

CÉSAR ANLEU

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No microbes

can RESIST

good habits

Illustrated by Giorgia Casti

AUTONOME PROVINZ  
BOZEN – SÜDTIROL



PROVINCIA AUTONOMA  
DI BOLZANO – ALTO ADIGE

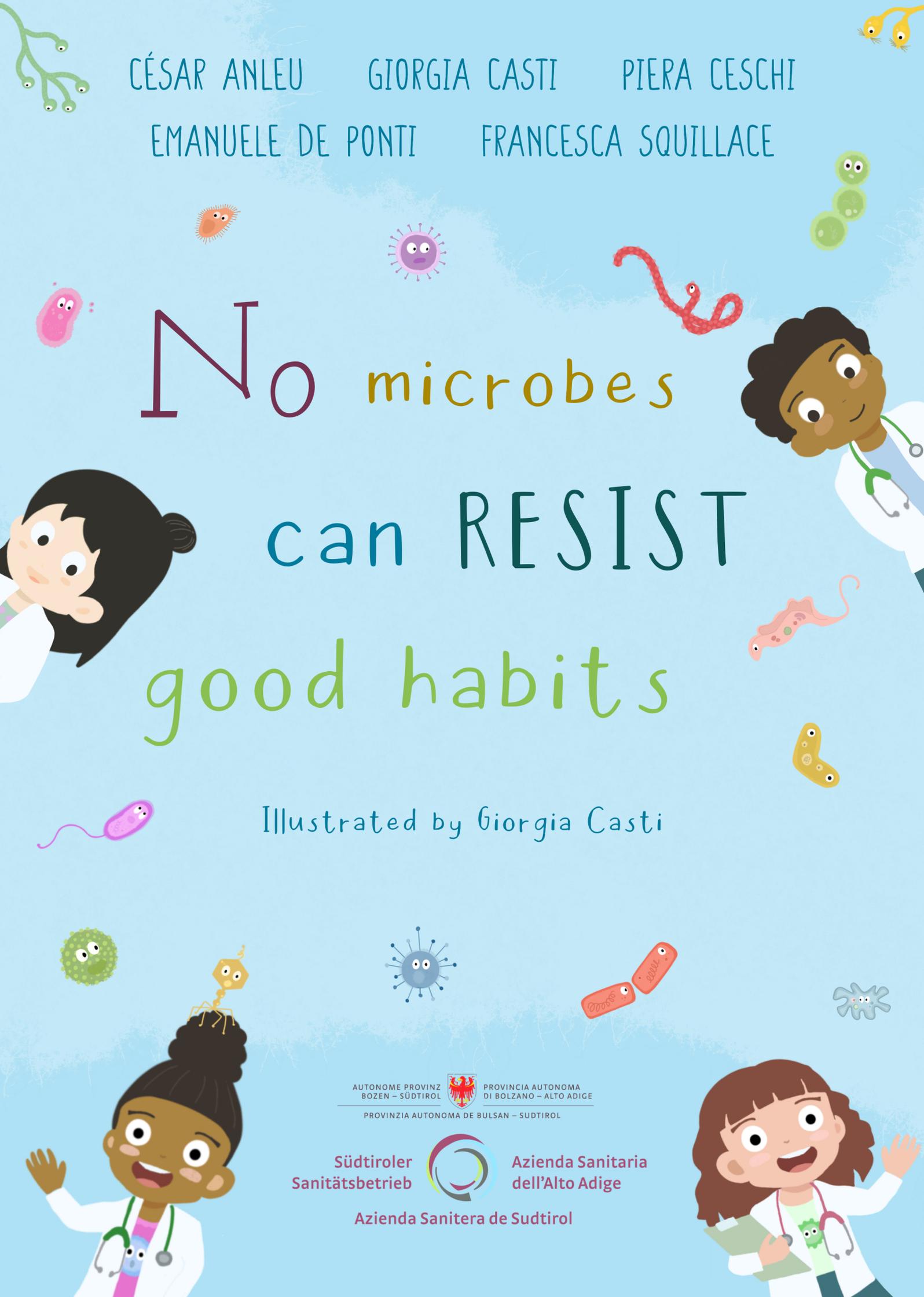
PROVINCIA AUTONOMA DE BULSAN – SÜDTIROL

Südtiroler  
Sanitätsbetrieb



Azienda Sanitaria  
dell'Alto Adige

Azienda Sanitera de Sudtiroi



## DEAR ADULTS,

this book is given to you with the intention of helping you and providing you with a useful tool to enable children to understand something more about our beautiful world.

**All children** deserve the opportunity to learn about the world, to be fascinated by it, to receive tools that can help them take care of it.

This book aspires to be a small tool in small hands to protect what is greatest to us: the health of all, none excluded.

**All children** have the right to know the world, including the problems that are part of it, sometimes big problems, such as

## ANTIMICROBIAL RESISTANCE,

which they cannot solve on their own and which we cannot solve without them.

**Together** is the key word.

We stand together, adults alongside children, to take care of

**everyone's world,  
everyone's future,  
everyone's health.**



## DEAR CHILDREN

this book is for you,  
all of you.

You will make  
many new microscopic friends  
and learn more about  
our little **big** world.

You will discover that  
there are microbes that can be  
**resistant** to all our medicines,  
but that **NO** microbe  
can resist **good habits**.

These are your super powers,  
along with the desire to learn  
about the world.

Understanding the world with  
its beauties, its diversities, with  
its small and even **bigger**  
problems is the first step to  
taking care of it.

Remember  
there is no problem  
we can't solve if we **all**,  
**together**, tackle it.



**This book  
belongs to**



# WHAT WILL YOU FIND IN THIS BOOK?



1. Nice to meet you **microbes** !



2. Explore all the different **microbes** with the microscope



3. Discover how **microbes** can **jump**!



4. Microbes are **globetrotters**



5. Let's catch **microbes** together



6. When did microbes learn to build their **SHIELDS**®?



7. **YOU** have **superpowers** too!

**SPREAD THIS BOOK:**

download it anytime and everywhere for free.

You can find additional activities, coloring pages, games, and quizzes in the interactive section

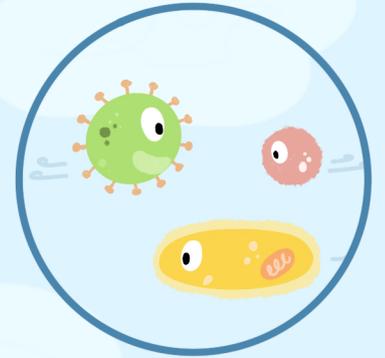
# 1. Nice to meet you microbes!

THIS MICROBIAL WORLD

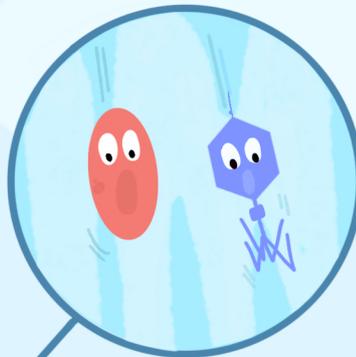


Microbes are tiny creatures invisible to the naked eye.

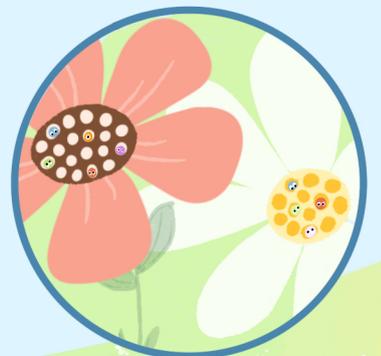
We need powerful MICROSCOPES to see them!



