Strongyloides stercoralis and *Ascaris lumbricoides*

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Department of Medical Laboratory
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Strongyloides stercoralis

- **Distribution**

It is found mainly in the tropics but may also occur in the temperate regions.

- **Habitat**

The **female** adult worm is found embedded in the mucosa of the small intestine of human. The **male** worms are not seen in human infection

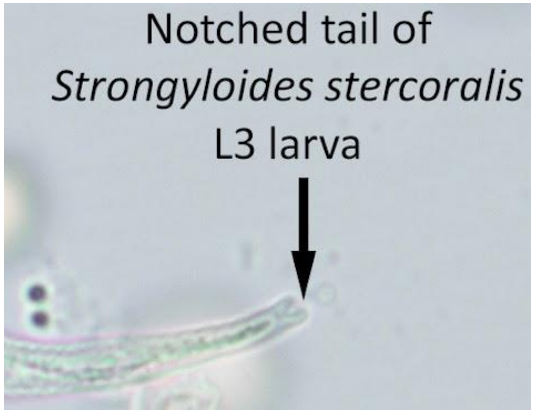
- **Morphology**

This is the smallest intestinal nematode of human.

The worm is **parthenogenetic**. It reproduces without the presence of a male worm.

Strongyloides stercoralis

- The worm causes **autoinfection** and hence, infection may persist for years.
- It is **ovoviviparous, as soon as** the eggs are laid, they **hatch out** to **rhabditiform larva** (L1 stage). Thus, it is the **L1** stage and **not the egg**, which is excreted in faeces and detected in stool examination.
- The L1 stage **migrates** into the lumen of the intestine and passes down the gut to be excreted out in faeces.
- **Filariform larva** (L3 stage) is the third larval stage. **L1** larva **moults twice** to become the **L3** larva. It is long and slender, with a notched tail. It is the infective stage to human.



Strongyloides stercoralis life cycle

(1) Rhabditiform larvae, L1, in the intestine are excreted in stool of infected human.

This larva can follow 3 different pathways to complete its life cycle (direct, indirect and autoinfection). In the **direct** development, the L1 moults twice into L3 in the soil.

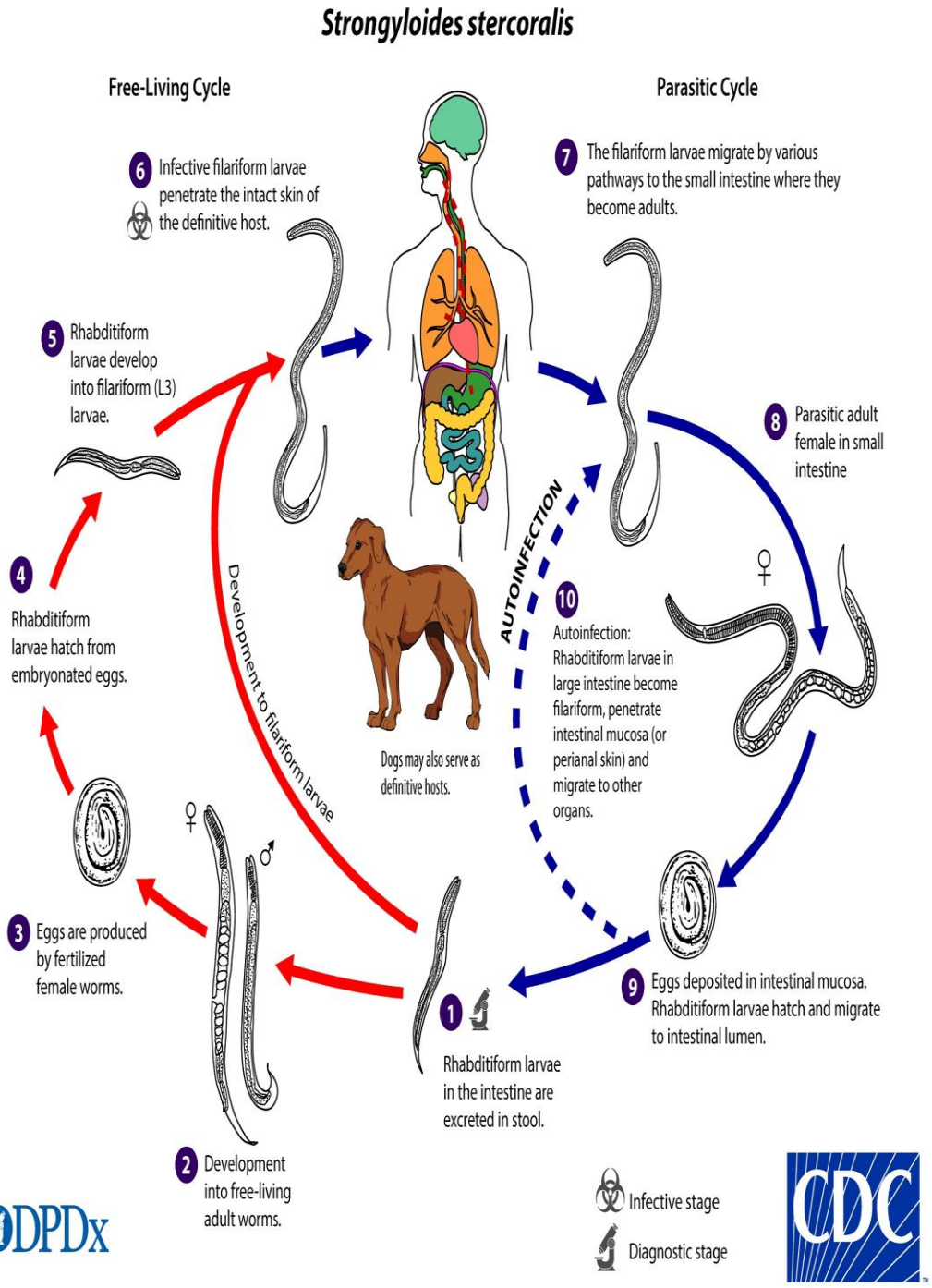
(2) In the **indirect** development, the L1 larvae develop into the free-living adult worms (male and female) in the soil.

