Lecture 15: Acanthocephala

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Phylum Acanthocephala

Parasitic worms known as acanthocephalans, thorny-headed worms or spiny-headed worms

With eversible proboscis armed with spines which is used to pierce and anchor the parasite to the gut wall of the host

With complex life cycle involving at least two hosts which may include invertebrates, fish, amphibians, birds and mammals

About 1150 species described

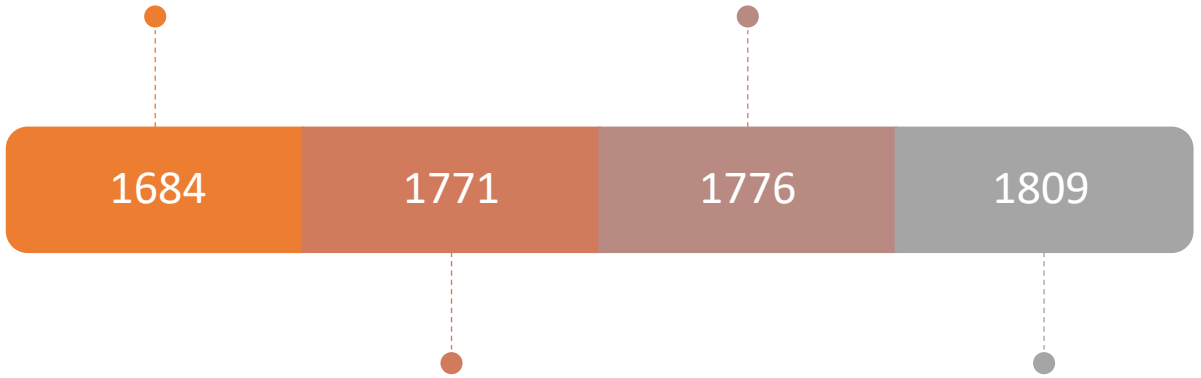
Highly adapted for parasitic mode of life

Lost many organs and structures through evolutionary processes

Historical Notes

Francesco Redi (1684) first described acanthocephalan as a worm with a proboscis armed with hooks.

Philipp Ludwig Statius Muller in 1776 independently called the worms *Echinorhynchus*.



Joseph Koelreuter in 1771 proposed the name Acanthocephala.

Karl Rudolphi in 1809 formally named the worms Acanthocephala.

At Present

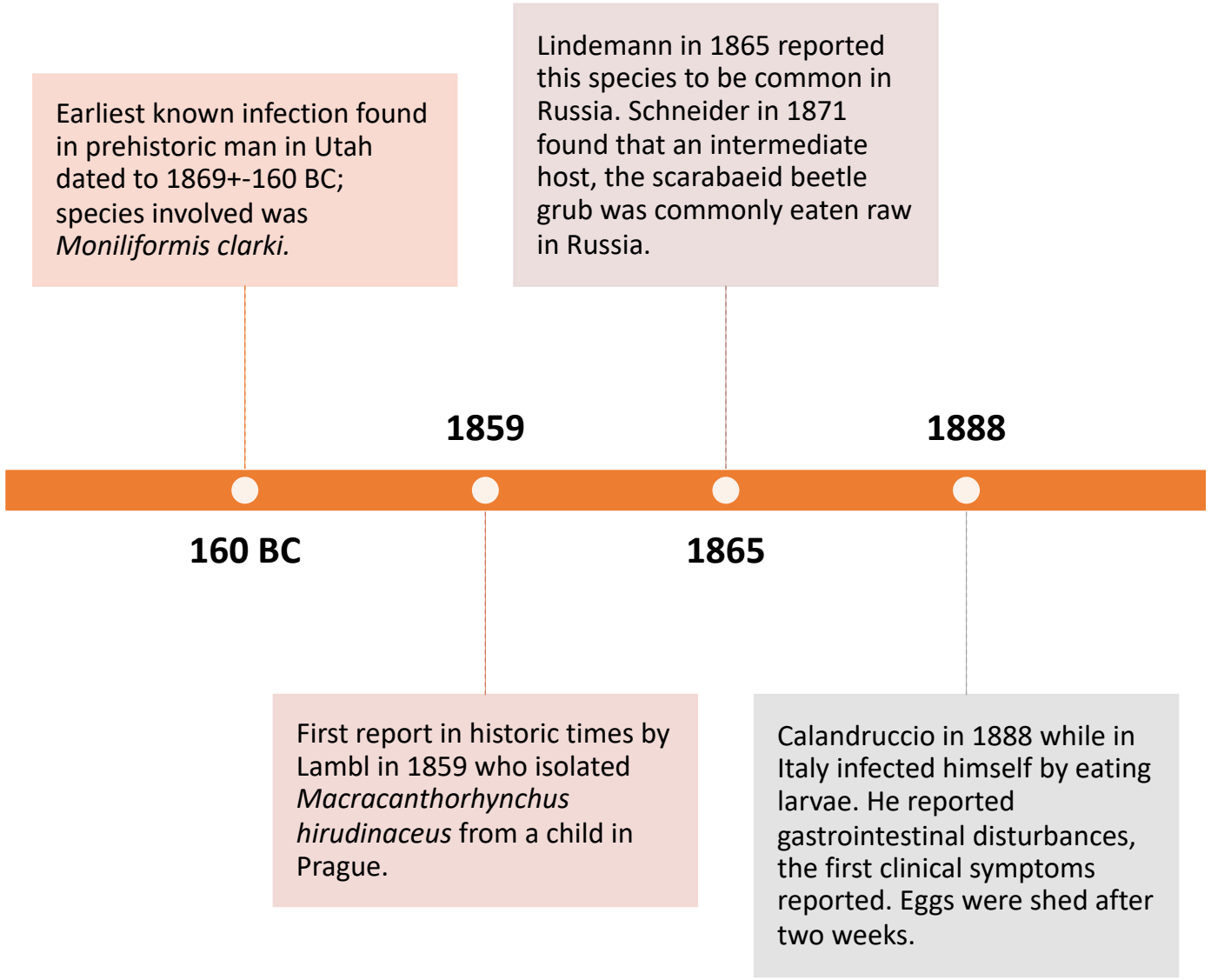
Subsequent natural infections have since been reported.