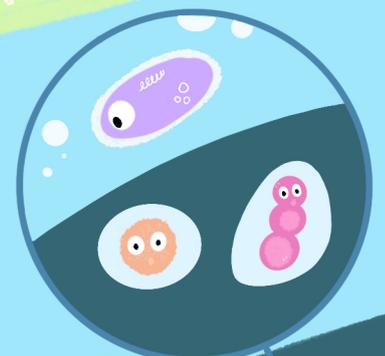
AIR



FLOWERS



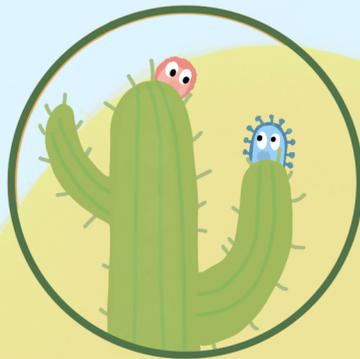
WATER



# Microbes are EVERYWHERE

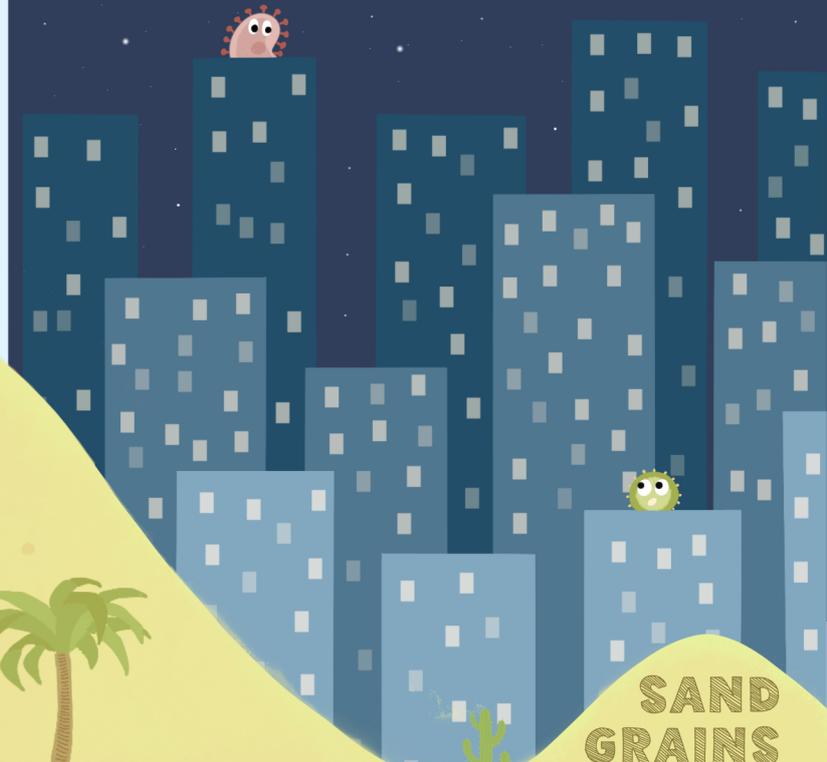
DAY

Microbes can be found in the nature and also in the places where we live. They never sleep and love to explore all kinds of places!

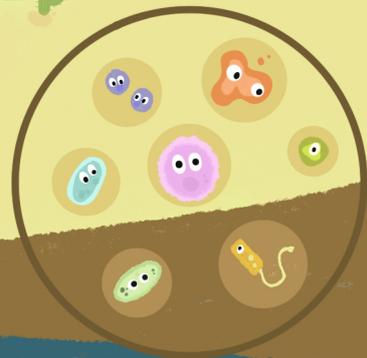


DESERT

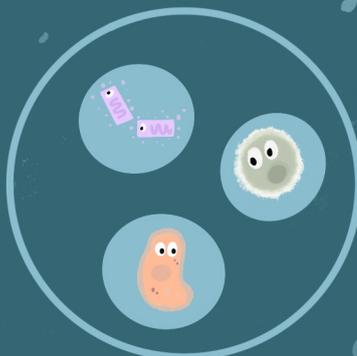
NIGHT



SAND GRAINS



GROUND

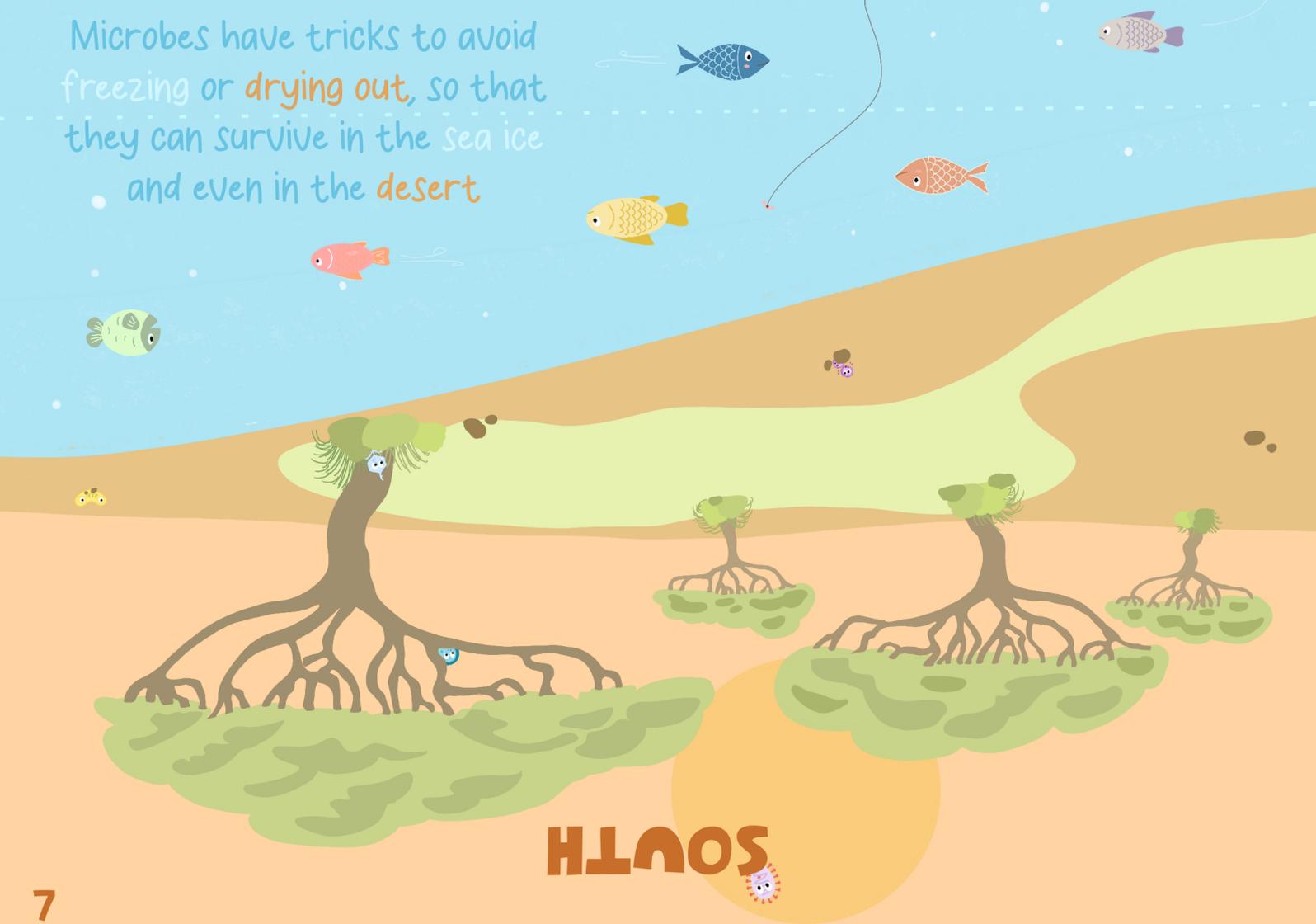


SEABED

NORTH



Microbes have tricks to avoid freezing or **drying out**, so that they can survive in the sea ice and even in the **desert**.



