STRUCTURES OF TAENIA

TAENIA SAGINATA

ADULT WORM:

- Size: **5-10 metres** long, upto 24 metres.
- Colour: **White** and transparent.
- Parts:
  1. Scolex (head),
  2. neck,
  3. proglottides (segments)

Scolex (Head):

- It is 1-2 mm in diameter.
- It is quadrate.
- It has 4 circular suckers.
- Head is not provided with any rostellum/hooklets.
- It moves against the peristaltic movement of the gut.
Neck:

- It is long.
- Narrow (.5 mm width)

Proglottides (Segments):

- There are about 1000-2000 proglottides in taenia saginata adult worm.
- Terminal gravid segment: (2cm × .5cm).
- The common genital pore is situated marginally near the posterior end of each segment.
- The genital pore irregularly alternates between the right and left margins.
- The vagina is provided with a sphincter muscle.
- The gravid uterus consists of a central longitudinal stem with 15-30 branches and their sub-branches on each side.
- Testes having 300-400 follicles.

Special feature of proglottides:

- The gravid proglottides are expelled singly within the GIT and they go through the anal sphincter forcefully.
- The free gravid proglottide, while crawls out of the anal orifice, oviposits in the perianal skin.

EGGS:

As there is no uterine opening, the eggs are liberated by rupture of the mature proglottides.

- Shape: Spherical
- Colour: Brown (bile stained)
- Wall: Two walls:
  1> outer thinner transparent shell, and,
  2> inner thicker brown embryophore.
• Each egg contains an oncospore, with 3 pairs of hooklets.
• Eggs do not float in the saturated solution of NaCl.
• Eggs are infective only to cattle.

TAENIA SOLIUM

ADULT WORM:

• Length: 2-3 metres.
• Parts:
  a. Scolex
  b. Neck
  c. Proglottides

Scolex:

1. 1 mm in diameter.
2. Globular in shape.
3. Has 4 circular suckers.
4. Head is provided with a rostellum, with a double row of large and small teeths. (Diff. With taenia saginata)

Neck:

1. Neck is short. (Diff. With taenia saginata)

Proglottides:

1. The total number of segments is under 1000. (800-900)
2. A gravid segment measures (12 mm × 6mm). (As compared with taenia saginata- 2mm×.5mm)
3. Common genital pore is marginally present near the lateral margin of each segment. (As compared with T.saginata, where it was present at the posterior margin of each segment)
4. The common genital pore alternates irregularly between right and left margins.

5. The vaginal opening is not guarded by a sphincter. (Diff. With T. Saginata)

6. The gravid uterus consists of a medial longitudinal stem, having 5-10 lateral branching and their sub-branchings on each side.

7. Testes having 150-200 follicles.

Special features: (compared with T.saginata)

- The gracid proglottides are never expelled singly, but in chains of 5-6 at a time.

EGGS:

The eggs having the same features with T.saginata, just differs at their infectivity. Whereas, T.saginata eggs are infective only to cattle, T.solium eggs are infective cattle as well as man.

DIFERENCE BETWEEN ADULT WORMS OF T.SAGINATA AND T.SOLIUM

<table>
<thead>
<tr>
<th>TRAITS</th>
<th>T.SAGINATA</th>
<th>T.SOMIUM</th>
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<tbody>
<tr>
<td>Length</td>
<td>5-10 metres</td>
<td>2-3 metres.</td>
</tr>
<tr>
<td>Head</td>
<td>• Large,</td>
<td>• Small,</td>
</tr>
<tr>
<td></td>
<td>• Quadrate</td>
<td>• Globular,</td>
</tr>
<tr>
<td></td>
<td>• Without</td>
<td>• With rostellum and</td>
</tr>
<tr>
<td></td>
<td>rostellums and hooklets.</td>
<td>hooklets.</td>
</tr>
<tr>
<td>Neck</td>
<td>Fairly long</td>
<td>Short</td>
</tr>
<tr>
<td>Proglottides</td>
<td>1000-2000</td>
<td>800-900</td>
</tr>
<tr>
<td>Expulsion</td>
<td>Singly</td>
<td>5-6 at a time</td>
</tr>
<tr>
<td>Location of common</td>
<td>Posterior margin of each</td>
<td>Lateral margin of each</td>
</tr>
<tr>
<td>genital pore</td>
<td>segment.</td>
<td>segment.</td>
</tr>
<tr>
<td>Vagina</td>
<td>Sphincters present.</td>
<td>Sphincters absent.</td>
</tr>
<tr>
<td>Uterus</td>
<td>15-20 lateral branches</td>
<td>5-10 lateral branches</td>
</tr>
</tbody>
</table>
LIFE CYCLE OF TAENIA

