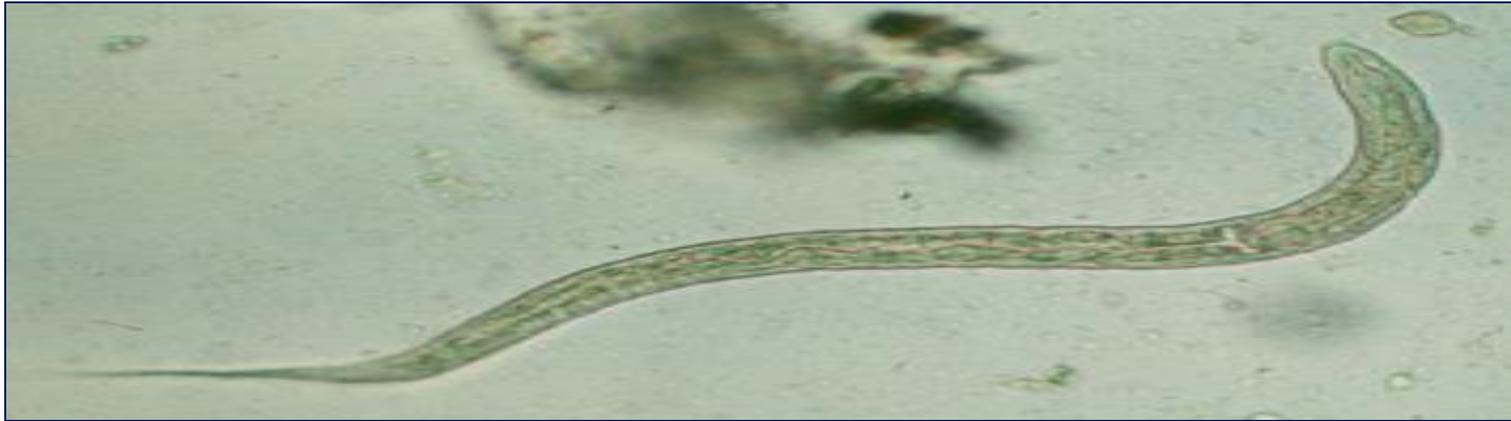


Ancylostoma duodenale



Size 60x40 μ
Shape oval,
blunt poles
Color
translucent
Content
immature (4 cell
stage)

