

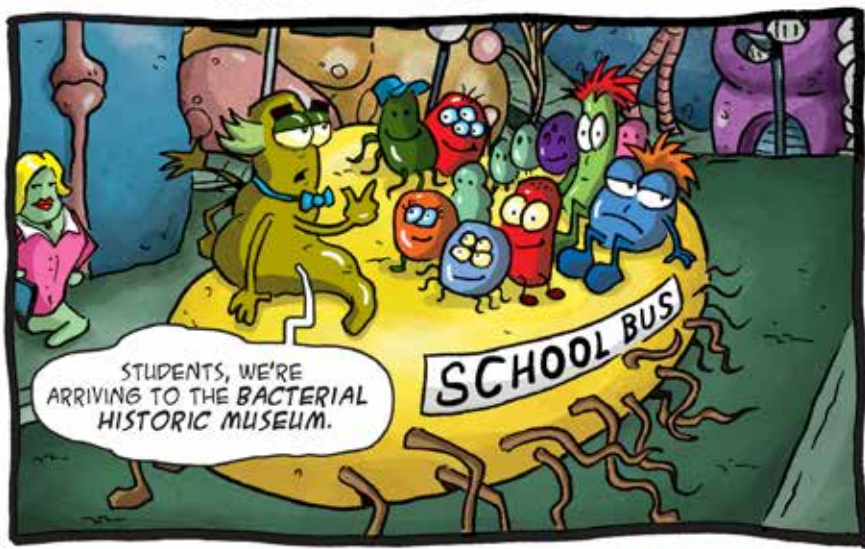
BACTERIA

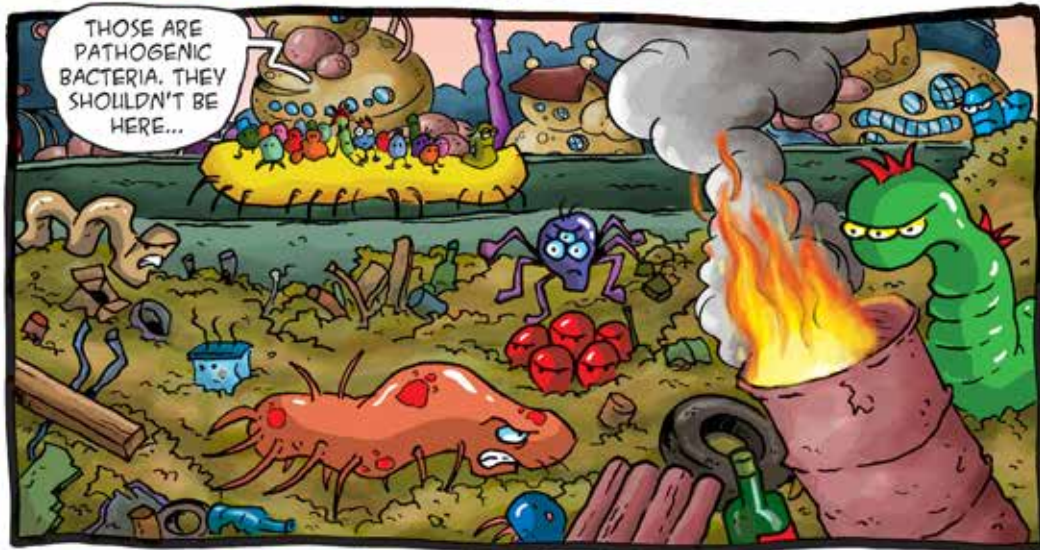
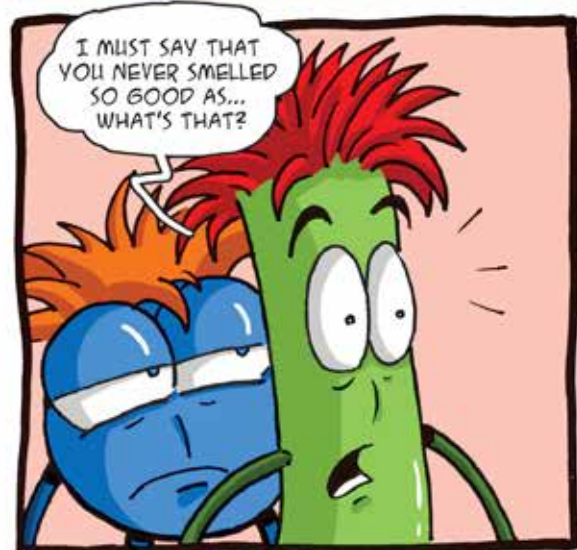


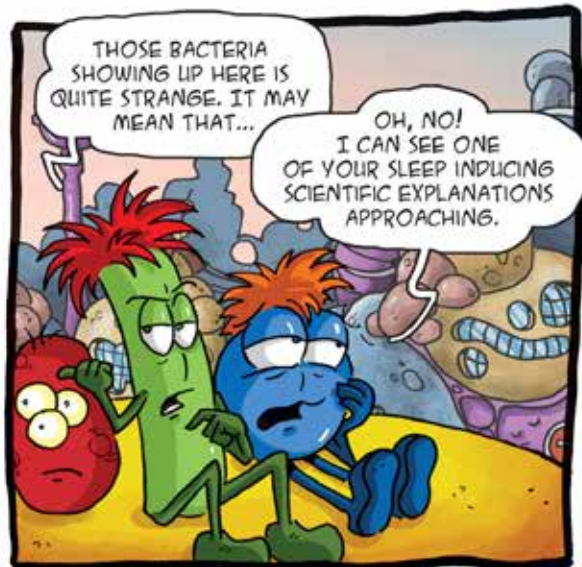
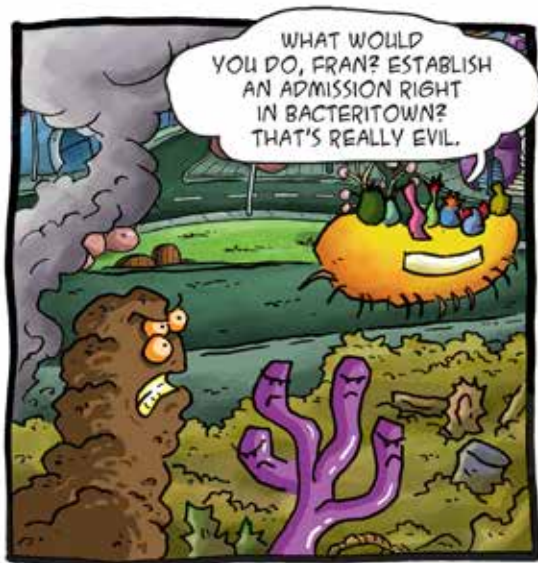
**THE TINIEST STORY
EVER TOLD**



Chapter I
BACTERITOWN









CHILDREN,
WELCOME TO THE
BACTERIAL HISTORIC
MUSEUM.

THIS SUCKS. IT'S
EVEN MORE BORING
THAN YOUR SCIENTIFIC
EXPLANATIONS...

AND NO CARAMEL
ON SIGHT, ON
TOP OF THAT...



IN THIS ROOM
WE'LL MEET OUR
OLDEST ANCESTORS: BACTERIA
WERE THE FIRST LIVING BEINGS
ON PLANET EARTH.



WE CAN SEE HERE AN
ENDOSPORE, WHICH CAN BE PRESERVED
FOR THOUSANDS OF YEARS.



WOW!
IT'S JUST
LIKE THE ONE
IN BACTERINDIANA
JONES!

