

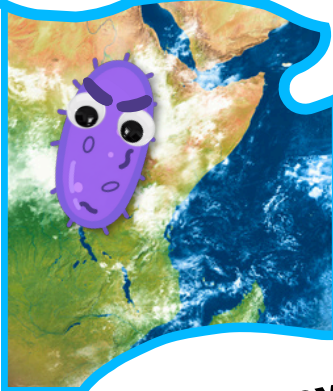
Meet_{the} MICROBES

CHAPTER 1

Oh, why, hello
there! It's very nice
to meet you. You can
call me **E. coli.**



You see, for
BILLIONS of years, us
microbes have been
hanging out on Earth...



...before any animals,
plants, or humans
were on this planet!



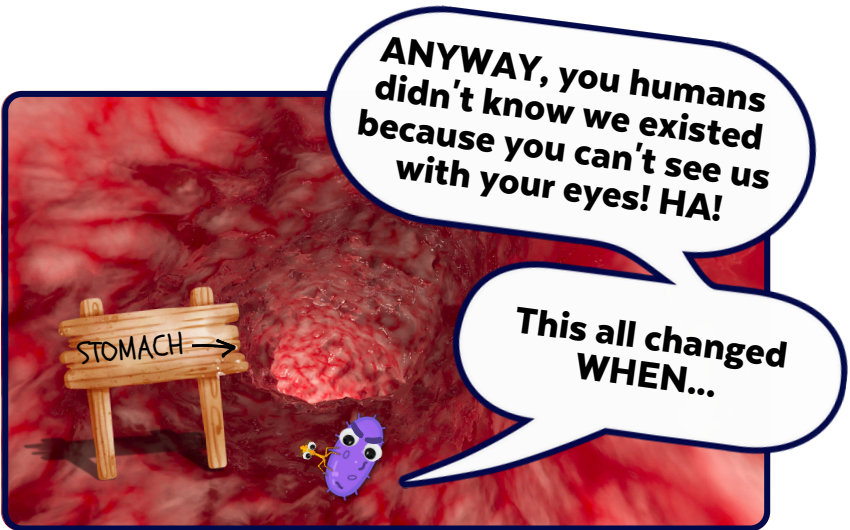
But, we have a
VERY special bond
with humans.



For years,
we've made
you sick --



HEY! Phage,
here! Not all of us
make you sick.
Many of us are your
friends, like me!



You see, a **MICROSCOPE** is a tool that can zoom in and see things that are **REALLY** tiny, like us!



That's why they call us **MICROBES**, short for microorganisms.

Micro means "small", **ORGANISMS** mean "living things."
We are small and alive!



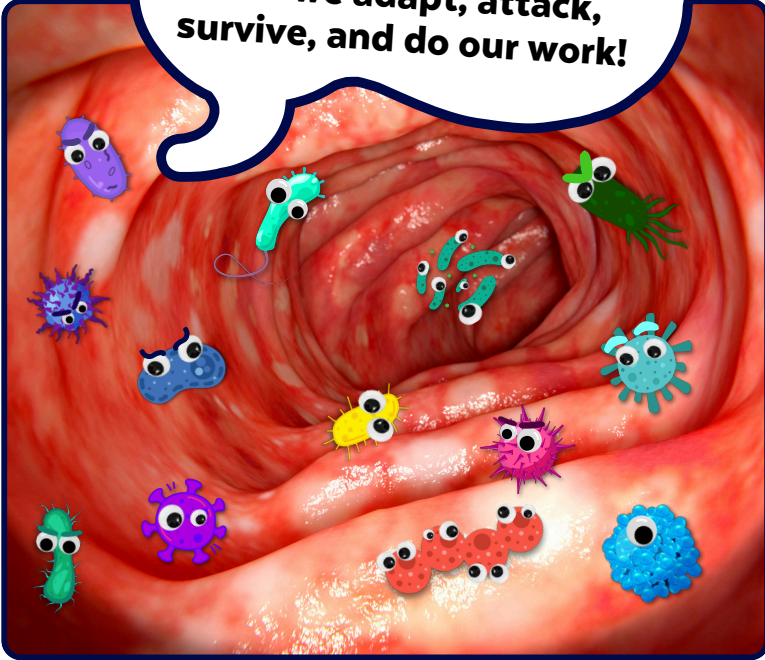
Now, **SCIENTISTS**
are obsessed with us!

