

***Structure Life cycle and Pathogenicity of Wuchereria bancrofti Lecture notes by Dr. Arjun Pratap Singh***

**Habit and Habitat of Wuchereria Bancrofti:**

Wuchereria bancrofti is a dreadful endoparasite of man; adults harbouring the lymphatic vessels and lymph nodes.

Its life history is digenetic, as it involves a secondary host, the blood-sucking insects, i.e., the female mosquitoes of the genus Culex, Aedes or Anopheles; the secondary host for W. bancrofti in India and China is Culex pipiens, in Pacific Islands (except Fiji and New Caledonia) is Anopheles punctatus and in Polynesian Islands is Aedes polynesiensis.

Wuchereria bancrofti is viviparous or to say ovo-viviparous; its larvae are referred to as microfilariae which/harbour the blood of human beings.

**Geographic Distribution of Wuchereria Bancrofti:**

Wuchereria bancrofti is largely confined to the tropical and sub-tropical countries of the world.

However, it occurs in India, West Indies, Puerto Rico, Southern China, Japan, Pacific Islands, West and Central Africa and South America.

**Structure of Wuchereria Bancrofti:**

The adult worms are long, hair-like, transparent and often creamy-white in colour.

They are filiform in shape having tapering ends; the head end terminating in a slightly rounded swelling. Sexes are separate and sexual dimorphism is distinct. The male worm measures 2.5 to 4 cm in length and 0.1 mm in diameter having a ventrally curved tail-end containing a number of genital papillae and two spicules of unequal copulatory spicules.

The female worm measures 8 to 10 cm in length and 0.2 to 0.3 mm in diameter having a narrow and abruptly pointed tail. The male and female worms remain coiled together; females are usually more in number than the males. Its mouth is simple without lips, pharynx is divisible into an anterior muscular and a posterior glandular parts, the oesophageal bulb is not found and the intestine is like those of other nematodes.

The microfilariae are very active and can move both with and against the blood stream. They have colourless and transparent bodies with blunt anterior ends and rather pointed tails. A microfilaria measures about 290 µm in length and 6 to 7 µm in diameter.

The body of a microfilaria is covered in a hyaline sheath followed by cuticula being lined by flattened subcuticular cells or epidermis and an inner column of cytoplasm containing nuclei. However, various structures from anterior end downwards are future mouth or oral stylet, nerve ring band, nephridiopore, renette cells and a dark coloured inner mass and four cells of future anus.

The microfilariae do not undergo further development in the human body unless they are taken up by their suitable secondary host (mosquito). If these microfilariae are not sucked up by the mosquito, they die in course of time. Their life span in human body is probably 70 days.

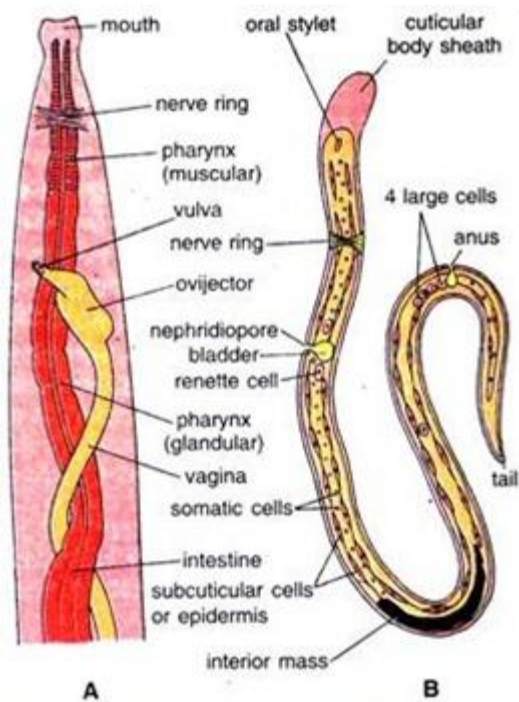


Fig. 48.1. *Wuchereria bancrofti*. A—Anterior part of female; B—Microfilaria.

## Life History of Wuchereria Bancrofti:

We know that *Wuchereria bancrofti* is digenetic, i.e., its life history is completed in two hosts; man is the main host, while female mosquito, usually *Culex pipiens*, is the secondary host.

Mature male and female worms copulate in the lymph glands of man where they usually live. Since female worm is viviparous or ovoviviparous, it delivers numerous larvae called microfilariae. The microfilariae are born in very immature stage.

However, microfilariae find their way into the blood stream where they can live for a considerable time without undergoing any developmental changes. As referred to, due to their nocturnal periodicity they are sucked up by the secondary host when it comes to take its blood-meal from the human body.

### Pathogenic manifestations of heavy infection of Wuchereria

The microfilariae, after reaching in the body of the secondary host, undergo further development to become infective to man. In fact, immediately after their entry in the stomach of mosquito, the sheaths around their bodies are shed off and then they penetrate the gut wall within an hour or two and migrate to the thoracic muscles.