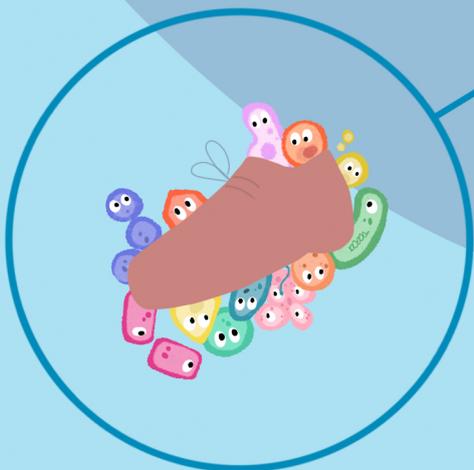
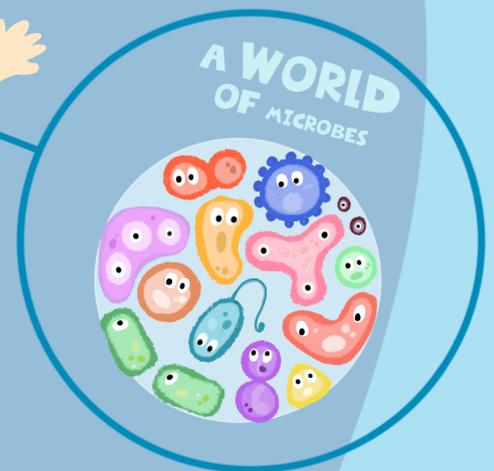
SOUTH

# They are even inside you!



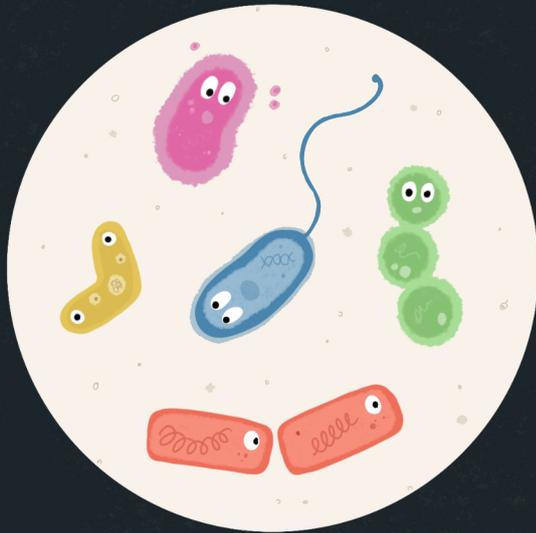
There are **moore** germs  
in your **MOUTH** –  
**100 billion!** –  
than there are people  
on **EARTH** – about  
**8 billion!**

Your **HAND** houses  
many many maaaany  
microbes – up to  
**10 million!**



You bring **home**  
nearly **425,000** microbes  
with your **SHOES**

## 2. Explore all the different microbes with the microscope

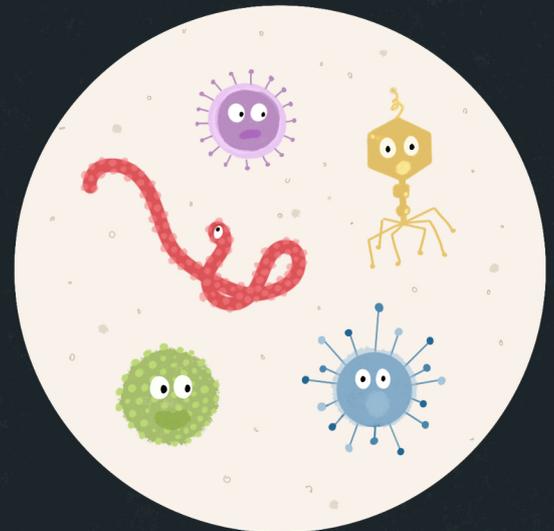


### Bacteria

Bacteria are among the world's **smallest** living things – **a single cell!** – and existed on Earth as long as **3.5 billion** years ago. They are not always bad: **most bacteria are actually helpful**

### Viruses

Viruses are even **smaller** than bacteria. They are **not** technically living things because they **need** to be **in living cells** to grow and multiply



### Parasites

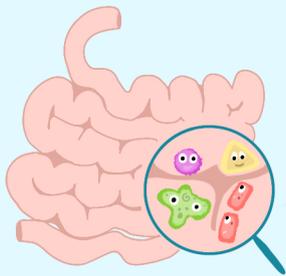
Parasites are small creatures that **live in or on** other animals or people: **fleas** jump on dogs, **lice** hide in our hair.





Microbes are **not** always harmful  
many of them are actually  
**HELPFUL**

**helpful** bacteria  
LIVE INSIDE our **INTESTINES**  
and **HELP** the body  
to **DIGEST** food



**YEASTS**  
- microscopic **fungi** -  
are the basis of **FERMENTATION**  
which helps make  
**bread and pastries**



**YOGHURT** is made  
by **BACTERIA-CHEFS**  
that eat **sugar** in the **MILK**



Microbes that can cause  
illnesses (**INFECTIONS**)  
are called **PATHOGENS** .  
**LESS THAN 1%** of bacteria are  
pathogenic. We can contrast them  
with our **IMMUNE SYSTEM**,  
but in the process, we can get **sick**  
and may need specific **therapy**



**PATHOGEN** = 

# 3. Discover how microbes can jump!

TRANSMISSION ROUTES

Germs **SPREAD**  
in **maaaany** ways

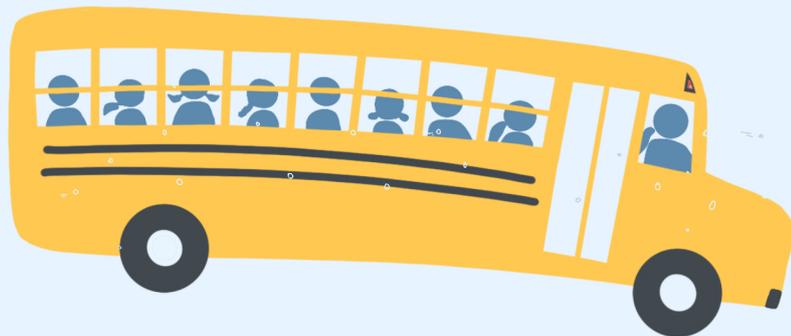
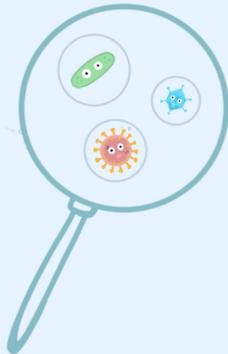
we can  
contaminate  
**WATER**

and **FOOD**

we can jump  
from your **HAND**  
to your **TOYS**  
and back

thanks to a **SNEEZE**  
we can jump  
up to 8 meters

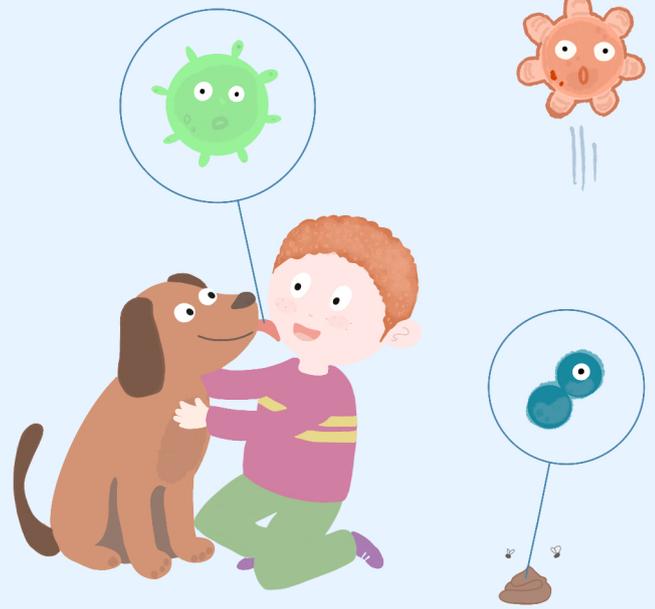
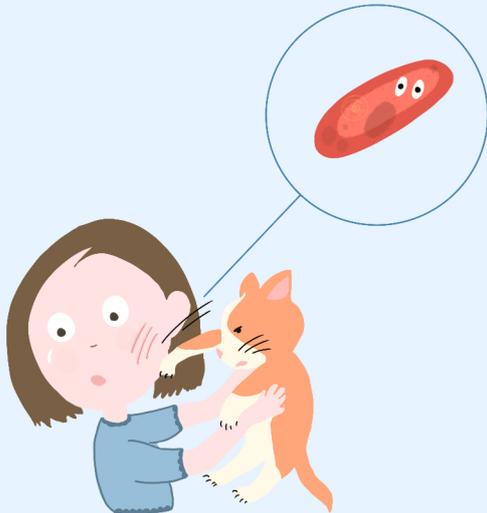
just think,  
it's the length of  
a school bus!