I mean, I don't
blame them.

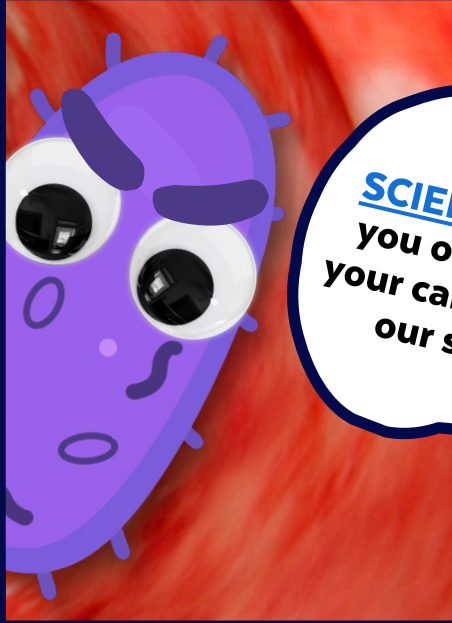
Look at our fabulous
shapes and colors!



Our shapes and colors
play an important role in
how we adapt, attack,
survive, and do our work!



SCIENTISTS have sent
you our ID cards. Grab
your cards and check out
our super powers!



HANDS-ON ACTIVITY

CHECKLIST



**Grab 3 Microbe ID
Cards from your
teacher.**



Check out your cards!



**Play games, trade,
and collect cards!**



MEET THE MICROBES

Bad Microbes



E. COLI
Escherichia coli

MICROBE TYPE:
Bad Bacteria

POWERS:
Sneaks into poop, then onto your hands, and into your mouth! Gives you diarrhea.

MICROBE BUSTERS:

- ✓ Eat fully cooked meat
- ✓ Drink clean water
- ✓ Wash fruits and veggies
- ✓ Wash hands after using the bathroom and before eating
- ✗ Avoid unpasteurized milk



TERTIAN FEVER
Plasmodium Vivax

MICROBE TYPE:
Bad Protozoa

POWERS:
Sneaks in through dirty mosquito bites and gives you a fever, nausea, and bad headaches!

MICROBE BUSTERS:

- ✓ Use bug spray
- ✓ Use mosquito nets



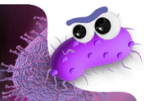
BLASTO
Blastomycosis dermatitidis

MICROBE TYPE:
Bad Fungus

POWERS:
Sneaks in through your breathing and gives you a lung infection and chest pain.

MICROBE BUSTERS:

- ✓ Wear a mask if digging or playing in soil
- ✓ Wash hands
- ✓ Clean your clothes and shoes after playing outside



THE RAGE
Rabies

MICROBE TYPE:
Bad Virus

POWERS:
Sneaks in through sick animal bites (bats, raccoons, skunks, foxes, and sometimes dogs and cats); can hide in your body before it makes you sick. Gives you pain and weakens your muscles.

MICROBE BUSTERS:

- ✓ Get your pets vaccinated
- ✓ Tell an adult if you get bitten
- ✗ Don't touch animals outside




STOMACH BUG
Norovirus

MICROBE TYPE:
Bad Virus



POWERS:

Sneaks in from dirty hands, food, and surfaces. Loves to travel through hugging or touching hands with a sick person! Gives you diarrhea and makes you vomit.

MICROBE BUSTERS:








- ✓ Wash hands
- ✓ Wash fruits and veggies
- ✓ Clean surfaces
- ✓ Wash dirty dishes
- ✗ Don't eat old food or street food
- ✗ Don't eat raw seafood




CORONAVIRUS
SARS-CoV-2

MICROBE TYPE:
Bad Virus



POWERS:

Travels through the air when a sick person talks, coughs, or sneezes! Gives you fever, shortness of breath, and hijacks your smell and taste senses!

MICROBE BUSTERS:






- ✓ Wash hands
- ✓ Get vaccinated
- ✓ Wear a mask in crowded places
- ✓ Distance from sick people




HAV
Hepatitis A

MICROBE TYPE:
Bad Virus



POWERS:

Sneaks into poop, then onto your hands, and into your mouth! Turns your skin and eyes yellow.

