



## TISSUE NEMATODES

### 49.1 INTRODUCTION

Some nematodes cause infection in the tissues and may be found in the blood or lymphatics as well as in the muscle and other adventitious tissue. The nematodes in this category are filarial nematodes, *Dracunculus medineensis*, Loa



### OBJECTIVES

After reading this lesson, you will be able to:

- describe the characteristics of nematodes
- describe the morphology, pathogenicity, lab diagnosis of dracunculiasis
- describe the morphology, pathogenicity, lab diagnosis of micro filariasis

### 49.2 FILARIASIS

#### Introduction

Filariae are long slender thread like nematodes that infect human beings. They reside in the lymphatics and produce symptoms related to obstruction of lymphatic flow. The disease was described by Sushruta. In 1709 Clarke described the disease in the natives off the Kerala coast as the “Malabar leg”. Wucherer demonstrated the microfilaria in the blood film of a filarial patient. In 1866 Manson in 1878 found the *Culex fatigans* mosquito to be the vector in filariasis.

The various species of filarial are :

- a) Wucheraria bancrofti
- b) Brugia malayi
- c) Loa loa
- d) Mansonella perstans
- e) Mansonella ozzardi
- f) Mansonella streptocerca
- g) Onchocerca volvulus

The commonest species causing filariasis are Wucheraria bancrofti and Brugia malayi.



Notes

### 49.3 GENERAL FEATURES

Slender thread like worms that inhabit blood vessels, lymphatic systems, connective tissue, serous cavities. Adult & microfilaria is seen in man. Embryo could be sheathed or unsheathed.

### 49.4 WUCHERARIA BANCROFTI

#### Morphology

- a) Adult

Female is longer than the male

Worm has lipless mouth, cylindrical oesophagus without bulb and simple intestine.

Female is viviparous and releases the microfilaria into the blood stream.

- b) Microfilaria: 290 x 6 -7 um in size and are colourless with blunt head and pointed tail. It is covered by a hyaline sheath which is much longer 359um.

Somatic nuclei appear as granules. At the ant end Cephalic space. Stylet can be shown with vital stains

Tail tip is free of nuclei

Nerve ring: Ant end an area devoid of granules

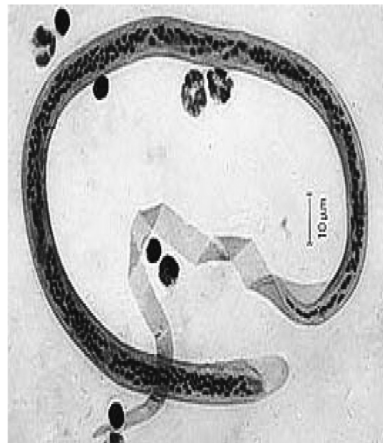
Excretory pore Anterior V spot

Genital cells: Number G1 – G4

Posterior V spot : Cloaca or anal pore



Notes



**Fig. 49.1**

**Table 49.1: Differential features of two major species of microfilaria**

S No		W bancrofti	B malayi
1	Length	290 μm x 7 μm	230 μm x 6 μm
2	Appearance	The body shows sweeping curves	The body has sharp kinky bends
3	Cephalic space	Length and breadth equal	Length twice as long as the breadth
4	Anterior end	Single stylet	Double stylet
5	Nuclear column	Discrete nuclei are seen	Blurred nuclei are seen
6	Tail tip	Free of nuclei	Two distinct nuclei seen. One is terminal and the other sub terminal
7	Sheath	Faintly stained	Well stained

**49.5 LIFE CYCLE (W BANCROFTI)**

It is seen in two hosts

Intermediate host is the mosquito belonging to Culex, Aedes or Anopheles

The development period in the mosquito is called as the Extrinsic incubation period

Microfilaria is taken by mosquito in blood meal.

It penetrates the stomach wall & enters thoracic muscles

## Tissue Nematodes

It develop to 1<sup>st</sup> Stage Larva (sausage shaped 125-250um)

Moults twice to form 2<sup>nd</sup> Stage larva

In a weeks time develops to 3<sup>rd</sup> Stage larva

Measuring 1500-2000 um

Man is the definitive host. Development in man is called as the biological incubation phase. Infective stage larva are deposited near the site of puncture

The larva enters the wound on to the lymphatics, settle down in the inguinal, scrotal and abdominal lymphatics and grow to adult worms. The adult parasite survives for many years in the host.

They reach sexual maturity in 5-18 months. The microfilaria are released by the female after sexual reproduction. The microfilaria are generally released at night when the host is asleep.

