

WUCHERERIA - ADULT FEMALE AND MALE

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Wuchereria bancrofti

EMBRYOS (MICROFILARIAE). Passing through the lymph nodes, these embryos find their way by the main lymphatic trunks into the circulating blood. They are very active in their habits and can move both with and against the blood stream. When unstained, they appear as colourless and transparent bodies with blunt heads and rather pointed tails. The embryo measures about $290 \mu\text{m}$ in length by 6 to $7 \mu\text{m}$ in breadth. When dead and stained with Romanowsky's stains, the embryo (Fig. 180) shows the following morphological peculiarities:

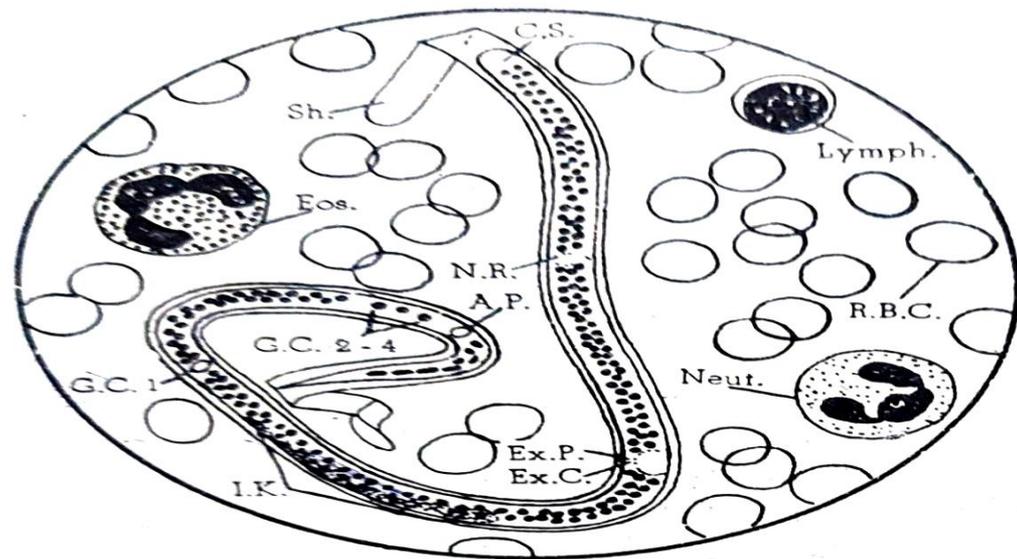


Fig. 180—Morphology of *Microfilaria bancrofti*.

Sh., Sheath; C.S., cephalic space; N.R., nerve ring; Ex. P. excretory pore; Ex. C., excretory cell; I.K., Innenkörper G.C., 1 & G.C. 2-4, G-cells (so called "genital cells"); A.P., anal pore; R.B.C., red blood cells; Neut., neutrophil; Eos., eosinophil; Lymph., lymphocytes.

subcuticular cells and is seen only with vital stains.

(iii) Somatic Cells or Nuclei. (These appear as granules in the central axis of the body and extend from the head to the tail-end.) The granules do not extend up to the tip of the tail (terminal 5 per cent) and serve as a distinguishing feature of *Mf. bancrofti*. (At the anterior end there is a space, also devoid of granules, called the cephalic space which is as long as it is broad. With vital stains the presence of a stylet is seen.)

(iv) The granules are broken at definite places serving as the landmarks for identification of the species. They include the following: (a) Nerve ring, an oblique space, (b) anterior V-spot, represents the rudimentary excretory system and (c) posterior V-spot or tail-spot, represents the terminal part of the alimentary canal (anus or cloaca).

