University of Zambia
School of Medicine

Trichuris trichiura

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Trichuris trichiura

- Scientific classification
- Kingdom — Animalia
- Phylum — Nematoda
- Class — Adenophorea
- Order — Trichurida
- Family — Trichuridae
- Genus — *Trichuris*
- Species — *T. trichiura*

Trichuris Trichiura

- **Common name:** Whipworm
- **Habitat**

  - *T*. *trichiura* lives in the large intestine

  - The adult worms attached to the wall of the **caecum,** less commonly to the appendix, colon and anal canal

Distribution

- Worldwide in distribution, but is much more common in the tropics
- Infection is widespread in tropical Africa, South America, and South-east Asia
- About 800 million people are estimated to be infected with this worm
- *Ascaris* and *Trichuris* are frequently observed as occurring together

Morphology

Adult Worm

- The male worm is 30–45 mm long,

- The female is slightly larger, about 40–50 mm.

- In shape, it resembles a whip;

  - with the anterior three-fifth thin and thread-like
  - the posterior two-fifth thick,
  - appearing like the handle of a **whip**

Morphology

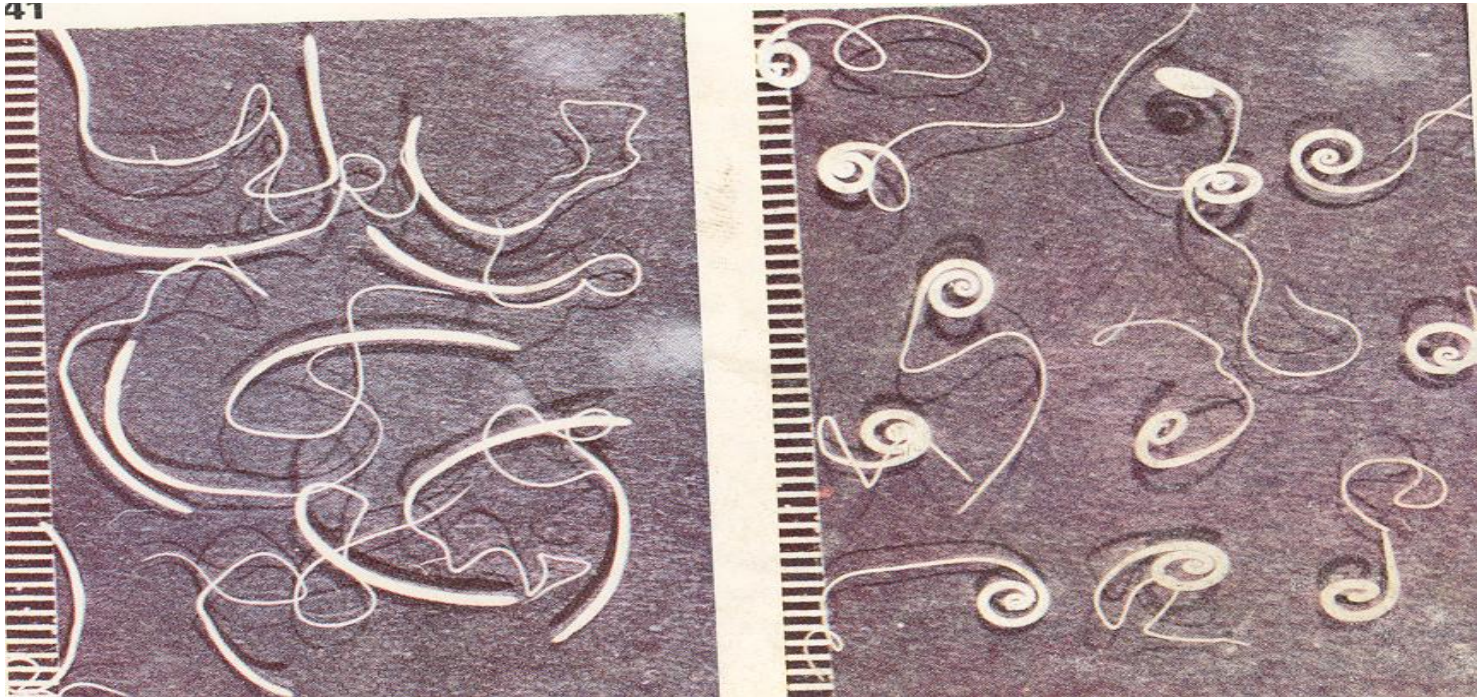
- The attenuated anterior portion, which contains the capillary esophagus, is embedded in the mucosa.
- The posterior part contains the intestines and reproductive organs
- The posterior end of the male is coiled ventrally, while the hind end of the female is straight, blunt and rounded
- The worm has a lifespan of 5–10 years