Rhabditiform larva



Rhabditiform

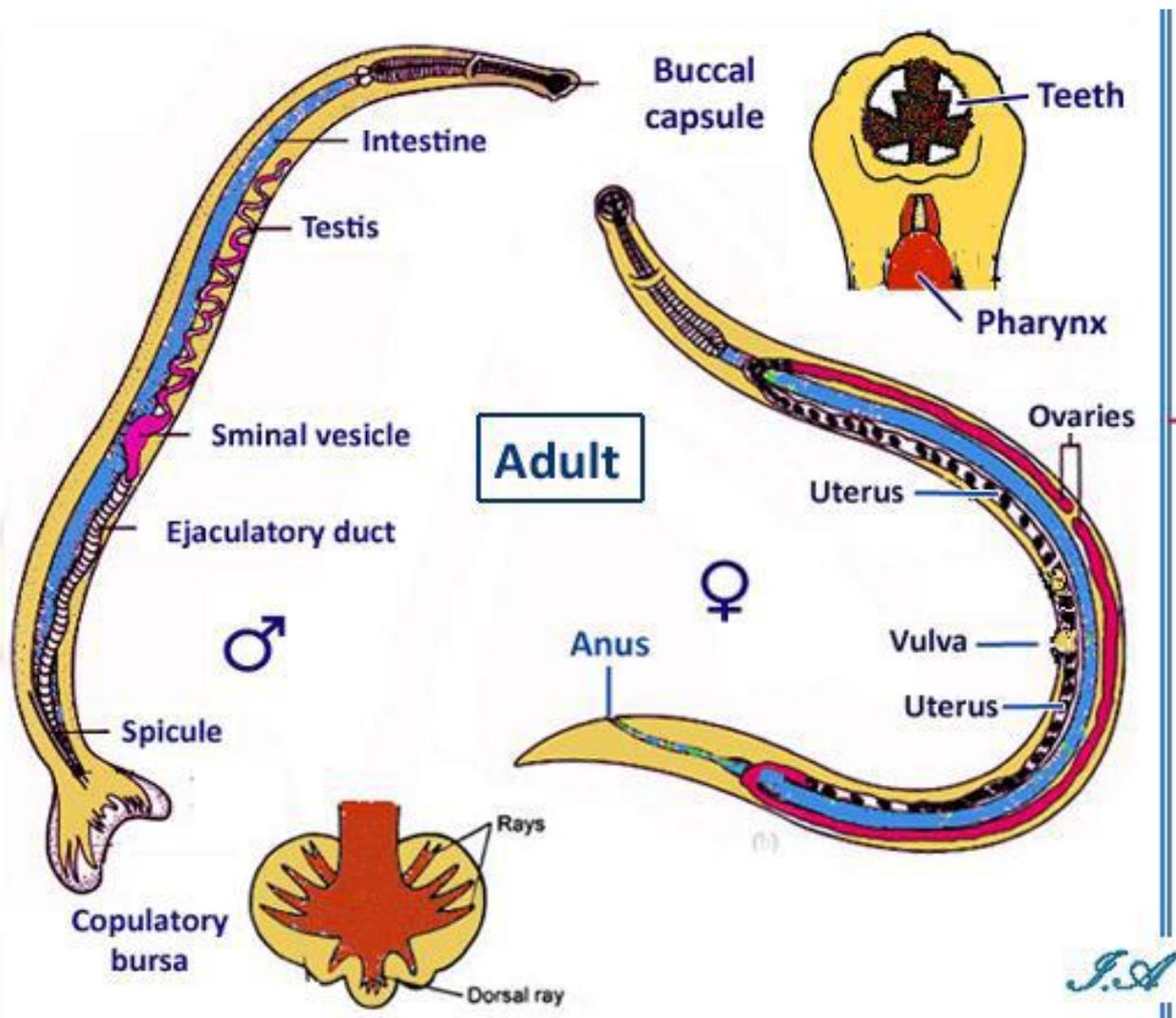
Pointed tail end

Filariform larva (I.S)

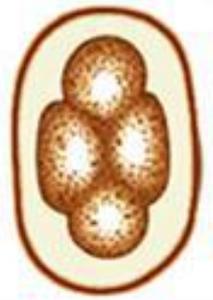


Cylindrical

With pointed tail & Sheathed

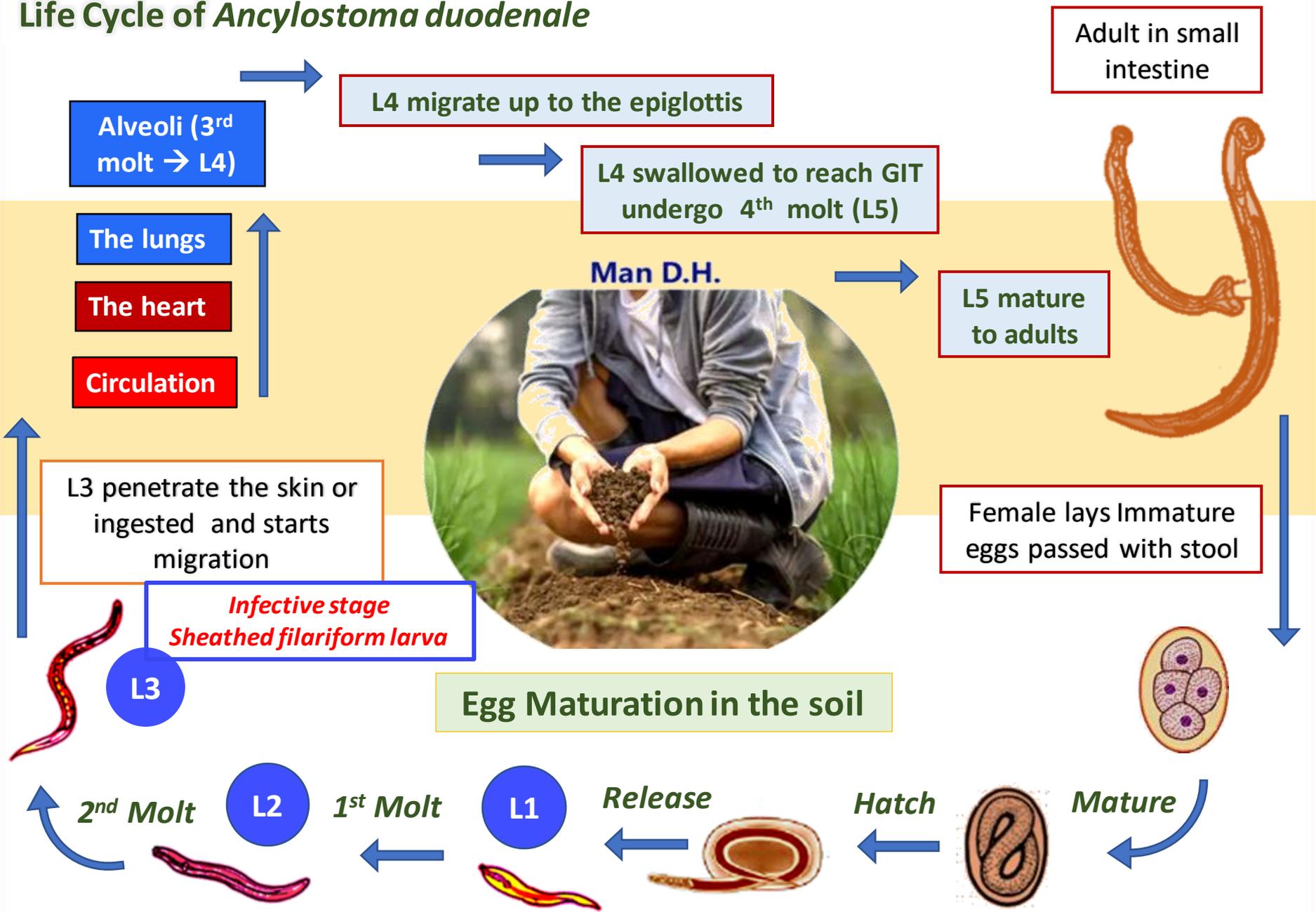


Immature Egg



Larva

Life Cycle of *Ancylostoma duodenale*





- **Habitat:** Upper part of the small intestine
- **D.H:** Man
- **D.S:** Egg
- **I.S:** Filariform larva
- **Mode of infection:** Penetration of the skin or mucus membrane of the mouth

Pathogenesis and symptomatology



Disease: Ancylostomiasis

Skin penetration Ground itch

- It is a **cutaneous** lesion produced as a result of penetration of human skin by filariform larva of *A. duodenale*.
- The most common sites are usually **between the toes, dorsal surface of the foot and inter digital spaces of hands**.
- Characterized by erythema, popular rash, vesicles and pustules with secondary bacterial infection

Migratory phase

- **Verminous pneumonia or Loeffler's syndrome** which is manifested by fever, cough, dyspnea, and hemoptysis with eosinophilia.
- **Eosinophilic granuloma** and abscess formation in different organs when larvae are distributed through the circulation to other organs.