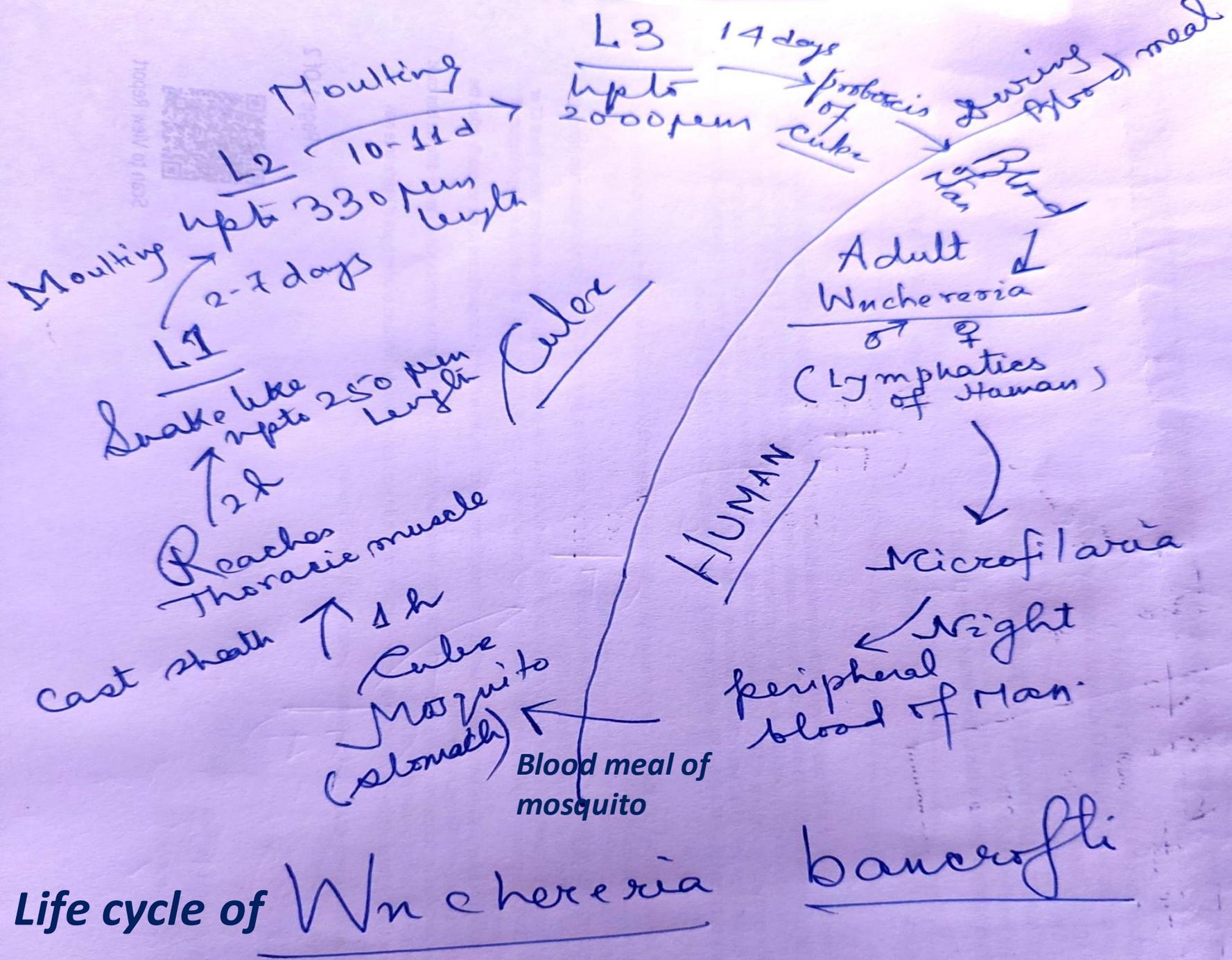
(v) A few G-cells (the so-called "genital cells") posteriorly; while G-cells 2, 3 and 4 are just in front of the anal pore, G-cell 1 is situated further in front.

(vi) Innenkörper, of Fülleborn or Central (Internal) Body of Manson extends from the anterior V-spot to the G-cell 1. It represents the rudimentary alimentary canal.

The larval forms do not undergo any further development in the human body unless they are taken up by their appropriate intermediate host (mosquito). If these microfilariae are not sucked up by the mosquito, they die in course of time. The life span of microfilariae in the human body has been found to be as long as 70 days (Rao, 1933).

(i) A Hyaline Sheath. (This is a structureless sac which is best seen where it projects slightly beyond the extremities of the embryo. The sheath is much longer ($359 \mu\text{m}$) than the larval body) so that the larva can move forwards and backwards within it. The sheath represents the chorionic envelope of the egg; it remains as an investing membrane round the larva.