Morphology

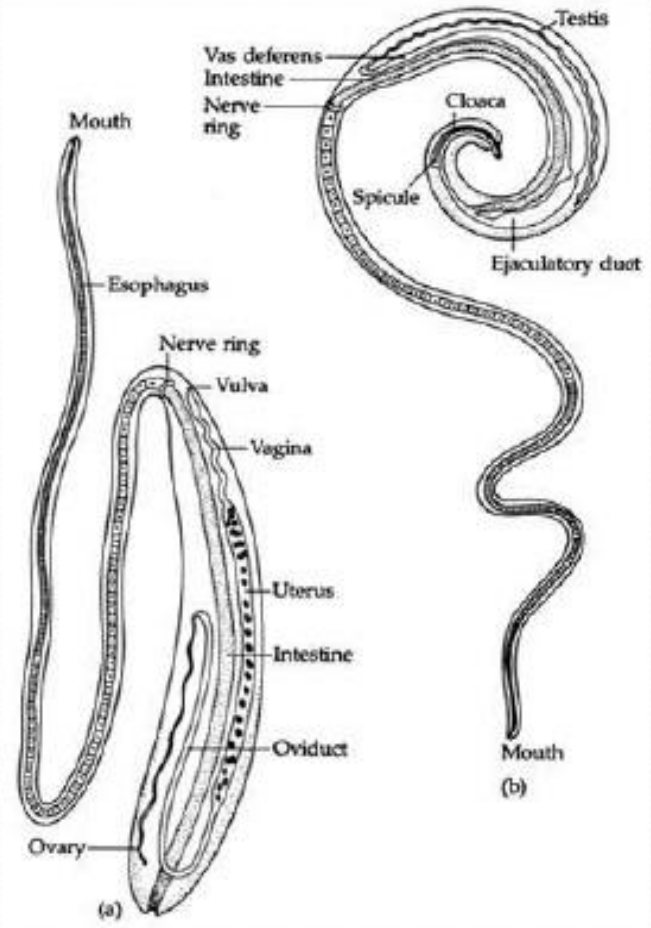
Posterior part of male *Trichuris trichuria*

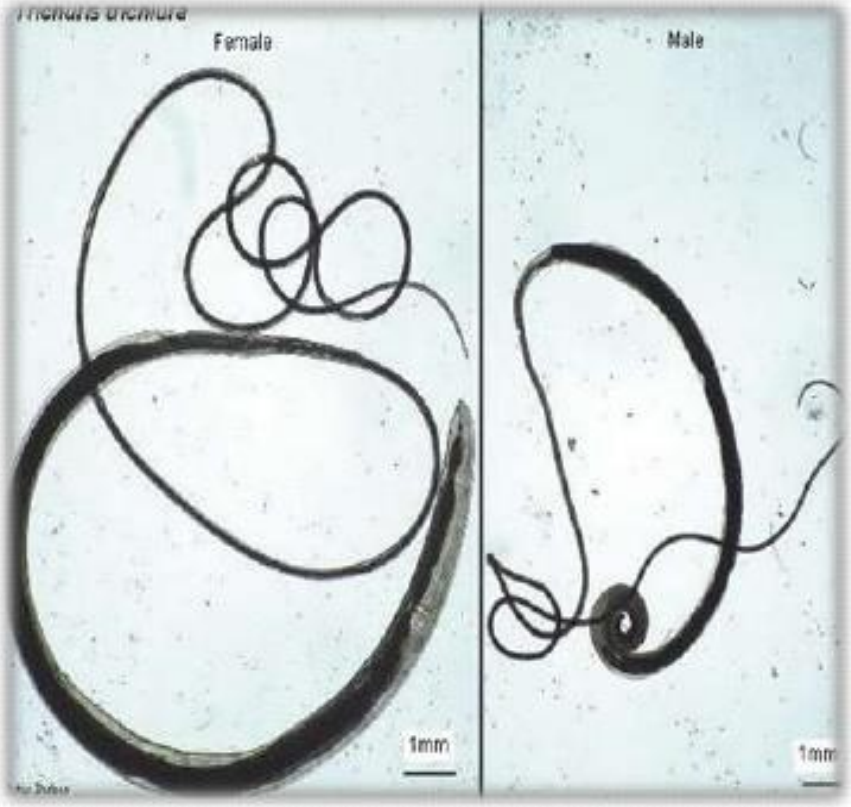
Posterior part of female *Trichuris trichuria*