To date, eight species have been isolated from humans.

Moniliformis moniliformis is the most common isolate.

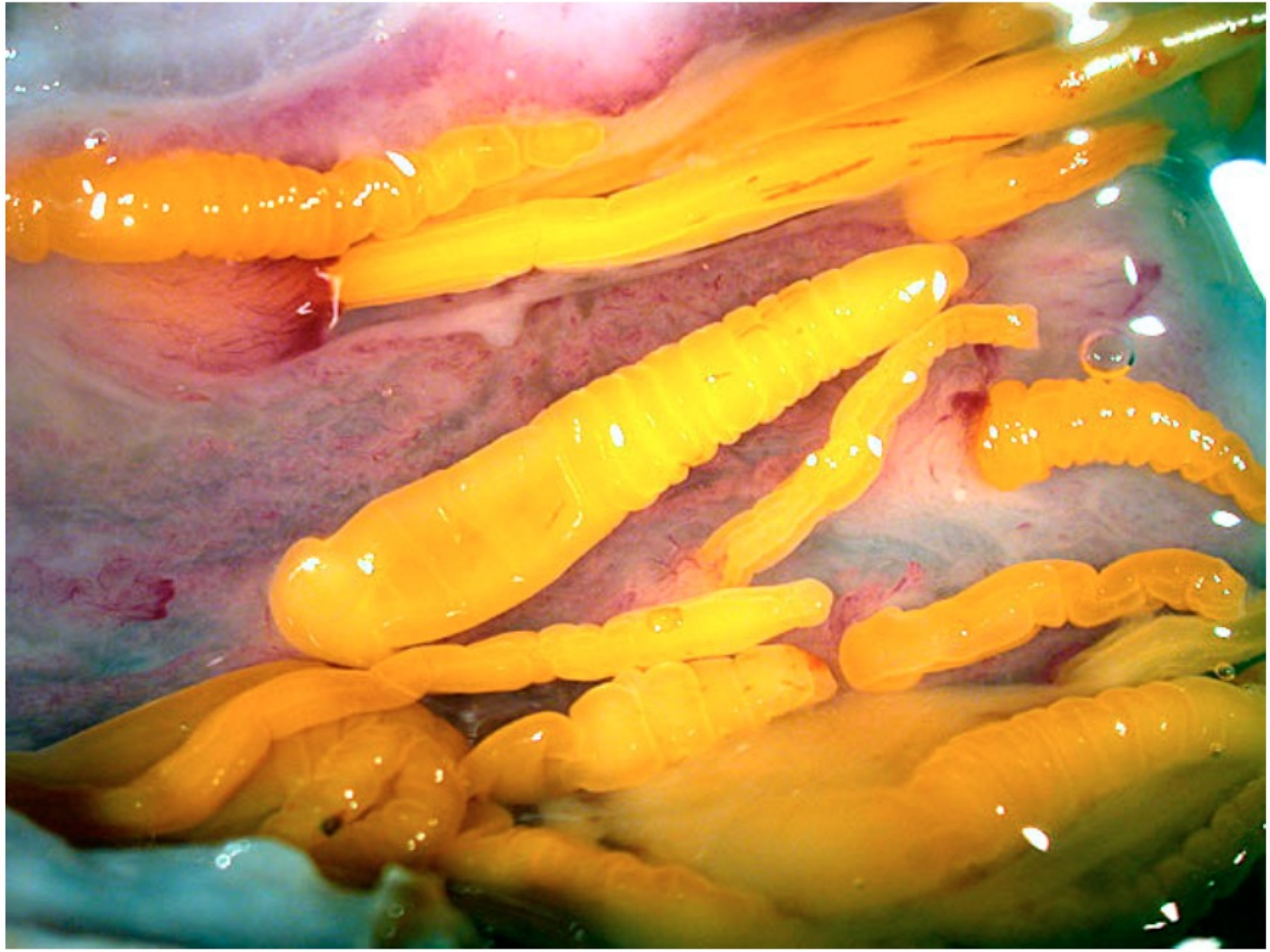
Others include *Acanthocephalus* and *Corynosoma strumosum*.