(3) Eggs are produced by fertilized female worms.

(4) L1 larvae hatch from embryonated eggs.

(5) The L1 larvae develop into **infective filariform, L3**.

(6–7) The L3 larvae **penetrate** the intact skin and enter the circulation, ending up in the heart and lungs.



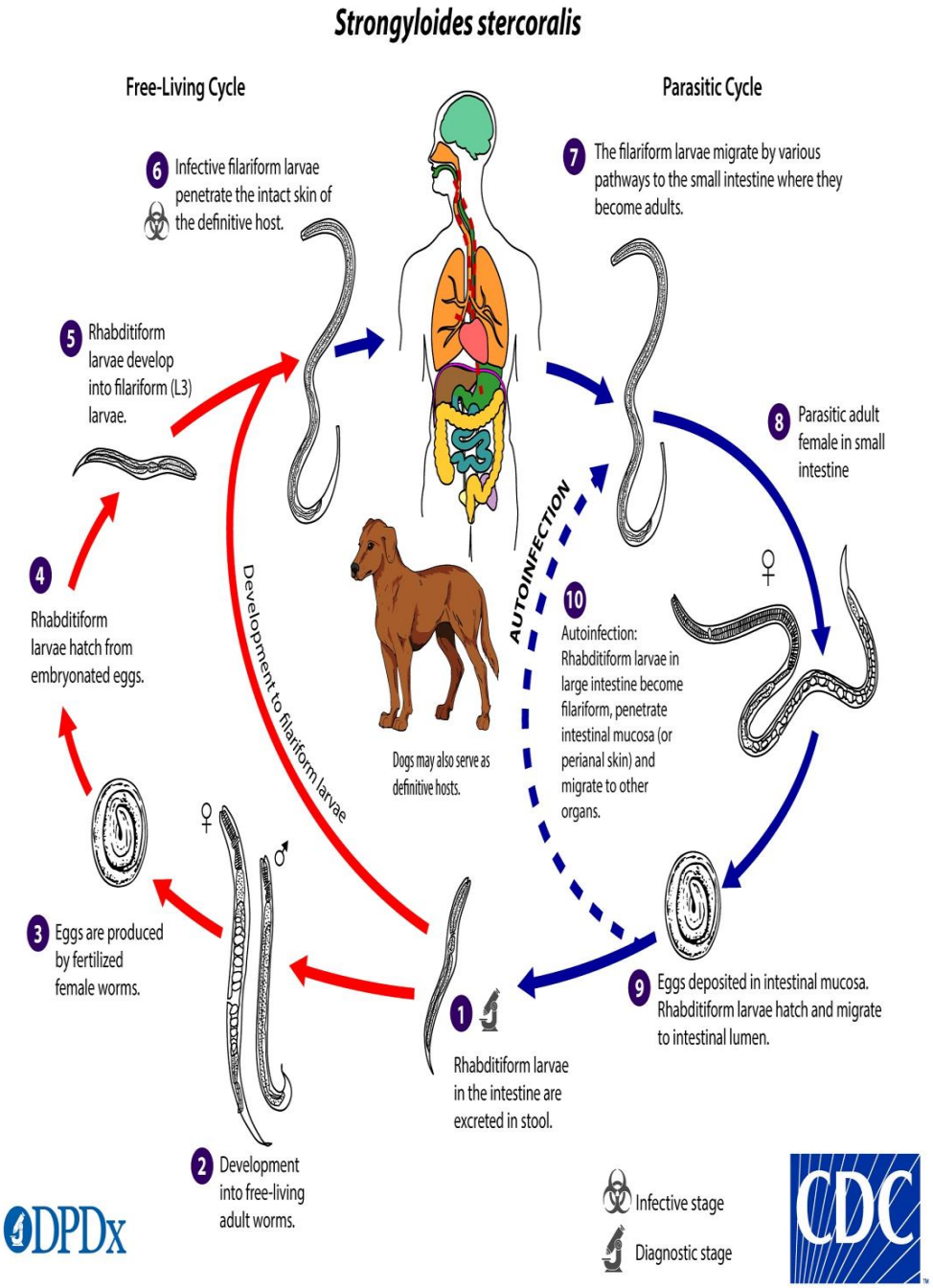
(8) They are then swallowed and develop into adults in the mucosa of the **small intestine**.