(ii) Cuticula is lined by



Life cycle of

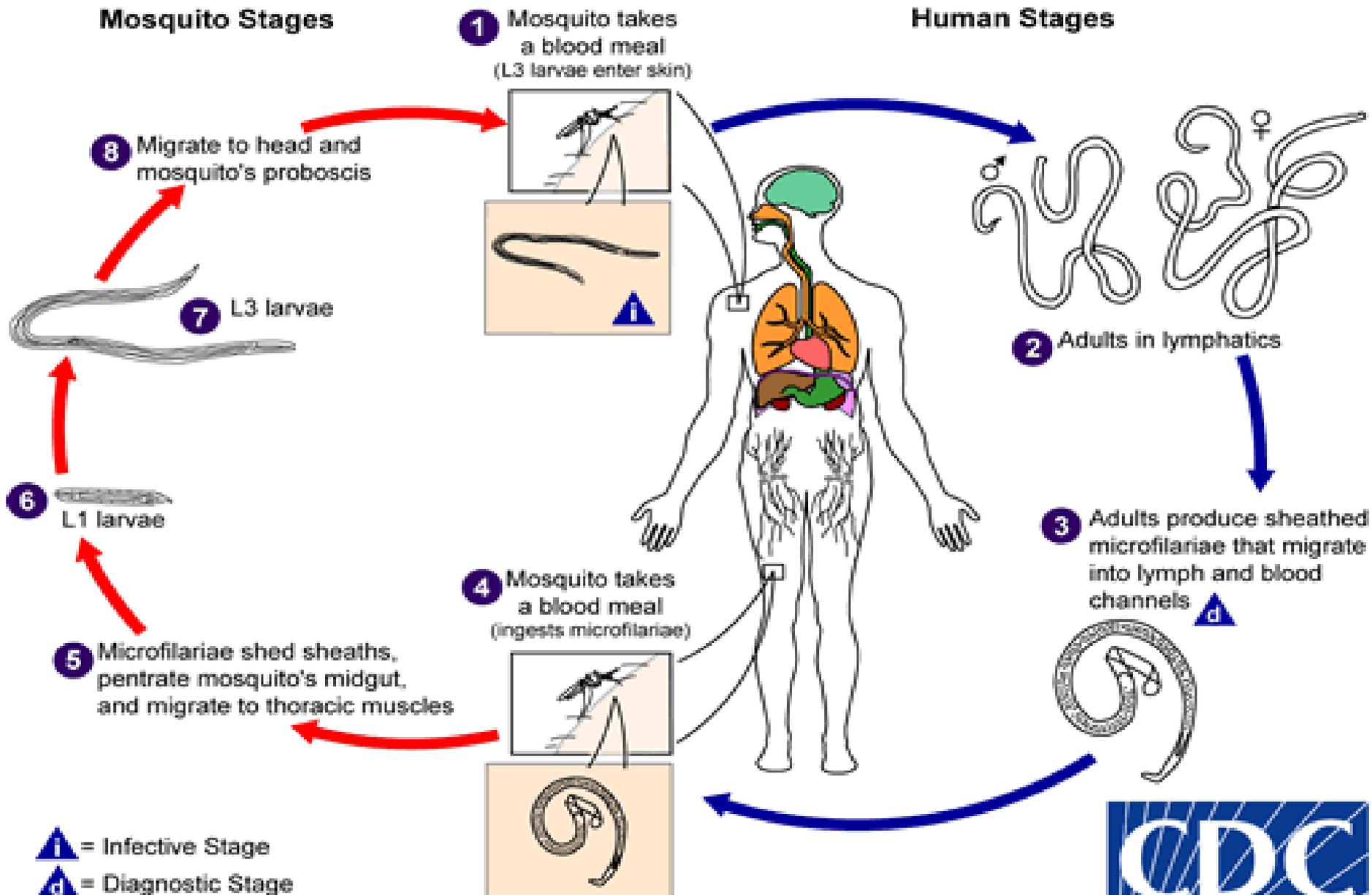
Wuchereria

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Wuchereria bancrofti

Mosquito Stages

Human Stages



Life Cycle. *W. bancrofti* passes its life cycle (Fig. 181) in two hosts: man and mosquito.

1. The definitive host is man, in whose lymphatic system the adult worms are harboured. Live embryos (microfilariae) are discharged which find their way into the blood stream. The embryos are capable of living in the peripheral blood for a considerable time without undergoing any developmental metamorphosis. They are subsequently taken up by the female culicine mosquitoes during their blood-meal.

2. The intermediate host is a mosquito, in which the microfilariae undergo further development, after which they become infective to man. A large number of species of mosquito belonging to the genus *Culex*, *Aedes* and *Anopheles* act as intermediate hosts for *W. bancrofti*.