Intestinal phase

- **Nausea, vomiting, diarrhea and abdominal pain**
- **Anaemia** (microcytic hypochromic) due to blood suction by worms and bleeding at the attachment sites (worm release anticoagulant) that may lead to anemic heart failure
- **Hypoproteinemia and nutritional deficiency** that leads to growth retardation



Ground itch



Laboratory diagnosis



**Fresh stool examination
for egg detection by
different methods:**

- **Direct smear.**
- **Concentration methods**

**Blood examination
for anaemia**

Treatment
Albendazole

Supportive treatment:

- **High protein diet.**
- **Vitamins & iron.**

**In severe anaemia,
blood transfusion
may be needed**



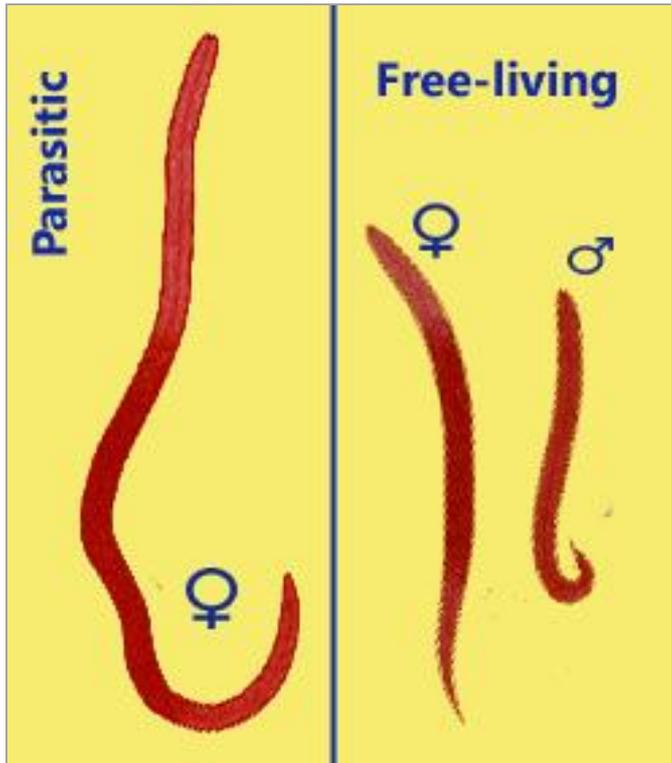
Strongyloides stercoralis



Strongyloides stercoralis (Dwarf thread worm)

- It is a **facultative** parasite that can live as a parasite or free living.
- It is an **opportunistic parasite** that infects the immunosuppressed individuals

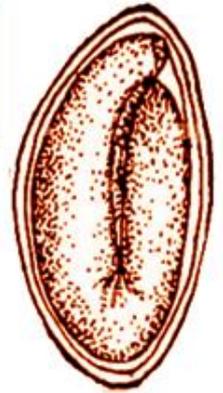
Strongyloides stercoralis



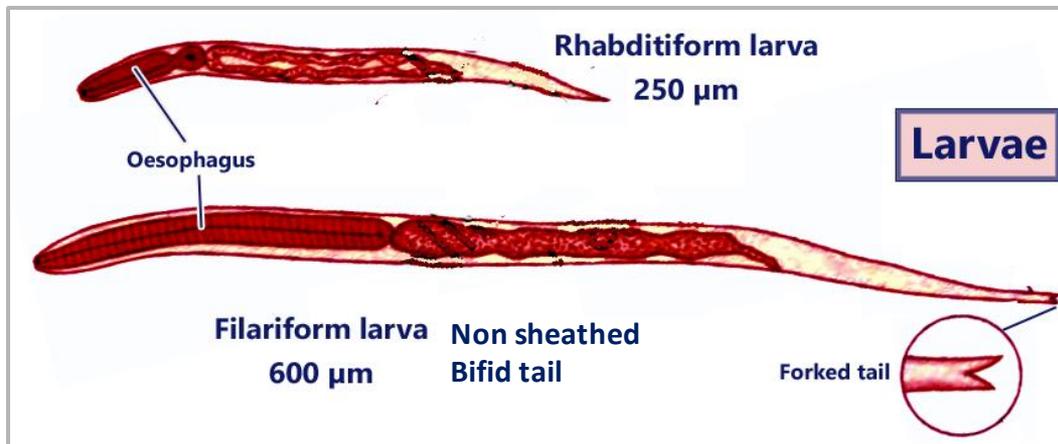
Adult:

- **Male:** 0.7 mm in length. **free-living** in the soil.
- **Parasitic female:** 2-3 mm. Cylindrical oesophagus
- **Free-living female:** 1 mm. Rhabditiform oesophagus

