

# SPREAD OF PATHOGENS

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HEATHER WALLS



# PURPOSE

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- I can explain the role of microorganisms in disrupting the health of organisms.

# WHY SHOULD YOU CARE?

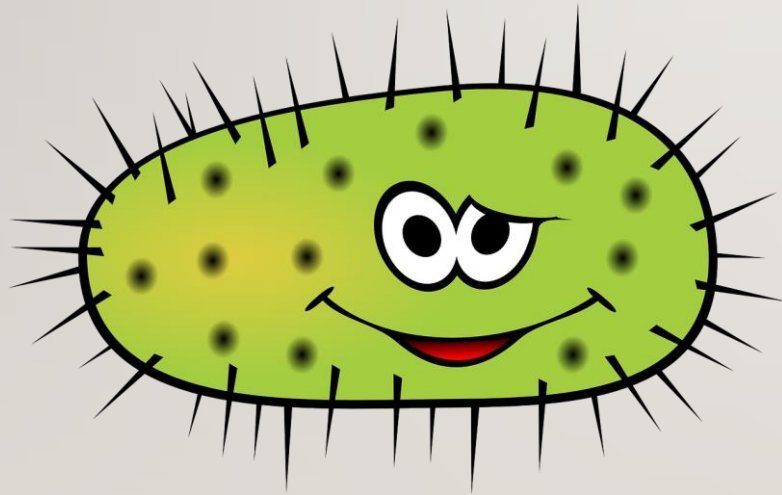
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- Plagues caused by infectious diseases have ravaged human populations throughout history.
- Even today, populations must deal with life-threatening diseases in localized areas or even on a global scale.
- Understanding what caused the diseases and how they spread has been the key to controlling these outbreaks and saving lives.
- We are currently dealing with the reality of COVID-19. Understanding the disease and how to control the spread is the key to fighting misinformation and panic.

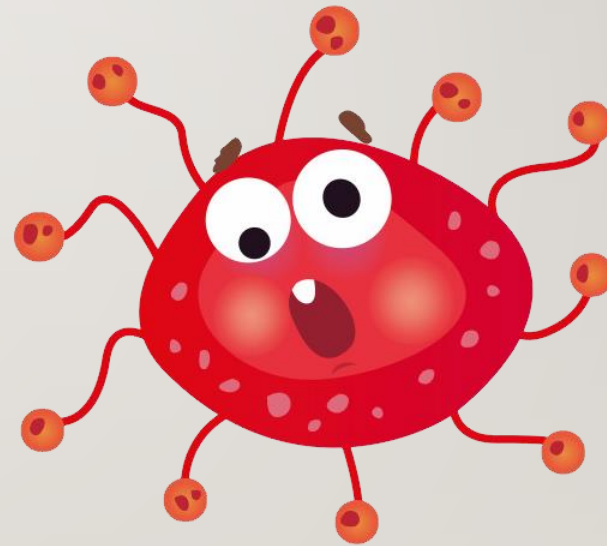
# WHAT IS A PATHOGEN

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- Pathogen-any microorganism or virus that can cause an infectious disease



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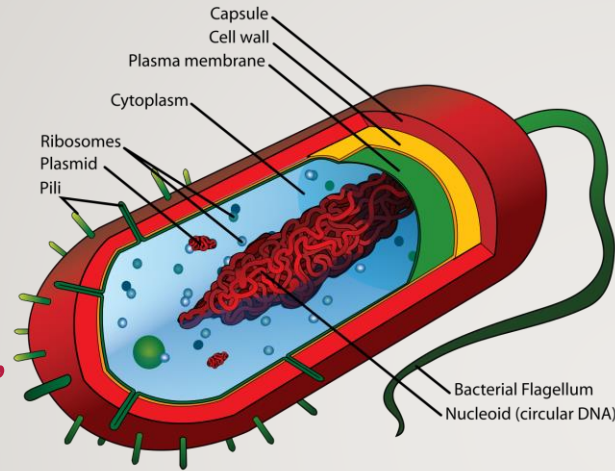