(9) The adult female deposits eggs in the intestinal mucosa. The eggs hatch into L1 larvae which migrate to the intestinal lumen and are excreted in the stool.

(10) The worm may develop **internal** and **external autoinfection**.

In **external autoinfection**. The L3 larvae cause reinfection by penetrating the perianal skin during defaecation.

In **internal autoinfection** seen commonly in immunosuppressed hosts. The L3 larvae penetrate the intestine.



Pathogenesis and Clinical Features of *Strongyloides stercoralis*

- Strongyloidiasis is generally benign and asymptomatic. **Eosinophilia** and **larvae in stool** are the only indication of infection.
- **Loeffler's syndrome** (pneumonia and asthma) during the larval lung migration phase of the parasite.
- Intestinal manifestations may present as **malabsorption** syndrome. **Diarrhoea** is often present.
- There may be dermatitis, with erythema and itching at the **site** of **penetration** of the filariform larva.

Strongyloidiasis

- **Diagnosis**

Microscopic examination, Stool culture, Serodiagnosis, or Molecular diagnosis.

- **Treatment**

All cases of strongyloidiasis, symptomatic and asymptomatic, should be treated to prevent severe invasive disease. **Ivermectin** is more effective than **albendazole**.

- **Prevention and Control**

1. Proper faecal disposal.

2. Use of footwear and gloves to prevent skin penetration by filariform larva.

3. Treatment of patients.

Ascaris lumbricoides

- Common name: Common roundworm.
- **Distribution**

It is distributed worldwide mainly in the tropics and subtropics.

- **Habitat**

Adult worms live in the lumen of the small intestine.

- **Morphology**

The adult *Ascaris* worms are **large** and **cylindrical**, with **tapering ends**.