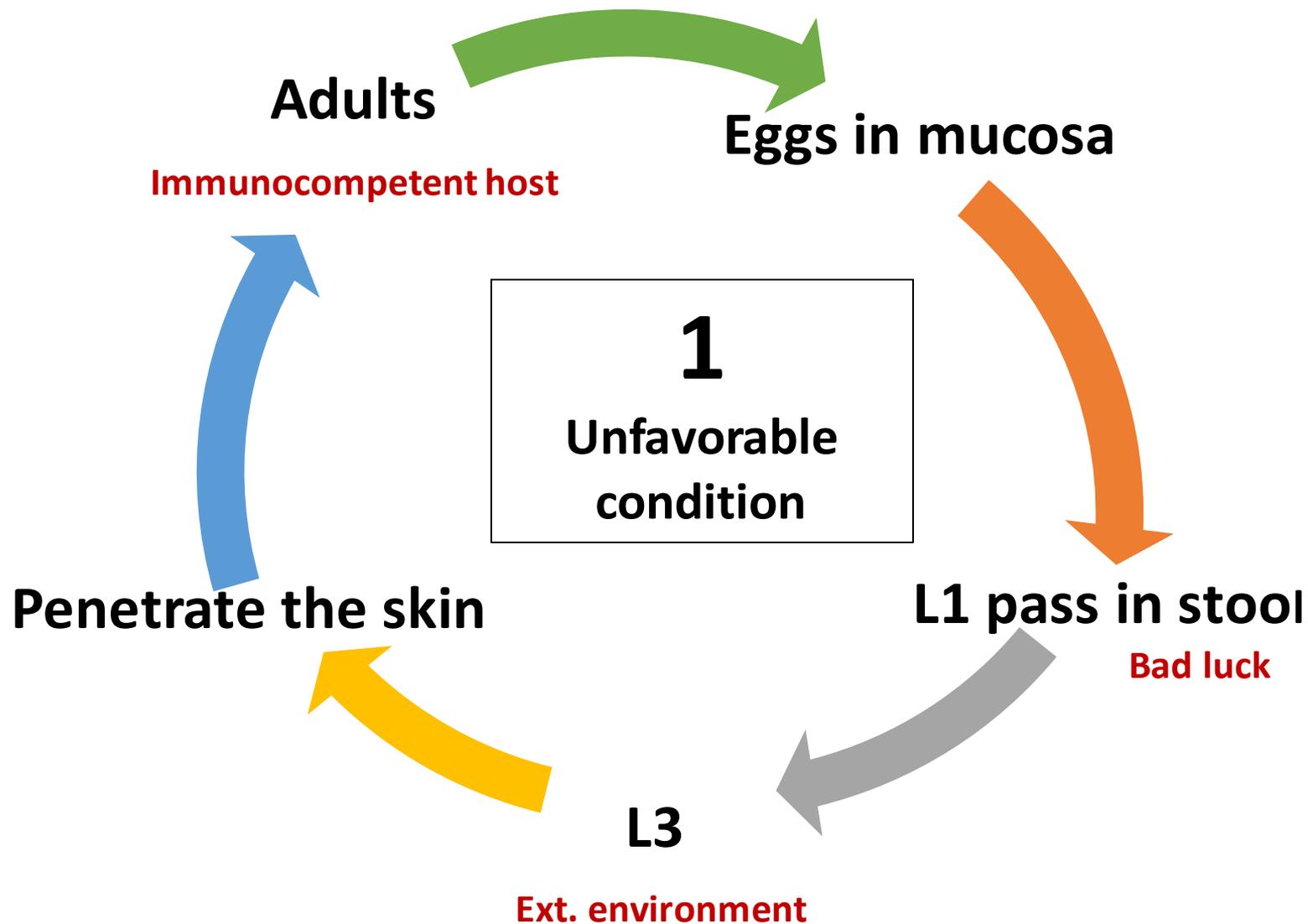
Egg
mature

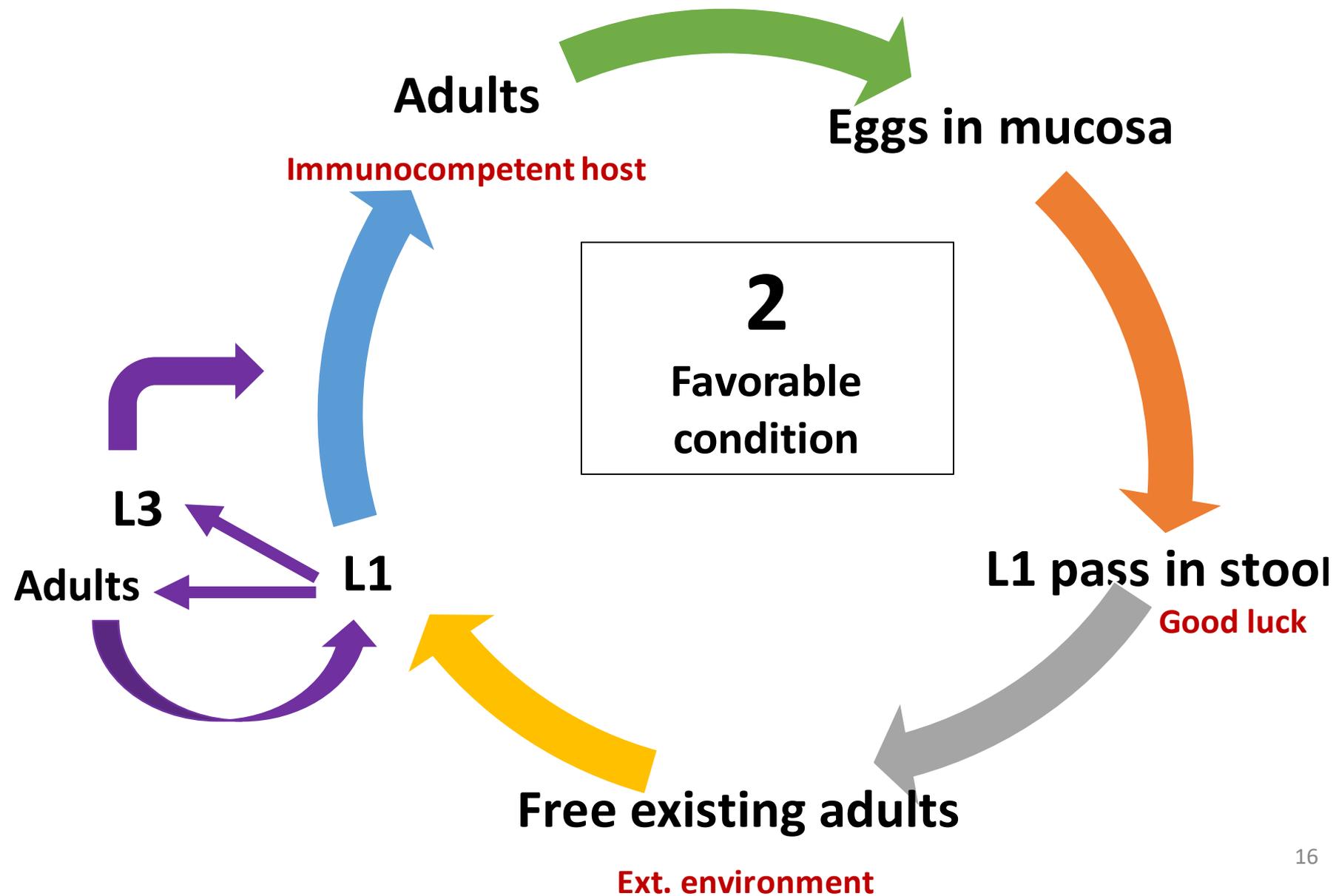


