

DRACUNCULIASIS

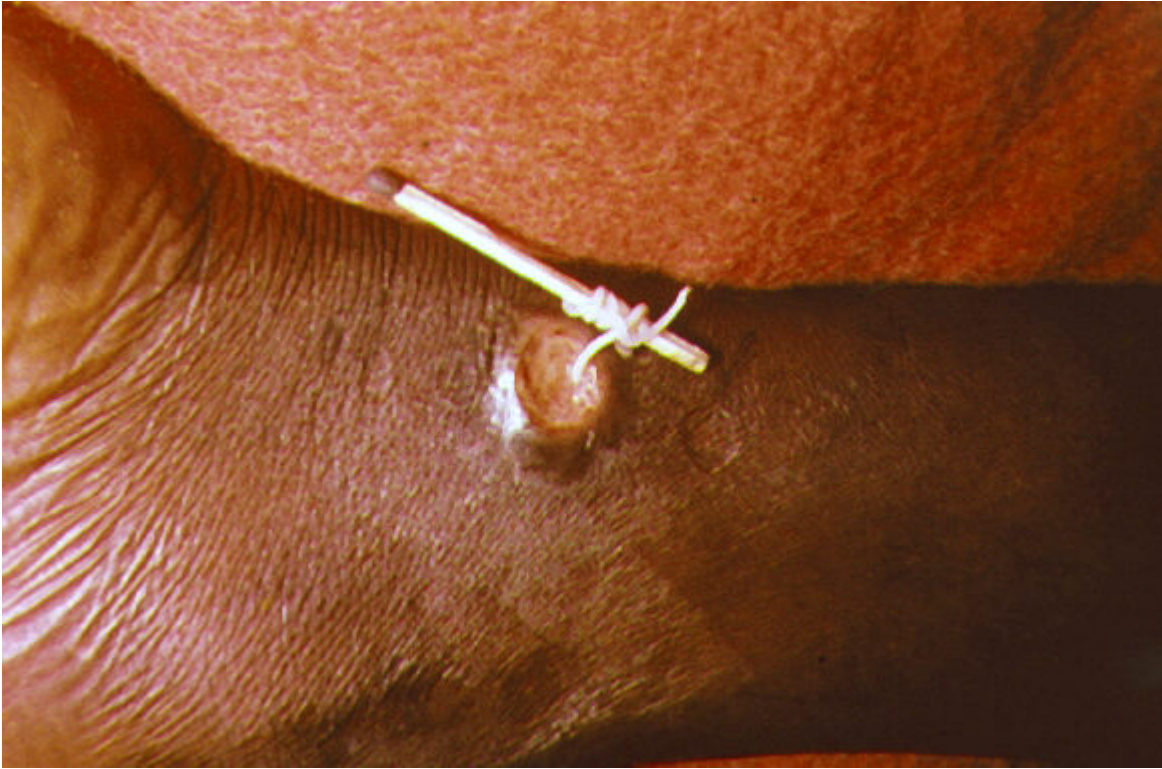
DRACUNCULIASIS (GUINEA WORM DISEASE) ?

Definition ?

- Dracunculiasis = **parasitic infection caused by Dracunculus medinensis**
 - Also known as:
 - **Guinea worm disease ?**
 - Characterized by:
 - Involvement of **subcutaneous tissue**
 - Commonly affects:
 - **Lower limbs (leg/foot) ?**
-

Agent ?





- **Dracunculus medinensis**
 - Long, thread-like nematode
 - Female worm:
 - Very long (up to 1 meter) ?
 - Habitat:
 - Subcutaneous tissue
-

Transmission ?