### 49.6 PATHOGENECITY

- a) The filarial infection is mostly asymptomatic
- b) The clinical manifestation is in the form of lymphangitis and lymphadenitis. Due to lymphangitis the adult worm may die in the lymphatic channels. The ensuing inflammation followed by fibrosis leads to blockage of lymphatic channels. This leads to lymphedema and swelling of the body parts. The skin over the affected area becomes rough and thickened giving it an elephant like appearance. Thus this disease is also called as elephantiasis.
- c) There is accompanying eosinophilia

### 49.7 LABORATORY DIAGNOSIS

The laboratory diagnosis is by demonstration of the microfilaria in the blood smear of the infected individual. The microfilaria is however seen only two hours after the person goes to sleep. Thus the blood smear is taken at night while the person goes to sleep.

The blood smear can also be taken 30 minutes –one hour after giving one tablet of hetrazan (diethyl carmazepine).

The adult worm is not normally seen, but may be accidentally detected in lymph node or tissue biopsies.

The patient may also have eosinophilia

## MODULE

Microbiology



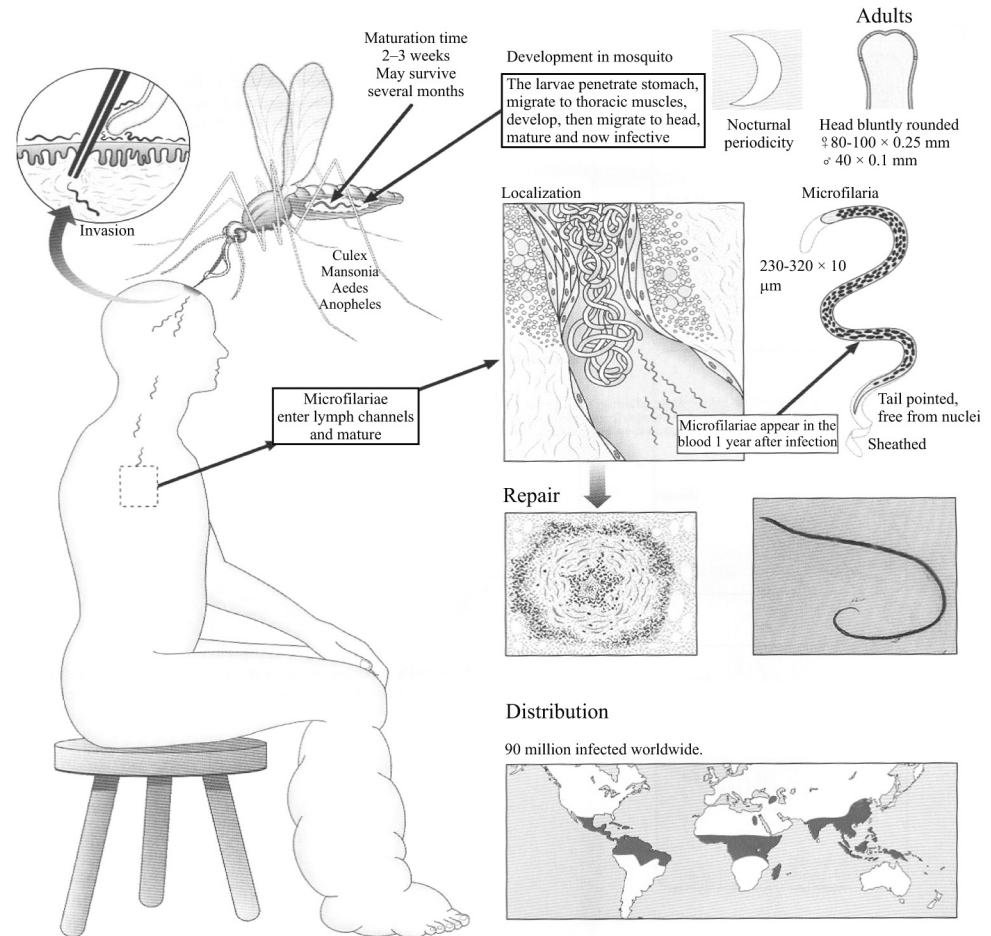
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*Wuchereria bancrofti* (filariasis)

Life cycle



**49.8 DRACUNCULIASIS**

The largest nematode measuring up to 1.2 m is *Dracunculus medinensis* also called as “Guinea worm” or fiery serpent

Geographical distribution: It is seen in over 22 countries mostly in West Africa & Asia. It is mostly seen in dry arid areas with limited water resources, where man and animal are forced to use the same water source.

**Habitat:** The adult worm resides in the subcutaneous tissues of the infected person

### 49.9 MORPHOLOGY

Adults: They have rounded heads, terminating in a thick chitinous shield containing a triangular mouth & papillae.

Males measure 1.2 - 1.9 cm x 0.4mm

Females measure 50 – 120 cm x 1.5mm

Posterior end is hook like. They are viviparous.