Discoveries on First Infection



Four Classes of Acanthocephalans

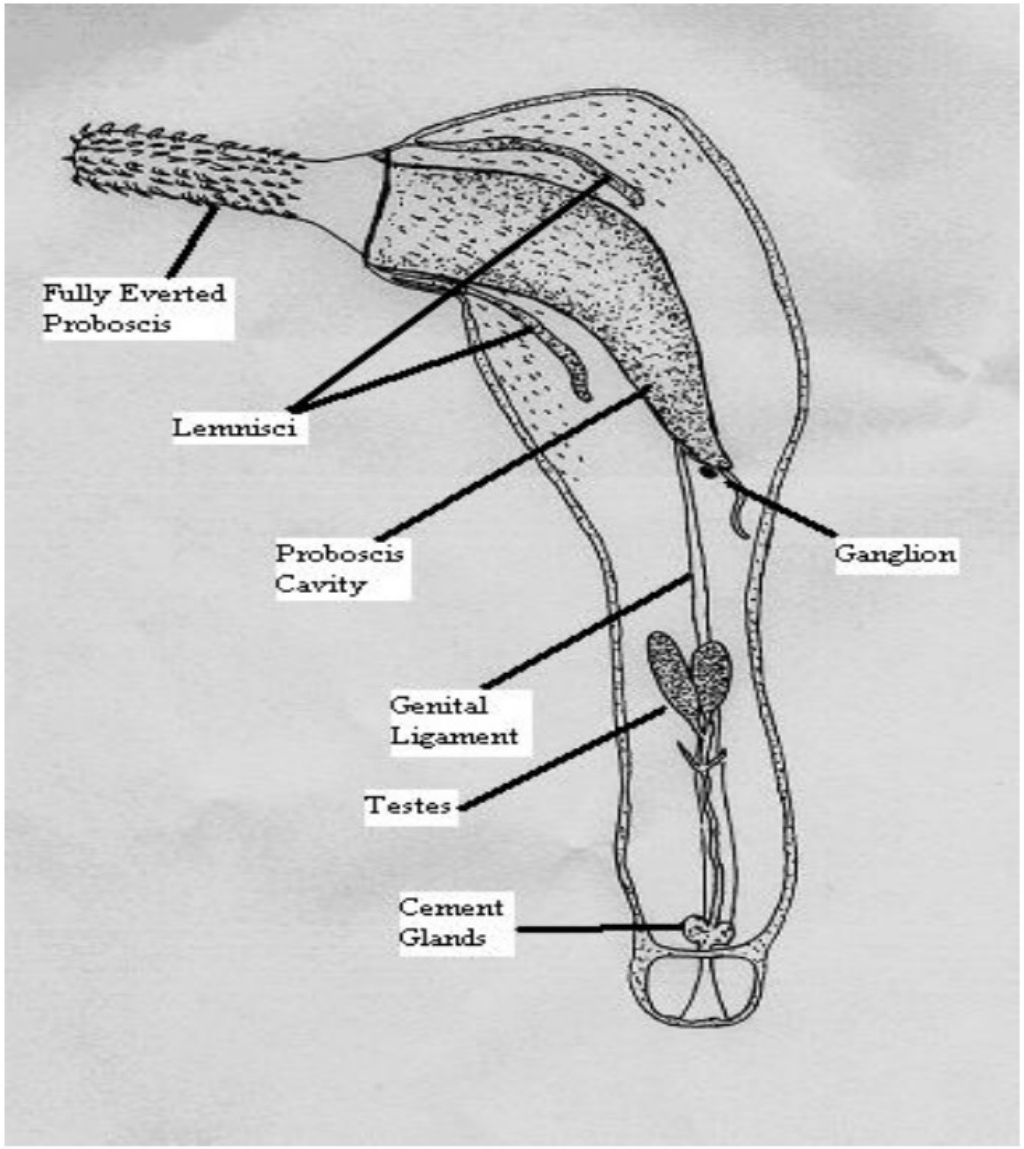
1. Palaeacanthocephala
2. Archiacanthocephala
3. Polyacanthocephala
4. Eoacanthocephala



