Structure and Affinities of Minor Phyla Acanthocephala

Phylum Acanthocephala includes a large number of parasitic worms. The most typical forms are Acanthocephalus, Neoechinorhynchus, Gigantorhynchus. They are parasites in the intestine of different vertebrates ranging front fish to mammals.The anterior end of the cylindrical body is produced into an extensible proboscis beset with rows of numerous chitinous recurved hooks. Two club-shaped fluid-filled structures called lemnisci are hanging at the sides of the proboscis. The lemnisci act as hydraulic system in proboscis eversion. A distinct neck between the proboscis and the trunk is present in certain forms. There is no aperture in the body excepting the gonopore at the posterior end of the body. The alimentary canal is totally absent. Two longitudinal vessels are present in the body wall which probably helps in absorption and distribution of nutrition. A single large nerve ganglion is situated at the base of the proboscis. Sense organs are lacking. The reproductive organs occupy almost whole of the body cavity. A pair of excretory organs is present in the posterior side of the body cavity. Single median excretory duct opens into the oviduct in the female and into the ejaculatory duct in the male

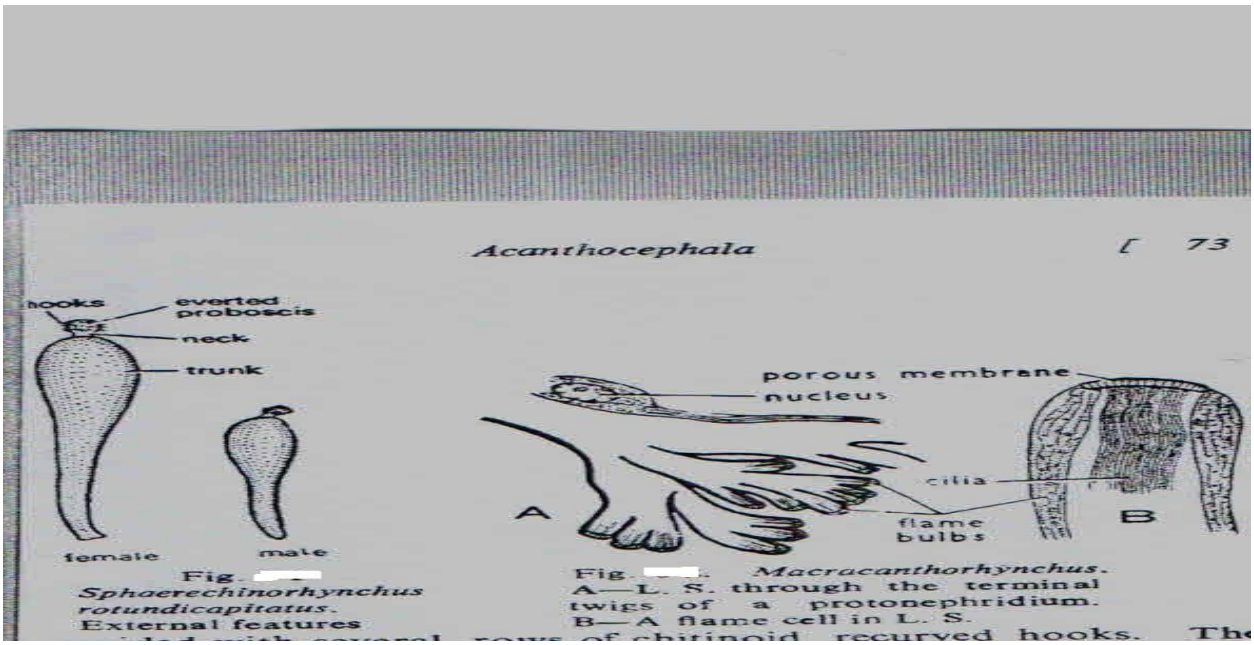

Fig. — *Sphaerechinorhynchus rotundicapitatus.* External features

Fig. — *Macracanthorhynchus.* A—L. S. through the terminal twigs of a protonephridium. B—A flame cell in L. S.