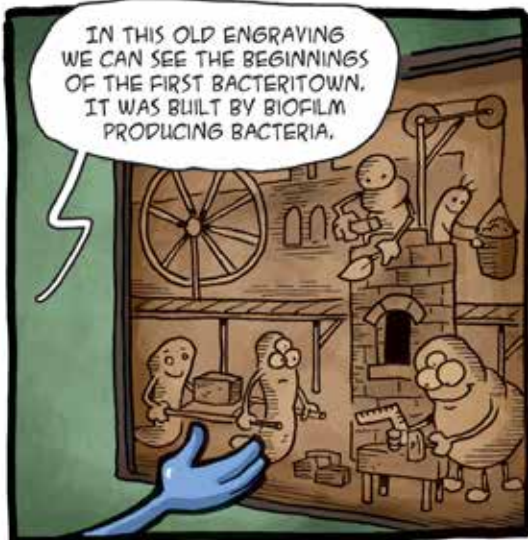
I WISH IT WAS!
THAT ONE COULD
MELT THE BAD GUYS... WHAT
IF WE SNEAK AWAY TO THE
MIDDLE BACTERIAGE ARMS
AND WEAPONS ROOM?



THESE ARE
PATHOGENIC
BACTERIA.

IN SPITE OF OUR BAD
REPUTATION, ONLY 0.36%
OF KNOWN BACTERIA
ARE HARMFUL.

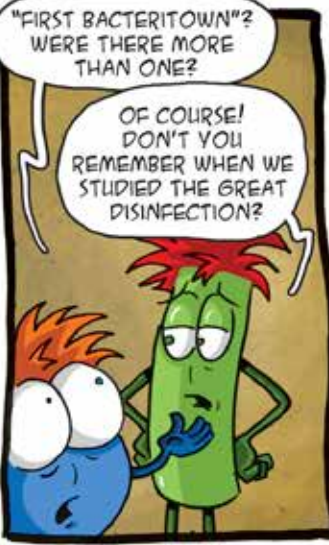
AMAZING! I DIDN'T
THINK THERE WERE
SO FEW OF YOU



IN THIS OLD ENGRAVING
WE CAN SEE THE BEGINNINGS
OF THE FIRST BACTERITOWN.
IT WAS BUILT BY BIOFILM
PRODUCING BACTERIA.

"FIRST BACTERITOWN"?
WERE THERE MORE
THAN ONE?

OF COURSE!
DON'T YOU
REMEMBER WHEN WE
STUDIED THE GREAT
DISINFECTION?



YOU KNOW
ONCE I PASS A
TEST I FORGET
EVERYTHING
ABOUT IT.

WE'RE NOW
ENTERING THE
MUSEUM GREAT HALL.
AS YOU MAY HAVE NOTICED,
IT'S DEDICATED TO THE
GREAT DISINFECTION.

AS YOU HAVE SURELY STUDIED IN SCHOOL, THE CATAclySM KNOWN AS THE GREAT DISINFECTIOn DESTROYED THE ORIGINAL BACTERITOWN AND 99.9% OF ITS INHABITANTS.



ONLY A FEW RECORDS OF THAT ERA SURVIVED.

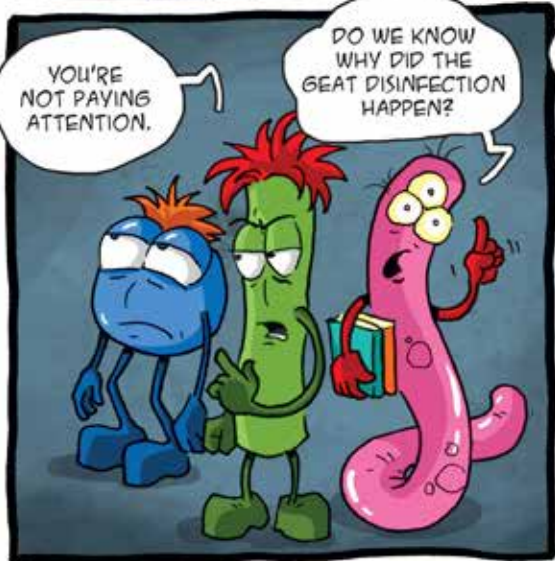


SO WE DON'T REALLY KNOW HOW MANY THOUSANDS OF BACTERIYEARS AGO THIS INCIDENT TOOK PLACE



YOU'RE NOT PAYING ATTENTION.

DO WE KNOW WHY DID THE GEAT DISINFECTIOn HAPPEN?



ATTENTION? THEY'VE ALREADY ASKED THIS ON THE TEST.

THERE ARE MANY THEORIES, BUT NONE IS CONCLUSIVE.



AND WHAT IF A NEW GREAT DISINFECTIOn COMES?

DON'T BE AFRAID, IT'S VERY UNLIKELY. THESE EVENTS HAPPEN EVERY MILLIONS AND MILLIONS OF YEARS.





LIE! NOT ONLY IT WILL HAPPEN AGAIN... IT'S ALREADY BEGUN!

UH?



IF YOU COME WITH ME, WE WILL SEE IMPORTANT ANTE-DISINFECTIONIAN RELICS.

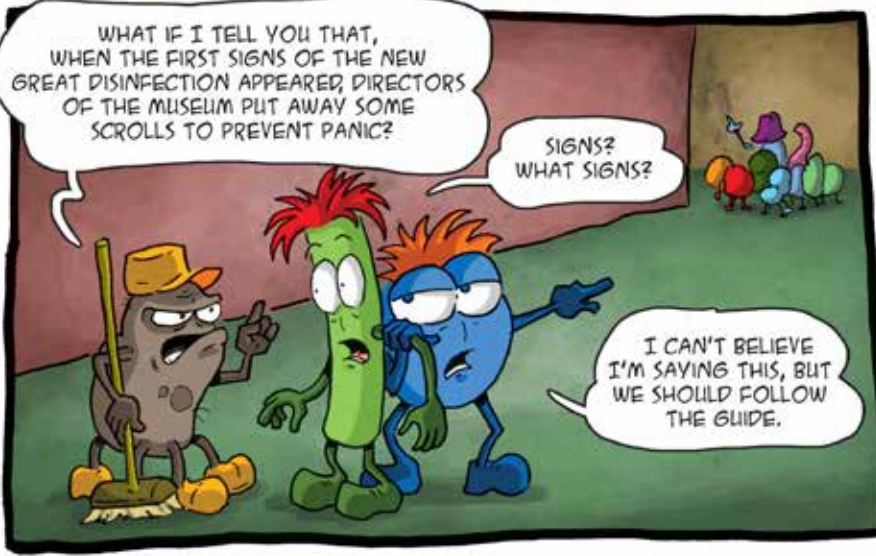
DID YOU HEARD THAT?

YEAH, WELL... DOESN'T LOOK LIKE A RELIABLE SOURCE TO ME.



DO YOU THINK EVERYTHING THAT SURVIVED THE GREAT DISINFECTION IS HERE?

I GUESS SO. I DON'T THINK IT'S IN THE BISCUITS FACTORY.



WHAT IF I TELL YOU THAT, WHEN THE FIRST SIGNS OF THE NEW GREAT DISINFECTION APPEARED, DIRECTORS OF THE MUSEUM PUT AWAY SOME SCROLLS TO PREVENT PANIC?

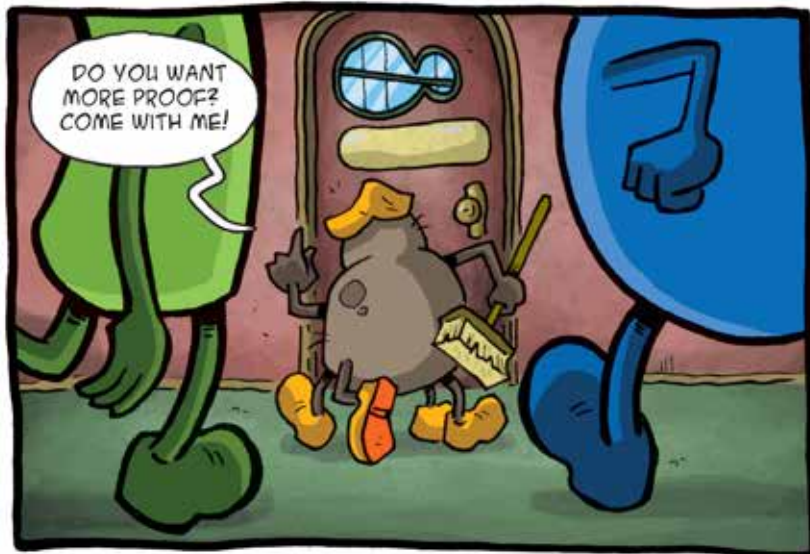
SIGNS? WHAT SIGNS?