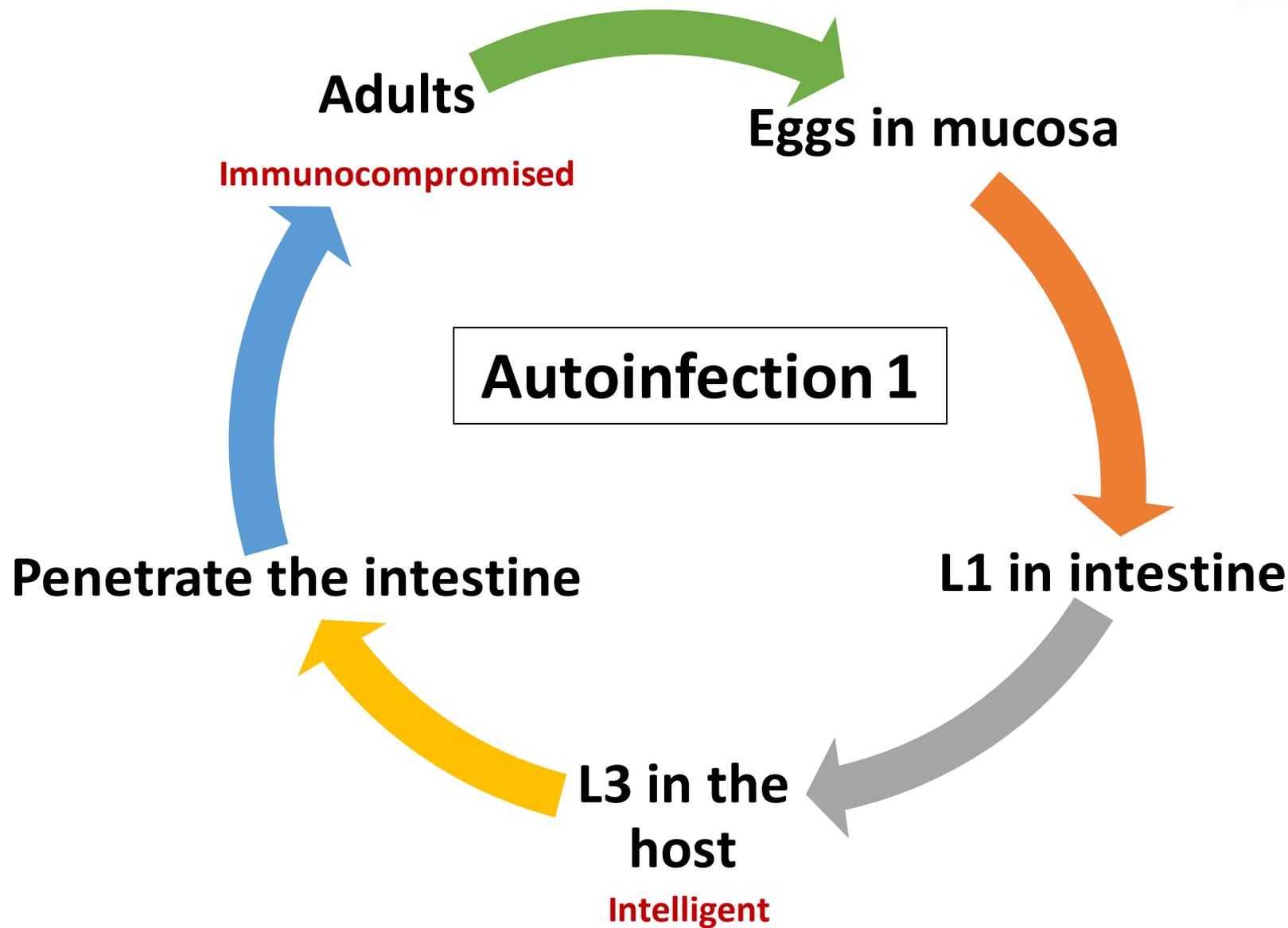
Found in the soil only
in the free living cycle