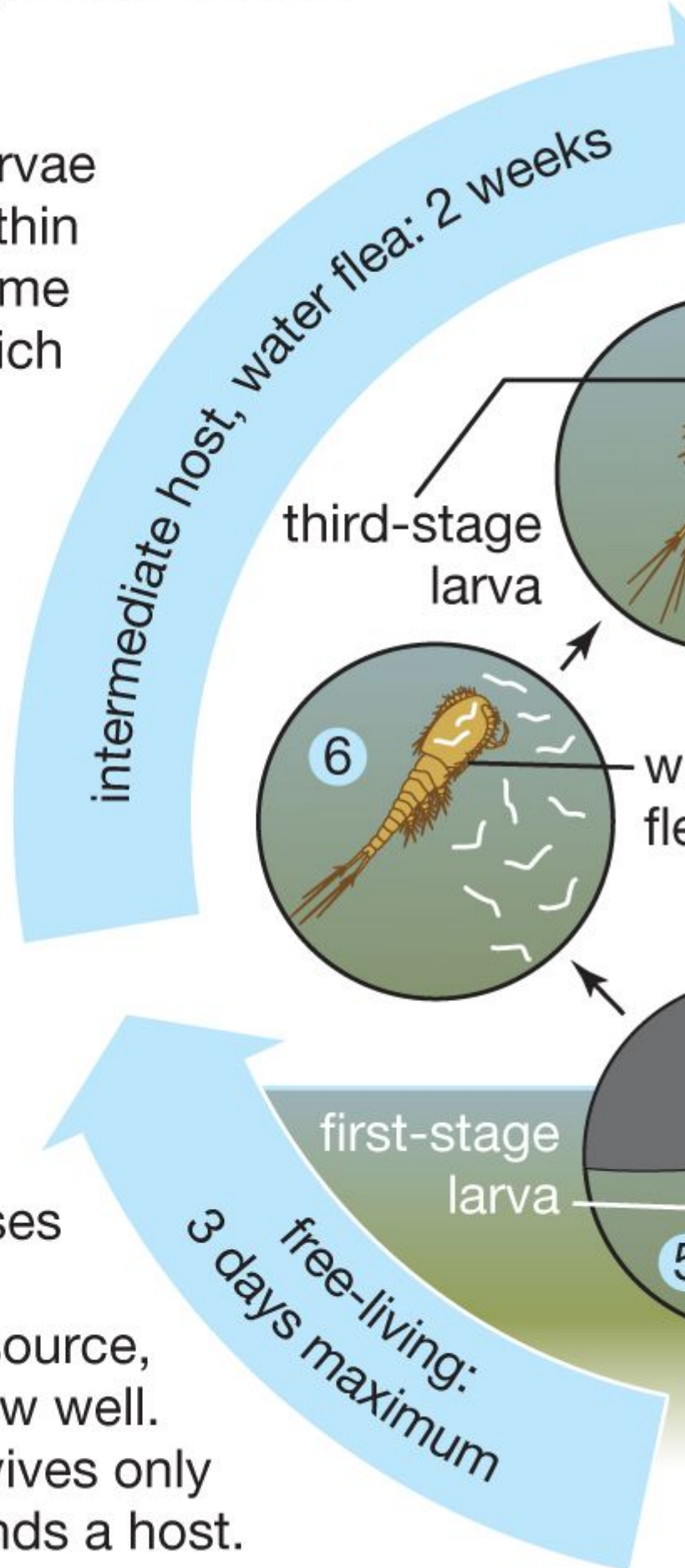
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Life cycle of the guinea worm

7. In two weeks the larvae undergo two molts within the water flea to become third-stage larvae, which can infect humans.

6. Water flea consumes worm larvae, which resist digestion.

5. On contact with water the emerging worm releases immature (first-stage) larvae into the water source, often a pond or shallow well. A free-living larva survives only three days unless it finds a host.