Characteristics of Acanthocephalans

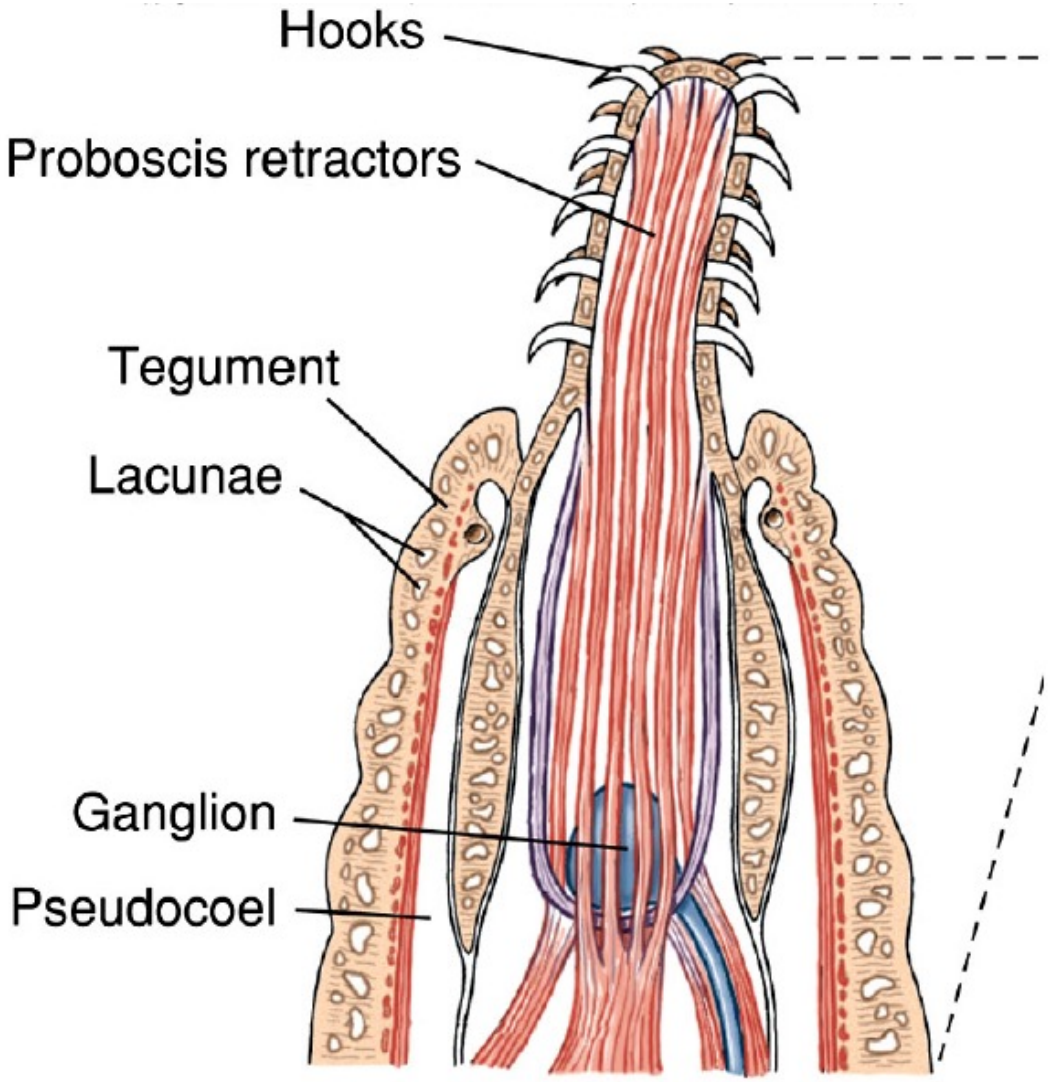
No mouth or gut just like tapeworms although the two are not related