MICROBE BUSTERS:





- ✓ Wash hands after using the bathroom and before eating
- ✓ Drink clean water
- ✗ Don't eat dirty food or raw food




CANDIDA
Candida albicans

MICROBE TYPE:
Bad Fungus



POWERS:

If it grows too much, it makes your skin itchy and your mouth sore. Can sneak in from other people's dirty towels and dirty utensils, too!

MICROBE BUSTERS:





- ✓ Take showers and dry off
- ✓ Brush your teeth after eating
- ✗ Don't eat too much sugar

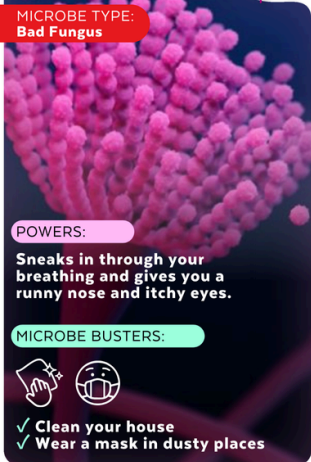
MEET THE MICROBES

Bad Microbes

**FUMI**
Aspergillus fumigatus



MICROBE TYPE:
Bad Fungus



POWERS:
Sneaks in through your breathing and gives you a runny nose and itchy eyes.

MICROBE BUSTERS:


- ✓ Clean your house
- ✓ Wear a mask in dusty places

**THE FLU**
Influenza virus



MICROBE TYPE:
Bad Virus



POWERS:
Travels through the air when a sick person talks, coughs, or sneezes! Loves to hang out on doorknobs and dirty toys, too. Gives you a fever, cough, sore throat, and runny nose!

MICROBE BUSTERS:


- ✓ Wash hands
- ✓ Cover your coughs and sneezes
- ✓ Get the flu shot
- ✓ Distance from sick people

**TB**
Mycobacterium tuberculosis



MICROBE TYPE:
Bad Bacteria



POWERS:
Travels through the air from person to person and gives you diarrhea.

MICROBE BUSTERS:


- ✓ Wash hands
- ✓ Get vaccinated
- ✓ Distance from sick people

**SALMONELLA**
Salmonella enterica



MICROBE TYPE:
Bad Bacteria



POWERS:
Sneaks into food and gives you diarrhea.

MICROBE BUSTERS:


- ✗ Don't eat raw eggs
- ✗ Don't eat old food or street food
- ✓ Wash hands
- ✓ Wash fruits and veggies
- ✓ Wash dirty dishes



STAPH
Staphylococcus aureus

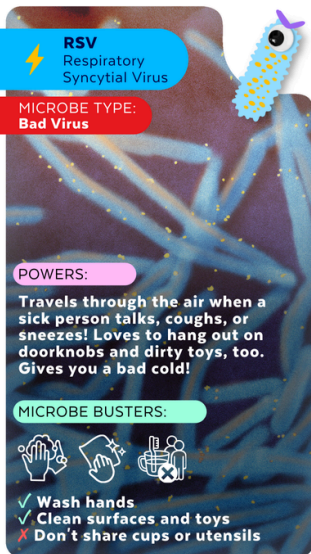
MICROBE TYPE:
Bad Bacteria

POWERS:
Sneaks into your body through a dirty cut or scrape. Makes your skin get painful bumps, red, or, swollen.

MICROBE BUSTERS:



- ✓ Wash hands
- ✓ Clean cuts and scrapes
- ✓ Take showers
- ✗ Don't share personal items



RSV
Respiratory Syncytial Virus

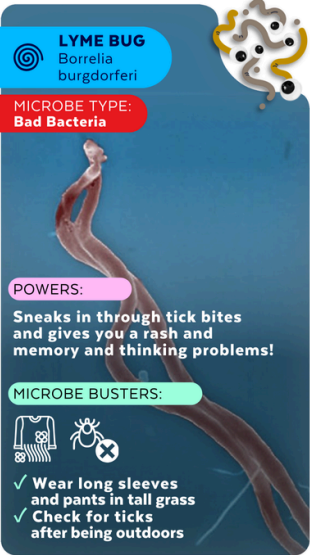
MICROBE TYPE:
Bad Virus

POWERS:
Travels through the air when a sick person talks, coughs, or sneezes! Loves to hang out on doorknobs and dirty toys, too. Gives you a bad cold!

