26/09/2018

Wuchereria bancrofti

For Part I (H) Zoology

Phylum - Nematoda
Class - Phasmidia
Order - Filarioidia
Genus - Wuchereria
Species - bancrofti

Habit & Habitat

→ commonly called filarial worm.
→ Adult worm lives coiled in the lymphatic vessels and lymphnode of Adultes.
→ It is found in tropical and subtropical countries like India, west Indies, south China, Japan pacific is lands, west and Central Africa & South America.

The primary host is man and secondary or inter mediate host is ♀ (female) Culex or Aedes mosquito.

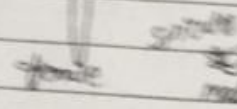
Structure

→ Adult worm is filiform.
→ Body cylindrical with both ends terminating blunt.
→ Body is creamish white with smooth and semitransparent body covering.
→ Locomotory Organs absent.
→ Sexes separate and shows sexual dimorphism
→ female is 65-100 mm long and 0.25 mm broad.
→ Male measures 40 mm in length and 0.1 mm in diameter.

→ posterior end of female is straight and blunt, while posterior end of male is strongly curved and contains genital papillae & two unequal copulatory spicules and caudal alae.

→ Genital pore in female is located in the anogenital region.

→ The male genital pores lie at the posterior end of body on the genital papillae.



Life cycle

Filaria is dioecious - sexes are separate. Completed in two hosts —

(a) Primary host - man.

(b) Intermediate host - blood sucking Culex mosquitoes or Aedes.

Life cycle in man

→ Copulation takes place when both sexually mature male & female worms are present in lymphatic gland.

→ Fibres are viviparous or ovoviviparous and release many larvae called microfilariae.

Microfilaria are microscopic about 0.2 to 0.3 mm long. It is surrounded by a delicate cuticular sheath.

Microfilaria contains rudiments of some internal organs or structures.

The body wall is covered by a single

layer of flattened epidermal cells and filled with cytoplasm containing nuclei.

→ The rudiments of following structures are visible.

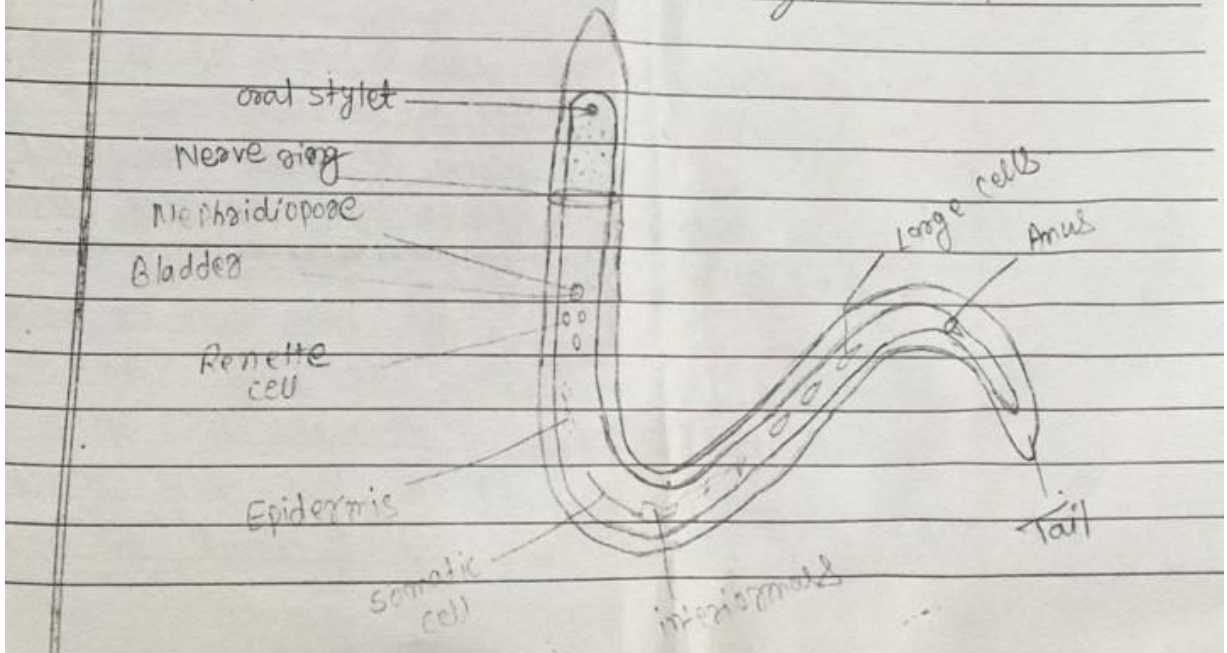
1. future mouth or oral stylet.
2. Nerve ring band.
3. Nephridiopore & bladder
4. Inner cell mass.
5. Renette cell.
6. four large cells &
7. future Anus.

→ The microfilaria are discharged into lymph vessels.

→ from here these enter the blood vessels and swim in the blood showing active movements.

They then migrates to deeper blood vessels of thorax Here these do not develop further until sucked by the intermediate host.

If not sucked by mosquitoes, the microfilaria dies with in 70 days.



2. Life cycle in Mosquito:-

Microfilaria shows diurnal rhythum when in blood During day time, these resides in the deep seated large blood vessels but migrates into superficial peripheral blood vessels in the night

Microfilaria are sucked the by the female Culex or Aedes.

In the stomach of mosquito the sheath is lost and microfilaria penetrates the stomach wall and migrates to the thoracic muscles or muscells of wings.

Here microfilaria undergoe two moults in about 10 days to reach the third stage larva or infective juvenile larva.

1. The microfilaria first change to a plump Sausage shaped organism.
2. It then changes into a more elongated form.
3. Finally it changes to a long Juvenile form.