I CAN'T BELIEVE I'M SAYING THIS, BUT WE SHOULD FOLLOW THE GUIDE.




DID YOU KNOW THAT JUST BEFORE THE GREAT DISINFECTION, PATHOGENIC BACTERIA SPREAD ALL OVER BACTERITOWN?

LIKE THE ONES WE SAW ON OUR WAY HERE!

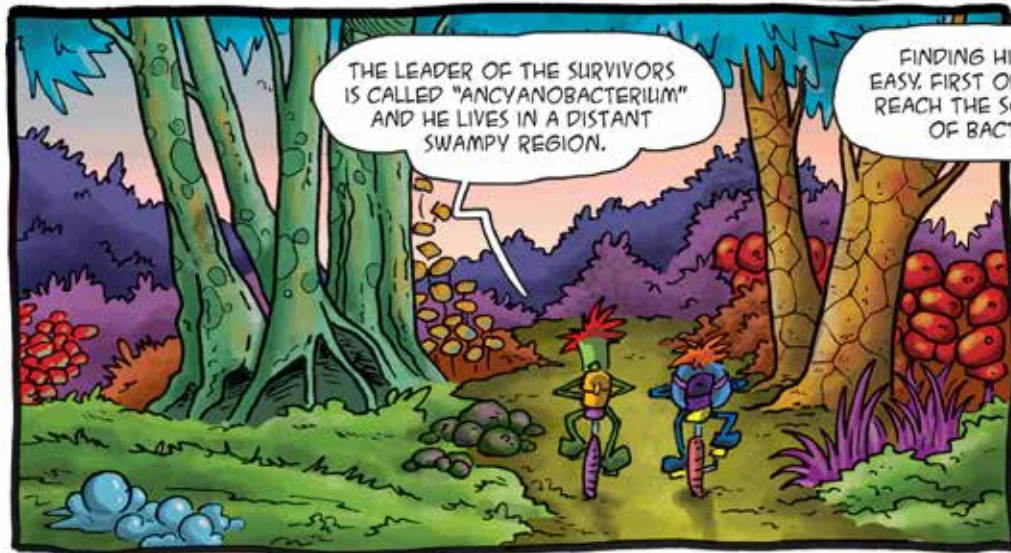


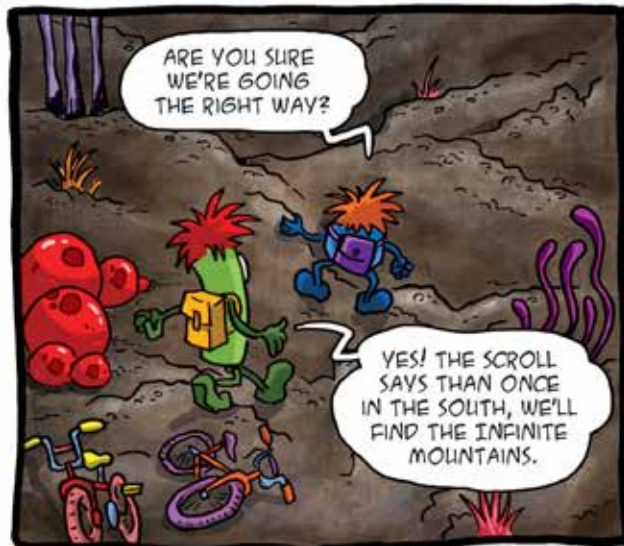




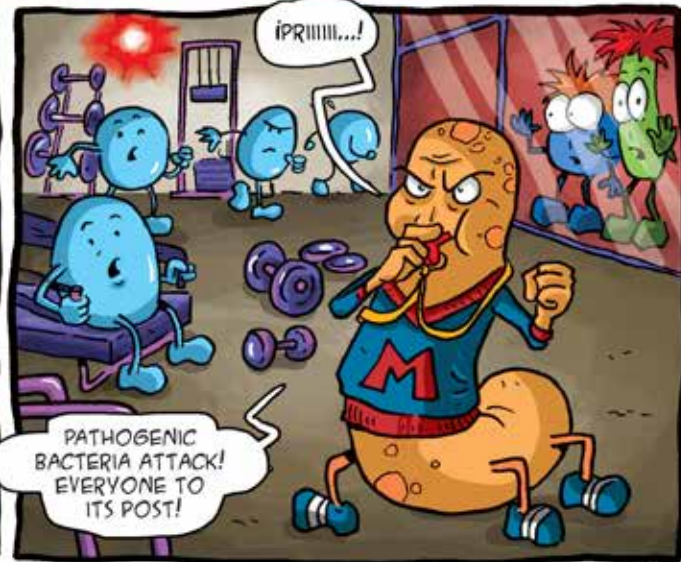
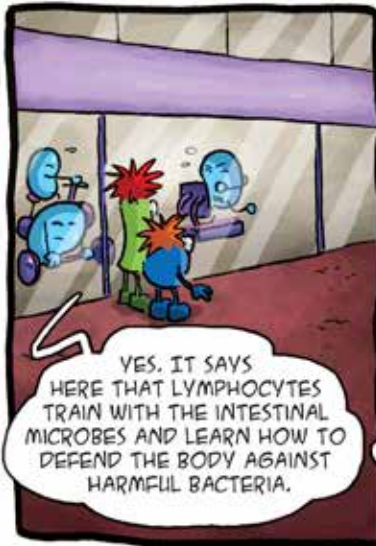
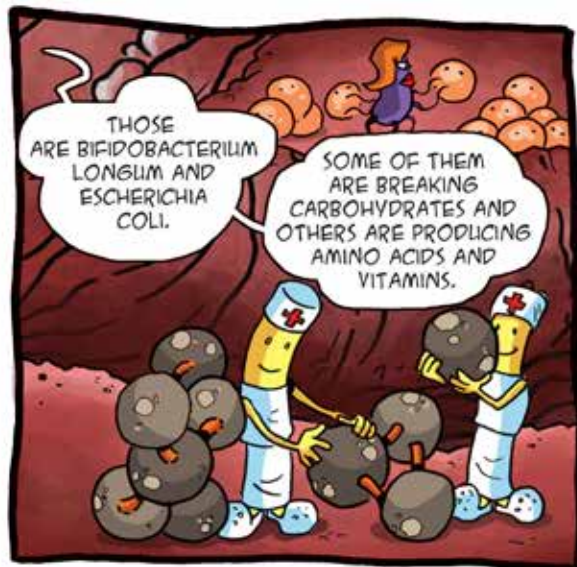


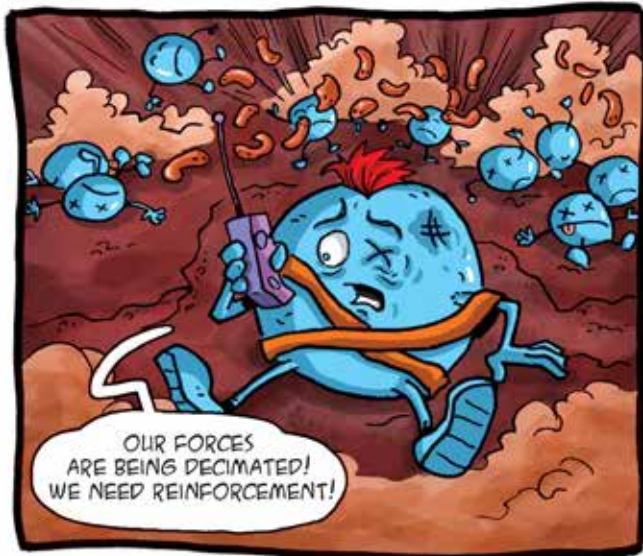
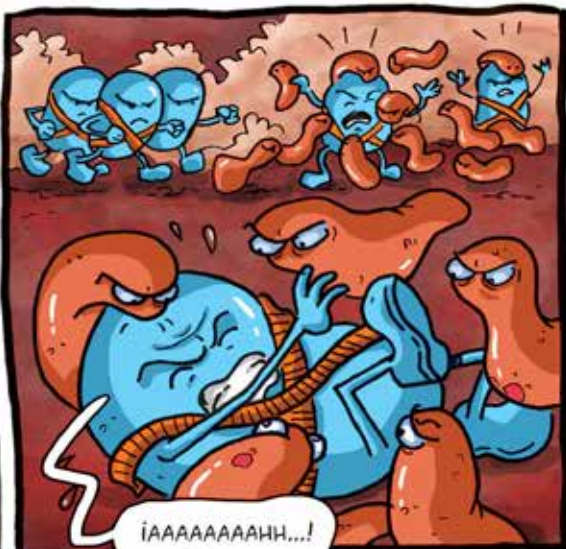
Chapter II
**THE GUT
MICROBIOTE**