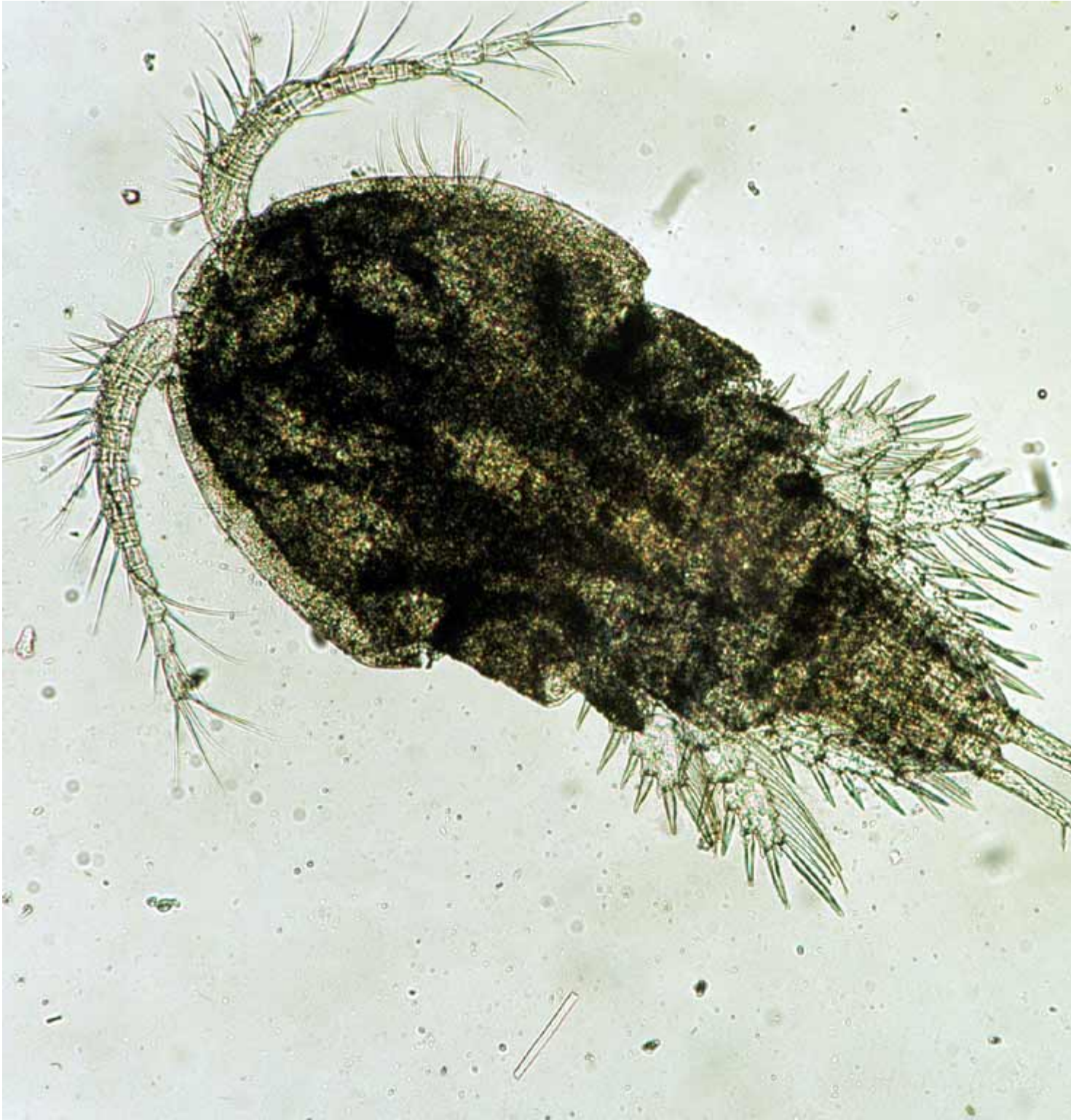
- Occurs by drinking:
 - **Water containing infected Cyclops ?**
 - Mechanism:
 - Cyclops (water flea) ingested ? larvae released in body
-

Reservoir / Intermediate Host / Vector ?

Reservoir ?

- **Human reservoir only (VERY IMPORTANT)**
-

Intermediate Host ?





- Cyclops (water flea) ?
- Freshwater crustacean

Vector

- No true vector
 - Transmission via:
 - Ingestion of intermediate host (Cyclops)
-

Ultra High-Yield Points ?

- Disease ? Guinea worm disease
- Agent ? *Dracunculus medinensis*
- Transmission ? Drinking water with Cyclops ?
- Reservoir ? Human only
- Site ? Subcutaneous tissue (leg/foot) ?

LIFE CYCLE OF DRACUNCULUS MEDINENSIS ?

Stepwise Life Cycle ?

1. Infected Water Ingestion ?

- Drinking water containing:
 - Cyclops with infective larvae
-

2. Larval Release

- In stomach:
 - Cyclops dies ? releases larvae
-

3. Maturation in Body

- Larvae penetrate intestinal wall
 - Migrate in body
 - Mature into adult worms
-

4. Gravid Female Migration ?

- Fertilized female migrates to:
 - Subcutaneous tissue (usually leg/foot)
-

5. Ulcer Formation ?





- Painful blister forms on skin
 - Ruptures ? forms ulcer
-

6. Larvae Released in Water ?

- When affected part contacts water:
 - Female releases **thousands of larvae**
-

7. Cyclops Ingests Larvae ?

- Larvae ingested by:
 - **Cyclops (intermediate host)**
 - Develop into infective stage ? cycle continues
-

FLOWCHART: LIFE CYCLE ?