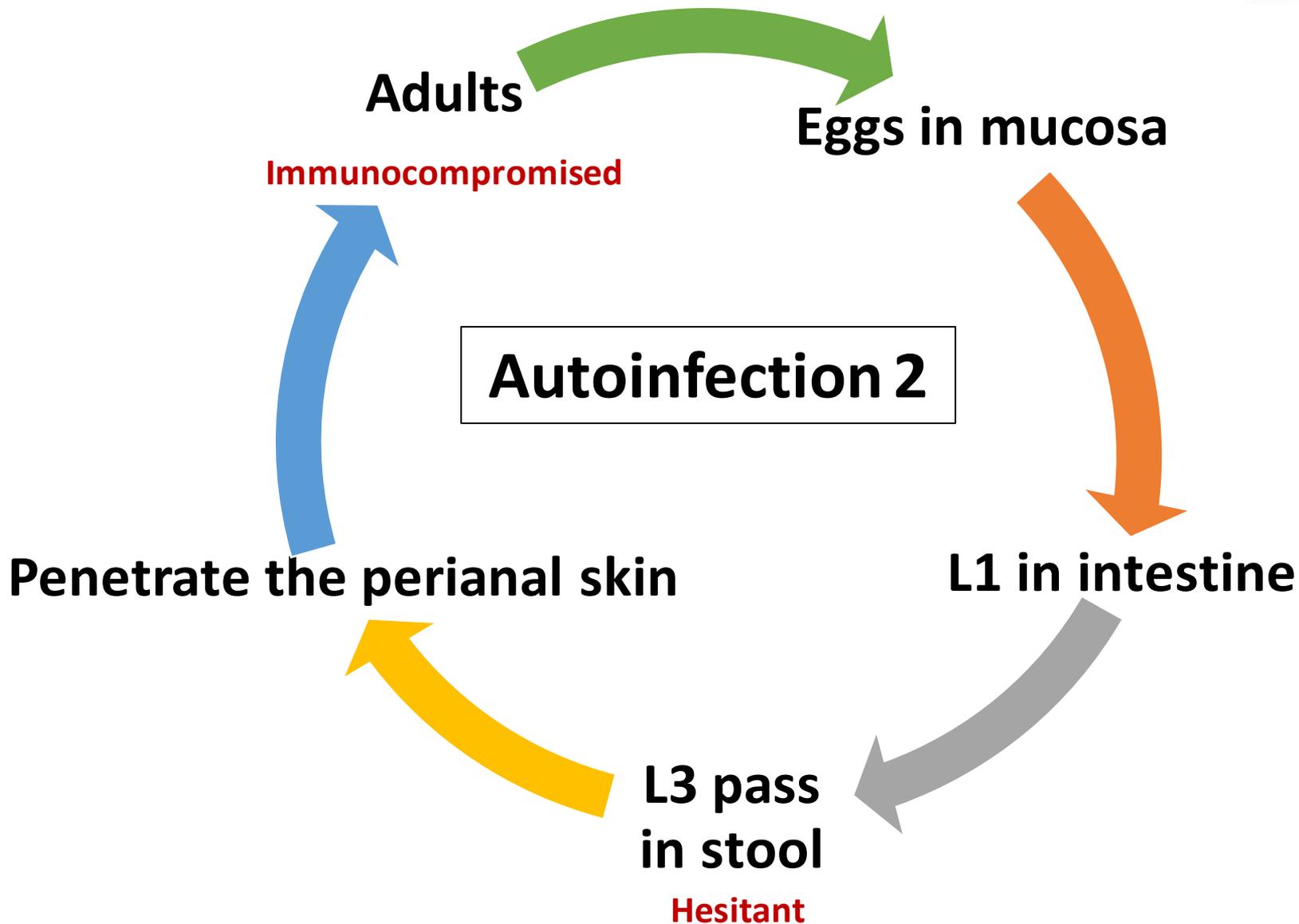


D.D with
filariform larva of
Ancylostoma
????