- The complete life-cycle of -
  1. *Taenia solium* involves two hosts: the pig and the human,
  2. *Taenia saginata* involves the cow and the human.
- Humans act as the **definitive host** and harbour the adult tapeworm in the small intestine.
- Pig/ cow acts as **intermediate host** and harbour the larval stage.
INFECTION OF THE INTERMEDIATE HOSTS:

- Both the proglottids and the eggs are released with the feces of infected individuals and serve as a source of infection for pigs and cattle, which act as intermediate hosts for these parasites.
- Following the ingestion of eggs, mature larvae (onchospheres) are released in the gut of cattle/pig.
- These onchospheres enter the blood stream by penetrating the small intestine and migrate to skeletal and cardiac muscles where they develop into cysticerci.
**ROUTE OF INFECTION TO HUMAN:**
Infection is acquired either-
- through the accidental ingestion of embryonated eggs passed in the feces of an individual infected with the adult tapeworm or,
- through the consumption of raw or poorly cooked meat containing cysticerci.

**INFECTION IN HUMAN:**
- In humans, cysticerci transform into adult tapeworms by attaching to the gut wall by means of its suckers.
- Then the adult tapeworms persist in the small intestines for years causing cysticercosis.
- The time between initial infection and the development of the adult worm occurs over a period of approximately 2 months.

**CLINICAL FEATURES OF TAENIA INFECTION:**

**CYSTICERCOSIS**
- Cysticercosis refers to the tissue infection caused by the larval stage, of *Taenia solium*.
- It is acquired by the accidental ingestion of eggs.
- The clinical manifestations associated with cysticercosis are a direct result of the inflammatory response induced to control parasite growth.
- **Cysticercosis is the most common intra-orbital parasitic infection.** Infection may involve the
  a. sub-retinal space
  b. extraocular muscles,
  c. eyelid and/or
  d. lachrymal glands surrounding the eye.

**SYMPTOMS:**
- a. Pain in the eyes
- b. Blurriness
- c. Partial or complete loss of vision.
d. In extreme cases, infection may cause complete detachment of the retina.

**Neurocysticercosis:**

- Neurocysticercosis is the most common parasitic infection of the human central nervous system and is observed in 60-90% of infected patients.
- Seizures are the most common symptom reported in patients with neurocysticercosis.
- Other commonly associated clinical manifestations include headache, dizziness, involuntary muscle movement, intracranial hypertension and dementia.

**DIAGNOSIS OF TAPEWORM INFECTION**

- By examining the stool, whitish segments can easily be recognised by open eye as contrast with yellowish stool.

- A microscopic examination of stool for eggs of adult worm has to be carried out by:
  1. A direct smear preparation or by,
  3. A perianal swab (NIH swab) may be used for detection of eggs.

**SPECIES DIAGNOSIS:**

- As the eggs of T.saginata and T.solium can’t be differentiated, when the head and proglottide segments are found, they may be used for species diagnosis.
- Diagnosis may be made by molecular methods such as DNA probe and PCR. **It should be remembered that only these methods can differentiate between T.saginata and T.solium eggs.**

**DIAGNOSIS OF CYCTERICERCOSIS**
• MRI and CAT scans are considered to be the most sensitive methods of detection of neurocysticercosis and are useful in establishing diagnosis.

• Serological methods of detection most often include the ELISA (enzyme-linked immune sorbent assays) and EITB (enzyme-linked immunoelectro transfer blot) and involve the detection of antibodies against cysticerci.
• EITB is highly sensitive and is considered to be the best immunological diagnostic test available.
• It should be noted, however, that detection of anticysticercal antibodies may simply indicate previous exposure or infection and is not an exclusive indication of a current, active infection within the host.
• Other methods of detection include compliment fixation and indirect haemagglutination assays.

TREATMENT

1. Praziquantel and
2. Albendazole
   -are the two anticysticercal drugs used to treat patients diagnosed with cysticercosis in the brain and skeletal muscles.