Ingestion of infected water (Cyclops) ?

?

Larvae released in stomach

?

Penetrate intestine ? migrate in body

?

Mature into adult worms

?
Gravid female migrates to skin ?
?
Blister ? ulcer formation
?
Contact with water
?
Larvae released in water ?
?
Cyclops ingests larvae
?
Infective stage develops

EPIDEMIOLOGY OF DRACUNCULIASIS ?

1. Former Endemicity ?

- Previously common in:
 - Africa
 - Asia (including India)
- Now:
 - **Nearly eradicated globally ?**

2. Seasonal Occurrence ?

- Depends on:
 - Water usage patterns
- More common during:
 - **Dry season (water scarcity ? use of contaminated sources)**

3. Water Source Relation ?

- Strongly associated with:
 - **Use of stagnant water sources ?**
 - Ponds

- Wells
 - Lack of:
 - Safe drinking water
-

Ultra High-Yield Points ?

- **Transmission ? Drinking water with Cyclops ?**
- **Characteristic lesion ? Skin ulcer with worm emergence**
- **Contact with water ? releases larvae (key step) ?**
- **Disease almost eradicated (important PSM fact)**
- Prevention focus:
 - **Safe water supply + filtration**

CLINICAL FEATURES OF DRACUNCULIASIS ?

1. Blister Formation ?





- Painful **blister over skin**
 - Common site:
 - **Lower limb (leg/foot) ?**
-

2. Burning Pain ?

- Severe burning sensation at lesion site
 - Patient often:
 - **Immerses limb in water** (important for transmission)
-

3. Worm Emergence ?

- Blister ruptures ? **adult worm emerges slowly**
 - May take:
 - Days to weeks
-

4. Secondary Infection ?

- Ulcer prone to:
 - Bacterial infection
 - Leads to:
 - Abscess
 - Cellulitis
-

5. Disability ?

- Due to:
 - Pain
 - Ulcer
 - Leads to:
 - Reduced mobility
 - Loss of working days
-

Ultra High-Yield Points ?

- **Blister + burning pain ? classical presentation**
 - **Water contact ? triggers larval release ?**
 - **Worm emergence ? diagnostic feature**
 - **Complication ? secondary infection**
-

PREVENTION AND CONTROL OF DRACUNCULIASIS ?

1. Safe Drinking Water ?

- Provide **protected water sources**
 - Avoid use of:
 - Contaminated ponds/wells
-

2. Filtering Water ?

- Use of:
 - Cloth filters
 - Nylon filters
- Removes:
 - Cyclops (intermediate host) ?

3. Prevent Infected Persons from Entering Water ?

- Do not allow:
 - Infected individuals to enter water bodies
- Prevents:
 - Release of larvae into water

4. Cyclops Control ?

- Use of:
 - Larvicides (e.g., temephos)
- Reduces:
 - Intermediate host population

5. Case Containment ?

- Early detection of cases
- Proper wound care
- Prevent water contamination

6. Surveillance ?

- Active surveillance to detect:

- New cases
 - Essential for:
 - Eradication
-

Ultra High-Yield Points ?

- **Key prevention ? Safe water + filtration ?**
 - **Cyclops = intermediate host**
 - **No vaccine / drug ? prevention-based control**
 - Focus on:
 - **Interrupting transmission cycle**
-

ERADICATION OF DRACUNCULIASIS ?

Global Eradication Effort ?

- Led by:
 - WHO and global partners
 - Strategy:
 - Safe water
 - Surveillance
 - Case containment
-

Remaining Endemic Countries ?

- Very few countries remain endemic
 - Mainly:
 - Parts of **Africa ?**
-

India Elimination Milestone ?

- India declared:

- Dracunculiasis-free (2000) ?

Ultra High-Yield Points ?

- Second disease targeted for eradication after smallpox
- No animal reservoir ? easier eradication ?
- India ? eliminated in 2000
- Focus:
 - Water safety + surveillance

TABLE: LIFE CYCLE OF GUINEA WORM ?