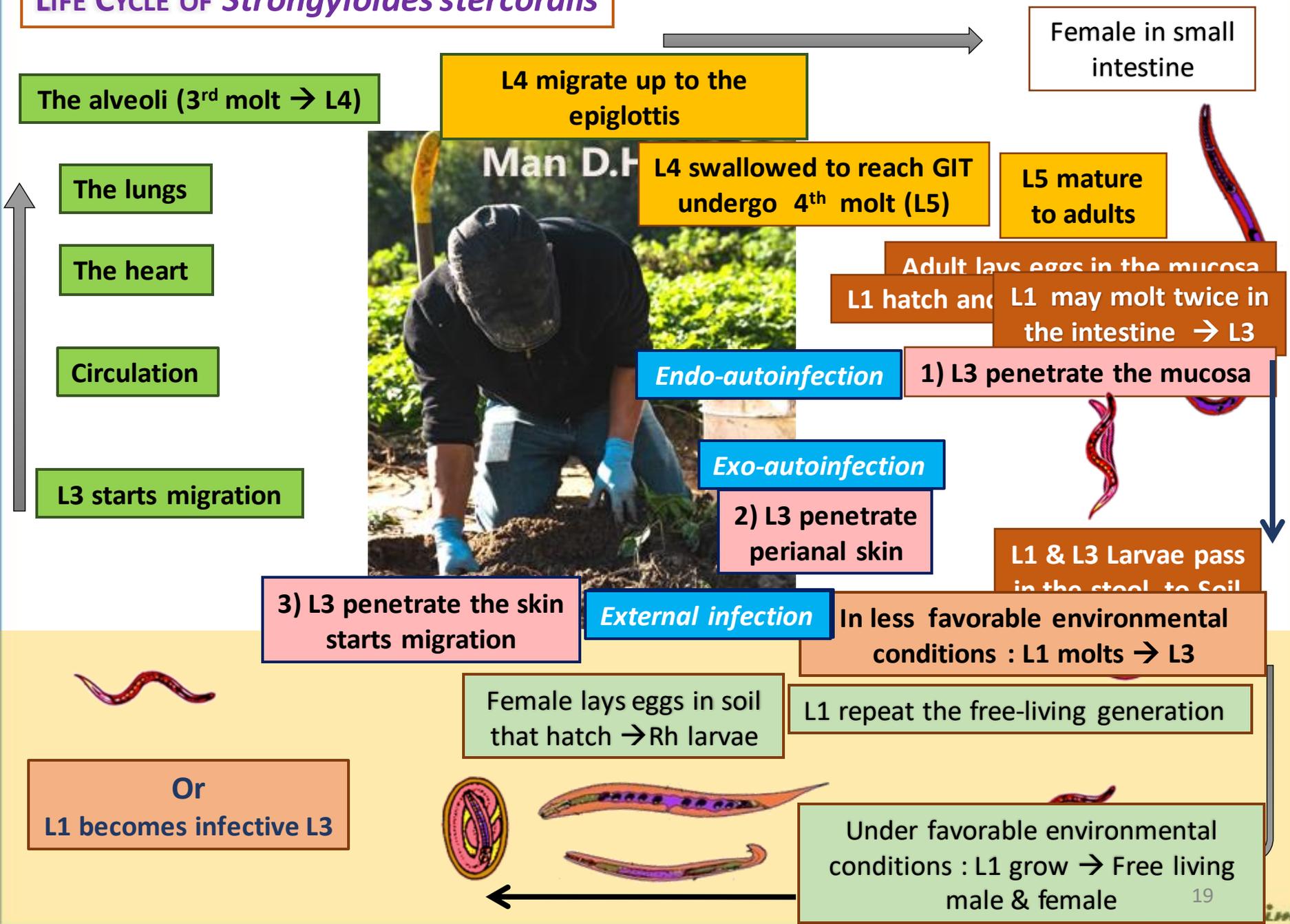








LIFE CYCLE OF *Strongyloides stercoralis*





**ATTENTION
PLEASE**

In the lung, the **filariform larvae** may develop into **free living adult worms** (good media due to the presence of oxygen) **invade the bronchial epithelium** → lays eggs → rhabditiform larvae that may develop again to filariform larvae and repeat the cycle.

Rhabditiform larvae, filariform larvae and adult worm can be detected in the **sputum**.



- **Habitat:** Upper part of the small intestine
- **D.H:** Man
- **R.H:** Dogs and monkeys
- **D.S:** Rhabditiform, filariform larvae and adults
- **Mode of infection:** Skin penetration-autoinfection



Mode of infection

•Penetration of the skin or mucous membrane of mouth by infective filariform larvae.

Autoinfection (common in immunocompromised persons)

Internal

Where **rhabditiform larvae** may develop to **filariform larvae (I.S)** into the lumen of the small intestine, then penetrate the intestinal mucosa to reach the circulation.