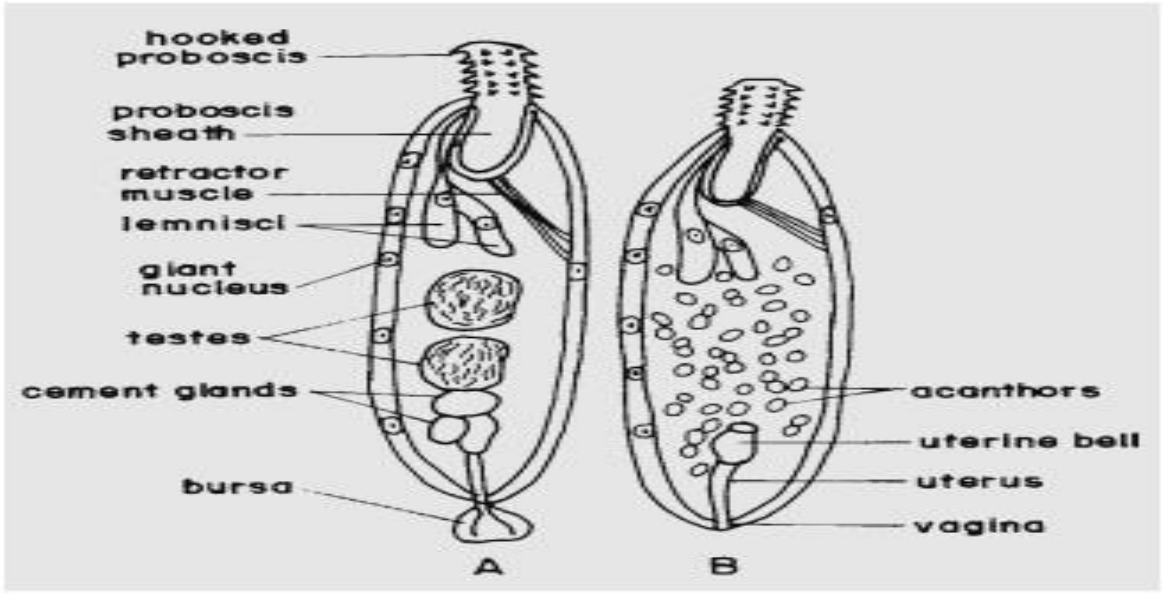

Figure Generalized structure of an (a) adult male and (b) adult female acanthocephalans

- The sexes are separate. There are two oval testes which remain connected with a suspensory ligament sac.
- It is a hollow, elongated sac of connective tissue, hangs in the pseudocoel from the proboscis sac to the accessory reproductive organs.
- In mature females, the ovary fragments into numerous bodies called ovarian balls that float freely in the ligament sac fluid.
- The early advanced phase of development takes place in the pseudocoel.
- The embryo is encased within a sac and the anterior end is provided with hooks. This stage is called acanthor stage.
- The acanthor larva contains a hooked rostellum that is used in penetrating host's tissue.
- At this stage the embryo is extruded from the intestine of the host along with the faeces.
- Further development is only possible if the embryo is swallowed by an intermediate host. The intermediate host in all the forms are some Arthropods.
- After reaching into the intestine of the intermediate host, the chitinous membranes dissolve and the embryo undergoes further development.
- The embryo either remains fixed to the intestinal wall and migrates into the body cavity.
- If the intermediate host is taken by the permanent host, attainment of adult size and sexual maturity are achieved.

Affinities of Phylum Acanthocephala

The parasitic mode of life and structural peculiarities pose a problem in the determination of affinities of Phylum Acanthocephala. Koelreuther recorded the acanthocephalan worms from the intestine of fish as a parasite and proposed the name Acanthocephalus in 1771. Cuvier placed the acanthocephalans with the flatworms. Vogt distinguished the flatworms from the roundworms in 1851. Gegenbaur gave the name Nemathelminthes for the roundworms.

Affinities of Phylum Acanthocephala with Platyhelminthes:

Similarities:

1. Armed contractile proboscis occurs in certain cestoideans.
2. Presence of syncytial tegument in Cestoideans, Digenea and Monogenea.
3. Circular and longitudinal muscle fibers present.
4. Absence of digestive tract.
5. Protonephridia with flame cells are present.
6. Male reproductive system is comparable with that of many flatworms.
7. The hooked rostellum of the larva is comparable with the hexacanth of the Cestoideans.

Affinities of Phylum Acanthocephala with Aschelminthes:

Similarities:

1. The division of the body into proboscis and trunk is comparable with the gordioid larva of Nematomorpha.
2. An armed retractile proboscis occurs in kinorhynchs and gordiacean larva of Nematomorpha among Aschelminthes.
3. Syncytial tegument present.
4. Presence of circular and longitudinal muscle fibres.
5. Presence of pseudocoel, divided by partitions and tissues resembling mesenteries.
6. Presence of protonephridia with flame cells.
7. Eutelic condition.

Affinities of Phylum Acanthocephala with Nematoda:

Acanthocephalans are considered as a member of non-coelomate groups which are included Nematoda, Nematomorpha, Acanthocephala, Rotifera and Calyssozoa (Endoprocta).Though Acanthocephalans show some similarities with Nematoda but they differ in following dissimilarities**:**

Dissimilarities:

1. Presence of recurved spined proboscis.
2. Absence of digestive tract.
3. Presence of circular muscle fibers.
4. Presence of protonephridia with ciliated flame cells.
5. Complex reproductive system.

Affinities of Phylum Acanthocephala with Rotifera:

Similarities:

1. Both phyla lack a cuticle.
2. Protonephridia with bundles of flame cells are present in some acanthocephalans, compare with rotifers.
3. Epidermis syncytial in acanthocephalans shows the similar intracellular network of protein fibers of rotifers.
4. Structure of the sperm