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This presentation is used with Lesson Plan 5:
Disease Transmission in the Latrine Design
and Construction Trainer Manual.

Available at www.cawst.org/resources



Disease Transmission



Learning Outcomes

1. Identify different transmission routes of diseases.
2. Identify diseases related to poor sanitation.
3. Explain how sanitation can prevent the transmission of diseases.



What is a Pathogen?

*Any living thing that
causes disease*



Types of Pathogens

- 1. Viruses:** (0.02 – 0.2 microns), unable to reproduce by themselves
- 2. Bacteria:** (0.2 – 5 microns), most common living things found in human and animal feces
- 3. Protozoa:** (4 – 20 microns), may be able to form cysts
- 4. Helminths:** (40 – 100 microns), worms and flukes, require a host and passed in human and animal feces



Size Comparison

Smallest



- Virus**
- Bacteria**
- Protozoa**
- Helminth**

○ Virus (0.02 to 0.2 micron)

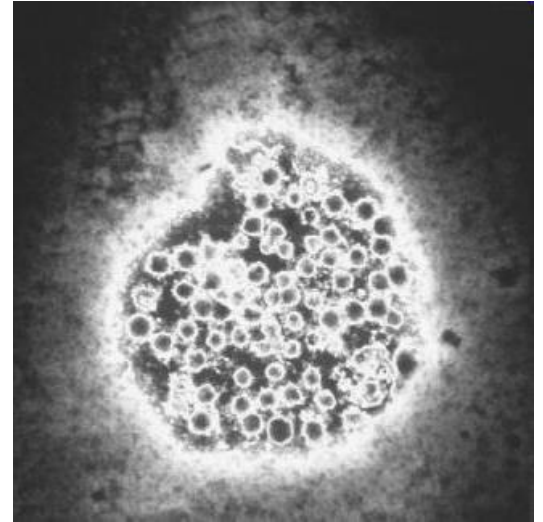
○ Bacteria (0.2 to 5 microns)

○ Protozoa
(4 to 20 microns)

○ Helminth
(40 to 100 microns)

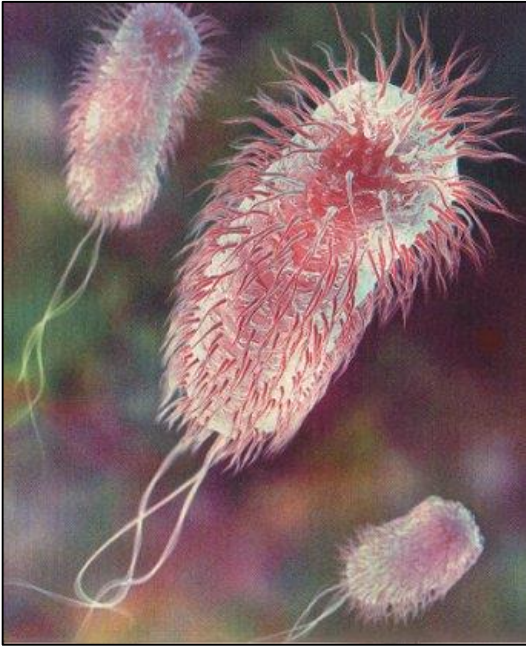
Viruses

- Hepatitis A and E
- Unable to reproduce by themselves
- Must use another living thing called a host
 - Microorganism, animal, human
- Water cannot spread HIV or influenza viruses

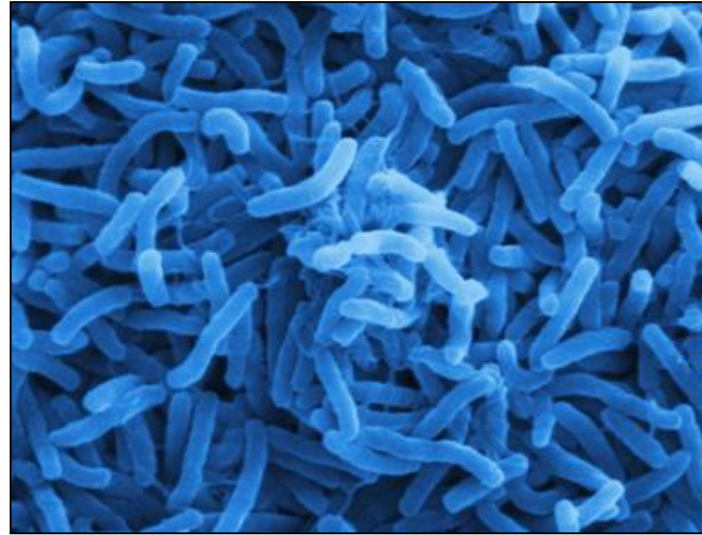


Hepatitis A

Bacteria



Escherichia coli



Cholera

- Most common living thing found in feces
 - 1 gram = billions of bacteria
- Diarrhea is the major symptom of sanitation-related diseases
 - Cholera, typhoid, shigellosis

Bacteria in Action

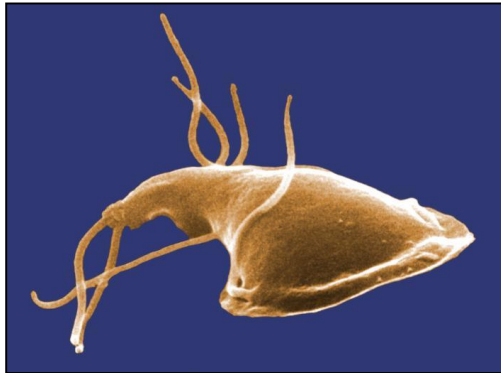


Protozoa

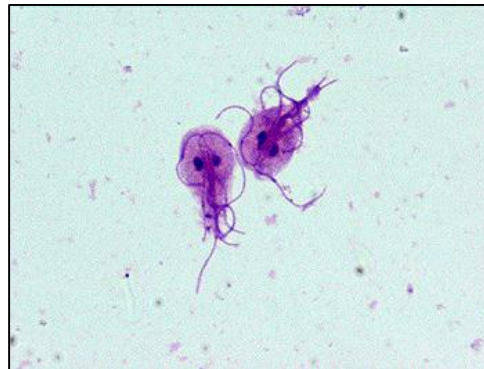


Cryptosporidium cyst

- Some need a host to survive
- Form cysts resistant to chlorine
- Some can stay alive outside of a host
- *Entamoeba histolytica*,
Cryptosporidium, *Giardia*



