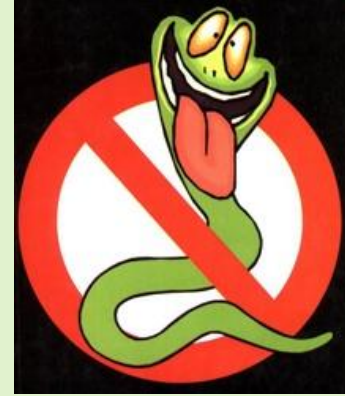


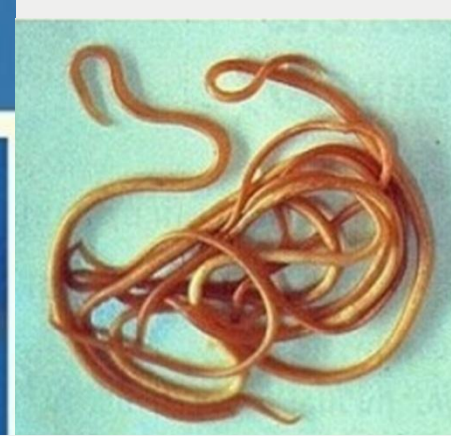
# ТЕМА ЛЕКЦИИ 07:



## Общая и медицинская гельминтология.

### Нематоды 2

**Ascaris lumbricoides** Linnaeus, 1758



**Тип Круглые черви  
(Nemathelminthes).**

**Класс Собственно круглые черви**

# КРУГЛЫЕ ЧЕРВИ

## ГЕОГЕЛЬМИНТЫ

**Аскарида человеческая**  
(*Ascaris lumbricoides*),

**Острица**  
(*Enterobius vermicularis*)

**Анкилостомиды**  
(*Necator americanus*  
and *Ancylostoma duodenale*),

**Власоглав** (*Trichuris trichiura*).

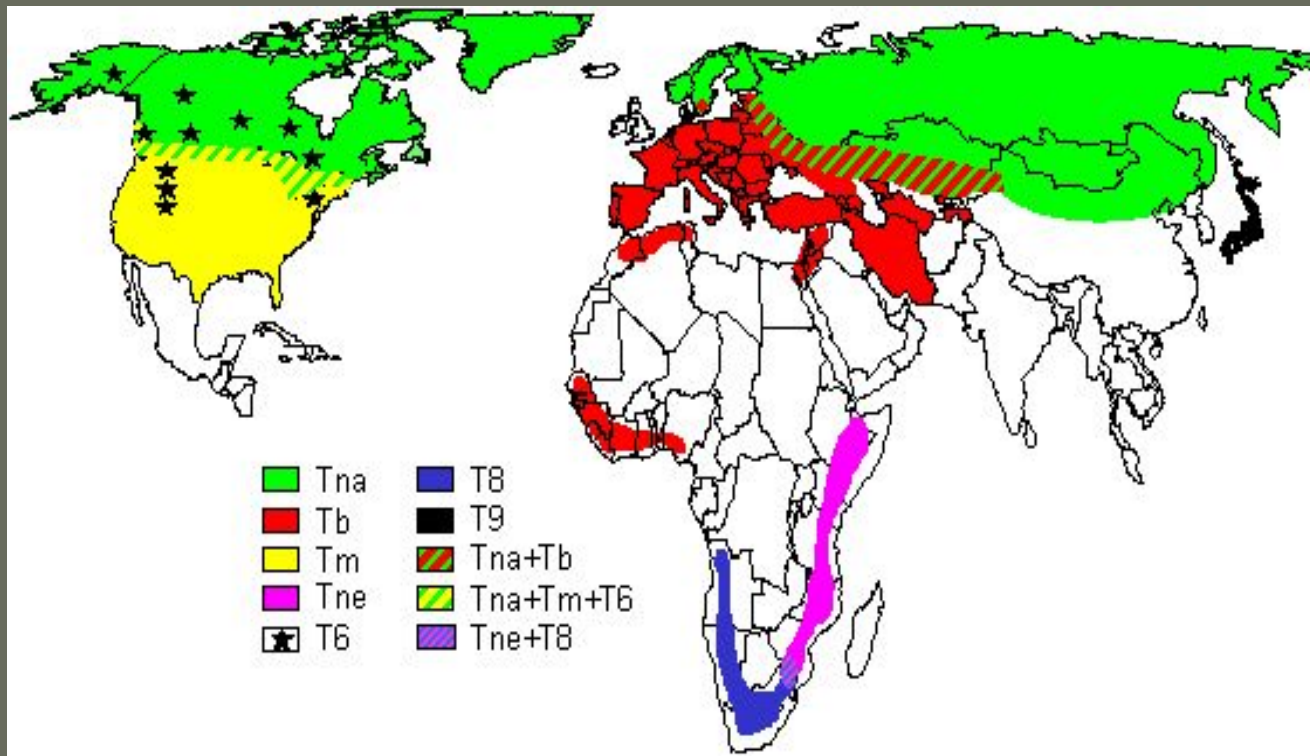
## БИОГЕЛЬМИНТЫ

**Трихинелла**  
(*Trichinella spiralis*),

**Ришта**  
(*Dracunculus medinensis*),

**Филярии** (*Wuchereria bancrofti*,  
*Brugia malayi*, *Brugia timori*,  
*Onchocerca volvulus*,  
*Onchocerca coecutiens*, *Loa loa*,  
*Mansonella ozzardi*, *Mansonella perstans*,  
*Mansonella streptocerca*).

# Трихинелла (*Trichinella spiralis*)

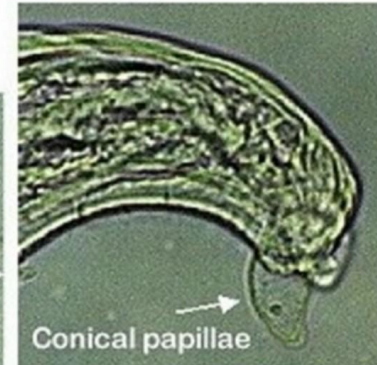
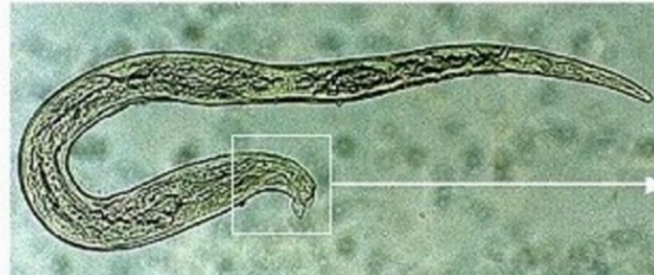
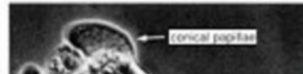
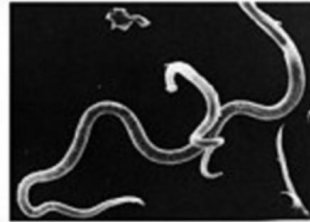
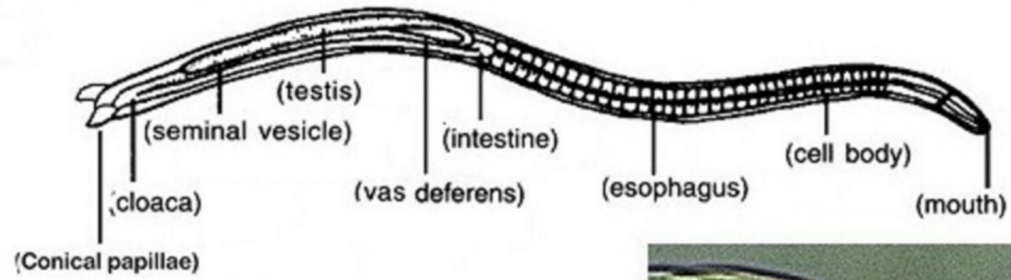