Adult stages live in the intestine and nutrients are absorbed through the tegument.


Fully Everted Proboscis
Lemnisci
Proboscis Cavity
Ganglion
Genital Ligament
Testes
Cement Glands

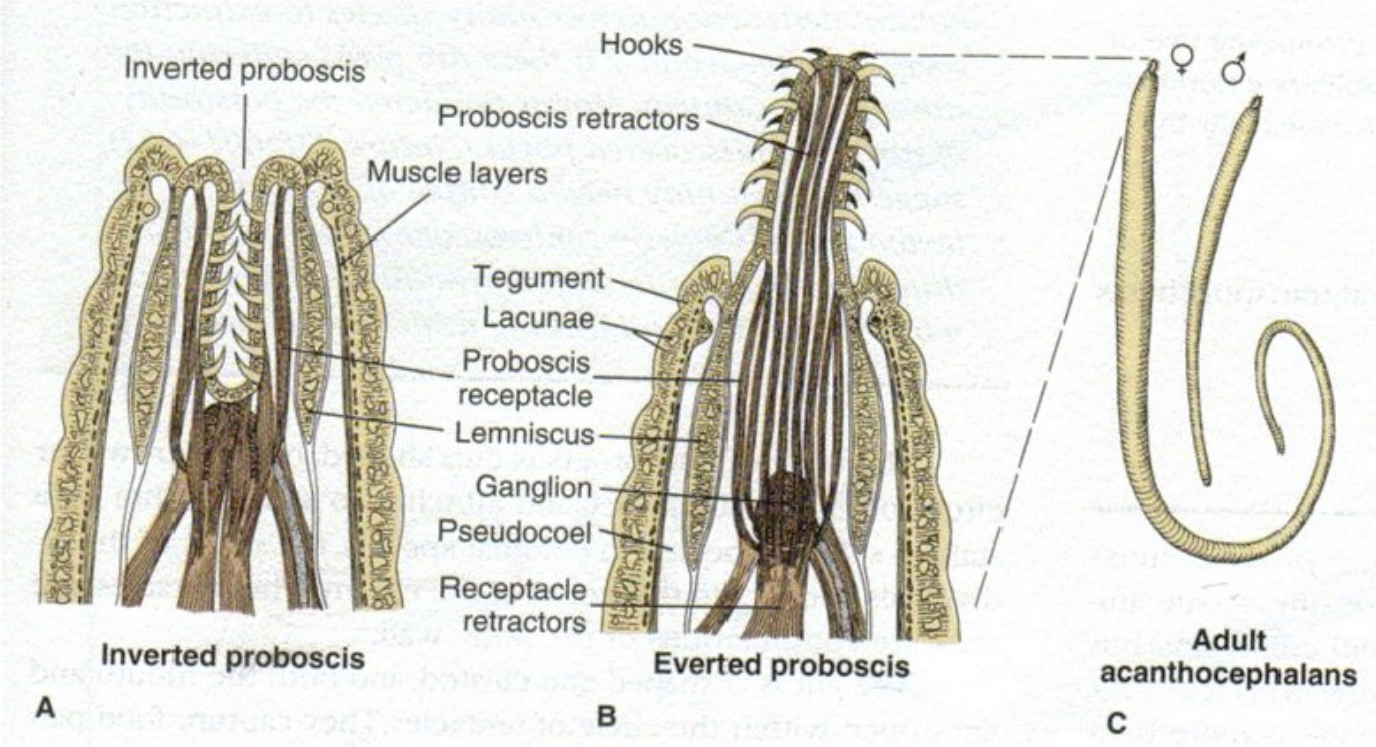
Proboscis

- Anterior protrusible proboscis with spiny hooks hence the term thorny or spiny-headed worm
- With rings of recurved hooks arranged in horizontal rows used to attach the worm to the mucosa of the gut of the host
- Proboscis hollow and cavity separated from the body cavity by a septum or proboscis sheath
- Muscle strands inserted into the tip of the proboscis at one end and into the septum at the other end. Contraction of these retractor muscles causes the proboscis to be invaginated into its cavity.
- Perforating acantocephalans can insert their proboscis into the host intestine and open the way to the abdominal cavity.