8 m

**DROPLETS**

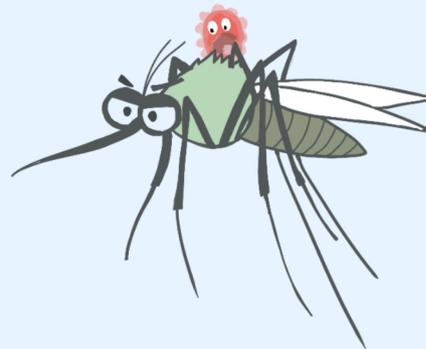
we can jump from human to human, but also from an **ANIMAL** to you and back



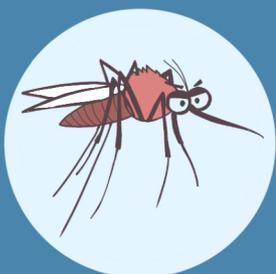
Diseases caused by microbes transmitted from animals to humans are called **ZOOSES**

A **VECTOR** is any living organism like mosquitoes, ticks, and fleas that can carry and transmit pathogens from one person or animal to another

Sometimes we get a **LIFT** from other creatures



**DO YOU KNOW WHICH IS THE MOST DANGEROUS CREATURE IN THE WORLD?**



**MOSQUITO!**

SOME MOSQUITOES ARE RESPONSIBLE FOR TRANSMITTING INFECTIONS THAT KILL MORE THAN 750000 PEOPLE WORLDWIDE EVERY YEAR, MORE DANGEROUS THAN LIONS (100 PEOPLE PER YEAR) OR SHARKS (4 PER YEAR)

# 4. Microbes are globetrotters

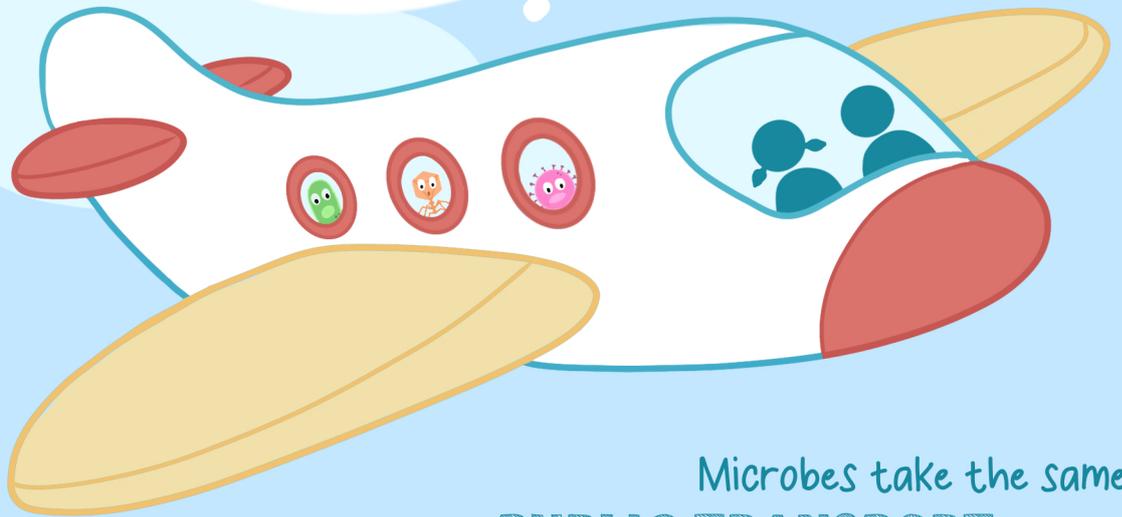
GLOBAL TRANSMISSION



Microbes can fly **thousands** of kilometres riding the **WINDS**

and we can come **BACK FROM holiday** with you

we go **on HOLIDAY** with you



Microbes take the same **PUBLIC TRANSPORT** as you: bus, train, and plane. They can be on surfaces like **SEATS, HANDRAILS,** and even the **AIR.** Although you don't see them, you meet them there.

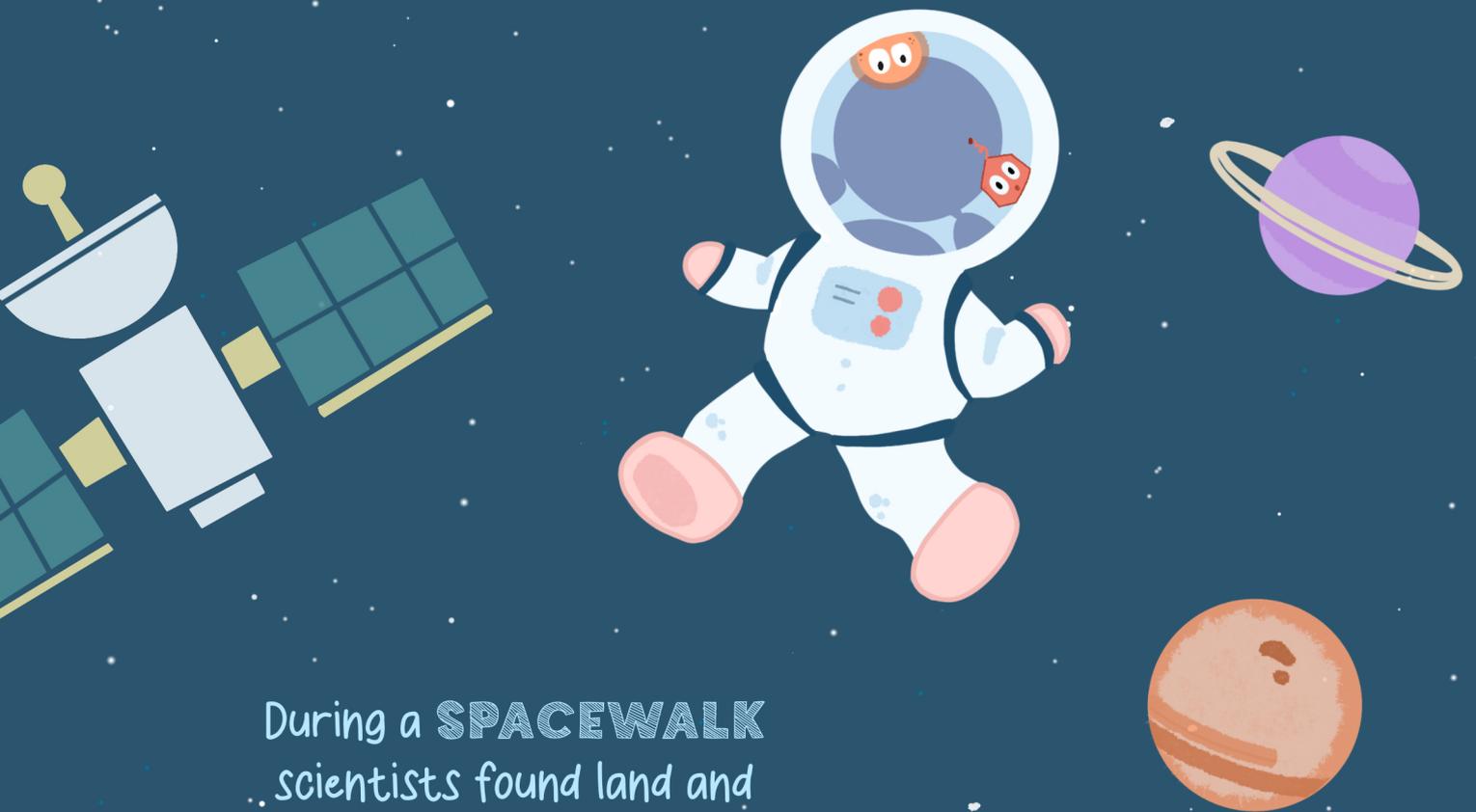
If you feel **sick** after coming back from your **HOLIDAY,** remember to tell your doctor **WHERE** you have been!