# MORPHOLOGY

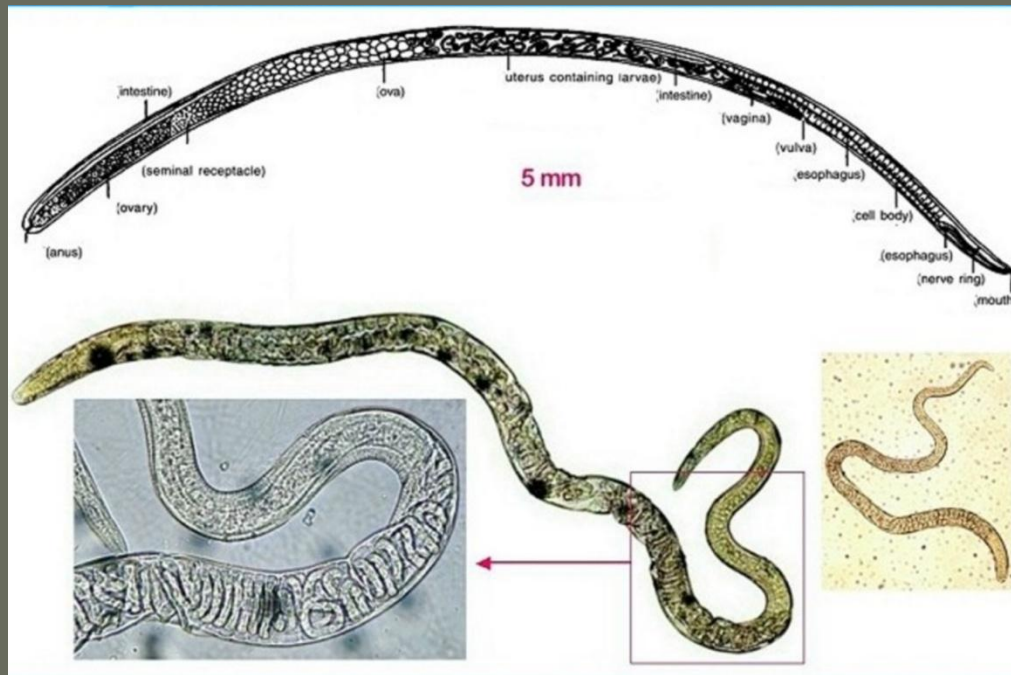
# Trichina worm



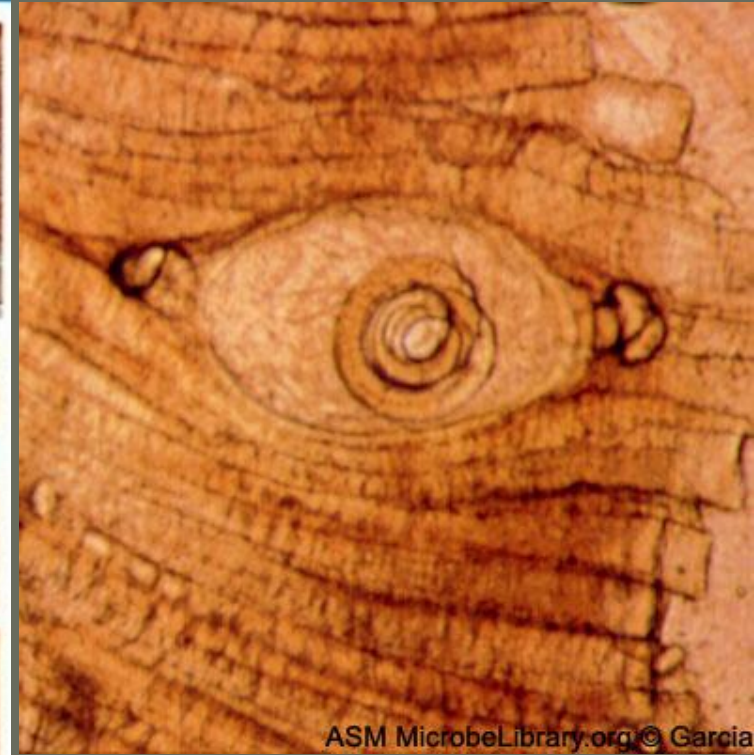
2mm



# Трихинелла



# Trichina worm



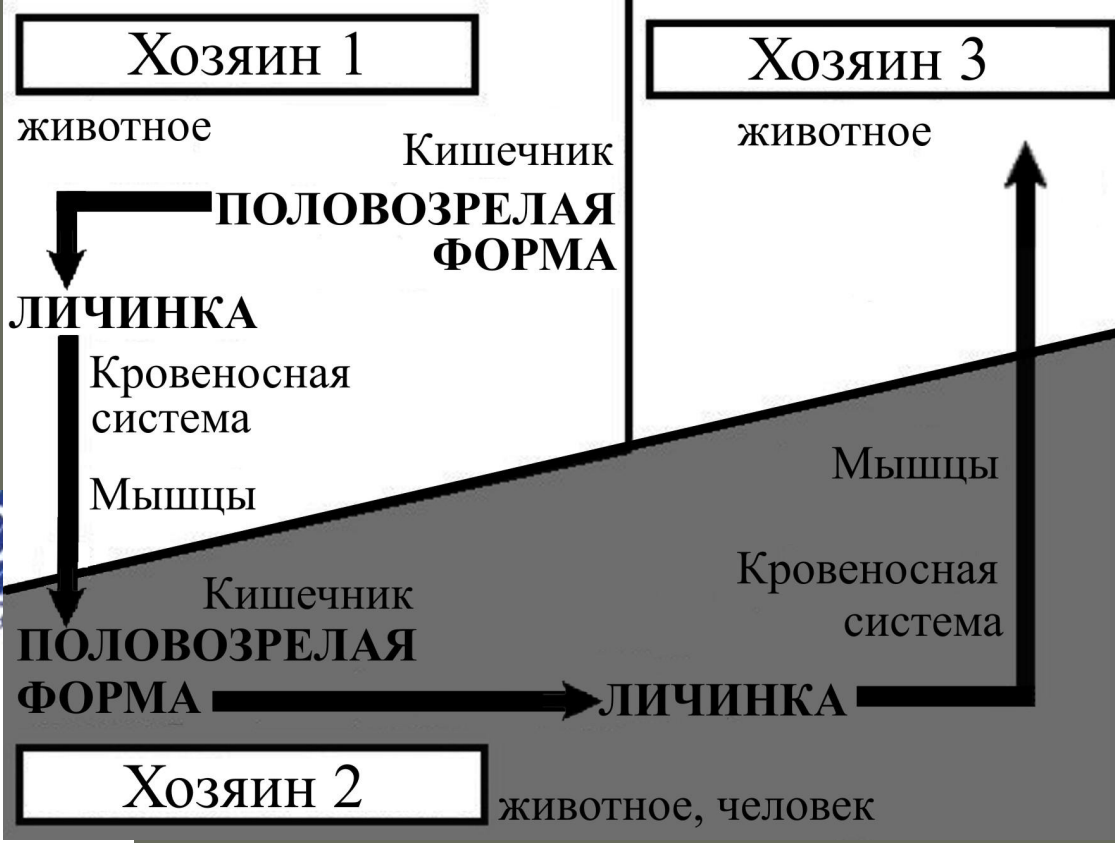
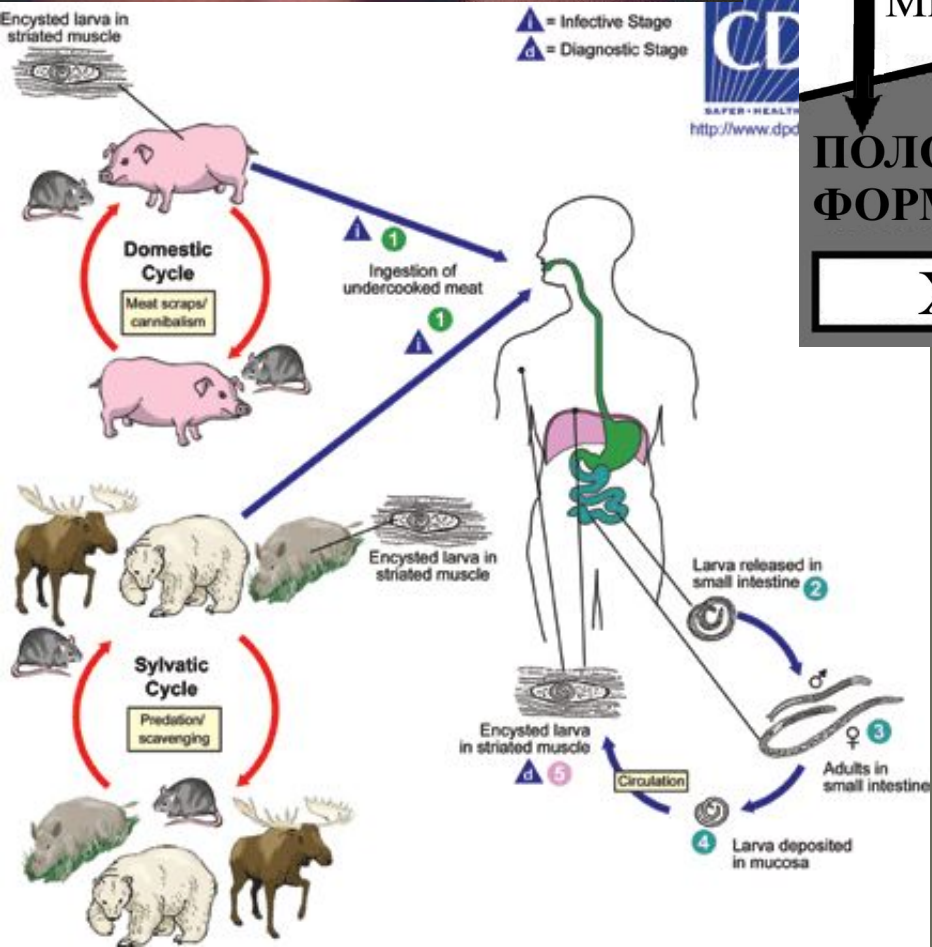
ASM MicrobeLibrary.org © Garcia

Инкапсулированные  
личинки в мышцах





© 2007 BRISQ UNIVERSITY/DR. THOMAS F. SELLERS



# Анизакиды (*Anisakis sp.*)

## Окончательные хозяева:

китообразные и ластоногие млекопитающие,  
хрящевые рыбы (акулы и скаты),  
рыбоядные птицы (цапля и др.)