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# FOUR GROUPS OF PATHOGENS

## Bacteria:

- Prokaryotic
- Often cause illness by secreting or producing toxic substances
- Examples: strep, cholera, tetanus, botulism



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## Fungi:

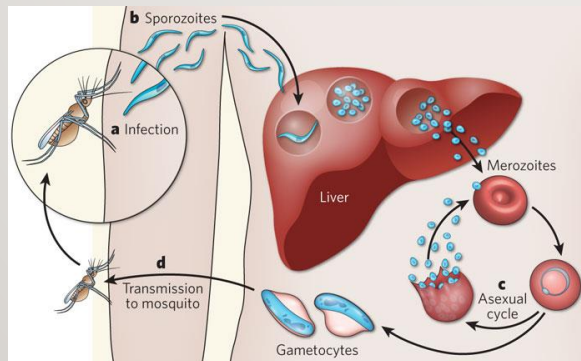
- Eukaryotic
- Can cause disease by producing toxins that can make us sick, acting as parasites, or causing allergic reactions
- Examples: ringworm, candida such as thrush and yeast infections, athlete's foot



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## Protists:

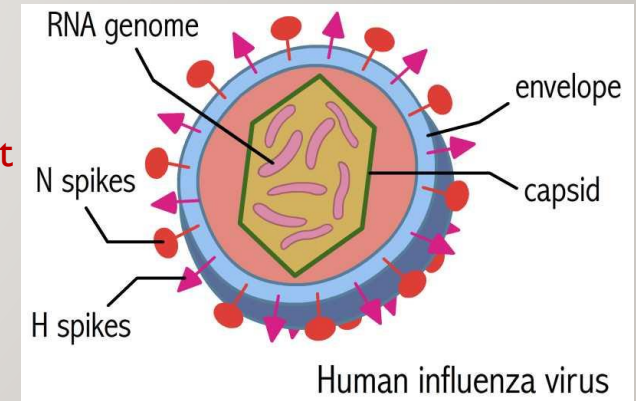
- Eukaryotic
- Huge diversity in kingdom; most diseases are caused by animal-like protists
- Harmful parasites
- Examples: malaria, Chagas disease, giardia, toxoplasmosis



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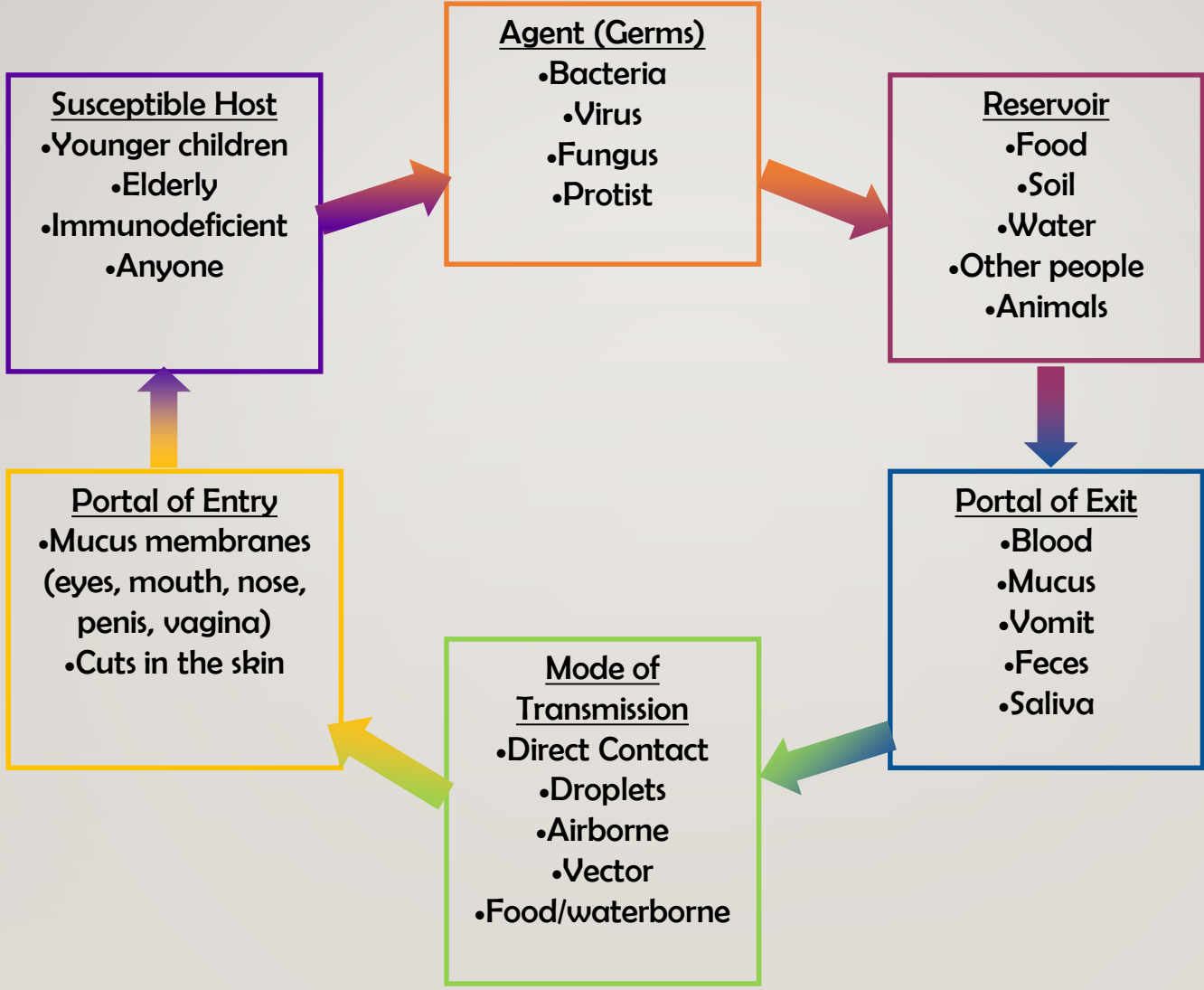
## Viruses:

- Not a cell; a nucleic acid surrounded by a protein coat
- Cause disease by invading a cell and using the cell's organelles to create new viruses that break out to infect new cells
- Examples: HIV, chicken pox, flu, COVID-19



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# Chain of Infection



# EXAMPLES

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- HIV is spread through direct contact of infected white blood cells such as sexual intercourse or intravenous drug use
- Mononucleosis is the “kissing disease” and can also spread through sharing drinks
- Flu is spread through droplets as people cough or sneeze (or drink after each other)
- Measles is considered airborne because the virus can stay in the air and active for several hours after the people has gone
- Malaria and West Nile are diseases spread by mosquitos; which do not actually have the disease, they just spread the pathogens
- Cholera caused many deaths in the late 1800s when feces contaminated local water sources

# PREVENTION

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- Hand washing after using the restroom and before eating
- Proper food handling and cooking temperatures
- Covering your mouth when coughing or sneezing
- Controlling insect populations
- Avoid contact with bodily fluids



# THEY AREN'T ALL BAD

## Bacteria:

- Prokaryotic
- Used to produce foods such as yogurt and cheese
- Help with digestion and absorption of nutrients
- Help keep other disease-causing bacteria in check
- Nitrogen fixation in the soil for plants
- Decomposers!

## Fungi:

- Eukaryotic
- Used to produce foods such as bread, beer, and other fermented foods
- Many antibiotics are derived from fungi
- Some weird people eat mushrooms
- Genetically engineered to make human hormones
- Decomposers!

## Protists:

- Eukaryotic
- Plant-like protists make over half of the oxygen on the planet
- Nitrogen fixers
- Decomposers!

## Viruses:

- Phages live in mucus membranes and help destroy bacteria
- Help develop immune systems of young children
- Scientists are working on genetically engineering viruses to work for us

# FOLLOW UP QUESTIONS

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- What are some other vectors you can think of?
- Considering the different modes of transmission, which modes would be most likely to infect a large number of individuals in a short period of time?
- Why might diseases spread by vectors be harder to control than other modes of transmission?
- Some infections can be spread before the person starts to show symptoms. Others can be spread by carriers that don't actually get sick. What kind of challenges do health care officials face when trying to control these diseases?