STAGE	LOCATION	KEY EVENT	IMPORTANCE
Infected water ingestion ?	Human	Cyclops containing larvae ingested	Entry of infection
Larval release	Stomach	Cyclops dies ? larvae released	Start of infection
Larval migration	Body tissues	Penetrate intestine ? migrate	Development stage
Adult maturation ?	Subcutaneous tissue	Worms mature	Pathogenic stage
Gravid female migration ?	Skin (leg/foot)	Moves to surface	Prepares for transmission
Blister formation	Skin	Painful ulcer forms	Clinical stage
Larvae release ?	Water contact	Larvae discharged into water	Transmission stage
Cyclops ingestion ?	Water	Cyclops ingests larvae	Intermediate host stage

TABLE: MEASURES FOR ERADICATION OF DRACUNCULIASIS ?

MEASURE	ACTION	IMPORTANCE
Safe drinking water ?	Provide protected water sources	Prevent infection
Water filtration ?	Use cloth/nylon filters	Removes Cyclops
Prevent water contamination ?	Stop infected persons entering water	Break transmission
Cyclops control ?	Use larvicides (temephos)	Kill intermediate host
Case containment ?	Detect and manage cases early	Prevent spread
Surveillance ?	Active case detection	Essential for eradication
Health education	Awareness programs	Behavior change

TABLE: DRACUNCULIASIS vs FILARIASIS vs CELLULITIS vs OTHER WORM SKIN LESIONS ?

FEATURE	DRACUNCULIASIS	FILARIASIS	CELLULITIS	OTHER WORM SKIN LESIONS
Cause	Dracunculus medinensis ?	Wuchereria bancrofti	Bacterial infection	Various parasites
Transmission	Drinking water (Cyclops) ?	Mosquito bite ?	Skin infection	Variable
Site	Subcutaneous tissue (leg/foot) ?	Lymphatics	Skin/subcutaneous tissue	Skin
Onset	Slow, chronic	Chronic	Acute ?	Variable

FEATURE	DRACUNCULIASIS	FILARIASIS	CELLULITIS	OTHER WORM SKIN LESIONS
Key lesion ?	Blister ? worm emergence	Lymphedema, elephantiasis	Red, painful swelling	Nodules / tracks
Pain	Burning pain ?	Usually painless	Severe pain ?	Variable
Systemic features	Minimal	Fever (acute phase)	Fever	Variable
Diagnostic clue ?	Worm emerging from ulcer	Microfilaria in blood	Clinical signs	Depends on parasite

Ultra High-Yield Points ?

- **Dracunculiasis ? blister + worm emergence**
- **Filariasis ? lymphedema / elephantiasis ?**
- **Cellulitis ? acute painful swelling**
- **Transmission difference ? water vs mosquito ?**
- **Eradication ? possible due to no animal reservoir ?**

FLOWCHART: LIFE CYCLE OF *Dracunculus medinensis* ?

Ingestion of contaminated water (Cyclops with larvae) ?

?

Larvae released in stomach

?

Penetrate intestinal wall ? migrate in body

?

Maturation into adult worms

?

Gravid female migrates to skin (leg/foot)?

?

Blister formation ? ulcer

?

Contact with water

?

Larvae released into water ?

?

Cyclops ingests larvae

?

Larvae develop into infective stage

FLOWCHART: ERADICATION STRATEGY ?

Identify cases (active surveillance) ?

?

Case containment (prevent water contact) ?

?

Provide safe drinking water

?

Water filtration (remove Cyclops) ?

?

Health education

?

Cyclops control (larvicides) ?

?

Prevent reintroduction of infection

?

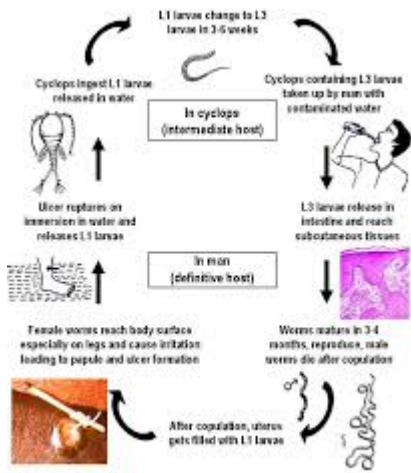
Continuous surveillance

?