**Промежуточные хозяева** — водные ракообразные.

**Дополнительные (резервуарные) хозяева** — крупные ракообразные, моллюски (кальмары, осьминоги) и морские рыбы (треска, корюшка, морской окунь, сельдевые, мерлуза, макрель, камбала, бельдюга, пикша, серебристый хек, зубатка, морская форель, путасу, ставрида, скумбрия, нототения, мойва и др.)





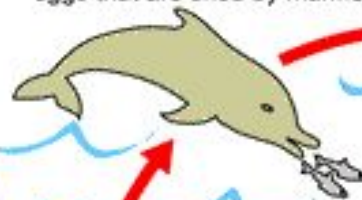
7 Humans become incidental hosts through eating infected raw or undercooked seafood.

**i** = Infective Stage  
**d** = Diagnostic Stage



Diagnosis of anisakiasis can be made by gastroscopic examination during which the 2 cm larvae can be removed. **d**

6 When fish or squid containing L3 larvae are ingested by marine mammals, the larvae molt twice and develop into adult worms. Adult worms produce eggs that are shed by marine mammals.



1 Marine mammals excrete unembryonated eggs.



2a Eggs become embryonated in water and L2 larvae form in the eggs.



2b After the L2 larvae hatch from eggs, they become free-swimming.

5 Fish and squid maintain **i** L3 larvae that are infective to humans and marine mammals.



3 Free-swimming larvae are ingested by crustaceans and they mature into L3 larvae.

4 Infected crustaceans are eaten by fish and squid. Upon the host's death, larvae migrate to the muscle tissues, and through predation, the larvae are transferred from fish to fish.

Чаще всего появляются сильные боли в животе, головокружение, тошнота, рвота и понос.

Вследствие инфекции может появиться ощущение сдавливания пищевода. Потом личинки отхаркиваются и их можно увидеть в слюне. В дальнейшем инфицированные жалуются на боли в животе, потерю веса, отсутствие аппетита и общую слабость.

С клинической точки зрения анизакидоз ведет к образованию язв в желудочно-кишечном тракте, так называемым эозинофильным гранулемам.

Жалобы длятся около трех недель (время жизни личинок), после чего, в результате разложения личинок, появляются хронические боли в подчревной области. В худшем случае возможны осложнения в виде образования кишечной непроходимости или даже прорыва кишечника.

<http://www.slovomed.ru/articles/anisakiasis.html>

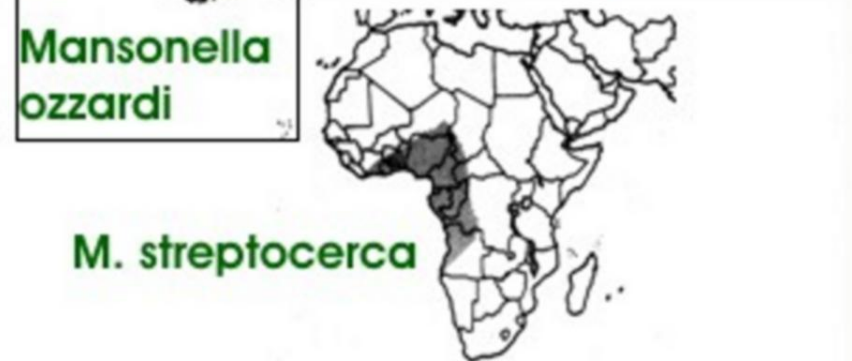
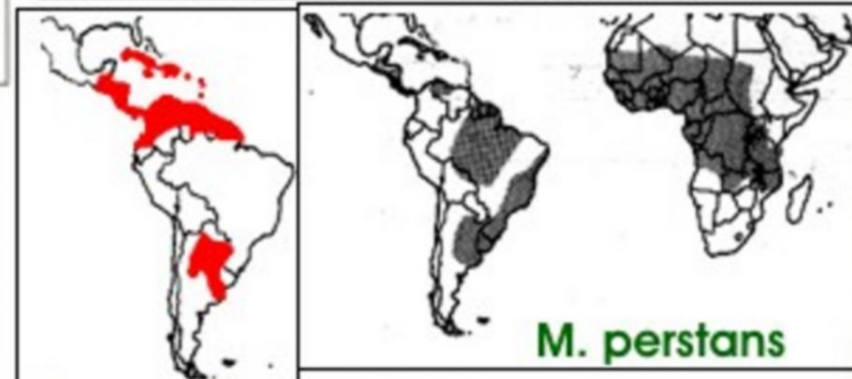
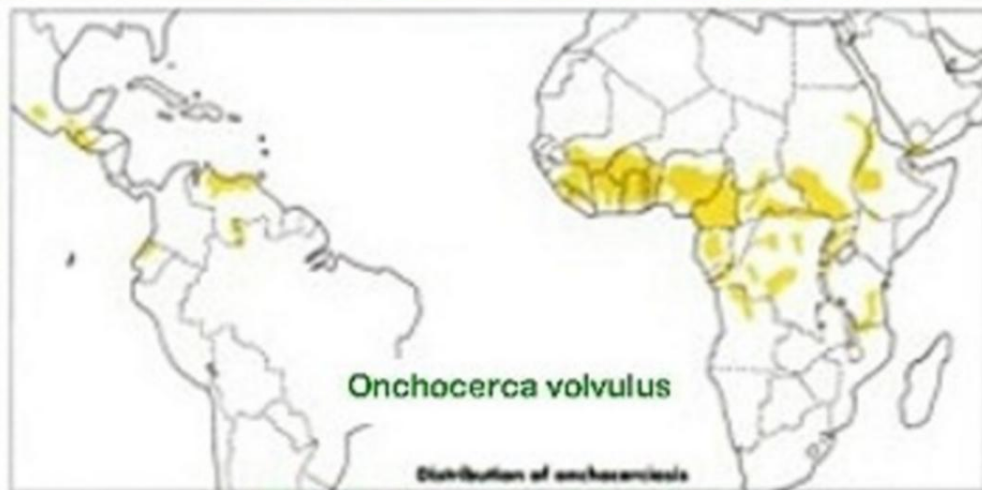
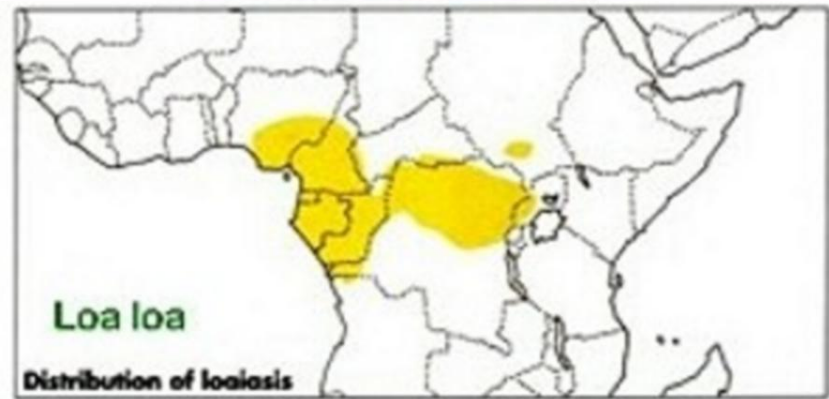
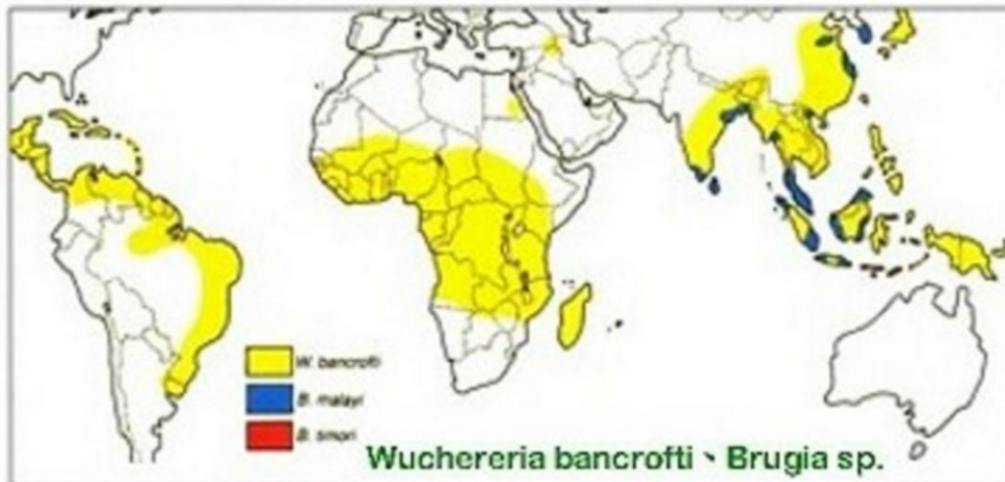
# Филлярии