# The **ASTROBUGS!**

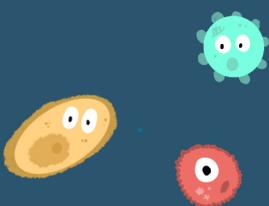
BACTERIA TRAVEL FAR...AS FAR AS SPACE

The astronauts of the **INTERNATIONAL SPACE STATION** have the company of millions of microbes, that come on board with crew members

**ASTROBUGS**  
beyond  
the atmosphere



During a **SPACEWALK** scientists found land and marine bacteria in cosmic dust samples



# 5. Let's catch microbes together

WITH THE DOCTOR'S HELP

Doctors are like **DETECTIVES** :  
when you're **sick**, they check  
your **body** to understand what is  
happening to **you**



Sometimes they need to do more **TESTS**  
to detect the **HIDDEN** germs!



They have to investigate to find out  
whether it is an **INFECTION** or something else.  
And if it is an infection, unmask the **PATHOGEN**.  
Is it a **bacterium** ? A **virus** ? Or a **parasite** ?

# The RIGHT medicine

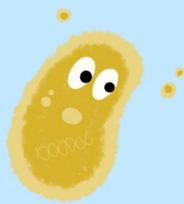


# for the RIGHT bug

Once we discover which **microbe** is responsible for your **infection**, the **doctor** can decide **WHETHER** you need medicine, and, if so, **WHICH** is the **CORRECT** medicine to help you

GET BETTER

hi ! I am  
a **bacterium**



ANTIPARASITIC



and I am  
a **virus!**

ANTIBIOTIC



here  
I am too, I am  
a **Parasite**



ANTIVIRAL



## DO YOU KNOW?

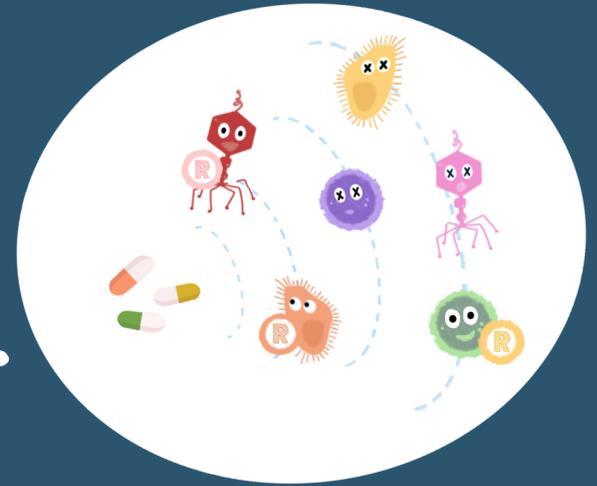
**PENICILLIN**, the first antibiotic, was discovered... by **ACCIDENT** !  
A scientist found mold on **bread** – a great job for a fungus! – and turned it into one of the **most important medicines ever!**



# 6. **WHEN** did microbes **learn** to build their **SHIELDS**?

## ANTIMICROBIAL RESISTANCE

occurs when microbes **STOP** responding to **SUPER**-medicines, such as antibiotics, antivirals, antiparasitics



