



Microbiology

Our focus...

- Learn about **microbial** life
 - Microbiology is a field of **really tiny living** organisms
 - **Bacteria** are **1000's** of times smaller than what we can **see**
 - **Viruses** are **1000's** of times smaller than bacteria!



Viruses

- Viruses are particles of a nucleic acid
 - Like DNA or RNA
- Surrounded by a protein coat

HOW MANY OF THE
MACROMOLECULES
DOES A VIRUS HAVE?



WHICH ONES ARE
MISSING???

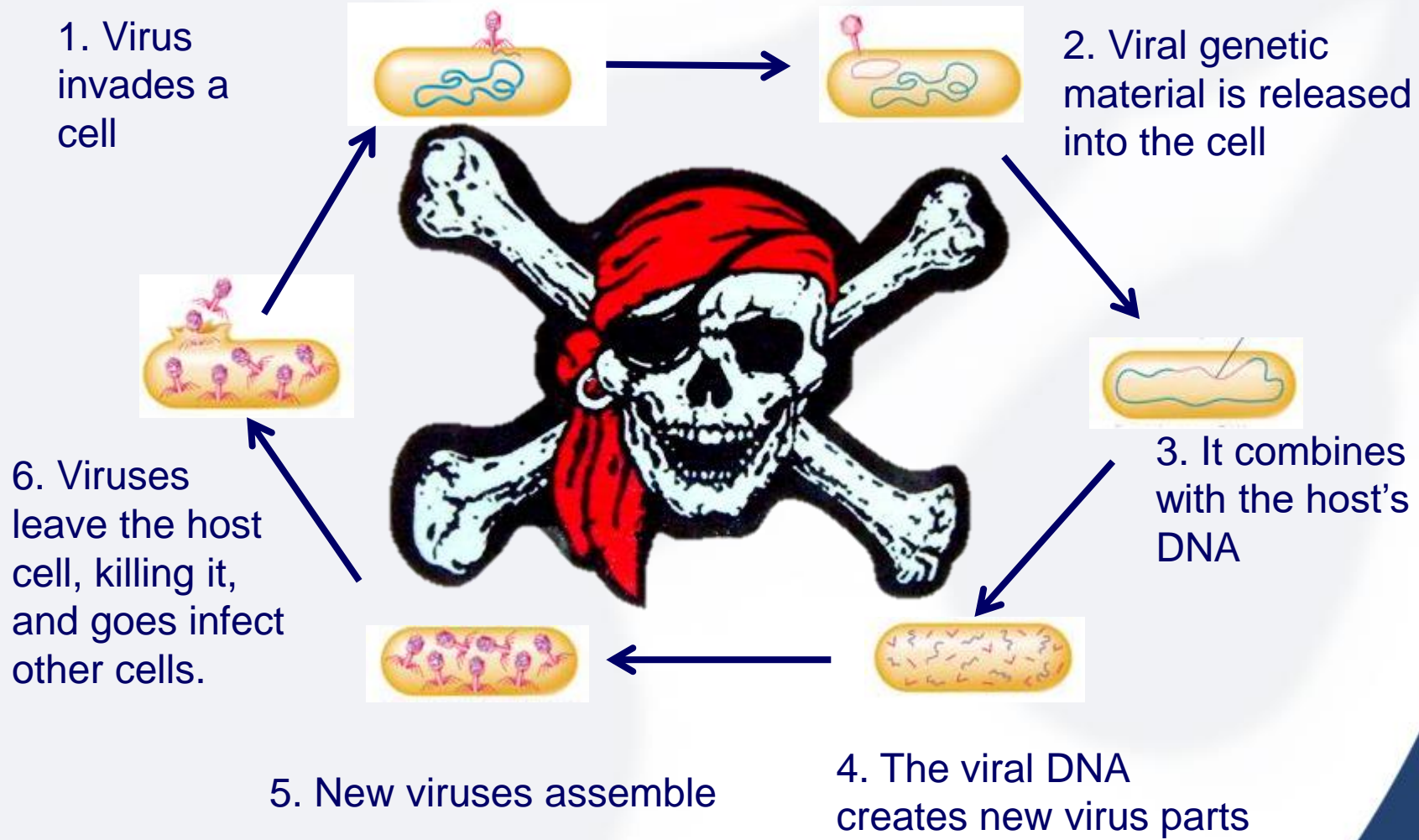
**SO ARE THEY
REALLY ALIVE???**

Viruses



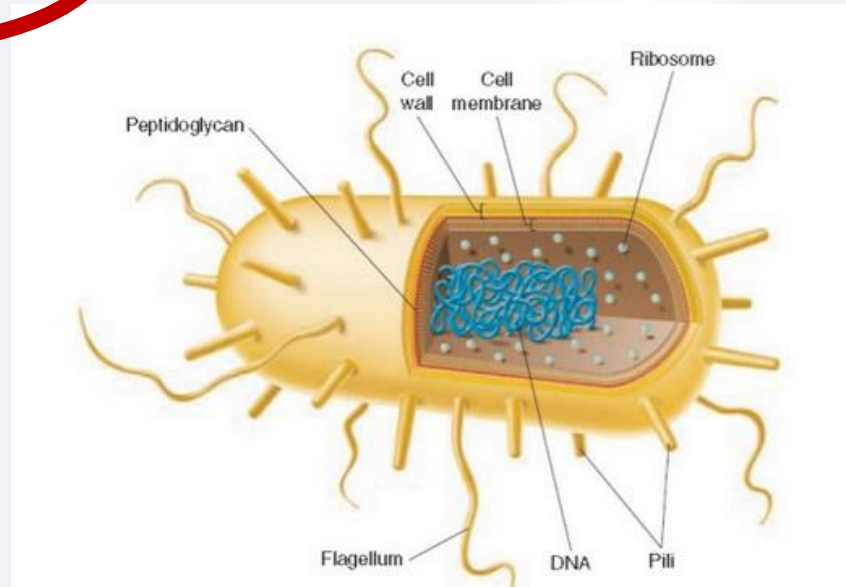
- Replicate by **invading a host cell**
 - Can only **infect a specific type of cell**
 - So are they really “alive”?
 - Yes
 - **Have genetic material and proteins, can replicate**
 - No
 - **Can’t replicate on their own, no carbs/lipids**

Viruses



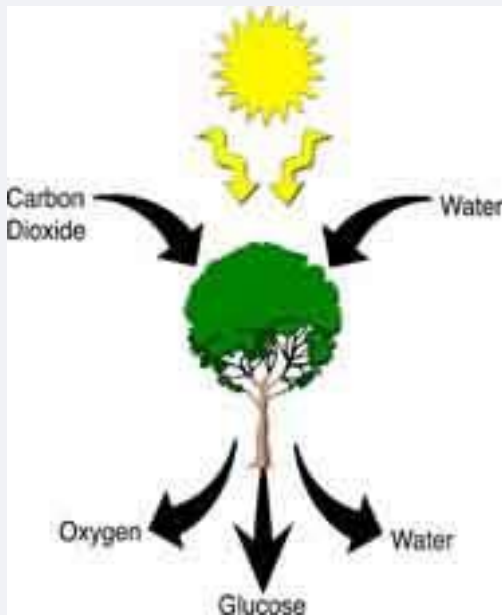
Bacteria

- **LIVING** organisms
 - Single celled
 - Lack a nucleus
 - Prokaryotic or eukaryotic?

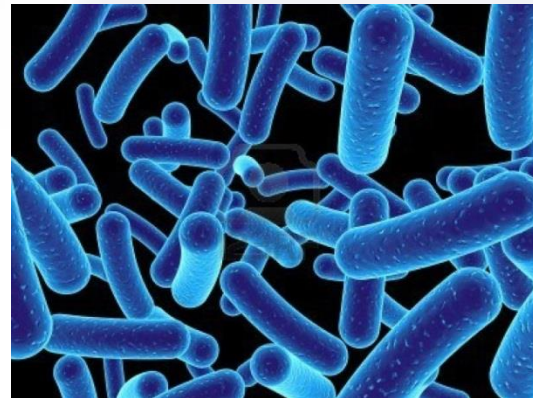