Everted proboscis

- Proboscis
  - Everts and attaches to intestine



Other Features

Size varies from a few millimeters to huge such as *Giganthorhynchus gigas* measuring from 10 to 65 cm or 3.9 to 25.6 in.

Thin tegument covering the epidermis which consists of a syncytium with no cell walls. Syncytium traversed by series of branching tubules containing fluid and controlled by series of wandering amoeboid cells.

Inside syncytium is irregular layer of circular muscle fibers and within this some scattered longitudinal fibers; no endothelium; microstructure of muscular fibers similar to nematodes

Canals of the proboscis open into circular canal around the base of the proboscis. From the canals emerge two sac-like projections called lemnisci along the proboscis cavity. These act as reservoirs into which the fluid used to keep the proboscis erect can withdraw when the proboscis is retracted and from which the fluid can be forced out into the proboscis again.

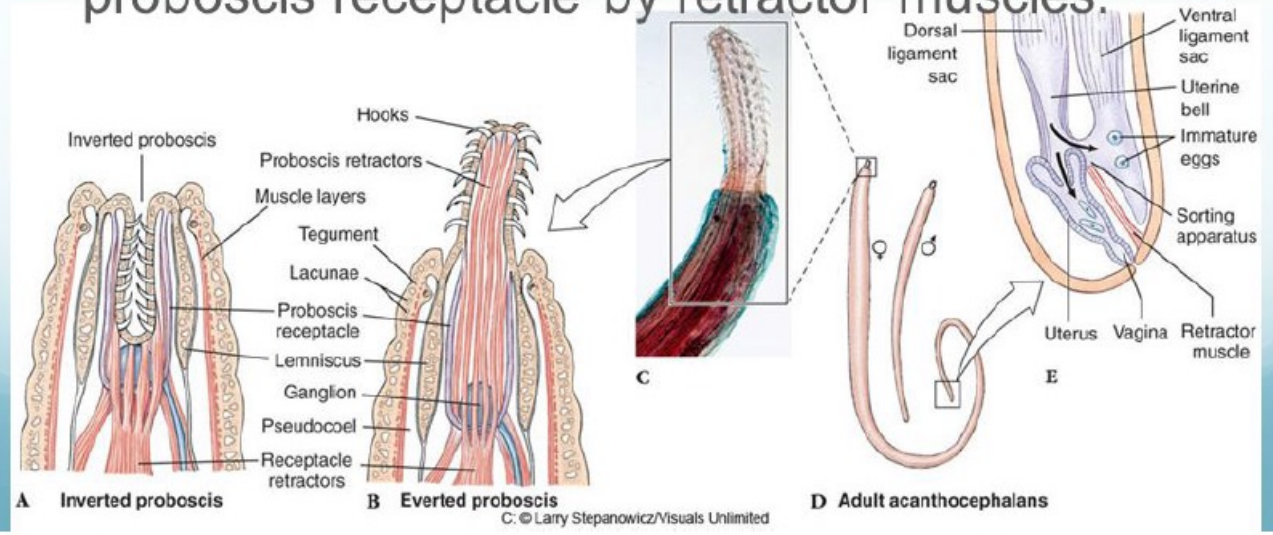
Organ Systems of Acanthocephalans