family Filariidae

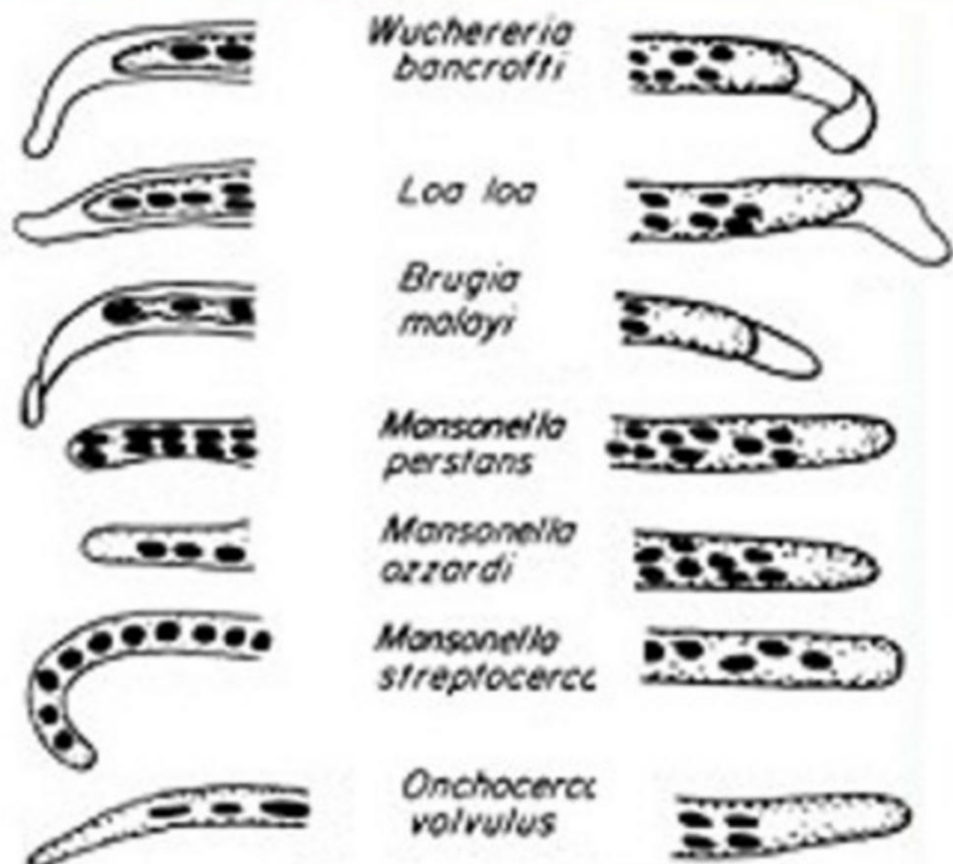


Species	Vector( or Intermediate Host)
<i>Wuchereria bancrofti</i>	Mosquito : Culex \ Aedes \ Anopheles
<i>Brugia malayi</i>	Mosquito : Aedes \ Mansonia
<i>Brugia timori</i>	Anopheles barbirostris
<i>Onchocerca volvulus</i>	Simulium (black fly, buffalo gnat)
<i>Mansonella ozzardi</i>	Culicoides (Simulium)
<i>Mansonella perstans</i>	Culicoides
<i>Mansonella streptocerca</i>	Culicoides
<i>Loa loa</i>	Chrysops \ mango fly

# Distribution of filariases



## Microfilaria

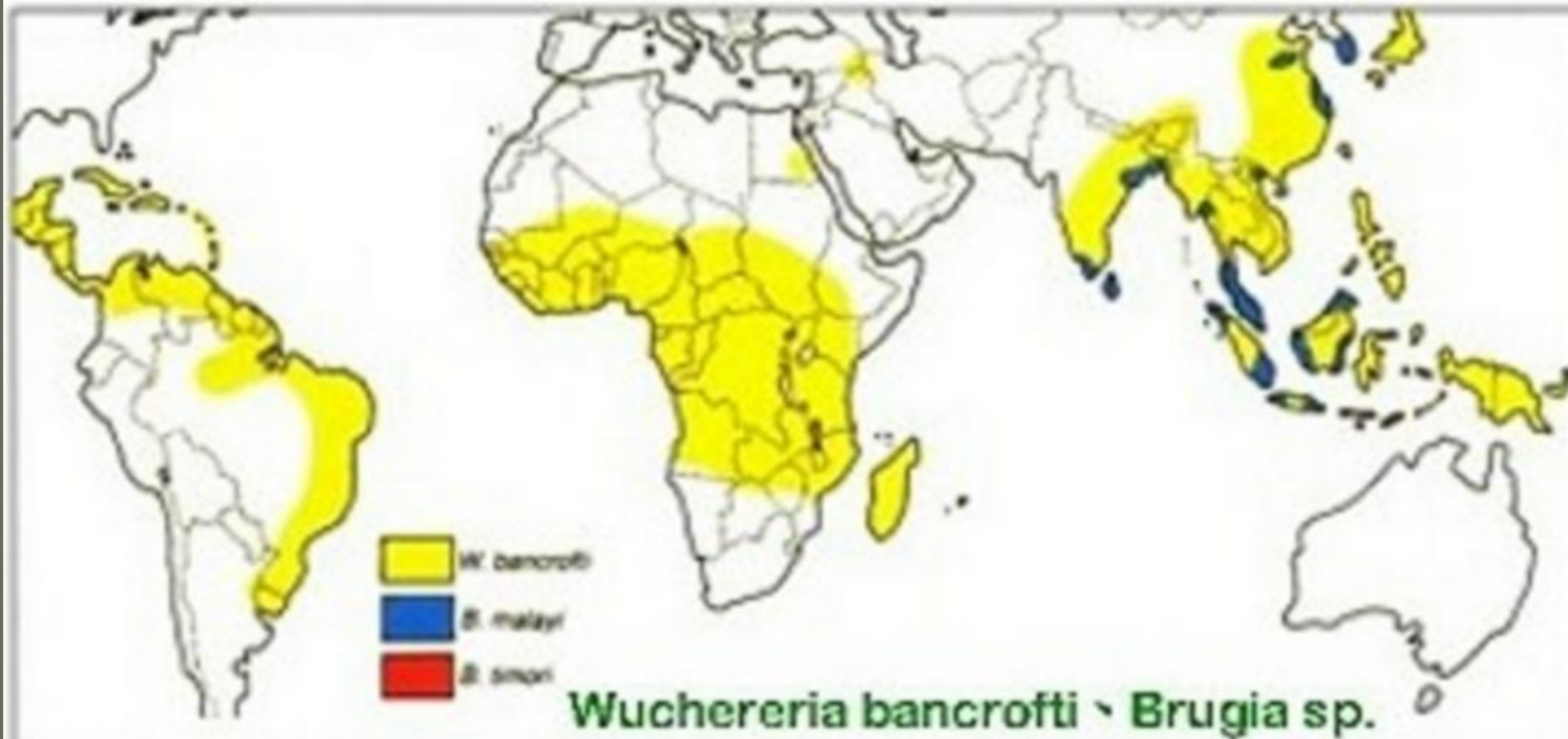


# *Wuchereria bancrofti* and *Brugia malayi* (lymphatic filariasis)

250 million humans affected;

