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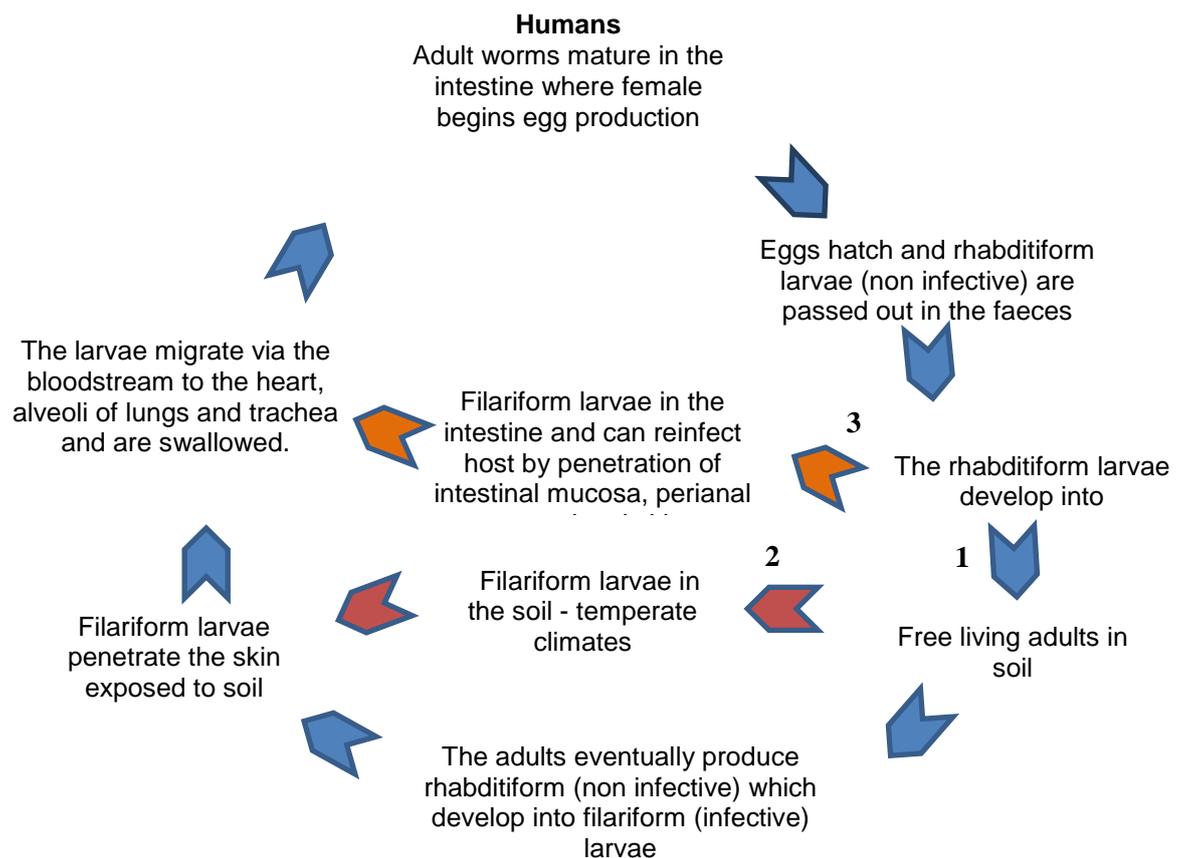
Larvae of *Strongyloides stercoralis*

Introduction

Strongyloides stercoralis is an intestinal nematode commonly found in warm areas, although it is known to survive in colder climates. The geographic range of *Strongyloides* infections tends to overlap with that of Hookworm.

Life cycle

The lifecycle of *Strongyloides stercoralis* is a complex one as demonstrated by the following diagram.



In summary, the life cycle of *S. stercoralis* has three phases;

1. The non infective first stage or rhabditiform larvae develop into free living adults in the soil and produce infective third stage or filariform larvae which can penetrate exposed skin. This phase is common in moist, warm tropical countries.

2. The non infective rhabditiform larva which are excreted in the faeces, develop into infective filariform larvae in the soil. These infective larvae penetrate exposed skin. There is no development of free living adult worms and this phase is common in temperate zones.
3. The non infective rhabditiform larva develop into infective filariform larvae while passing down the small intestine. Autoinfection occurs when the larvae reinfect the host by penetrating the intestinal mucosa or the perianal or perineal skin. The larvae migrate to the lungs via the circulatory system and then return to the intestine.