Adult Worm



morphology





male, 30-45 mm; female, 35-50 mm

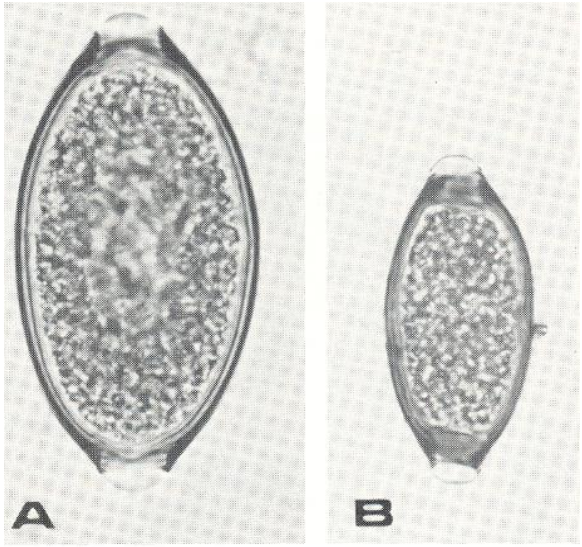
Egg Morphology

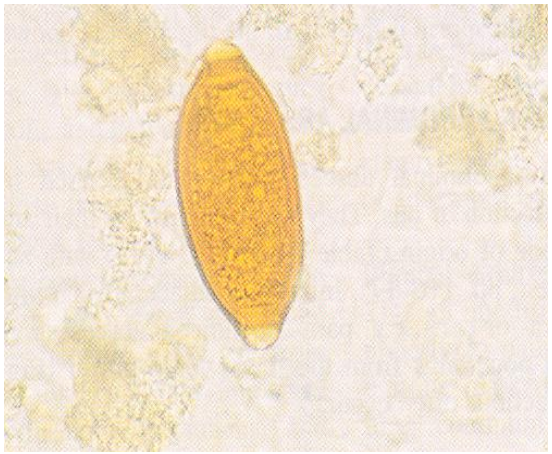
- The egg has a characteristic appearance.
- It is brown in color being **bile-stained**.
- It has a **triple shell**, the outermost layer of which is stained brown.
- It is **barrel-shaped** and about 50 µm long and 25 µm wide in the middle, with a projecting **mucus plug** at each pole containing an unsegmented ovum

Egg Morphology

- The plugs are colorless.
- The egg floats in saturated salt solution.
- When freshly passed, the egg contains an unsegmented ovum.
- At this stage, the eggs are not infective to humans.
- The fertilized female lays about 3000 - 10,000 eggs per day.