STAGES IN THE DEVELOPMENT OF MICROFILARIA IN THE MOSQUITO (Cont 40)

(i) Sheathed microfilariae ingested by the mosquito during its blood-meal collect round the anterior end of the stomach. They cast off their sheaths quickly, penetrate the gut-wall within an hour or two and migrate to the thoracic muscles. Here they rest and begin to grow.

(ii) In the next 2 days the slender, snake-like organism changes to a thick, short, sausage-shaped form with a short spiky tail, measuring 124 to 250 μm in length by 10 to 17 μm in breadth (the first-stage larva). It possesses a rudimentary digestive tract.

(iii) In 3 to 7 days time the larva grows rapidly, moults (sheds cuticle) once or twice and at the end of this stage measures 225 to 330 μm in length by 15 to 30 μm in breadth (the second-stage larva).

(iv) On the 10th or 11th day the metamorphosis becomes complete: the tail atrophies to a mere stump and the digestive system, body cavity and genital organs are now fully developed. This is the third-stage larva which measures 1,500 to 2,000 μm in length by 18 to 23 μm in breadth and has 3 subterminal caudal papillae (*B. malayi* has 2). At this stage it is infective to man and enters the proboscis sheath of the mosquito on or about the 14th day. It should be noted that one microfilaria gives rise to one infective larva in the proboscis sheath. There may be several larvae remaining coiled up, waiting for an opportunity to infect man while the mosquito is having its blood-meal.

Note: The time taken for the complete development of microfilaria in the mosquito varies from 10 to 20 days or more, depending however on the atmospheric temperature, humidity and also to a certain extent, on the species of the mosquito.

ENTRANCE INTO MAN AND DEVELOPMENT INTO ADULT WORMS

When the infected mosquito bites a human being, the *third-stage larvae* are not directly injected into the blood stream like malarial parasites but are deposited on the skin near the site of puncture. Later, attracted by the warmth of the skin, the larvae either enter through the puncture wound or penetrate through the skin on their own.

The *third-stage larvae* (infective larvae), having penetrated the skin, reach the lymphatic channels, settle down at some spot (inguinal, scrotal or abdominal lymphatics) and begin to grow into adult forms. In course of time, probably after a period of 5 to 18 months they become sexually mature. The male fertilises the female and the gravid females give birth to larvae. A new generation of microfilariae is emitted which passes either through the thoracic duct or the right lymphatic duct, to the venous system and pulmonary capillaries and then to the peripheral circulation (capillaries of the systemic circulation), thus completing the cycle.

Pathogenicity and Clinical Features. The clinical change initiated by W.

Pathogenicity : the disease caused by *Wuchereria sp* is called **Filaria** which may have the following symptoms.

- **Lymphangitis**- Swelling of the lymph ducts due to blockage in lymph flow by adult worms.
- **Lymphadenitis**: Swelling of the lymph nodes
- **Elephantiasis**: Swelling of legs, scrotum, epididymis, mammary glands occur as lymphatics are blocked by adult worms
- **Hydrocele**: Fluid accumulation in epididymis etc with **Microfilaria**
- **Chyluria**: release of chyle in urine
- **Filarial fever**: Temperature of 103-104°
- Hydrocele and chyluria are normally found in China, Japan., pacific countries.

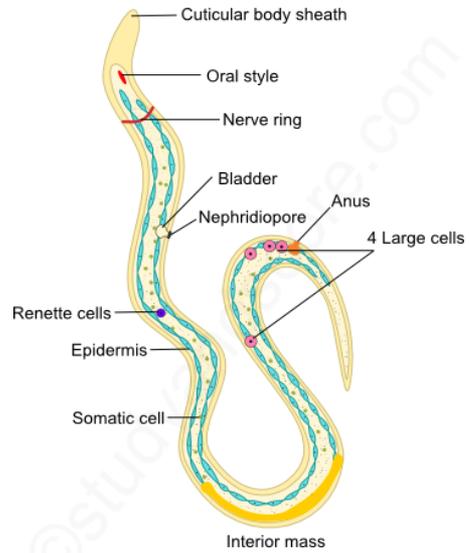
Diagnosis

- ❖ **Microfilaria in Blood**
- ❖ **Immunological test**

Treatment

- **MeIW** for adult worms
- **Hetrazan (DEC)** for **Microfilaria**





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