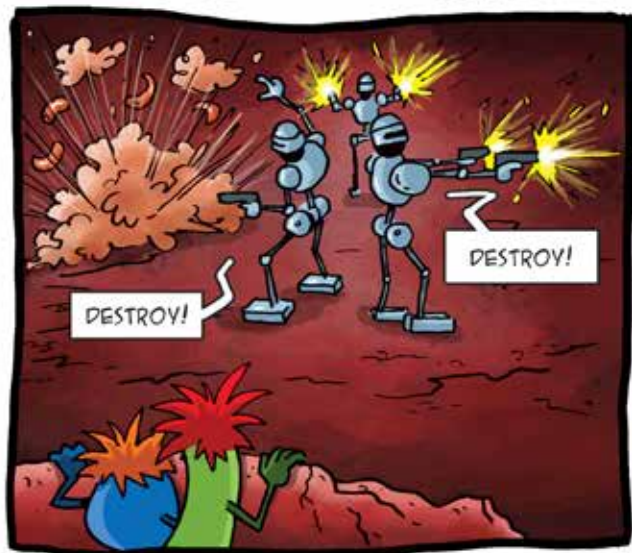
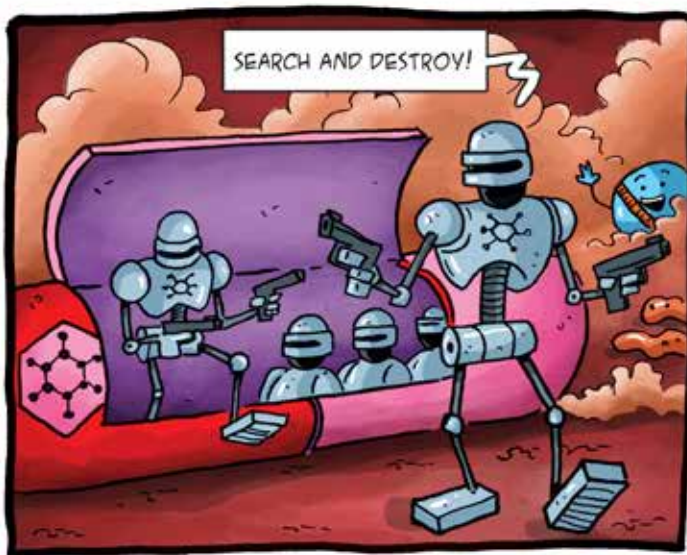


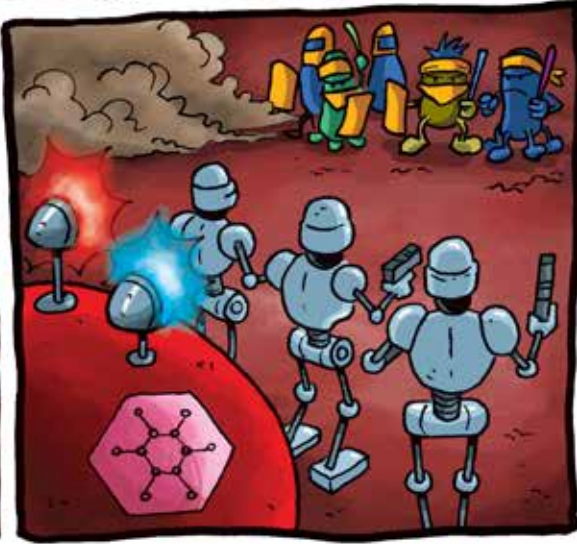
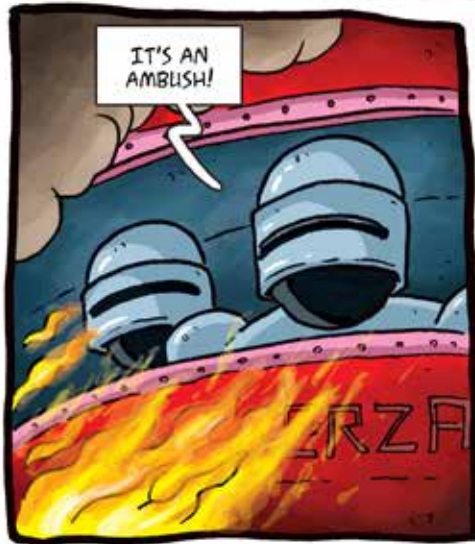
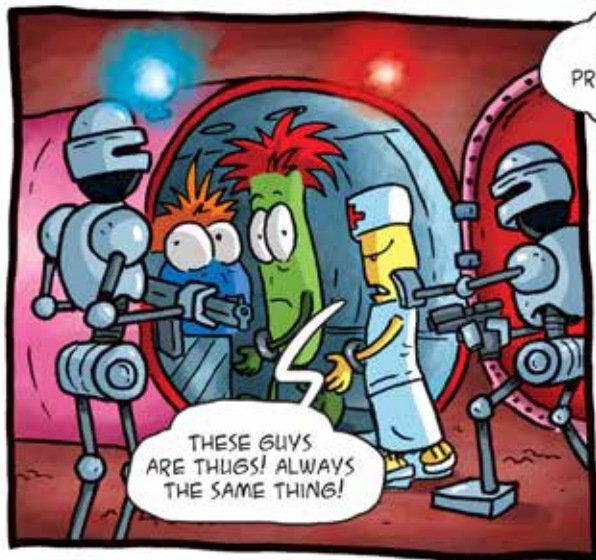














HURRY UP!
FOLLOW ME!



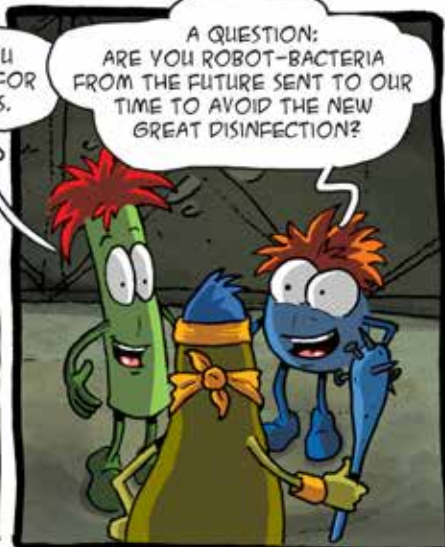
WHAT A RESCUE! ONLY
IF THEY'D SAID "COME WITH
ME IF YOU WANNA LIVE" WITH
AN AUSTRIAN ACCENT!



DID YOU SEE
WHEN THEY PUT THEIR
ARMOUR TO PIECES WITH
ONLY A TOUCH?



THANK YOU
VERY MUCH FOR
SAVING US.