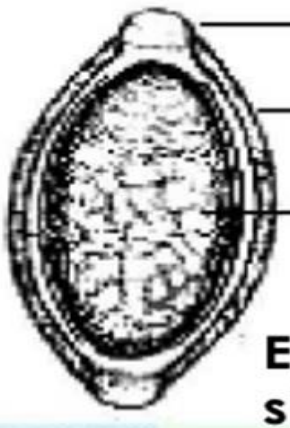
Egg

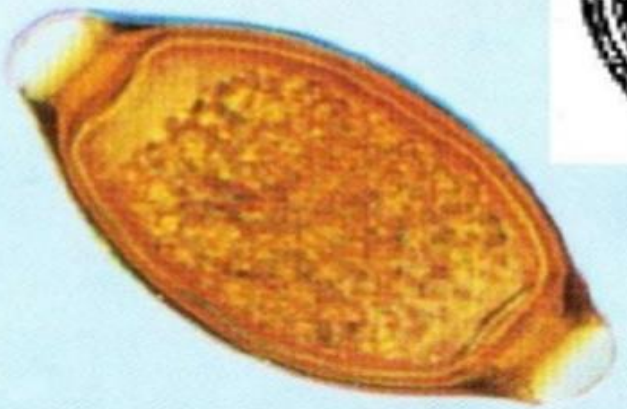




Egg

Eggs





Eggs are lemon shaped with plug-like translucent polar prominences. 50~54um

Life Cycle

- **Natural host:** Man. No intermediate host is required.
- **Infective form:** Embryonated eggs containing rhabditiform larva.
- Adult female worm lives in large intestine and lays eggs which are discharged in faeces.
- Unlike *Ascaris*, there is no heart lung migration

Life Cycle

- The egg undergoes development in soil, optimally under warm, moist, shady conditions, when the **infective rhabditiform larva** develops within the egg in **3–4 weeks**.

- At lower temperatures, this may be delayed for 3 months or more

- Embryonated eggs are infective to man.

Life Cycle

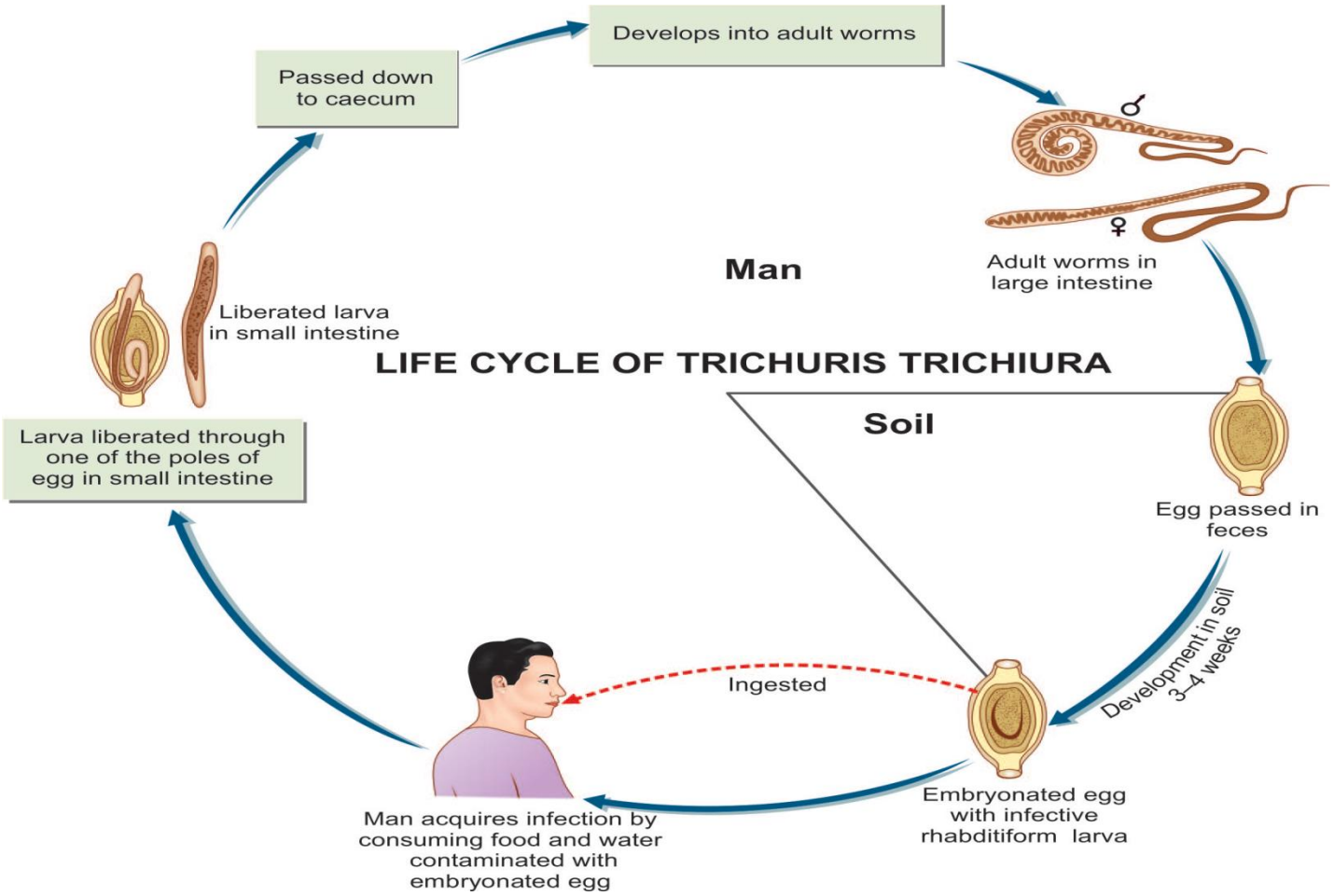
- **Mode of Transmission: (faecal – oral route)** Infection occurs in humans when the mature embryonated eggs containing the infective larvae are swallowed in **contaminated food or water**.