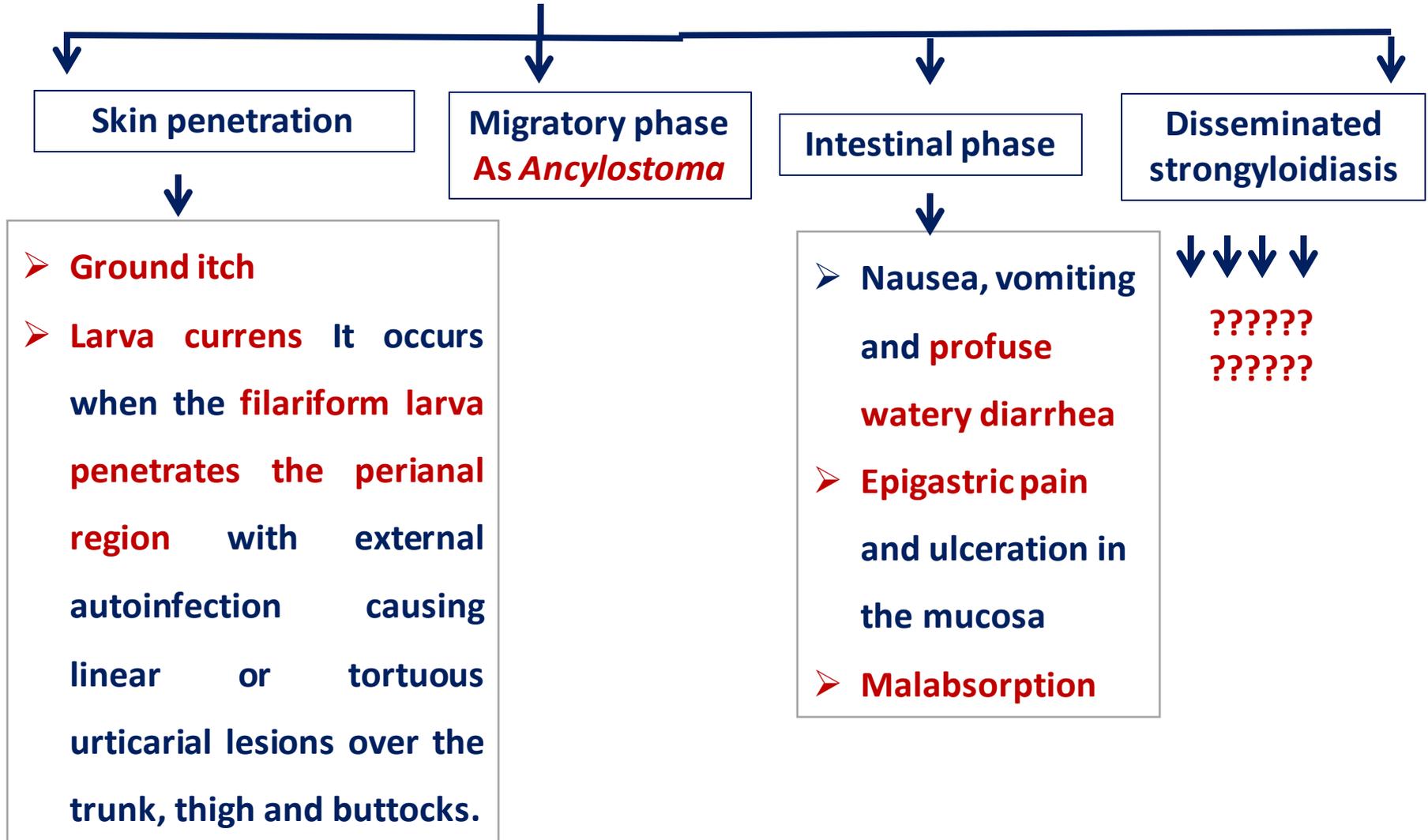
External

Filariform larvae (I.S) come out the anus and penetrate the perianal skin to reach the circulation and complete the cycle

Pathogenesis and symptomatology



Disease: Strongyloidiasis



Hyper infection syndrome and Disseminated strongyloidiasis



In immunocompromised patients the parasite produces massive number of rhabditiform larvae that develop into filariform larvae in the intestinal lumen (autoinfection) →

Hyperinfection syndrome

Larvae penetrate the intestinal wall → reach the circulation → different organs as brain, lung, liver and kidney (disseminated strongyloidiasis)

This condition is fatal and death occurs due to:

- ① Massive increase of intestinal worm burden → intestinal perforation, peritonitis and paralytic ileus.
- ② Invasion of CNS → meningitis & brain abscess.
- ③ Respiratory failure.
- ④ Septicaemia due to larval migration from the intestine.



Larva currens

Laboratory diagnosis

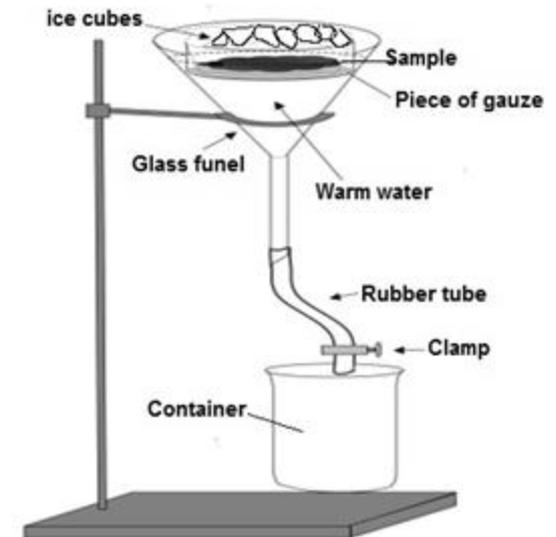


Direct methods

- **Stool examination for rhabditiform larvae** by direct smear and concentration methods as bearman's technique.
- **Stool culture** to detect free living adults
- **Duodenal aspiration or enterotest** reveals larvae and adults.
- **Sputum examination or culture:** during disseminated disease, all stages may be present in lung (rhabditiform larvae, filariform larvae, adults).

Indirect methods

- **Eosinophilia (10-40%)**
- **Serological testes (CFT, IHT, ELISA)**



Treatment



- **Ivermectin (drug of choice).**
- **Mebendazole.**
- **Antihistaminic and antibiotics for cutaneous lesions.**





Define

- Ground itch
- Disseminated strongyloidiasis

Mention

- Complications of ancylostomiasis