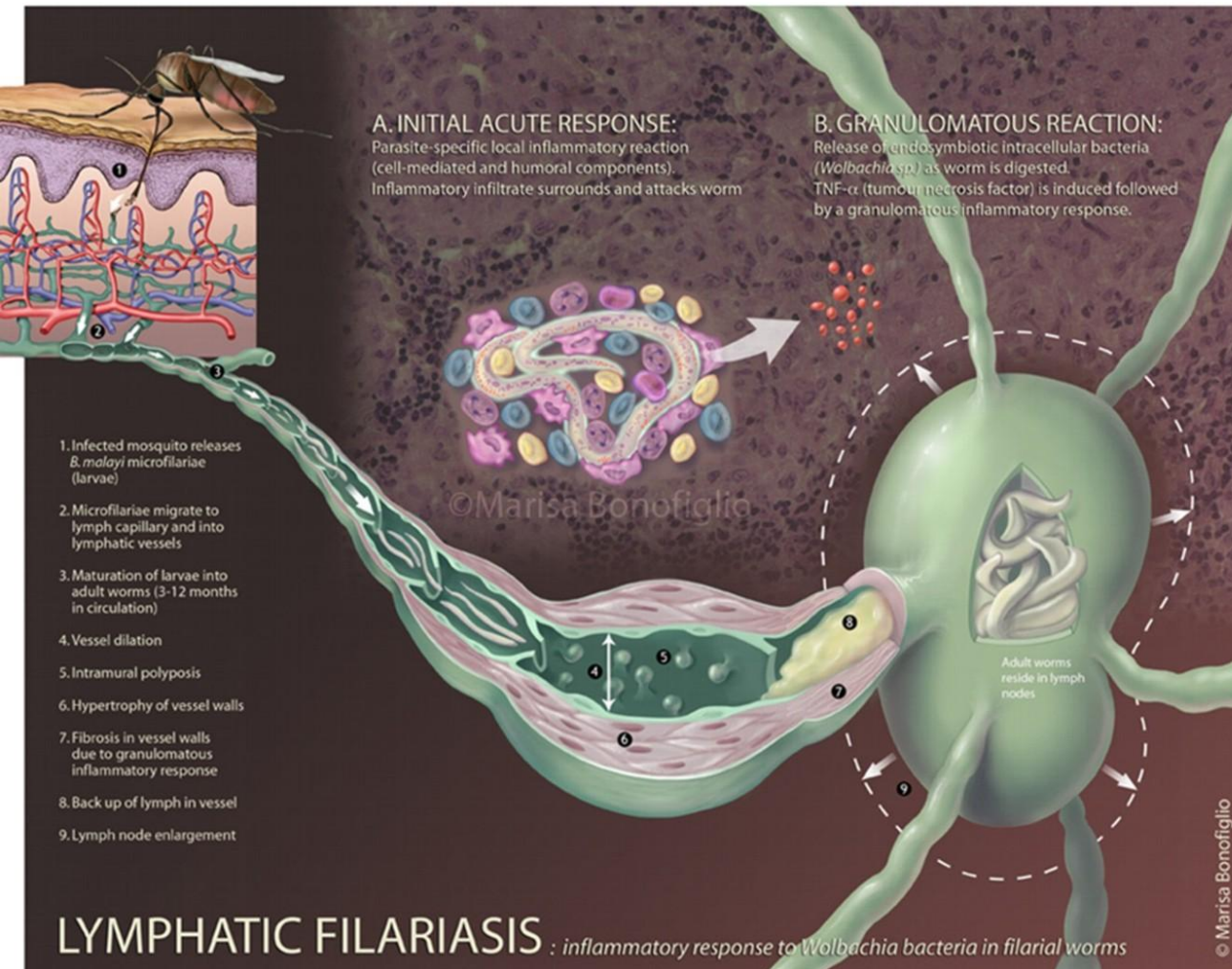
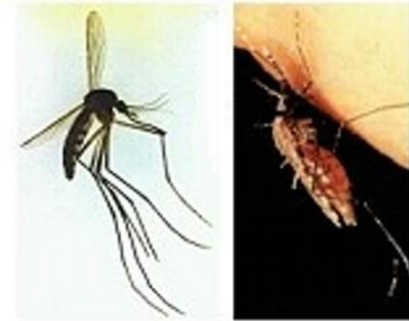
widely distributed throughout tropical and subtropical countries.

Cause lymphatic filariasis occasionally terminating in elephantiasis.



microfilariae circulate preferentially from 10:00 p.m. to 2 a.m.

- this corresponds to peak activity of vector mosquitoes.