Infection

→ The infective Juvenile form is about 1.5 cm long. It now migrates to labrum of mosquito.

When the infected mosquito bites a man, the third stage larva are deposited easily in pairs on the skin near wound.

The larva are attracted by warmth of skin and enter the body either through puncture or penetrating through the skin.

From here they reaches the lymphatic channels and settle down at some

spot to metamorphosis into A dults.
with 5 to 18 months adults become sexually mature & start new generation.

pathogenecity and clinical symptons

→ The pathogenic effect is produced by the adult worm living or dead.
→ The dead worm also block the lymph vessels.
→ As a result, periodic attacks of fever occur and tissues surrounding the lymph nodes and other organs of ~~ret~~ reticuloendothelial system such as liver, scrotum ~~testis~~ vulva, legs & groins greatly enlarged producing tumour like solidity. This condition is called Elephantiasis.

Treatment

The drugs in elephantiasis are divided into three categories.

(i) on adult worm.
Metal or Arsenic preparation
(ii) on microfilaria. - Diethyl carbamizine (Hetrazan)
on infection larva and immature adult paramelomming phenylstiborate (MSB)

Dr. V. Kumar LESSION For P.G. Semester II Zoology.

Theories of Biological classification,

The arrangment of animals in biological classification has been described in various ways. But all of them belong to any of the following types -

<1> Phenetic classifications
[2] Natural classifications
[3] Phylogenetic classifications
[4] evolutionary classifications
[5] Omnispective classification.

[1] Phenetic classifications

- This system is based exclusively upon face value of observed characters without direct reference to phylogeny. The taxa are either classified on the basis of few characters or several characters.

- When based upon few characters, the groupings are subjected to change on the discovery of natural natural affinities of the taxa.

- The idea of overall characters was originated by Adanson in 1757. After discovery of electronic computers, the idea of numerial classificatio was further extended by Sneath, Sokal, Moss and others. They have devised various methods for obtaining similarities - dissimilarity data using large number of characters, ~~without any weighting in establishing a classification~~

Limitations

- The greatest weakness in phenetic approach is that it demonstrates false claim in establishing natural groups as products of the human mind, rather than of evolution.

- It is now a well recognized fact for all natural taxa, specially species with their genetically programmed isolating mechanism, which safeguard their reproductive isolation, that they are not an arbitrary, subjective, man made phenomena.

(2) Natural classification

All will agree that classification is based on the natural characters of the taxa. Some consider natural classification is a Phylogenetic one reflecting the evolutionary relationship groups that comprise it. Smith, 1965 & others opposes this concept on the ground that phylogeny is not known but hypothesised. Blackwelder 1967 opposes

- In the natural system of classification, the animals are placed into as many groups and subgroups as are the similarities and dissimilarities which the groups are recognised by having a maximum number of attributes in common.

He defines 'natural classification' as one in

[3] Phylogenetic or cladistic classification

Phylogeny plays a great role in classification. It is the appropriate theoretical background for taxonomy and is quite essential in explaining all the associations involved in classification.

Cladistic (developed by Willi Henning 1950) classification is exclusively based on phylogenetic branching. cladistic phylogeny, in opposition to numerical Phenetics includes an attempt to map the sequence of Phyletic branching through a determination of characters that are shared - primitive and that are shared derived.

But upto now, no true phylogenetic classification for any groups of animals except that of horses is known. This is due to incomplete fossil record and also because the comparative data collected through other approaches, fail to possibly give a clear picture by itself.

Recently, christoffersen 1995, has dealt cladistic and phylogenetic classification as distinct.

- In cladistic classification, one uses a cladogram as the graphical model for constructing biological system. A cladogram is a predominantly bifurcating, asymmetrical, nontruncate dendrogram, with no defined vertical and horizontal axis.

- In Phylogenetic classification one uses a Phylogeny or a temporalised cladogram as a graphical model for constructing biological system. A Phylogeny is a predominantly bifurcating, asymmetrical and truncate dendrogram with time as its vertical axis.

Linean Phylogenetic taxonomy, like modern taxonomy, was modeled on a phylogenetic tree rather than a cladogram, and like its predecessor, ~~perpetua~~ perpetuates the use of morphology as a means of recognizing ~~clades~~ Clades (Serono 2003)

Evolutionary classification

Simpson 1961 & others prefer evolutionary Classification because it commonly needs information which is still largely phylogenetic but practically impossible to include in a tree diagram. It does not express phylogeny as based on it but as ~~const~~ consistent with it. It shows objectively, reality, arbitrariness, and the likes: monophyly, polyphyly, clades and grades; different kinds and degrees of affinities involved in phylogeny and relative antiquity of taxa.

This classification provides foundations of all comparative studies in biology through the degree of genetic similarity existing between organisms and the phylogenetic sequence of events in their history.

The whole concept of this classification is based on Darwinism. Darwin's idea influenced the workers to a great extent when they started believing that the groups are created through evolution.

They thus started classifying organisms rather than characters which were regarded merely of independent existence in nature. A biologist, thus understands that he is classifying populations, not individuals or Phena.

This classification, thus is useful for the groups of organisms which are the result of divergent evolution.

Transpective classification

This is the extension of the concept of natural classification put forward by Blackwelder 1967. This approach seems quite realistic and pragmatic. Here an experienced taxonomist includes all the readily available features of the organisms but uses only those for classificatory purpose which are helpful in establishing grouping and distinctions. This practice is currently used by most of the animal taxonomists.

Future of classification

Classification has to be viewed as an organisational system which is constantly undergoing a sort of evolutionary development in the light of new groups of animals still being discovered and also their relationship to one another.

Since, about three to ten million species still await discovery, the animal taxonomists have to continue their struggle of discovering and classifying species.