It is **TRUE** that it is a

**NATURAL PHENOMENON**, however

some behaviours of us humans can accelerate it

# enormously

and resistant microbes become **more and more**

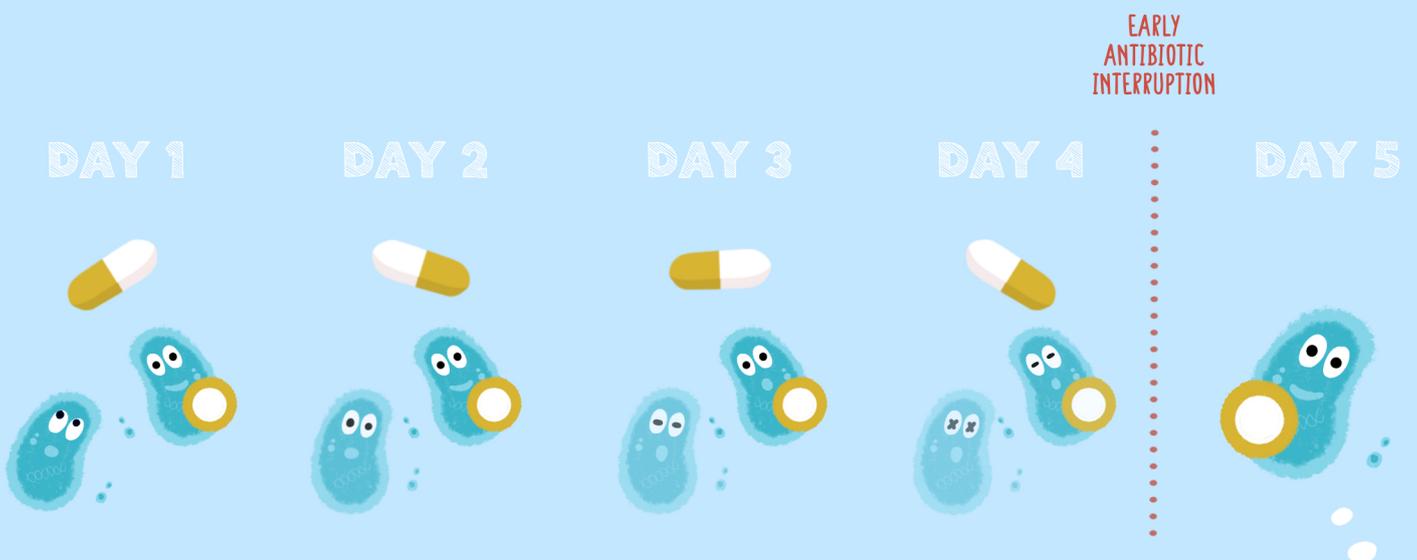


## What are some of these behaviours?

IMAGINE TAKING AN ANTIBIOTIC ON YOUR OWN **WITHOUT** CONSULTING YOUR DOCTOR WHEN YOU HAVE A **VIRAL** DISEASE

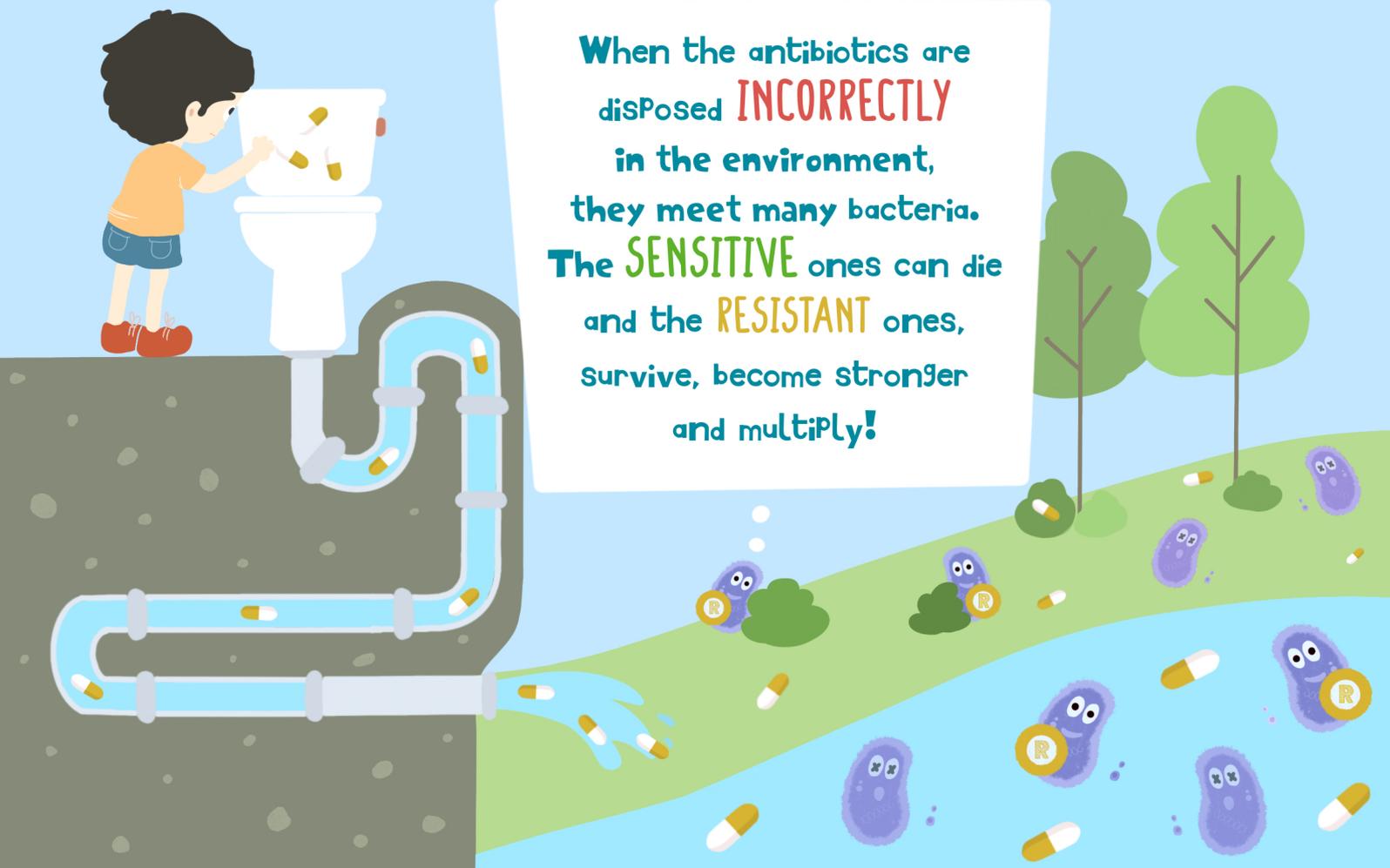


IMAGINE YOU HAVE A **BACTERIAL** DISEASE, AND YOU TAKE THE ANTIBIOTIC PRESCRIBED BY YOUR **DOCTOR**, BUT YOU **STOP** GETTING THE MEDICINE EARLIER THAN RECOMMENDED



You **ALMOST** succeeded! However, as you stopped the therapy too early, some bacteria survived and now are **RESISTANT** to this antibiotic. Next time this medicine **will not work properly!**

**IMAGINE** YOU THROW THE LEFTOVER **ANTIBIOTICS** IN THE DRAINS OR IN THE NATURE INSTEAD OF DISPOSING THEM IN **SPECIAL LEFTOVER CONTAINERS**



When the antibiotics are disposed **INCORRECTLY** in the environment, they meet many bacteria. The **SENSITIVE** ones can die and the **RESISTANT** ones, survive, become stronger and multiply!

**WHY** is so important  to seek **DOCTOR'S** advice ?



I advise you **WHETHER** or **NOT** you need an antimicrobial medicine, prescribe the **RIGHT** one and tell you **HOW MANY DAYS** you need to take it to **heal**

I can **HELP** you

**Follow the doctor!** 



# Imagine a world where antibiotics STOP working<sup>R</sup>

NO antibiotics  
work against  
me

And  
NOW?

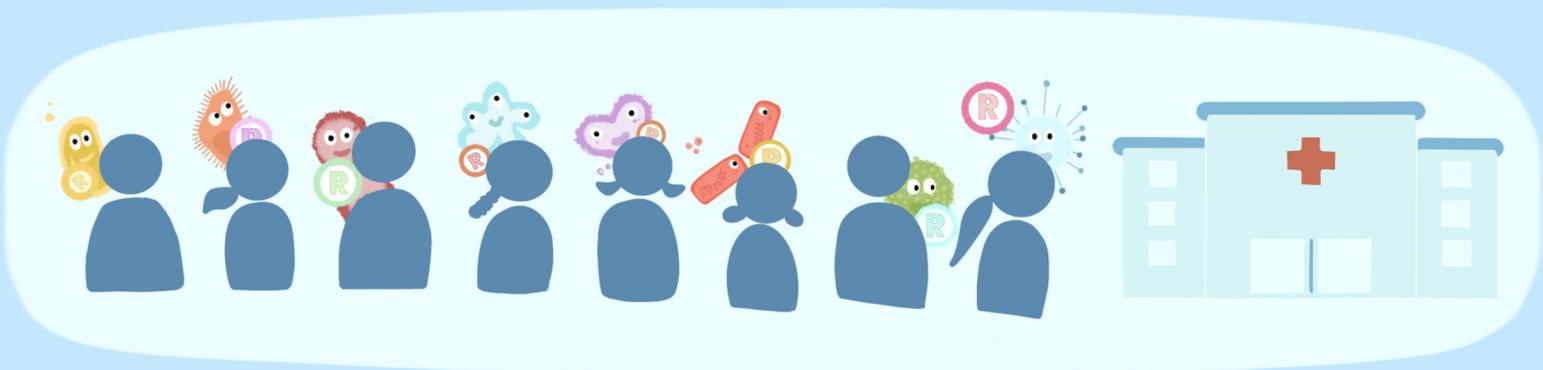
I am  
MULTIDRUG  
resistant!

When we get sick with these **shielded bacteria**,  
we take **LOOONGER** to heal,  
may need to go to the **HOSPITAL** more often,  
and sometimes even the **STRONGEST** medicines  
**don't work!**

# LOOOOONGER TO HEAL



# MORE OFTEN TO THE HOSPITAL



# THE STRONGEST MEDICINES DON'T WORK



BUT DON'T WORRY, EVERYONE CAN DO THEIR PART TO LIMIT THE SPREAD OF THESE SHIELDED BACTERIA, ESPECIALLY YOU!



# 7. YOU have superpowers too!

LET'S SPREAD GOOD HABITS, NOT MICROBES

You don't need a cape to be a

**SUPERHERO AGAINST ANTIMICROBIAL RESISTANCE!**

You just need your hands, your brain, your heart

and this **SUPER LIST OF PREVENTIVE MEASURES:**

## 1. HANDWASHING is one of your best superhero moves!

Wash your hand after using the bathroom, before and after eating, after being in public places, after petting animals, after blowing your nose, coughing or sneezing and every time your hands are visibly dirty.

water – soap – SCRUB SCRUB SCRUB ( 20 seconds is all it takes) – dry



4 SEC.



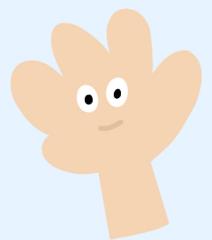
8 SEC.



12 SEC.



16 SEC.



20 SEC.

## 2. Keep you STRONG AND HEALTHY

Eat good food, drink enough water, move your body, get enough sleep, get vaccinated, and be kind to the world.



### 3. Follow **DOCTORS' ADVICE**

Take **ANTIMICROBIALS** when prescribed, as prescribed. **DO NOT STOP** them early, even if you feel better before you have complete the course. **DO NOT SHARE** them with others, and **DO NOT SAVE** them for later.



### 4. Keep **LEARNING** about our **BEAUTIFUL WORLD**

**KNOWING THE WORLD** is perhaps **OUR GREATEST SUPERPOWER**, the one that will allow us to **take care of it!**



### 5. **SPREAD THE WORD**

Small microbes travel fast, but good habits travel even faster when we share them! Tell your **family and friends** what you've learned, **you can help others make good choices too!**



**YOU** are part of something **big**:

# ONE HEALTH TEAM

One Health means **protecting**  
people, animals  
and the whole planet!