**LYMPHATIC FILARIASIS** : inflammatory response to *Wolbachia* bacteria in filarial worms

Asymptomatic  
microfilaremia

Lymphangitis and  
lymphadenitis

Tropical pulmonary  
eosinophilia

Orchitis and epididymitis

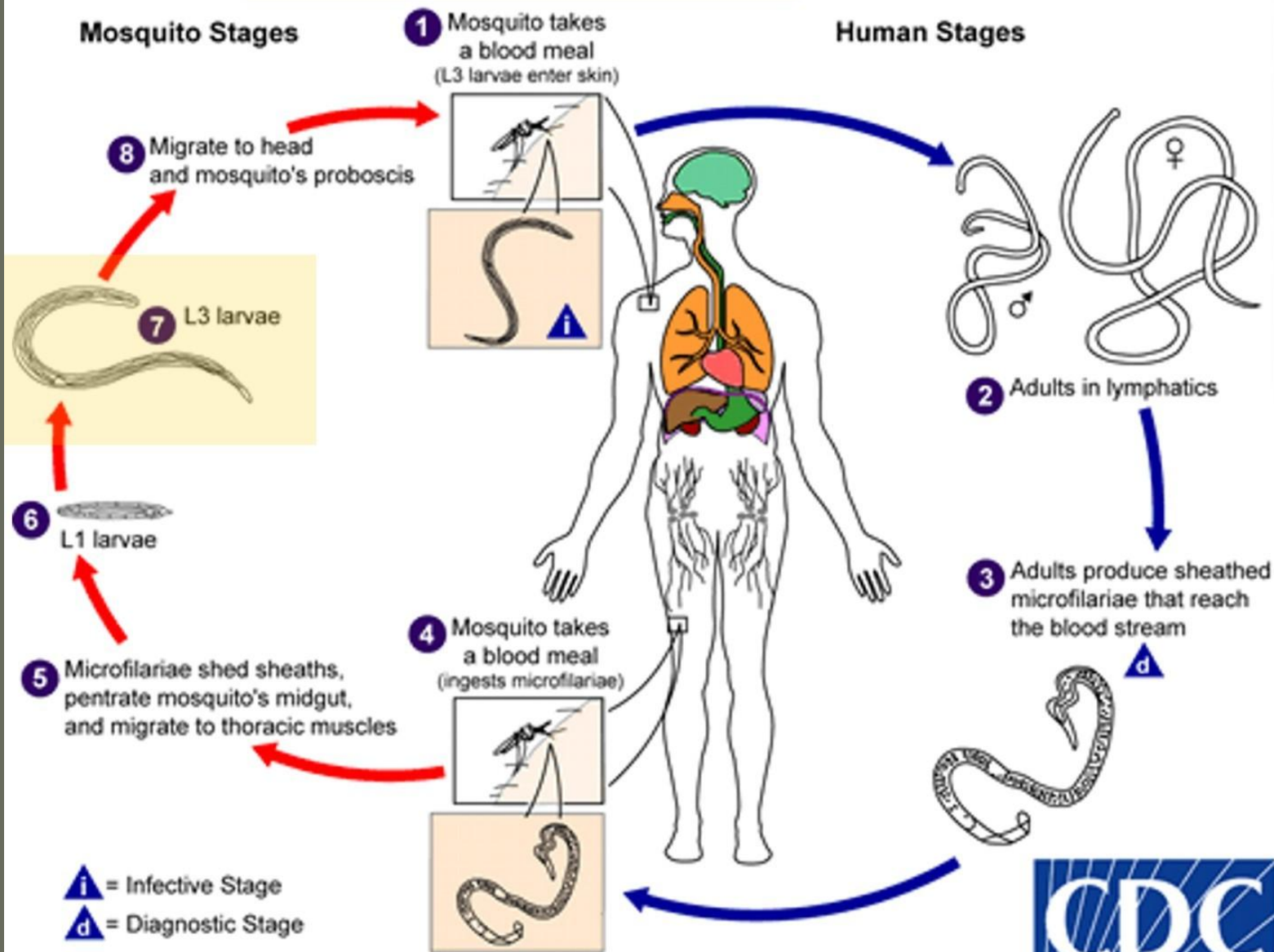
Elephantiasis

Chyluria

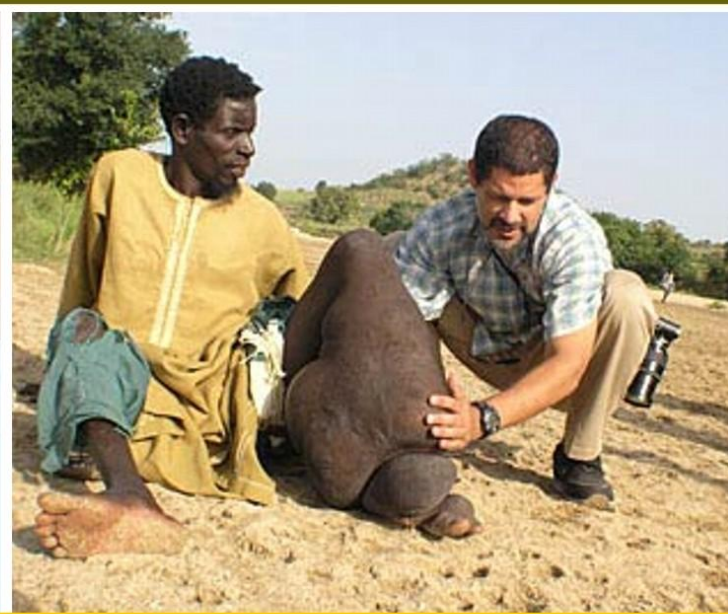
*Brugia malayi* *Wuchereria bancrofti*

**Mosquito Stages**

**Human Stages**

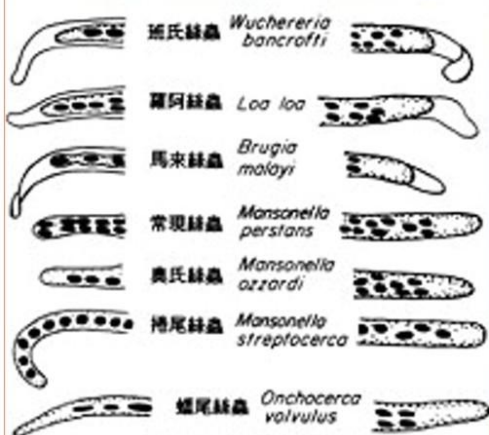




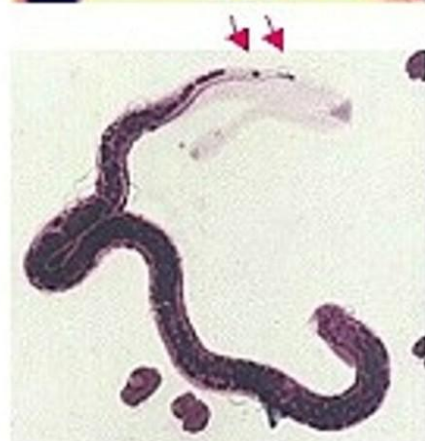
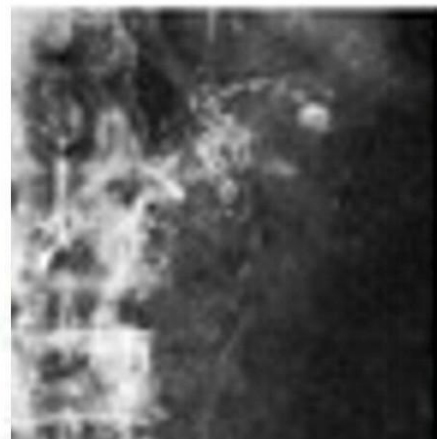
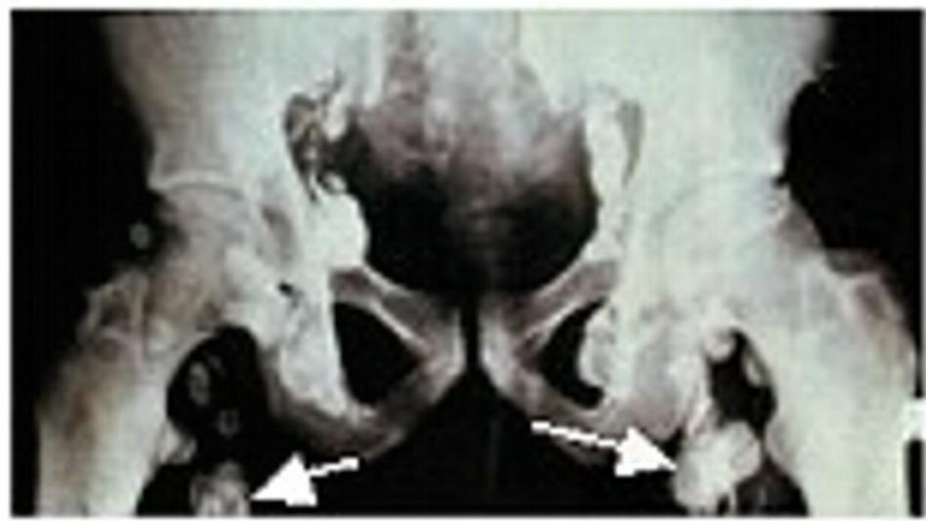


© Marcus Perkins Photography

# DIAGNOSIS



人體血液中微絲蟲種類的區別



# *Onchocerca volvulus*



- male: 2-3 cm long
- female: 60 cm long
- Adults occur in the subcutaneous tissues and in nodules
- microfilariae: 300 x 8 micrometer, 1000-3000 produced per day per adult female worm
- Adult worms have a longevity of 10-15 years

**35 countries in total.**

28 in tropical Africa, where 99% of infected people live.

Isolated foci in

Latin America (6 countries)

Yemen



# **Onchocerciasis is the world's second leading infectious cause of blindness.**

Rarely life-threatening, the disease causes chronic suffering and severe disability.

Fertile riverine areas are frequently abandoned for fear of the disease.

78 million people are estimated to be at risk

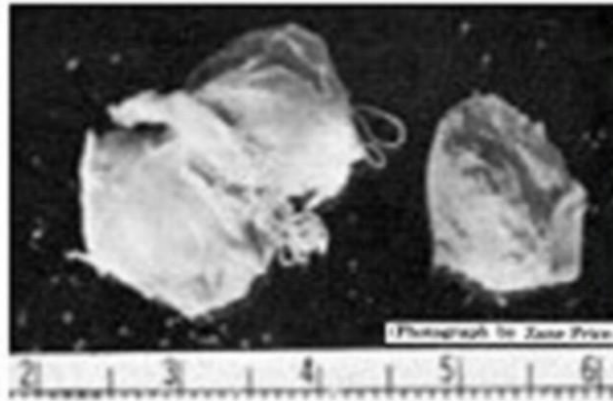
300 000 people are blind

Skin nodules, onchocercal dermatitis,  
hanging groin, blindness



In Africa, it constitutes a serious obstacle to socio-economic development.

# Skin nodules.



Onchocerca nodules on the back of a patient with the wrinkling of the dermis (Onchocercal dermatitis).  
From: Jansen, 1994 (Medical Parasitology)



onchocercal dermatitis



Sowda



leopard skin



Tissue paper skin



dermatitis with lichenification



Leonine facies



Acute onchodermatitis

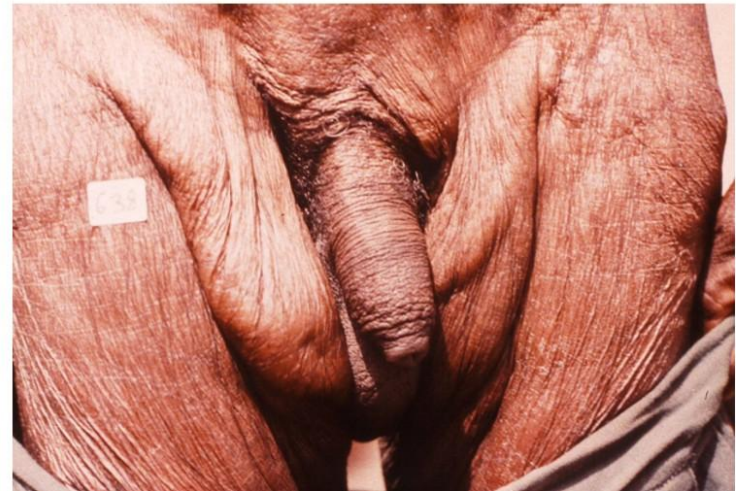
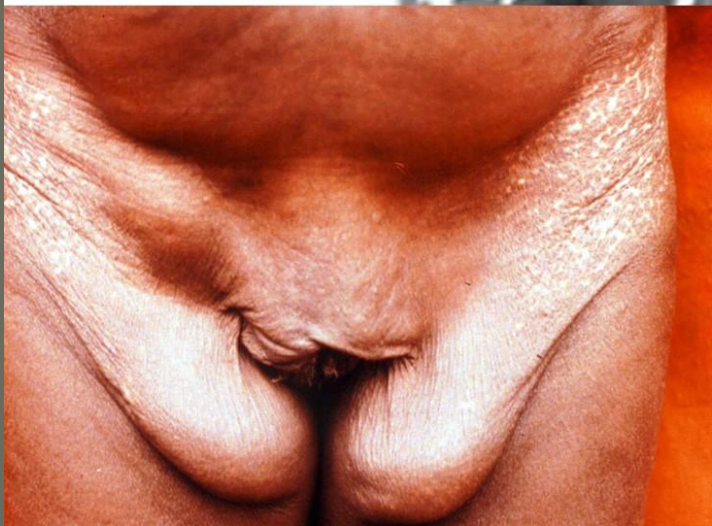