MICROBE BUSTERS:



- ✓ Wash hands
- ✓ Clean surfaces and toys
- ✗ Don't share cups or utensils



LYME BUG
Borrelia burgdorferi

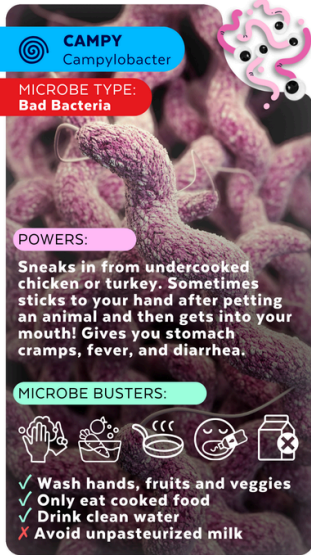
MICROBE TYPE:
Bad Bacteria

POWERS:
Sneaks in through tick bites and gives you a rash and memory and thinking problems!

MICROBE BUSTERS:



- ✓ Wear long sleeves and pants in tall grass
- ✓ Check for ticks after being outdoors



CAMPY
Campylobacter

MICROBE TYPE:
Bad Bacteria

POWERS:
Sneaks in from undercooked chicken or turkey. Sometimes sticks to your hand after petting an animal and then gets into your mouth! Gives you stomach cramps, fever, and diarrhea.

MICROBE BUSTERS:



- ✓ Wash hands, fruits and veggies
- ✓ Only eat cooked food
- ✓ Drink clean water
- ✗ Avoid unpasteurized milk

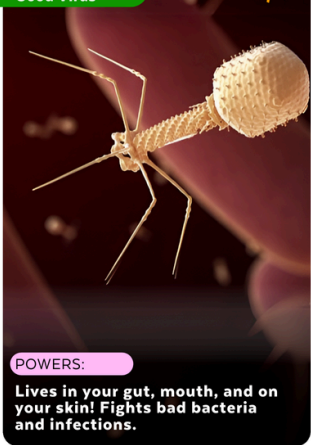
MEET THE MICROBES

Good Microbes

**PHAGE**
Bacteriophage



MICROBE TYPE:
Good Virus



POWERS:
Lives in your gut, mouth, and on your skin! Fights bad bacteria and infections.

**B. SUBTILIS**
Bacillus subtilis



MICROBE TYPE:
Good Bacteria



POWERS:
Enters your body when you eat fermented food. Helps you digest food, gives power to your immune system, and fights bad germs.

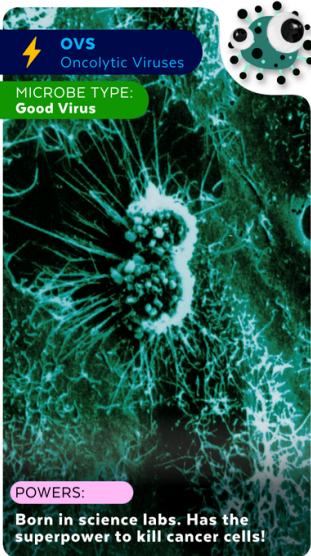
MICROBE BOOSTERS:

✓ Eat fermented foods like natto, miso, and sauerkraut

**OVS**
Oncolytic Viruses



MICROBE TYPE:
Good Virus

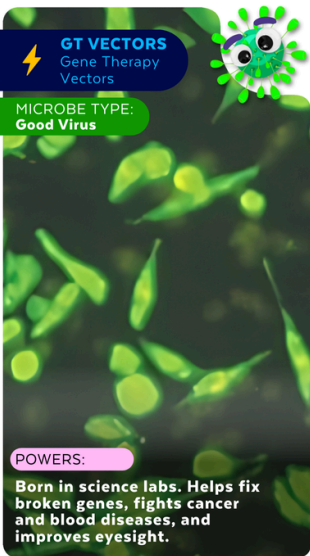


POWERS:
Born in science labs. Has the superpower to kill cancer cells!

**GT VECTORS**
Gene Therapy Vectors



MICROBE TYPE:
Good Virus



POWERS:
Born in science labs. Helps fix broken genes, fights cancer and blood diseases, and improves eyesight.