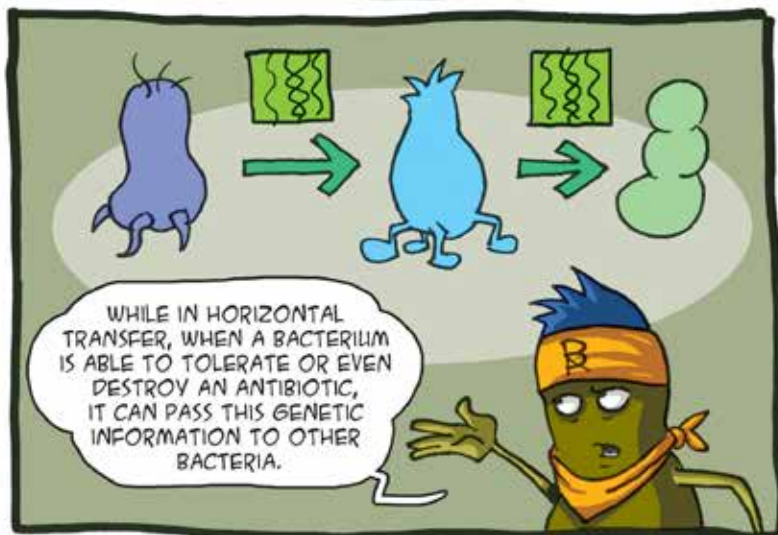
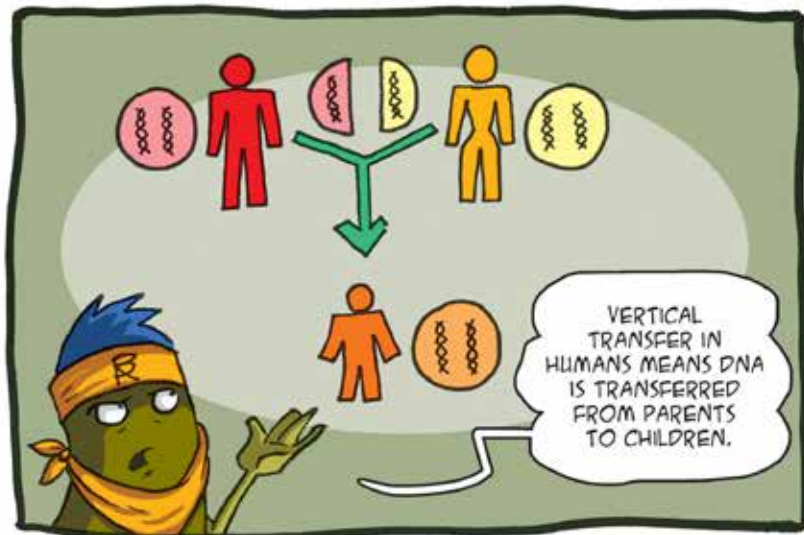
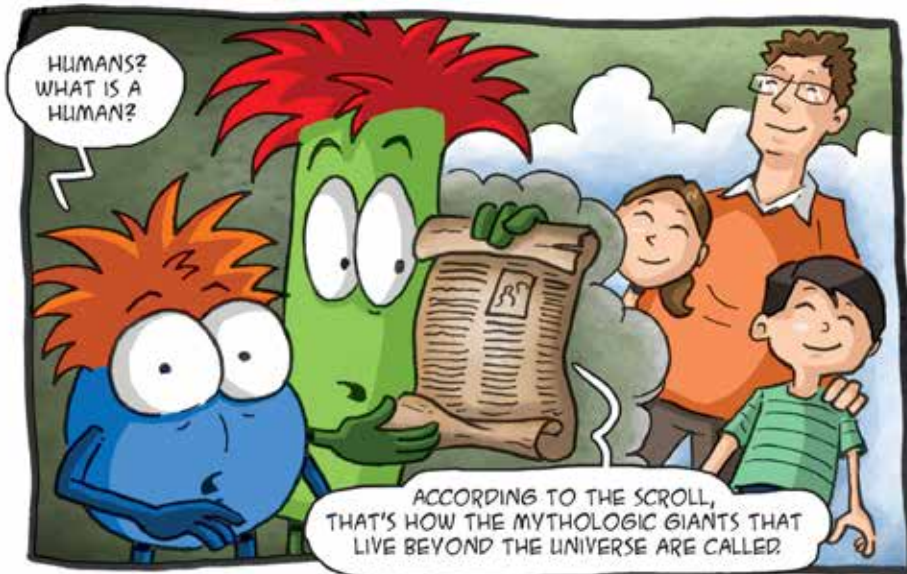
A QUESTION:
ARE YOU ROBOT-BACTERIA
FROM THE FUTURE SENT TO OUR
TIME TO AVOID THE NEW
GREAT DISINFECTION?



I'M AFRAID
I DON'T KNOW WHAT YOU'RE
TALKING ABOUT, YOUNG MAN...
WE ARE THE BACTERIAL RESISTANCE
AND WE FIGHT UNDERCOVER
AGAINST THE ABUSES OF
THE ANTIBIOTIC FORCES.

WELCOME. I HOPE
YOU'RE ALL FINE.





HOW DID THIS STRUGGLE AGAINST ANTIBIOTICS BEGIN?

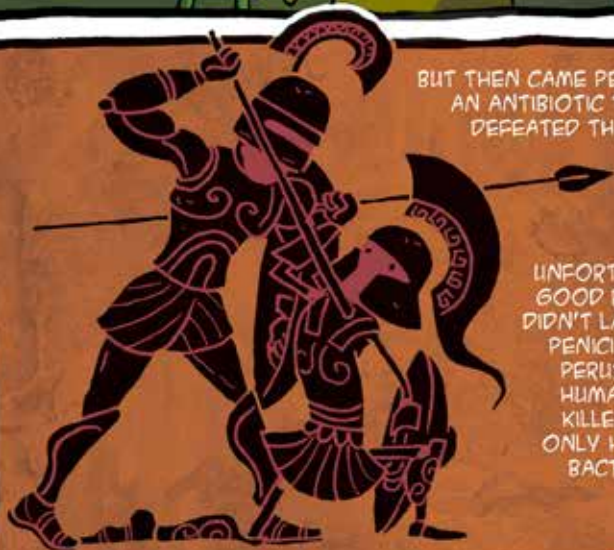


SINCE WE LIVE INSIDE A HUMAN, WE HAVE CONTACTS ON THEIR WORLD THROUGH THEM WE COULD LEARN OUR ENEMIES' ORIGINS.



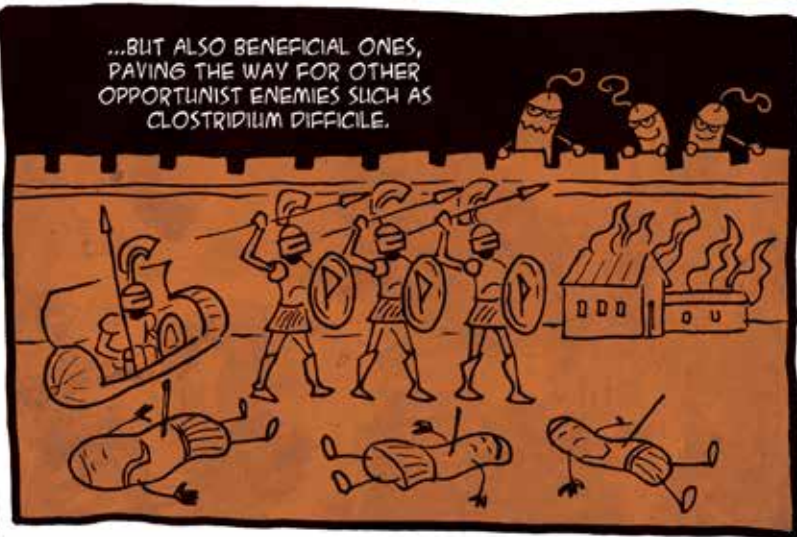
DURING THE GREAT WAR, HUMANS WERE ATTACKED BY HARMFUL BACTERIA AS CLOSTRIDIUM PERFRINGENS, WHICH CAUSED A LARGE AMOUNT OF CASUALTIES.

BUT THEN CAME PENICILIN, AN ANTIBIOTIC THAT DEFEATED THEM.



UNFORTUNATELY GOOD FORTUNE DIDN'T LAST LONG. PENICILIN WAS PERUSED BY HUMANS. IT KILLED NOT ONLY HARMFUL BACTERIA...

...BUT ALSO BENEFICIAL ONES, PAVING THE WAY FOR OTHER OPPORTUNIST ENEMIES SUCH AS CLOSTRIDIUM DIFFICILE.