- The eggs hatch in the **small intestine** and the larva, which emerges through the pole of the egg, passes down into the caecum.

Life Cycle

- In about **2–3 months**, they become mature adults after undergoing four larval stages
- They lie embedded in the caecal wall, with the thread-like anterior portion piercing the mucosa and the thick posterior end projecting out.
- The gravid adult female lays eggs, which are discharged in faeces and the cycle is repeated.
- Eggs start appearing in faeces usually about **3 months** after infection.

Life Cycle


LIFE CYCLE OF TRICHURIS TRICHIURA
Man
Soil
Develops into adult worms
Passed down to caecum
Adult worms in large intestine
Liberated larva in small intestine
Larva liberated through one of the poles of egg in small intestine
Egg passed in feces
Development in soil 3–4 weeks
Ingested
Embryonated egg with infective rhabditiform larva
Man acquires infection by consuming food and water contaminated with embryonated egg

Pathogenicity and Clinical Features

- Infection with T. trichiura (**trichuriasis, whipworm infection**, or **trichocephaliasis**) is asymptomatic, except when the worm load is heavy.

- Disease may result either due to mechanical effects or allergic reaction.

- The worms lie threaded into the caecal mucosa and even though it is not a blood feeder, oozing of blood may occur at the sites of attachment.

Pathogenicity and Clinical Features

- Mechanical blockage of the appendiceal lumen by masses of whipworms may cause acute appendicitis