The body cavity contains a fluid that is toxic

Life span is 1 year

The embryos are unsheathed, flattened. They have a coiled rounded anterior end and a long filariform tail. They measure 650-750 um It dies in 2 days if not ingested by Cyclops after release into a water body.



Notes

### 49.10 LIFE CYCLE

The gravid female worm is present in the subcutaneous tissue of the infected person. The female protrudes from an ulcer which may be present on the feet and releases the larvae from the ulcer. The infected person feels very itchy in the ulcer area and gets a relief only when the affected part is dipped under water. The larva which are released in the water body are eaten by the Cyclops present in it. Humans consume water from these water bodies which contain the infected Cyclops.

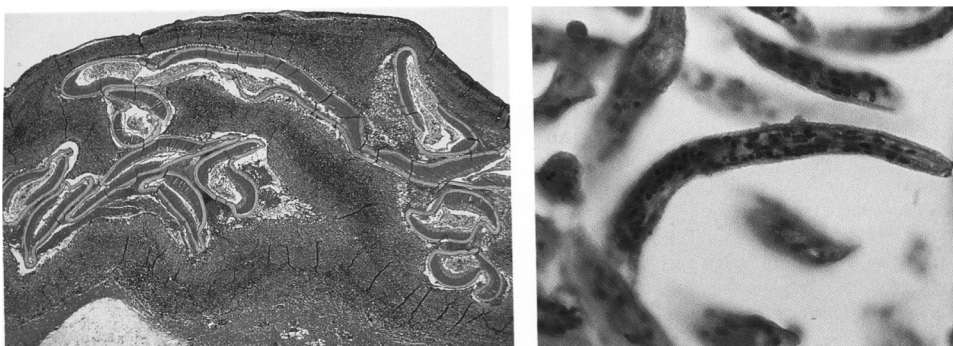


Fig. 49.3

The cyclops is digested by the gastric juices and the larva is released in the stomach. The larva penetrates the stomach wall and penetrates the tissue to reach the retroperitoneal tissues. The larva develops into an adult worm and becomes



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sexually mature. The male worm dies after mating. The female then migrates to the lower limbs through the retroperitoneal tissue. In the limb the worm reaches the feet or hands and releases certain secretions which make the part itchy leading to the formation of an ulcer. The female the releases its larva through the ulcers into the water bodies.

**49.11 CLINICAL FEATURES**

- a) Symptoms due to migrating worm Papule, blister, ulcer
- b) Allergy
- c) Due to injured or broken worm
- d) Due to calcified worm Arthritis, fibrosed joints, compression of spinal cord

**49.12 DIAGNOSIS**

Clinical

Detection of embryo: cold water on ulcer

Radiological

DLC: eosinophilia

Immunodiagnosis: ELISA, IHA, IFA, Western blot

Intradermal test: wheal in 24h

**49.13 TREATMENT**

Roll out the worm

Occlusive bandage

Niridazole, thiabendazole



**INTEXT QUESTION 49.1**

- 1. Filariasis is caused by .....
- 2. Microfilaria is taken by mosquito in their .....
- 3. The definitive host of W.bancrofti is .....
- 4. The larva settles down in ....., ..... & ..... parts of human body and grows to worms
- 5. Blood smear for diagnosis of filariasis is taken at ..... part of the day





### WHAT HAVE YOU LEARNT

- Some nematodes cause infection in the tissues and may be found in the blood or lymphatics as well as in the muscle and other adventitious tissue
- Filariae are long slender like nematodes that infect human beings that reside in lymphatics and produce symptoms related to obstruction of lymphatic flow
- Commonest species causing filariasis are *Wucheraria bancrofti* and *Brgia malayi*
- In *Wucheraria Bancrofti* the female is longer than the male. Female is viviparous and releases the microfilaria into the blood stream
- The intermediate host is the mosquito belonging to *Culex*, *Aedes* or *Anopheles* and the development period in the mosquito is called as extrinsic incubation period and microfilaria is taken by mosquito in blood meal
- Man is the definitive host. Development in man is called as biological incubation phase and infective stage larva are deposited near the site of puncture
- Filarial infection is mostly asymptomatic and it manifests in the form of lymphangitis and lymphadenitis and the disease is also called as elephantiasis
- The laboratory diagnosis is by demonstration of the microfilaria in the blood smear of the infected individual. The microfilaria is however seen only two hours after the person goes to sleep and the blood smear is taken at night while the person goes to sleep
- *Dracunculiasis* is the largest nematode and *Dracunculus medinensis* also called as Guinea worm or fiery serpent



### TERMINAL QUESTIONS

1. Name the nematodes which cause filariasis.
2. Enumerate the difference between the microfilaria of *W bancrofti* and *B malayi*.
3. Discuss the life cycle and pathogenicity of filariasis..
4. Discuss the life cycle and pathogenicity of *D medinensis*.