THAT'S WHERE WE -THE BACTERIAL RESISTANCE- COME INTO SCENE. AND OUR FIRST GREAT VICTORY WAS AGAINST PENICILIN.



BUT THE ENEMY FOUGHT BACK WITH MORE AND MORE SPECIFIC AND POWERFUL ANTIBIOTICS.



EVERY TIME ONE OF US DEFEATED AN ANTIBIOTIC, IT SHARED ITS DNA, PASSING ON THAT ABILITY TO ALL OTHERS.

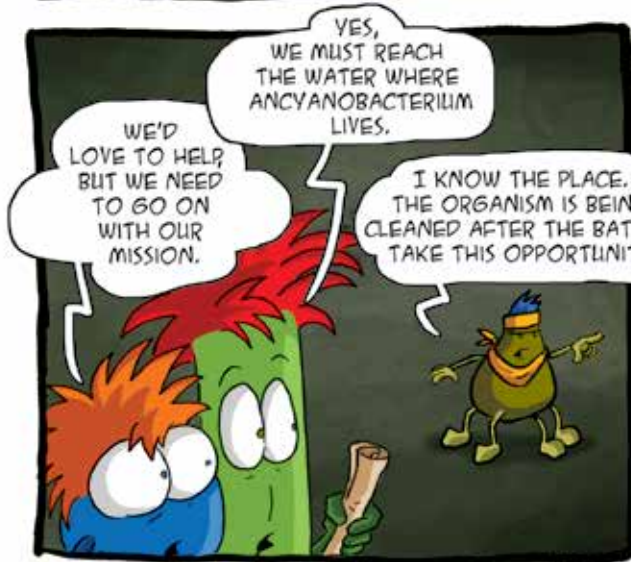
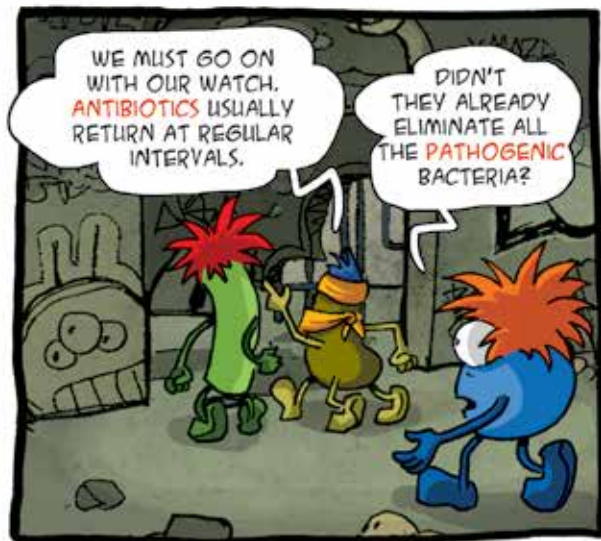


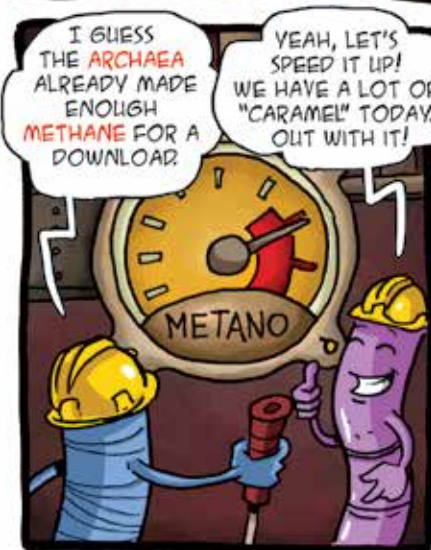
BUT, HOW IS THIS CONFLICT GOING TO END?

IF ANTIBIOTICS ONLY AIMED AT PATHOGENIC BACTERIA, SPARING THE BENEFICIAL ONES, WE'D PUT OUR WEAPONS DOWN.



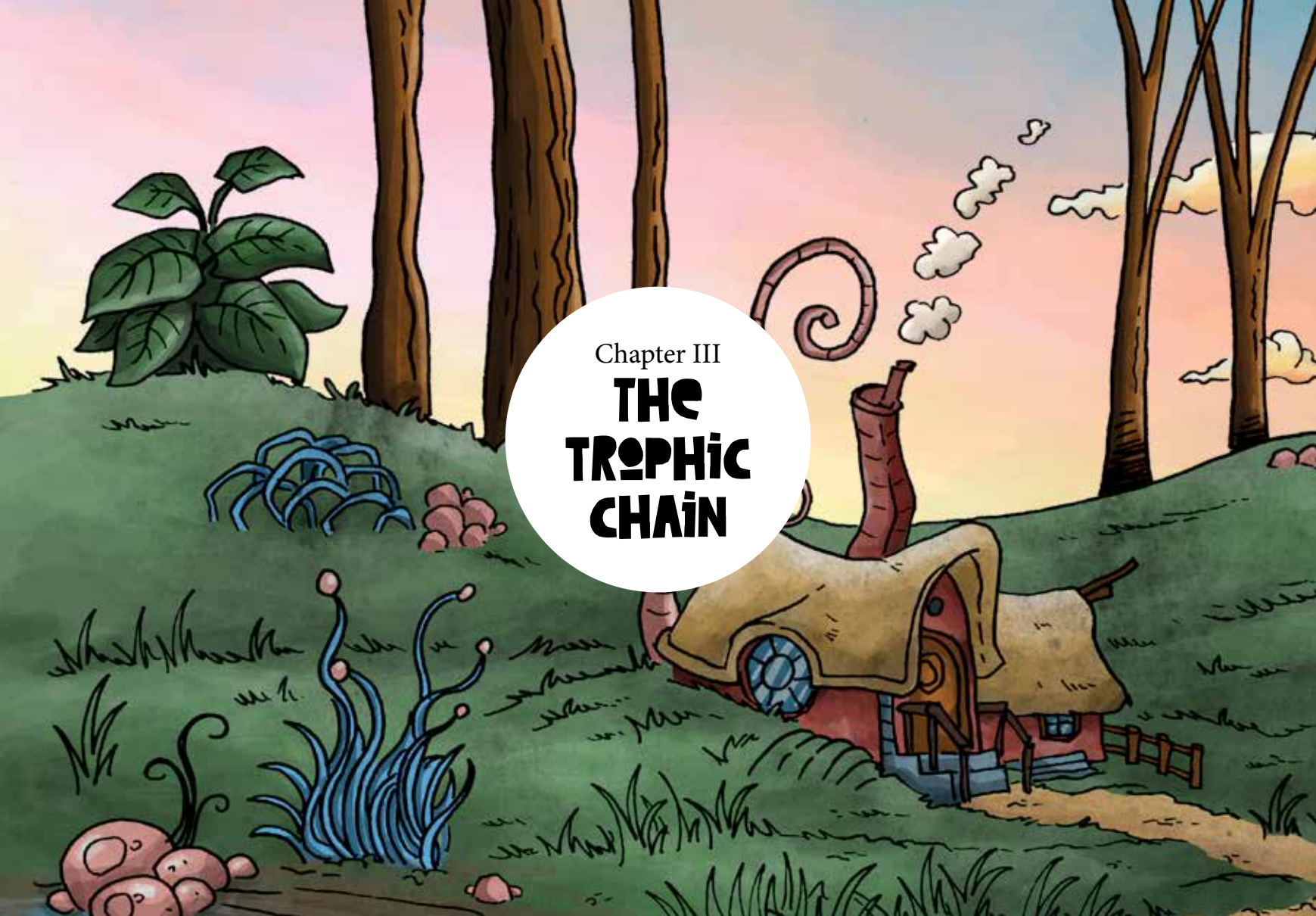
SOMETHING THAT'S NOT GOING TO HAPPEN SOON, I GUESS.