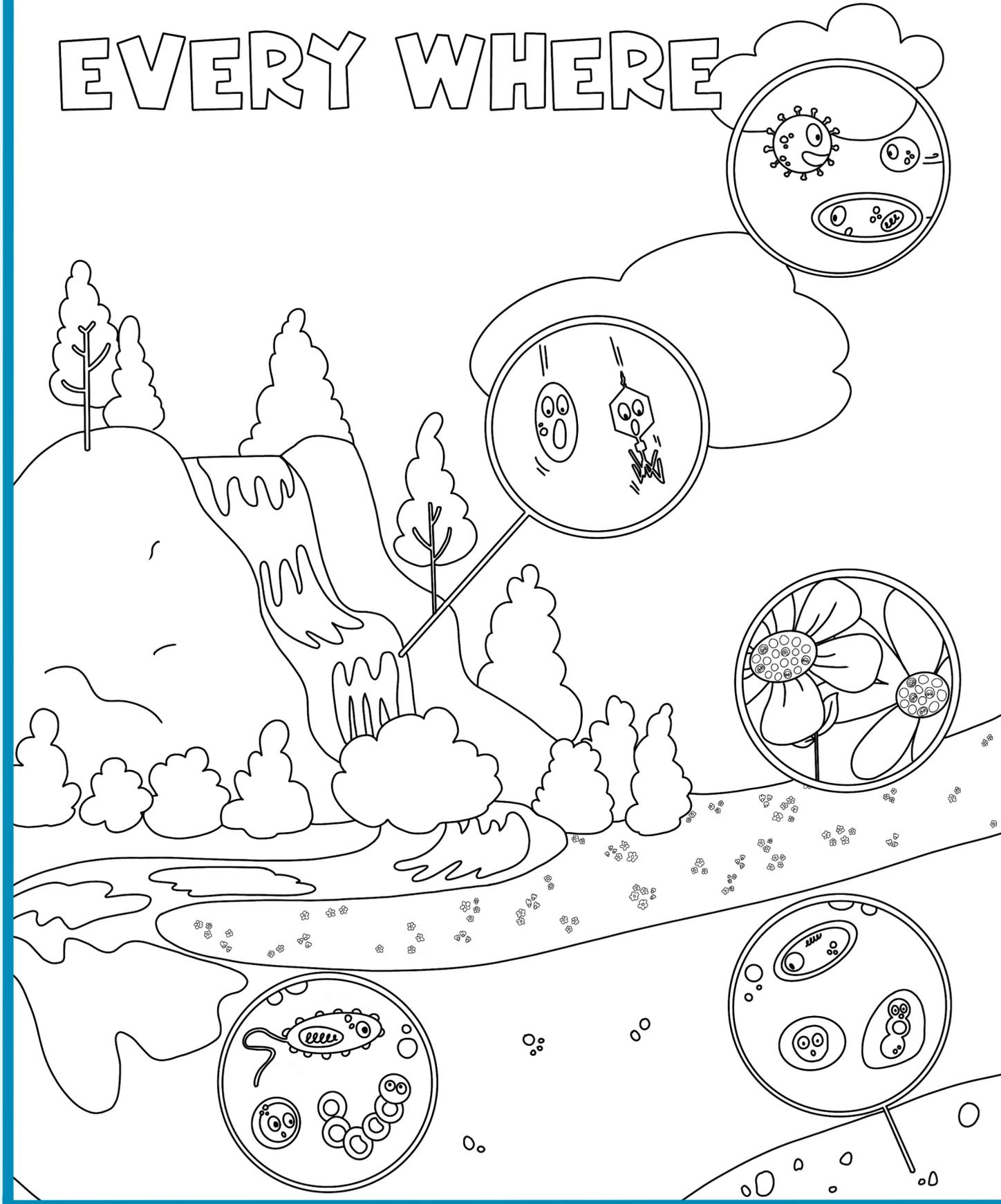
**Let's take care of the World,**

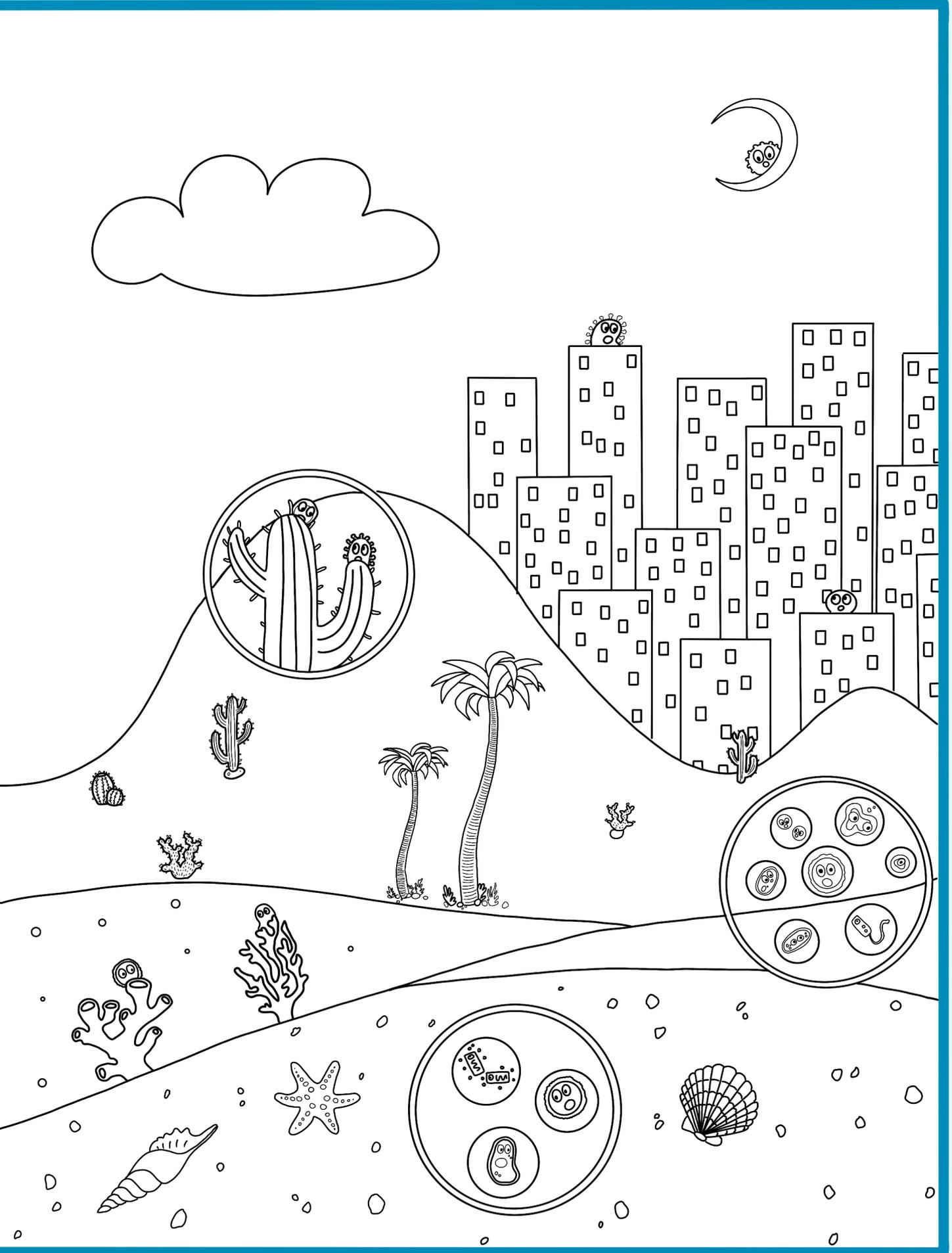
# TOGETHER



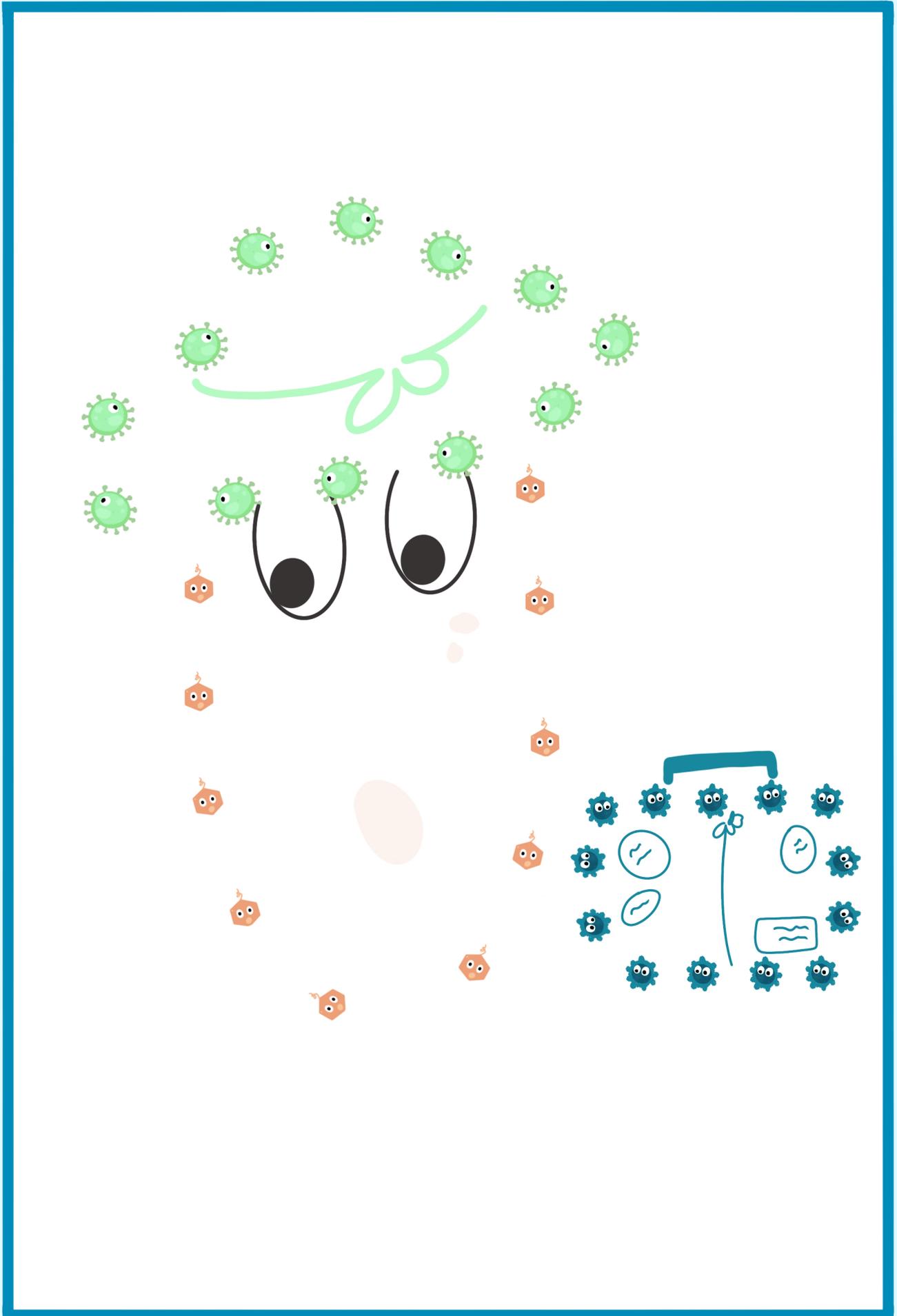


# Microbes are EVERYWHERE





# Connect the dots: discover who travel!



# The right match !

Complete and connect the microbes with the right treatment

I am a

.....



Antiviral



I am a

.....



Antiparasitic

I am a

.....



Antibiotic

What **PART** of the book did  
you like the most?

.....

.....

.....



# Only the brave !



Now you are ready to answer some questions to get the certificate **One Health Ambassador**

## 1. Can you see the microbes?

- a. Yes, if you use a telescope
- b. Yes, if you use the microscope
- c. No, because they cannot be caught

## 2. Let's see what you think of when I say the word "bacterium"

- a. They can be found only in the desert
- b. They can be found only in the air
- c. They can be found almost everywhere, and they can also be helpful

## 3. Which is the most dangerous creature in the world?

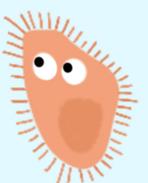
- a. The lion
- b. The mosquito
- c. The shark

## 4. If you have diarrhea after a journey, what should you do?

- a. I tell my doctor that I have been travelling recently
- b. Nothing, I think that it is normal to feel sick after a travel
- c. Nothing, I don't need to tell it anybody

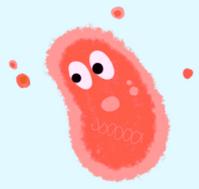
## 5. Why is it important to ask the doctor for advice?

- a. To discover which is the pathogens that make you sick
- b. To get from the doctor the right medicine
- c. Both answers are correct





# Only the brave !



Good!

Keep answering to get the certificate.

## 6. What happens if bacteria become resistant to antibiotics?

- a. Nothing, bacteria cannot become resistant
- b. Nothing, antibiotics always work
- c. I will take longer time to heal

## 7. What can you do to reduce the risk of spreading resistant bacteria?

- a. There is nothing that I can do
- b. I can wash my hands properly, I can do sport, I can eat nutritious food, I can follow the doctors' advice, I can take care of the animals and the planet
- c. I am not sure, I have to read the book again

Now **check** your answers,  
following the  
**INSTRUCTIONS**  
written on the **NEXT** page