Lizard skin

hanging groin



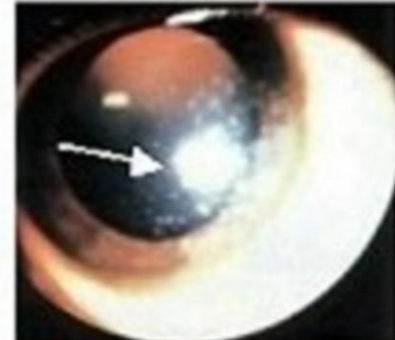
and scrotal elephantiasis



# River blindness



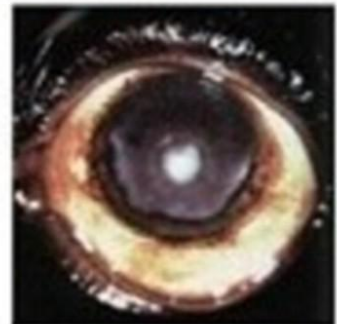
Early stage



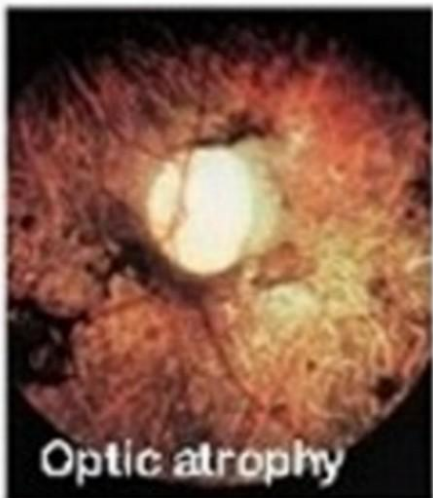
Corneal involvement snowflake-like



Advanced stage



cornea in sclerosing keratitis



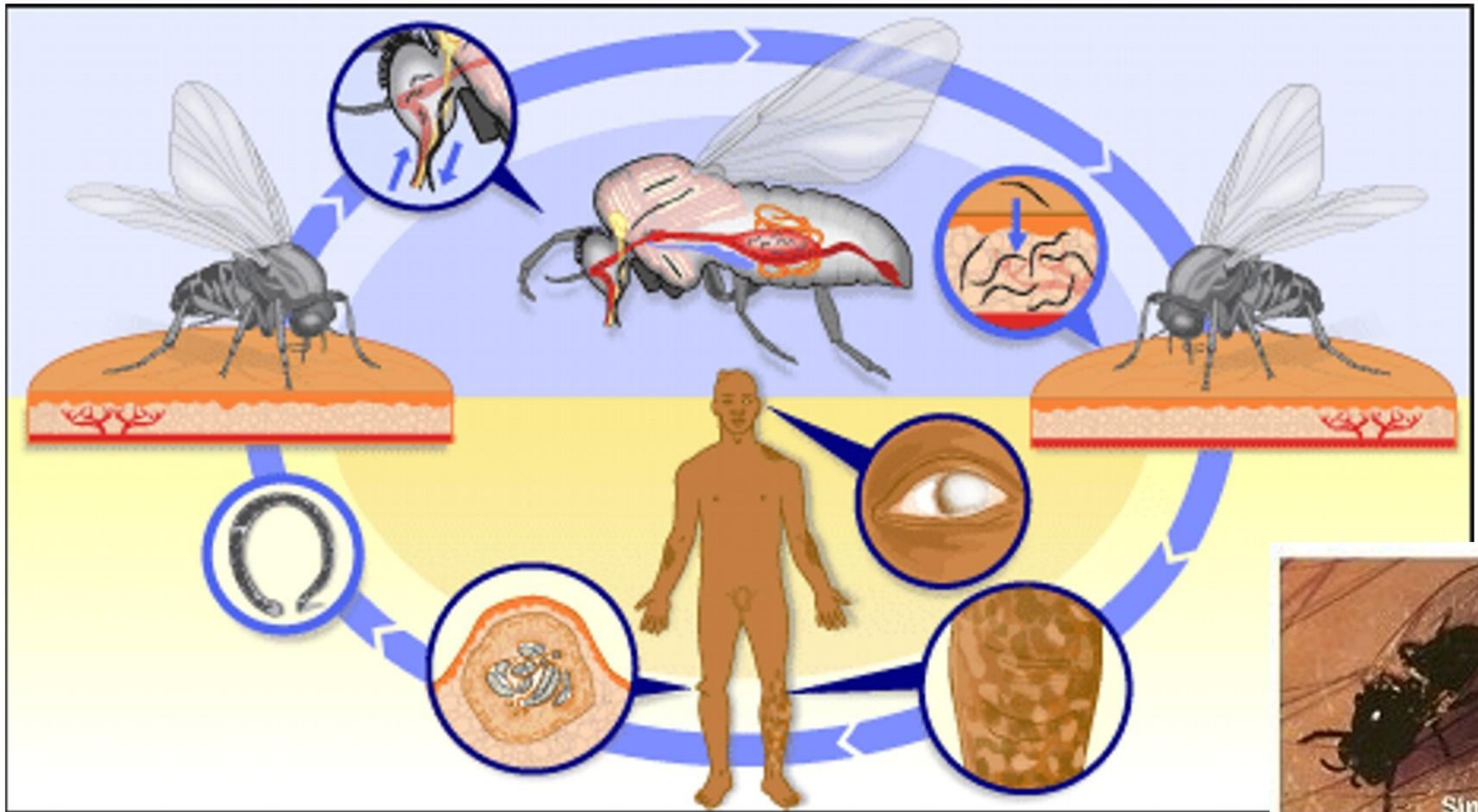
Optic atrophy



Late stage 全盲







Infective larvae transmitted to man by black flies of the genus *Simulium*.

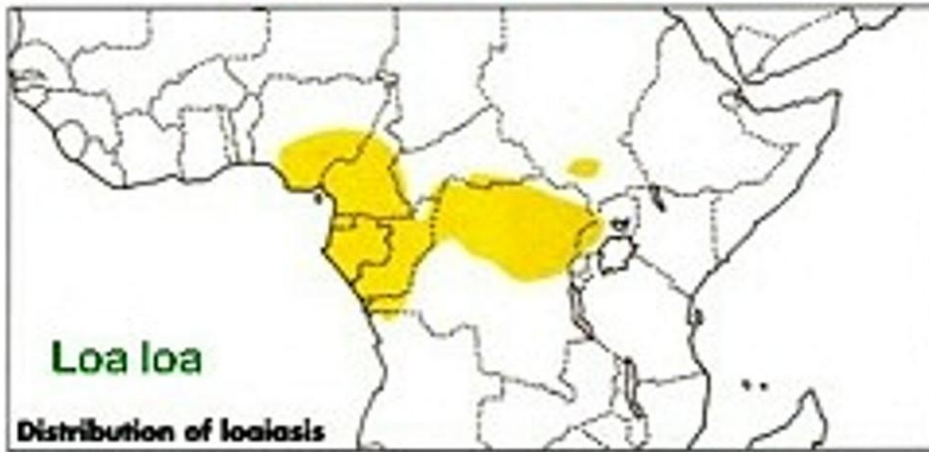
# *Loa loa* (loiasis)(Eye worm)