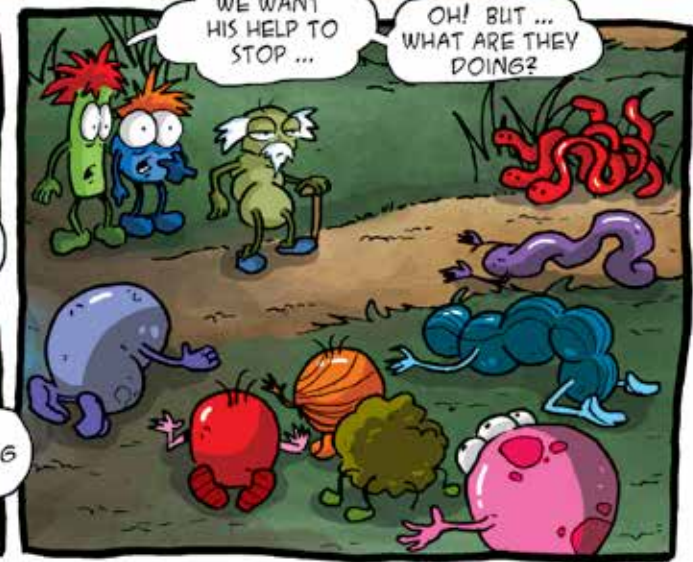


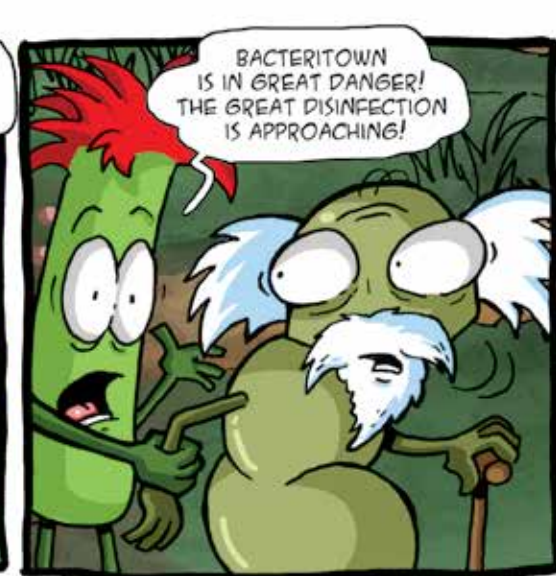
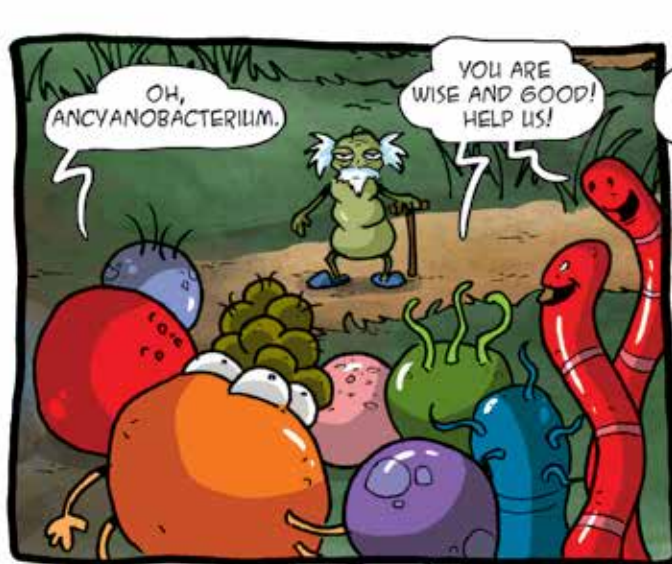
YEAH, LET'S SPEED IT UP! WE HAVE A LOT OF "CARAMEL" TODAY. OUT WITH IT!

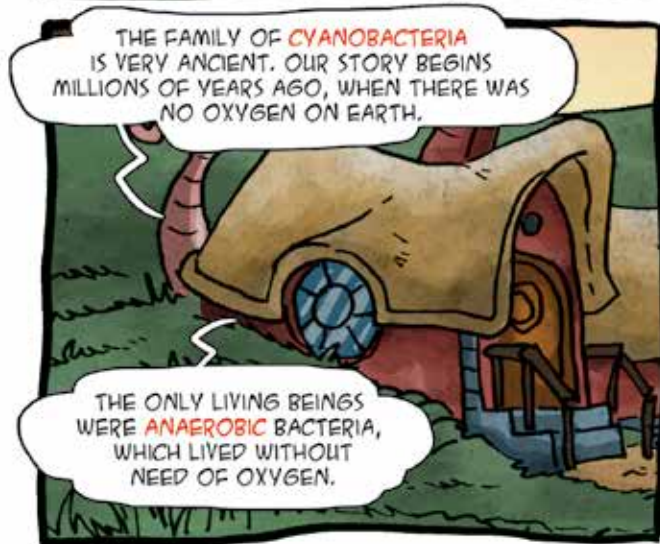




Chapter III
**THE
TROPHIC
CHAIN**









THAT'S THE PROBLEM!
YOUNG PEOPLE ARE
ALWAYS HUNGRY!

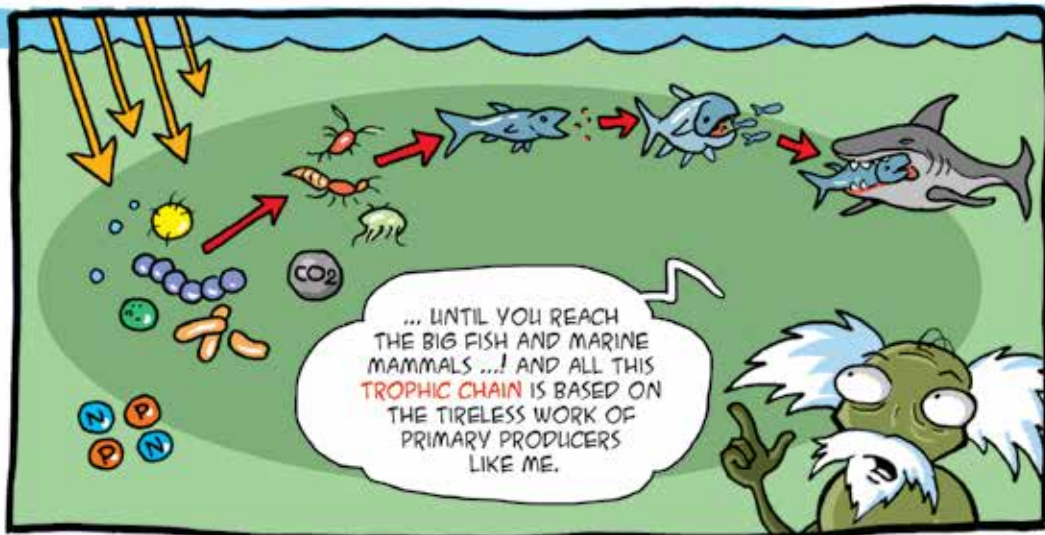


WE **CYANOBACTERIA** ARE **AUTOTROPHIC**,
BECAUSE WE PRODUCE OUR OWN FOOD.
THIS ENERGY IS USED BY THE OTHER BACTERIA,
THE **HETEROTROPHS**. AND NOBODY
THANKS US FOR ANYTHING!

SORRY SIR... THANK
YOU VERY MUCH!
I'M GOING TO
TRY ONE.