# Only the brave !

## RIGHT ANSWERS



**1. Can you see the microbes?**

**b.** Yes, if you use the microscope – answer p. 4

**2. Let's see what you think of when I say the word "bacterium"**

**c.** They can be found almost everywhere, and they can also be helpful – answer p. 9

**3. Which is the most dangerous creature in the world?**

**b.** The mosquito – answer p. 12

**4. If you have diarrhea after a journey, what should you do?**

**a.** I tell my doctor that I have been travelling recently – answer p. 13

**5. Why is it important to ask the doctor for advice?**

**c.** Both answers are correct – answer p.15

**6. What happens if bacteria become resistant to antibiotics?**

**c.** I will take longer time to heal – answer p. 20

**7. What can you do to reduce the risk of spreading resistant bacteria?**

**b.** I can wash my hands properly, I can do sport, I can eat nutritious food, I can follow the doctors' advice, I can take care of the animals and the planet – answer p. 22–23

**1 RIGHT ANSWER =** 

**1 WRONG ANSWER =** 

**Your SCORE .....** 

You will obtain the certificate by collecting 10 stars.

If your score is less than 14 stars,  
it may be useful to reread a few pages before retaking the quiz.

You are doing well. Do not give up! We need you.



# CERTIFICATE

**YOU** are a **MEMBER**

of the

**ONE HEALTH TEAM**

**YOU** are part of something **BIG**



**Let's take care of the World,**

**TOGETHER**



# Notes

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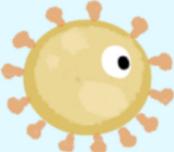
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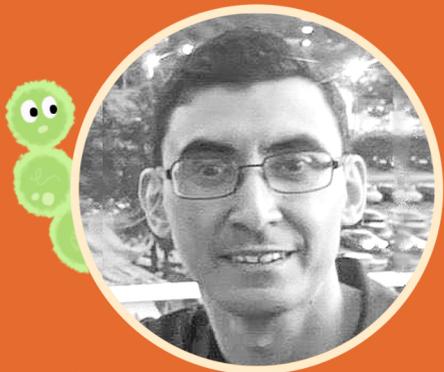
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# I WROTE THIS BOOK BECAUSE ...



**CÉSAR ANLEU**, pediatrician

... I want to build a better future by helping my patients understand antimicrobial resistance in a simple way

**GIORGIA CASTI**, pediatrician

... there is no child who does not deserve to discover the world, to be fascinated by it and to be given the tools to take care of it



**PIERA CESCHI**, veterinarian

... I want to explain to my kids what my job is all about



**EMANUELE DE PONTI**, medical doctor

... the future of antibiotics depends on what children and their parents learn today



**FRANCESCA SQUILLACE**, midwife

... I believe in raising minds that wonder, voices that question, and hands that shape a fairer world, from that very first breath

# GRATITUDE

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