Here they become short and thick like sausages within 2 days having short spiky tails and measure 124 to 250  $\mu\text{m}$  in length and 10 to 17  $\mu\text{m}$  in diameter, they also possess rudimentary digestive tract. These are first stage larvae. Within next 3 to 7 days they grow rapidly and moult once or twice to

become the second stage larvae; they measure 225 to 330  $\mu\text{m}$  in length and 15 to 30  $\mu\text{m}$  in diameter.

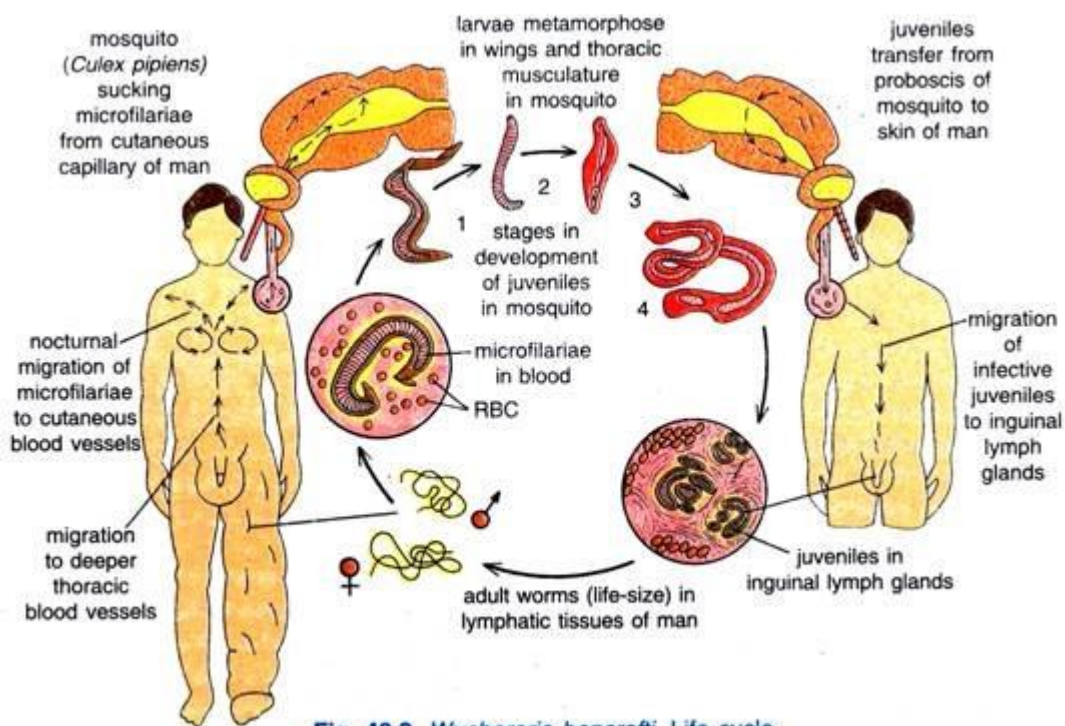
Finally, by 10th or 11th day they become fully grown and are referred to as third stage larvae; they measure about 1500 to 2000  $\mu\text{m}$  in length and 18 to 23  $\mu\text{m}$  in diameter. This stage is infective to man. These larvae are inactive and come to lie in the labium of the mosquito.

When the mosquito bites the warm and moist skin of man, the larvae creep out of the labium to the human skin, then they penetrate into the skin and finally come to settle down in the lymphatic's. Here, they grow and become fully adult and sexually mature within a period of 5 to 18 months.

These sexually mature worms start reproduction to repeat the life history again. The life span of adult worms is very long, probably ranging from 5 to 10 years.

### Diagnosis and Disease of Wuchereria Bancrofti:

The infection of *Wuchereria bancrofti* is diagnosed by the presence of microfilariae in stained blood smear and by the biopsy of lymph nodes. The disease caused by the infection of *W. bancrofti* is, in general, referred to as wuchereriosis or filariasis.



### Pathogenicity of Wuchereria Bancrofti:

In fact, the pathogenic effects seen during filariasis are caused by living or dead adult worms.

A light infection does not produce serious effects; it causes filarial fever, headache and mental depression, etc. But, during heavy infection a large number of pathological effects are observed; in this condition they block the lymphatic vessels and glands causing lymphatic obstruction so that lymph cannot get back to the circulatory system.

Hence, there occurs accumulation of lymph in the affected organs due to which they swell fantastically, a condition called lymphoedema. When they infect lymph nodes then they cause lymphadenitis, in lymph vessels they cause lymphangitis and after infecting epididymis and related areas they cause hydrocele.

However, the affected organs sometimes become enormously enlarged, producing a tumour-like ugly look, this condition is called elephantiasis; the elephantiasis of feet, hands, scrotum, etc., are of common occurrence in the areas where *W. bancrofti* is prevalent.

**Treatment and Prevention of Disease Caused by *Wuchereria Bancrofti*:**

So far, no satisfactory treatment has been reported. However, heterazan and compounds of antimony and arsenic are used to reduce or eradicate microfilariae from the circulatory system. The only way of prevention is to protect our bodies from mosquito bite.