Clinical disease

Disease associated with infections due to *S. stercoralis* is varied, ranging from some patients being totally asymptomatic to the hyperinfection syndrome. There are 3 areas of involvement in Strongyloides infections; skin, lungs and intestine.

1. Initial skin penetration of the filariform larvae usually causes very little reaction, however with repeated infections the patient may mount a hypersensitive reaction thus preventing the larvae from completing its life cycle. The term **larva currens** is used when there is a rapidly progressing urticarial track.
2. The migration of larvae through the lungs may stimulate an immune response which can result in a cough, wheezing and fever.
3. Symptoms associated with intestinal strongyloidiasis may mimic a peptic ulcer due to ulceration of the intestinal mucosa. In heavy infections the intestinal mucosa may be severely damaged resulting in malabsorption. There may also be lower gastrointestinal bleeding. Eosinophilia may be high.

Hyperinfection syndrome

The autoinfective capability of larvae may be responsible for long term infections which persist for many years. The parasite and host reach an equilibrium state where neither host or parasite suffers any adverse reactions. If this equilibrium is disturbed eg. immunosuppression, the infection proliferates with immense numbers of larvae migrating to every tissue in the body, especially the lungs. This condition is referred to as disseminated strongyloidiasis. This results in tissue damage, pneumonitis, brain damage or respiratory failure.

Laboratory diagnosis

Laboratory diagnosis depends on finding larvae in stool, sputum or duodenal aspirates. The first stage rhabditiform larvae measure approximately 250 μ long by 20 μ wide. They have a bulbed oesophagus and a short buccal cavity. In an old specimen, rhabditiform larvae of *S. stercoralis* must be differentiated from those of hookworm which have a longer buccal cavity. The third stage or filariform larva is approximately 500 μ long and has a notched tail (see below) compared with that of hookworm which is sheathed and has a long slender tail.

Eggs are rarely found in the stool as they hatch in the intestine. They are oval and thin shelled, resembling those of hookworm but are smaller measuring 50 - 58 μ by 30 - 34 μ .

Strongyloides larvae may be present in the stool in very small numbers and culture methods may be needed to encourage the rhabditiform larvae to develop into filariform larvae and migrate from the sample. The method currently employed at the Hospital for Tropical Diseases is the charcoal culture method.

Charcoal culture method

1. Thoroughly mix 10 grams of faeces in distilled water until it forms a thick suspension.
2. Mix the suspension with an equal quantity of granulated hardwood charcoal (BDH).
3. Take a Petri dish and cut a circle of filter paper smaller than the Petri dish. Moisten the filter paper and add the faecal charcoal mixture. Water can be added until the charcoal glistens and there should be a layer of water over the bottom of dish.
4. Seal the dish with vinyl tape and leave in a dark place.
5. Check the dish every day and if water is needed spray the surface without further mixing.
6. After 4 - 6 days, the Strongyloides larvae will have reached the infective stage. Care must be taken as the larvae penetrate the intact skin.
7. The larvae can be harvested in different ways, but to examine larvae for morphological features, add water around the mixture and leave exposed to light for approximately 2 hours. This allows the larvae to migrate into the water. The dish is then examined using a dissecting microscope and larvae can be seen at the edge of the filter paper.

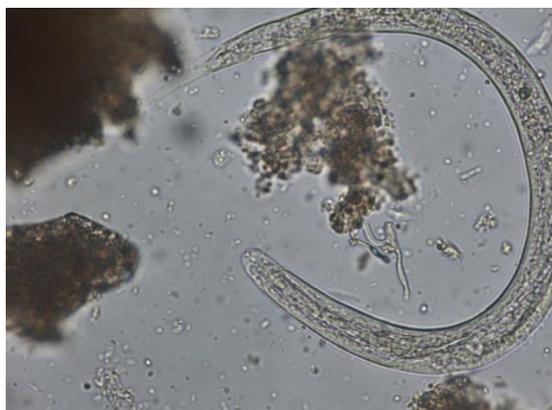
The Enterotest or string test can be used to recover larvae from duodenal aspirates.

Serology

Serological tests are of value in the diagnosis of strongyloidiasis when larvae cannot be found. An enzyme linked immunosorbent assay (ELISA) using larva antigen, is employed at HTD.



An ovum of *Strongyloides stercoralis*



Rhabditiformlarva of *Strongyloides stercoralis*