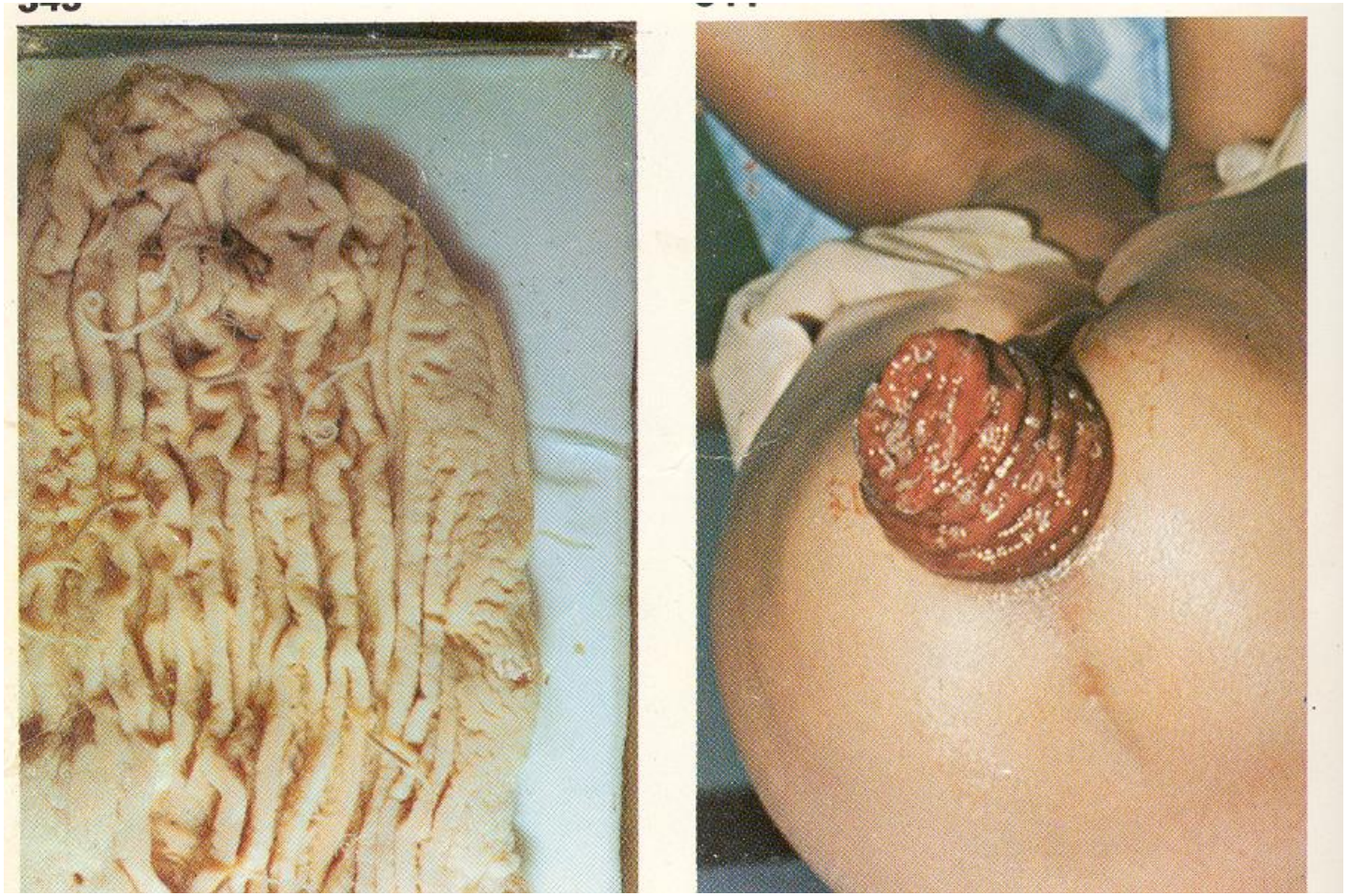
- The blood loss is **about 0.005 mL per worm per day**. Over a period of time, this may lead to anaemia and malnutrition.

- In heavy infection, the worm may be abundant on the colonic mucosa, even up to the rectum.

Pathogenicity and Clinical Features

- Mucus diarrhoea, chronic dysentery, abdominal pain, weight loss and painful or frequent defecation.
- Finger clubbing
- Some patients, particularly young children, may develop rectal prolapse.

Pathogenicity and Clinical Features



Laboratory Diagnosis

Stool Examination

- The characteristic barrel-shaped eggs are found in stools.
- The degree of infection can be assessed by egg counts.
- **Less than 10 eggs** per smear in direct stool preparation is considered **light infection** and
- **More than 50** per smear as **heavy infection**
- Light infection is not considered to cause clinical disease.

Laboratory Diagnosis

Sigmoidoscopy

- Sigmoidoscopy is useful as worms are found in the rectal mucosa in whipworm diarrhea and dysentery.

Charcot- Leyden crystals are usually abundant in stools of patients with whipworm dysentery.

- In heavy infection, sigmoidoscopy may show white bodies of worm hanging from the inflamed mucosa, the so called **coconut cake rectum**.

Laboratory Diagnosis

Blood Examination

- Differential leukocyte count (DLC) may show upto 25% eosinophilia in the early stage of the disease

Treatment

- Mebendazole (100 mg twice daily for 3 days) drug of choice
- Albendazole (single dose of 400 mg) are effective with cure rates of 70–90% (may be used as an alternative drug)
- Ivermectin in combination with Albendazole – exhibit better cure and egg reduction rate than Albendazole alone
- Iron supplements

Prevention and Control

- **Trichuriasis** can be prevented by
- Proper disposal of faeces.
- Avoiding consumption of unwashed fruits and vegetables.
- Treatment of infected persons.
- Mass treatment
- Health education

Thank You