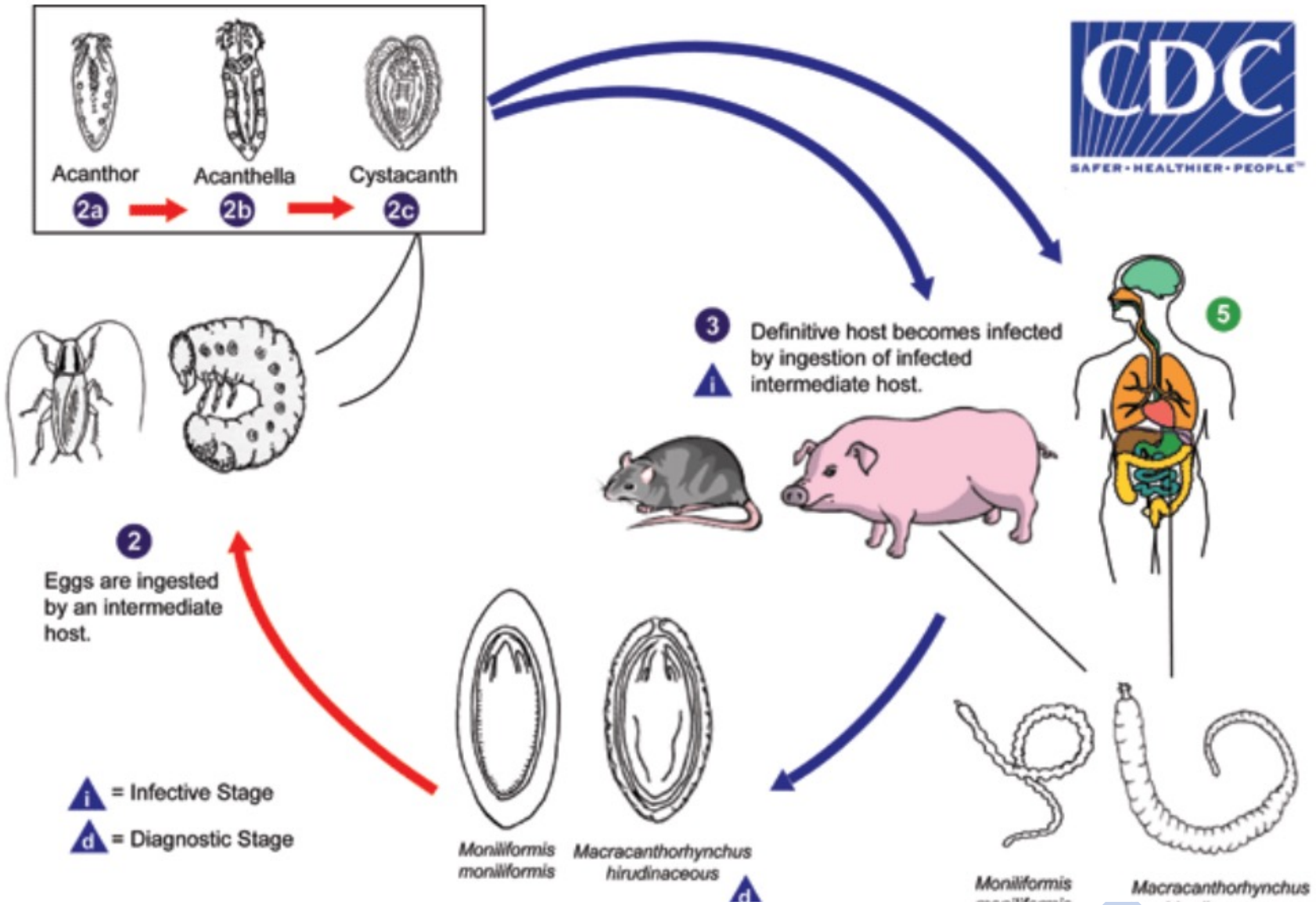
Central ganglion of the nervous system lies behind the proboscis sheath or septum and innervates the proboscis and from which two stout trunks connect and innervate posterior part of the body. Each trunk surrounded by muscle to form the nerve-muscle complex called retinaculum. In male, genital ganglion; some scattered papillae may serve as sense organs.

Dioecious helminthes with genital ligament that runs from posterior end of proboscis sheath to the posterior end of the body.

Phylum Acanthocephala

- **Proboscis** has rows of recurved spines that penetrate and may rupture host intestines.
- Proboscis with hooks can be inverted into a proboscis receptacle by retractor muscles.




Acanthor
Acanthella
Cystacanth
2a
2b
2c
3
Definitive host becomes infected by ingestion of infected intermediate host.
i
5
2
Eggs are ingested by an intermediate host.
i = Infective Stage
d = Diagnostic Stage
Moniliformis moniliformis
Macracanthorhynchus hirudinaceous
d
Moniliformis
Macracanthorhynchus

Thank you.