Adult worm lives in subcutaneous tissue

Adult: 55 mm x 0.5 mm

Microfilaria in subcutaneous tissues and blood

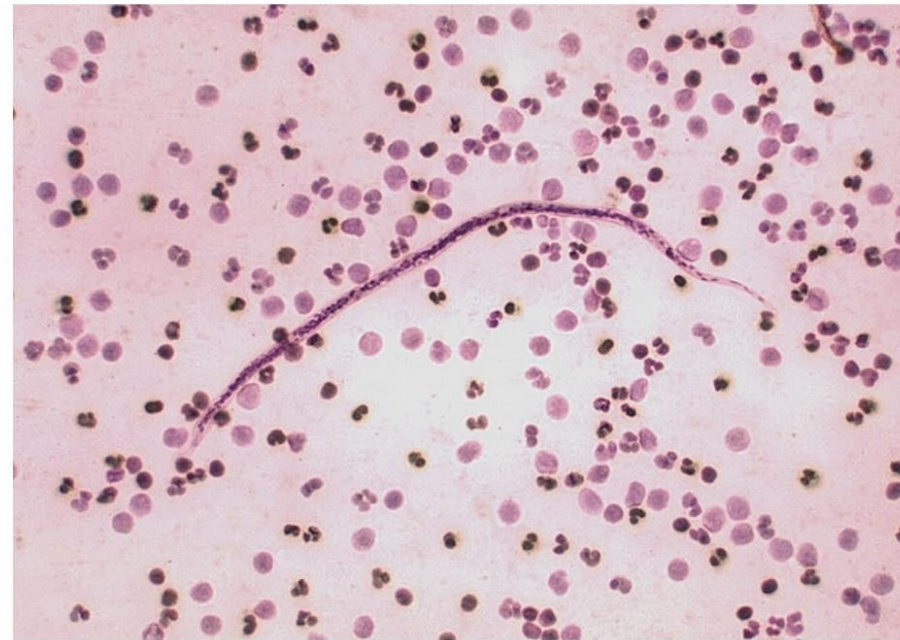
Microfilaria: 280 $\mu$ m x 7 $\mu$ m



Transmitted by the bite of deer flies of the genus *Chrysops*



**Mango flies**



# Loa loa

## Fly Stages

- 1 Fly (genus *Chrysops*) takes a blood meal (L3 larvae enter bite wound)



- 8 Migrate to head and fly's proboscis

7 L3 larvae



6 L1 larvae

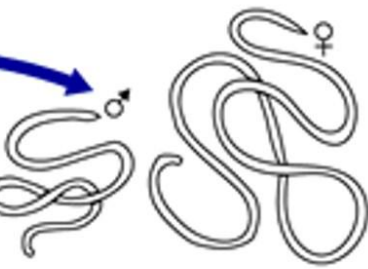


- 5 Microfilariae shed sheaths, penetrate fly's midgut, and migrate to thoracic muscles

- 4 Fly takes a blood meal (ingests microfilariae)



## Human Stages

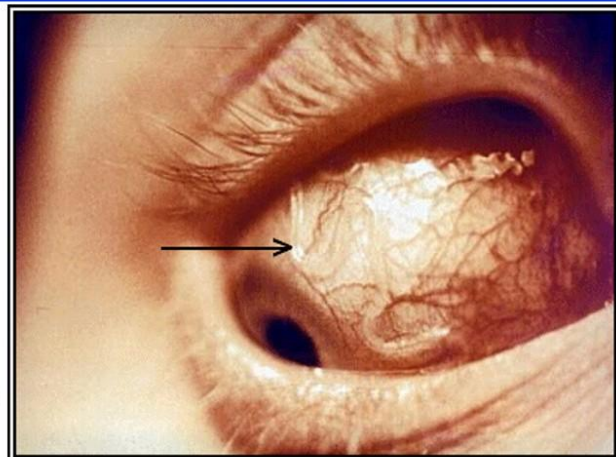


- 2 Adults in subcutaneous tissue

- 3 Adults produce sheathed microfilariae that are found in spinal fluid, urine, sputum, peripheral blood and in the lungs



**i** = Infective Stage  
**d** = Diagnostic Stage

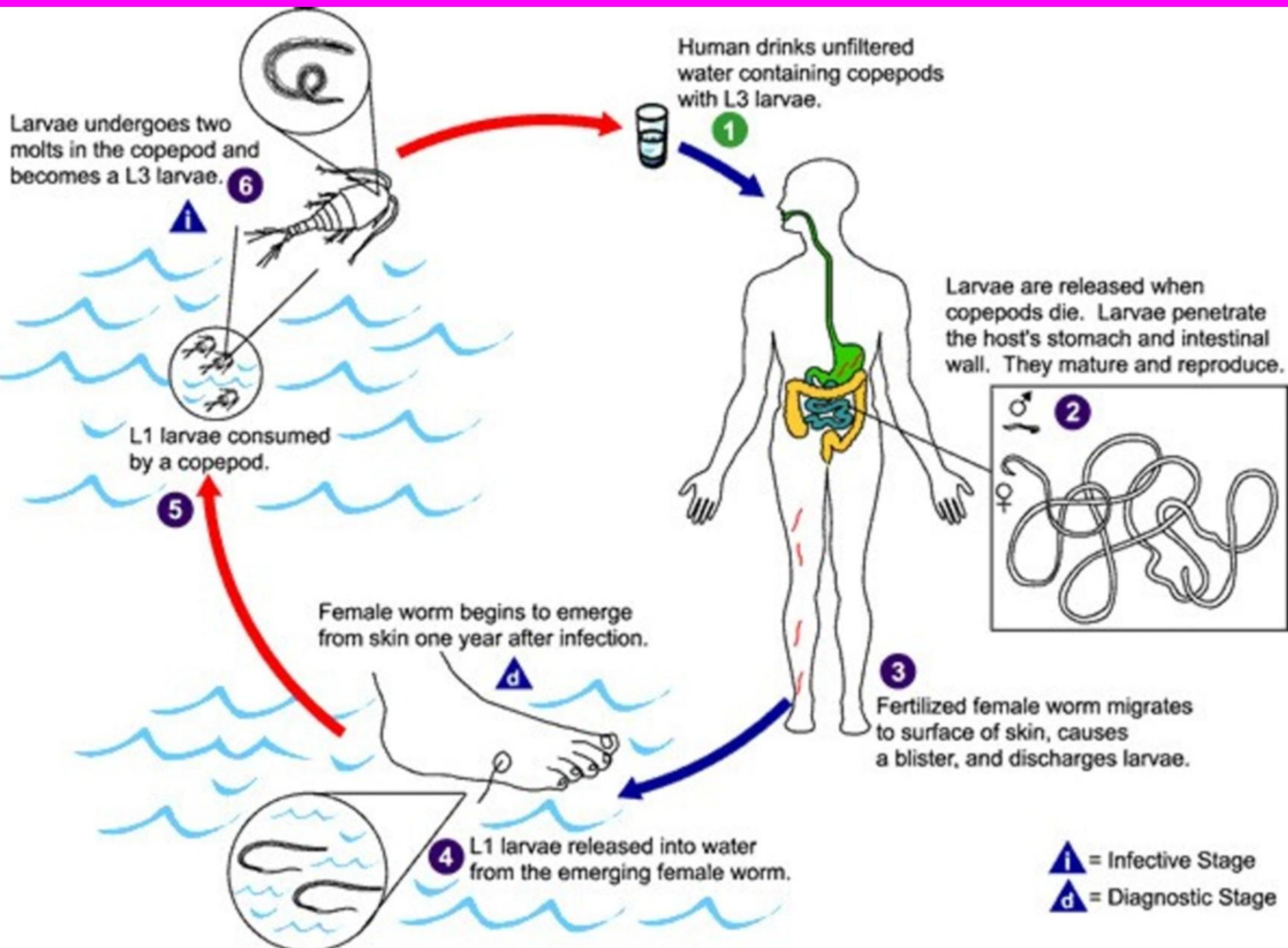


<http://www.dpd.cdc.gov/dpdx>

# Ришта (*Dracunculus medinensis*)



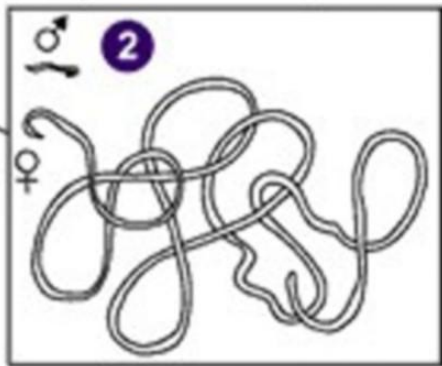




Human drinks unfiltered water containing copepods with L3 larvae.

1

Larvae are released when copepods die. Larvae penetrate the host's stomach and intestinal wall. They mature and reproduce.



2

Fertilized female worm migrates to surface of skin, causes a blister, and discharges larvae.

3

L1 larvae released into water from the emerging female worm.

4

Female worm begins to emerge from skin one year after infection.

d

L1 larvae consumed by a copepod.

5

i

6

Larvae undergoes two molts in the copepod and becomes a L3 larvae.

# Дирофилярия – *Dirofilaria immitis*