ERV
 Endogenous retroviruses

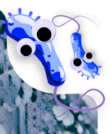


MICROBE TYPE:
Good Virus

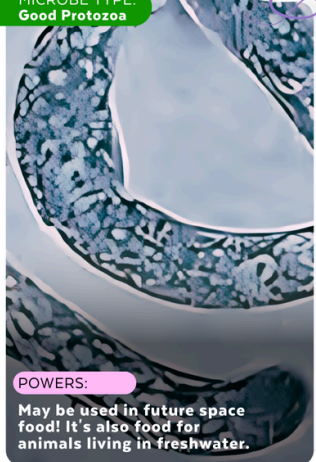


POWERS:
 Hangs out inside your DNA and protects you from viral infections.


EUGIE
 Euglena



MICROBE TYPE:
Good Protozoa



POWERS:
 May be used in future space food! It's also food for animals living in freshwater.


BAKER'S YEAST
 Saccharomyces cerevisiae



MICROBE TYPE:
Good Fungus



POWERS:
 It eats sugar and creates bubbles to make bread rise! Prevents diarrhea and even helps make vaccines to fight bad viruses.

MICROBE BOOSTERS:



✓ Eat fermented foods like kefir and yogurt


ORAL STREP
 Streptococcus salivarius



MICROBE TYPE:
Good Bacteria



POWERS:
 One of the first microbes to show in your mouth after being born. Prevents cavities and stops bad bacteria from overgrowing in your mouth.

MICROBE BOOSTERS:





✓ Brush your teeth twice a day
 ✓ Eat fruits and veggies
 ✗ Don't eat lots of sugar

MEET THE MICROBES

Good Microbes

**CY PHAGE**
Cyanophages



MICROBE TYPE:
Good Virus

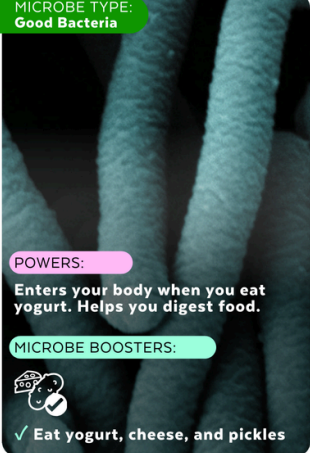


POWERS:
Great friend to Earth! Helps Earth's oxygen and carbon cycles and fights harmful blue-green algae in water.

**LACTO**
Lactobacillus acidophilus



MICROBE TYPE:
Good Bacteria



POWERS:
Enters your body when you eat yogurt. Helps you digest food.

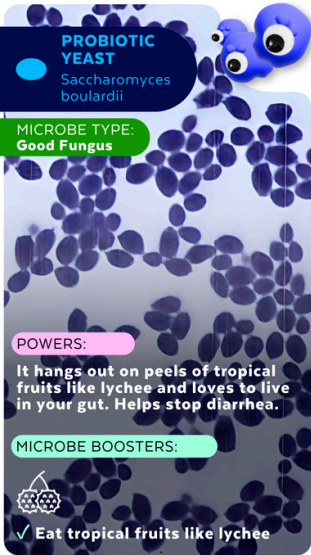
MICROBE BOOSTERS:

✓ Eat yogurt, cheese, and pickles

**PROBIOTIC YEAST**
Saccharomyces boulardii



MICROBE TYPE:
Good Fungus



POWERS:
It hangs out on peels of tropical fruits like lychee and loves to live in your gut. Helps stop diarrhea.

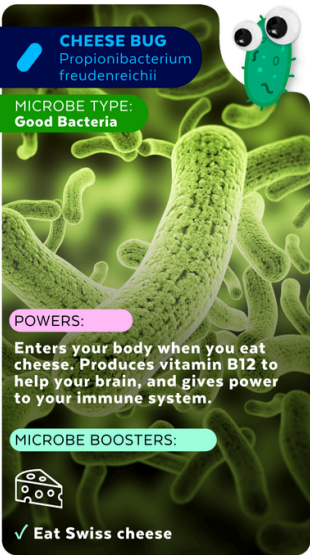
MICROBE BOOSTERS:

✓ Eat tropical fruits like lychee

**CHEESE BUG**
Propionibacterium freudenreichii



MICROBE TYPE:
Good Bacteria



POWERS:
Enters your body when you eat cheese. Produces vitamin B12 to help your brain, and gives power to your immune system.

MICROBE BOOSTERS:

✓ Eat Swiss cheese