Bacteria

- Can be **photoautotrophs**
 - Use **light** to make **energy by itself**



- Can be **chemoautotrophs**
 - Use **chemicals** to make **energy by itself**



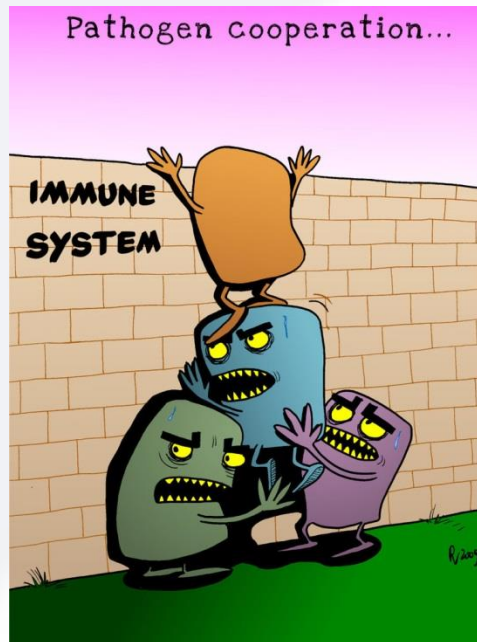
Bacteria

- Can be **anaerobic**
 - **Without** oxygen
- Can be **aerobic**
 - **With** oxygen



BIG PICTURE

- Bacteria and viruses are found literally **EVERYWHERE** in nature
 - Only a few cause disease
- **Disease-causing agents are called...**
 - **PATHOGENS**



Pathogens

- How to stop them?
 - Well, if it is **Viral** or **Bacterial** or **both**
 - **Vaccines** can be used
 - A vaccine is a preparation of weakened or killed pathogens
 - It is injected into the body
 - Shot, mist
 - Prompts the body to create immunity to the disease
 - Allows the body to destroy new pathogens



Pathogens

- How to stop them?
 - Bacteria ONLY
 - 3 ways exist
 - 1. Antibiotics can be used
 - 2. Sterilization
 - 3. Disinfectants
 - Remember the measles out break last year...?