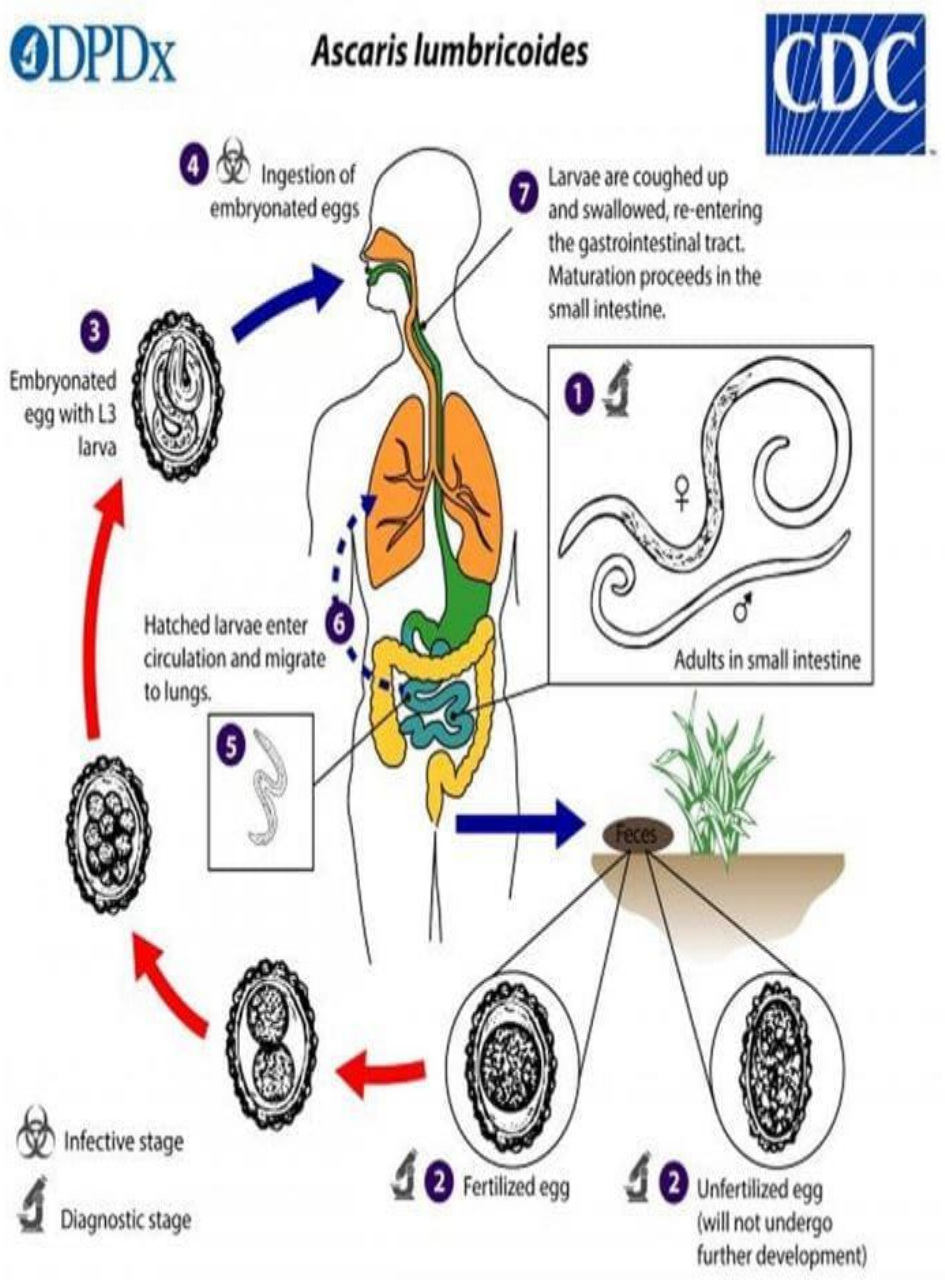
- The adult **male** worm posterior end is **curved** with **2 copulatory spicules**.
- The **female** worm posterior **extremity is straight** and conical.

- Two types of eggs are passed by the female worm; **fertilized** and **unfertilized**.
- The fertilized egg is spherical or ovoid, bile stained **(infective stage)**
- The unfertilized egg is longer, more elliptical with a thinner shell, and contains granules. It does not develop into the infective stage.

Life Cycle

1. The adult male and female worms live in the lumen of the **small intestine** of human.
2. The female worm produces both fertilized and unfertilized eggs which are passed out in faeces.
3. In the soil, the **fertilized egg** undergoes development to the infective stage.
4. Human acquires infection via **ingestion** of the infective eggs.
5. In the intestine, the eggs hatch into larvae.
6. The larvae **penetrate** the mucosa of the **small intestine** and enter the portal circulation and are carried to the **heart** and **lungs**.
7. In the lungs, the larvae rupture out of the alveolar capillaries into the alveolar space and **crawl up** the bronchiole, bronchi, trachea and pharynx.

They are swallowed back into the intestine where they develop into adults in about 3 months.



Pathogenesis and Clinical Features of ascariasis

- Clinical manifestations of ascariasis are caused by the migrating larvae and the adult worms.

- The larval migration causes **allergic reaction**.

- **Loeffler's syndrome** is characterized by low-grade fever, cough.

- The nutritional effects are usually seen when there is heavy worm burden. The worms interfere with **proper digestion** and **absorption** of food. Ascariasis may contribute to protein-energy malnutrition and vitamin A deficiency.

- Ascariasis may cause complications due to **mechanical effect**. Masses of worms may cause intestinal obstruction.

Ascariasis

- **Diagnosis**

1. Microscopic examination.
2. Macroscopic examination.

- **Treatment**

1. Pyrantel pamoate, albendazole, mebendazole, or ivermectin.
2. Complete **intestinal obstruction** is a surgical emergency.

- **Prevention and Control**

1. Proper faecal disposal.
2. Wash fruits and vegetables before consumption.
3. Personal hygiene.
4. Treatment of infected persons.