Eradication achieved ?

FIGURE: WATER CONTAMINATION CYCLE THROUGH CYCLOPS ?

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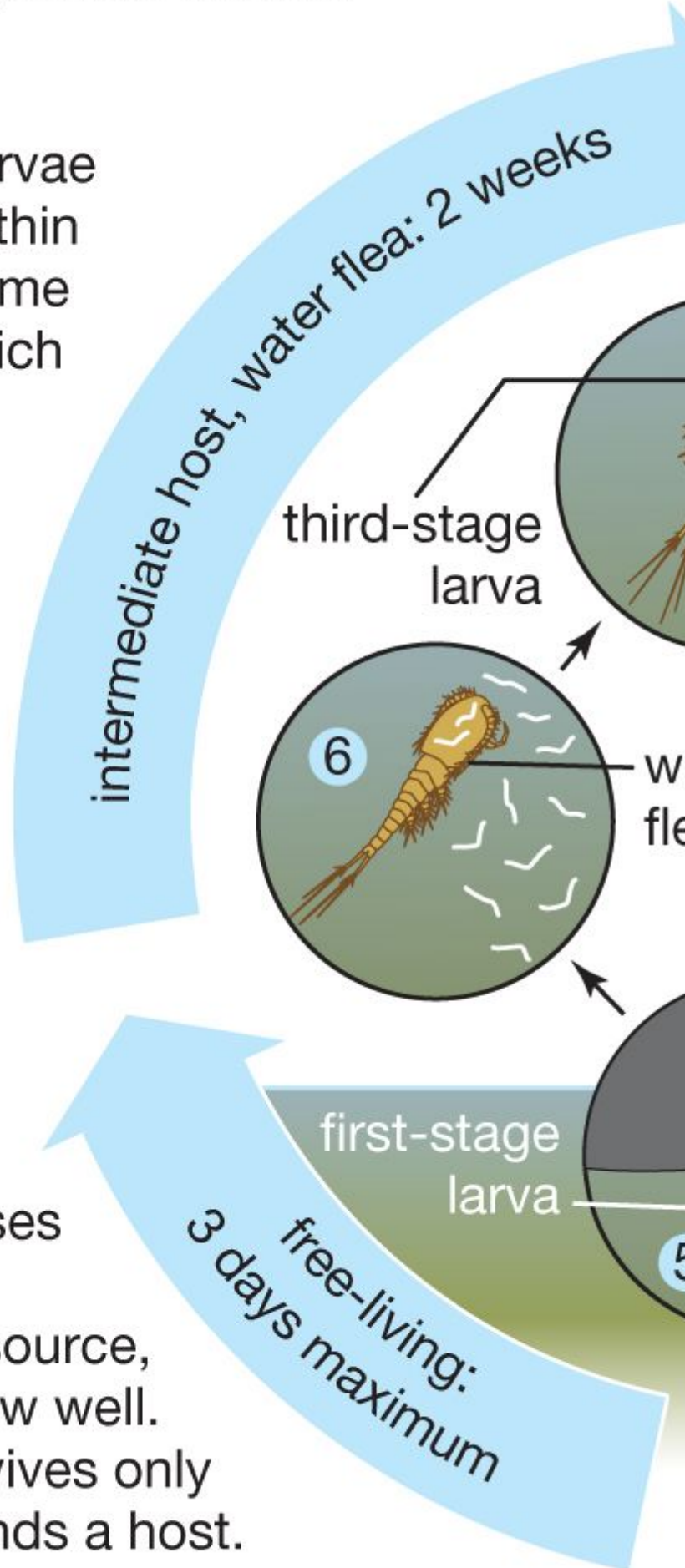


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Infected person enters water

?

Larvae released into water ?

?

Cyclops ingests larvae

?

Larvae develop inside Cyclops

?

Human drinks contaminated water ?

?

Cyclops ingested

?

Infection occurs

?

Cycle continues

Ultra High-Yield Points ?

- **Transmission ? Drinking water with Cyclops ?**
- **Key step ? Water contact releases larvae**
- **No animal reservoir ? eradication possible ?**
- **Prevention focus ? Water safety + filtration**