So here is the problem!

- Bacteria and viruses **evolve**
 - Their genetic material changes
- Why is this a problem?
 1. Bacteria become **resistant** to current antibiotics
 - MRSA
 2. Vaccines need to be **updated**
 - Annual flu shot



Debate on vaccines...



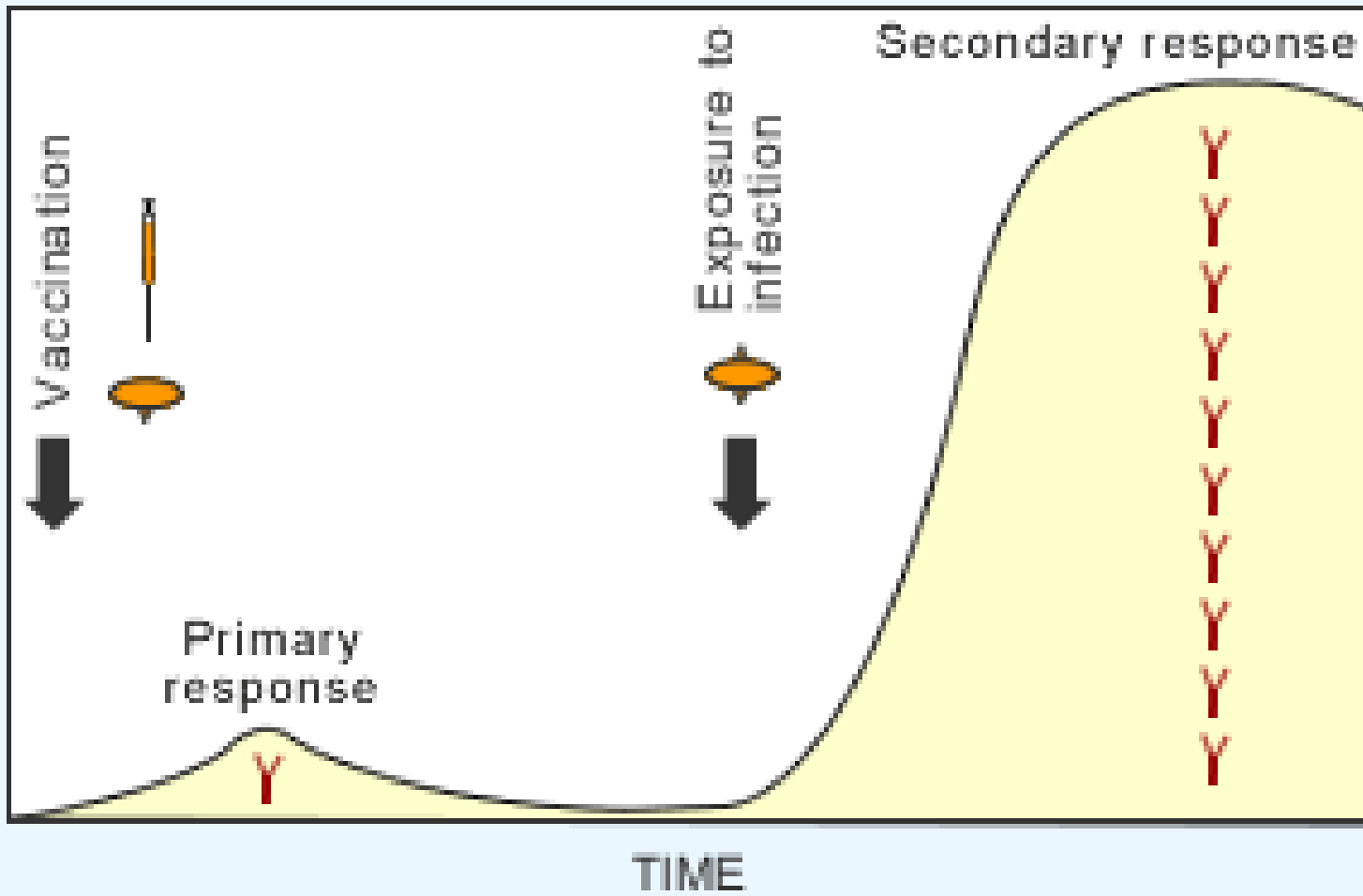
• Yes! Vaccinate!

- Eradicate disease
- Why risk your life due to personal, philosophical, or religious views?
- Certain ones are mandatory (small pox, polio)
- Childhood vaccinations in the US prevent 33,000 deaths per year
 - USA death rate for infants is 33rd in the world
- Helps prevent STD's / STI's
 - HPV
 - Recommended for males and females ages 10-26

• No! DON'T!

- I get sick!
- Risk of getting a contaminated specimen
 - Meningitis
- Could be allergic and not know it!
 - Vaccine injuries

ANTIBODY CONCENTRATION





DEATHS FROM INFECTIOUS DISEASE