Giardia (side view)
(Credit: CDC, 1982)



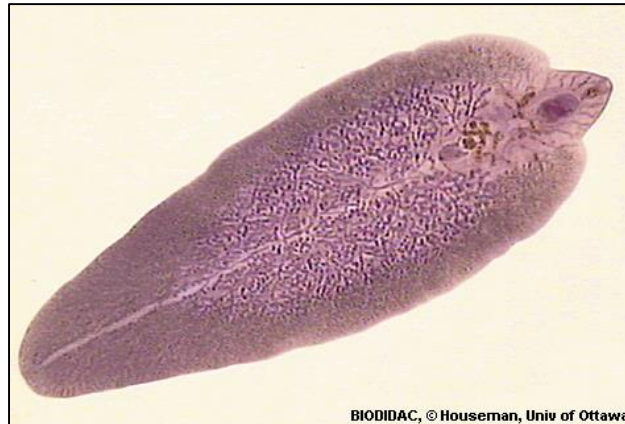
Giardia (top view)
(Credit: Mount Sinai Hospital)



Entamoeba histolytica
(Credit: Science Photo Library)

Helminths

- Schistosomiasis (bilharzia)
- *Dracunculus medinensis* (guinea worm)
- *Fasciola* (liver flukes)
- Round worm
- Hook worm
- Tape worm



Liver Fluke
(Credit: Houseman, BIODIDAC)



Guinea Worm
(Credit: Gubb, The Carter Center, Ghana, 2007)

Review

1. What is a pathogen?

*Any living organism that
causes disease*



Review

2. What are the four types of pathogens in order from smallest to largest?

1. *Viruses*

2. *Bacteria*

3. *Protozoa*

4. *Helminths*



Diseases Related to Sanitation

- Drinking water contaminated with fecal pathogens
- Washing in water contaminated with fecal pathogens
- Contact with soil contaminated with fecal pathogens

Diseases Related to Poor Sanitation

Cholera

Shigellosis

Schistosomiasis

Guinea worm

Giardiasis

Dysentery

Typhoid

Hook worm

Ascariasis

Cryptosporidiosis

Hepatitis A and E



Questions

1. Symptoms?
2. Pathogen?
3. Transmission?
4. Prevention?



Cholera

1. Symptoms:

- Watery diarrhea
- Nausea, vomiting
- Can lead to death



(Credit: Connect.in.com)

2. Pathogen: Bacteria (*Vibrio cholerae*)

Cholera

3. Transmission:

- Water and food contaminated with feces

4. Prevention:

- Sanitation facilities (e.g., latrines)
- Proper hygiene practices
- Safe drinking water and food



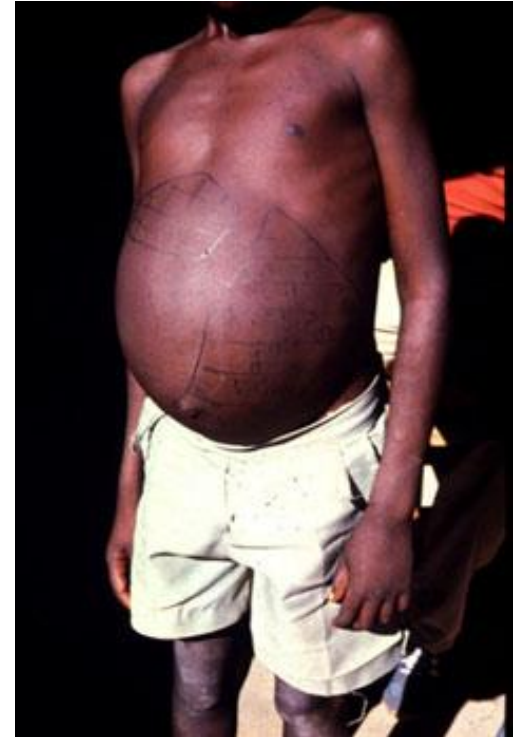
Schistosomiasis

1. Symptoms:

- Rashes and itchy skin
- Fever, chills, cough, muscle aches
- Blood in urine and stools

2. Pathogen: Helminth

(*Schistosoma haematobium*)



(Credit: www.path.cam.ac.uk)



(Credit: Natural History Museum, London)

Schistosomiasis

3. Transmission:

- Bathing or swimming in water contaminated with feces or urine

4. Prevention:

- Sanitation facilities
- Hygiene education and practices
- Design of water resources projects



Ascariasis

1. Symptoms:

- Often no symptoms
- Diarrhea, abdominal pain, general malaise, weakness
- Impairs nutrition, growth, physical development



Adult female roundworm
(Credit: CDC Division of Parasitic Diseases)

2. Pathogen: Roundworm (*Ascaris lumbricoides*)

Ascariasis

3. Transmission:

- Water or food contaminated with eggs
- Children who play in contaminated soil and then put their hands in their mouths

4. Prevention

- Sanitation to reduce soil contamination with infective eggs
- Treating excreta before using as fertilizer