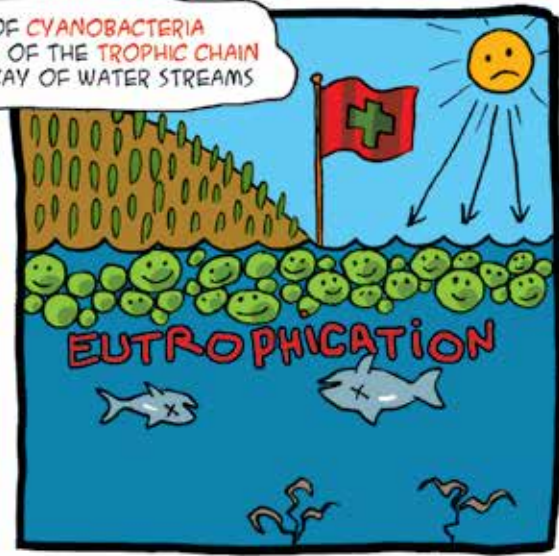
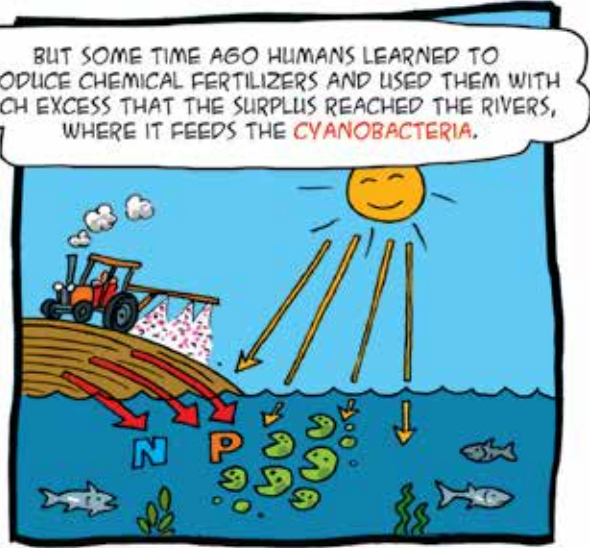
DO YOU REALIZE HOW GREAT THIS IS?
A GREAT CHAIN, WITH INCREASINGLY
COMPLEX LIFE FORMS, EACH ONE FED
BY THE PREVIOUS ONE ...!



... UNTIL YOU REACH
THE BIG FISH AND MARINE
MAMMALS ...! AND ALL THIS
TROPHIC CHAIN IS BASED ON
THE TIRELESS WORK OF
PRIMARY PRODUCERS
LIKE ME.



EXCUSE ME,
DO YOU HAV ANY CARAMEL,
FY CHANCE?





HEY, YOUNG MAN!
IF YOU KEEP EATING LIKE THIS
YOU WILL SUFFER A ...



...**BINARY**
FISSION...



GREAT!
I'M GOING TO PUT ON
WEIGHT UNTIL I GET TO THE
BINARY FISSION, AND WE'RE
GOING TO BE TWO
IDENTICAL COCOS.

DON'T DO IT!
I CAN BARELY
STAND ONE
OF YOU.



THIS IS NOT
FOR LAUGHTER!
THESE ACTIONS OF
HUMANS ARE VERY
HARMFUL TO THE
ENVIRONMENT.

AS THE DISINFECTION,
RIGHT?

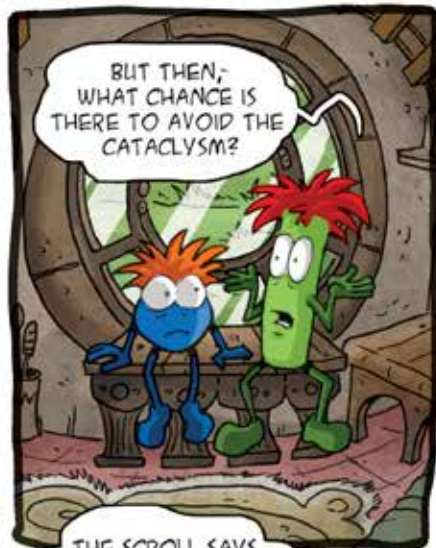


THAT'S RIGHT. HUMANS BELIEVE
THAT ALL BACTERIA ARE HARMFUL
TO THEIR HEALTH, SO THEY USE
SUBSTANCES THAT DESTROY US
WITHOUT DISTINGUISHING BETWEEN
BENEFICIAL AND **PATHOGENIC**.

LIKE
ANTIBIOTICS ...



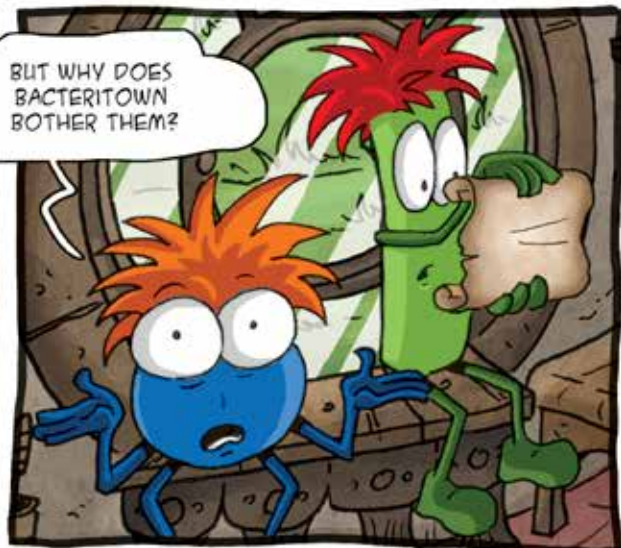
YES, SON.
HUMANS ARE AFRAID OF
WHAT THEY DO NOT KNOW.



BUT THEN;
WHAT CHANCE IS
THERE TO AVOID THE
CATACLYSM?



THE ONLY SOLUTION
WOULD BE TO CONVINCE
HUMANS THAT DISINFECTION
IS NOT NECESSARY.



BUT WHY DOES
BACTERITOWN
BOTHR THEM?



THE SCROLL SAYS
THAT ONE SIGNAL
OF THE GREAT
DISINFECTION
ARE **PATHOGENIC**
BACTERIA.



YES, THEY SMELL
VERY BAD! I DO NOT
UNDERSTAND WHY
THEY ARE NOT ALL
IMPRISONED

BY THE **CHLOROPLASTS**
OF MY GREATCHILDREN!
HAVE YOU NOT
UNDERSTOOD ANYTHING OF
WHAT I EXPLAINED TO YOU?



BACTERITOWN DOES NOT SMELL BAD
BECAUSE OF THE **PATHOGENIC** BACTERIA,
BUT BECAUSE OF THE WASTE THAT YOU
DUMP ON THE STREET! A **TROPHIC CHAIN**
THAT WORKS WELL LEAVES ALMOST NO RESIDUE;
EVERYTHING IS USED IS IT SO HARD
TO UNDERSTAND?



IT'S VERY EASY, THEN!



YOU MUST COME WITH US TO BACTERITOWN TO TEACH US.

ME?
I WILL NOT GO BACK TO THAT HORRIBLE CITY. ALSO, THERE IS NO WATER WHERE I CAN LIVE.



YOU ARE OUR ONLY HOPE!

YES! IT IS THE TROPHIC CHAIN OR THE CATASTROPHIC DISINFECTION ...



HOWEVER, THERE IS SOMETHING I CAN DO FOR YOU.



I'M GOING TO INTRODUCE YOU TO THE RHIZOBIA COLLECTIVE

?

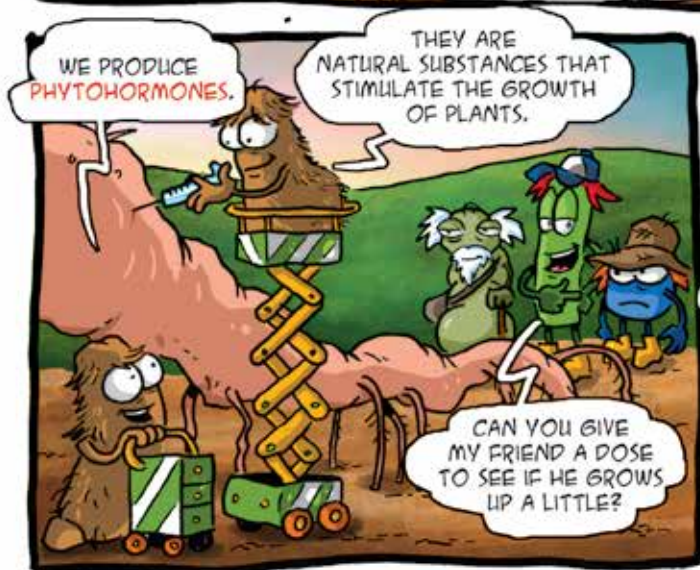
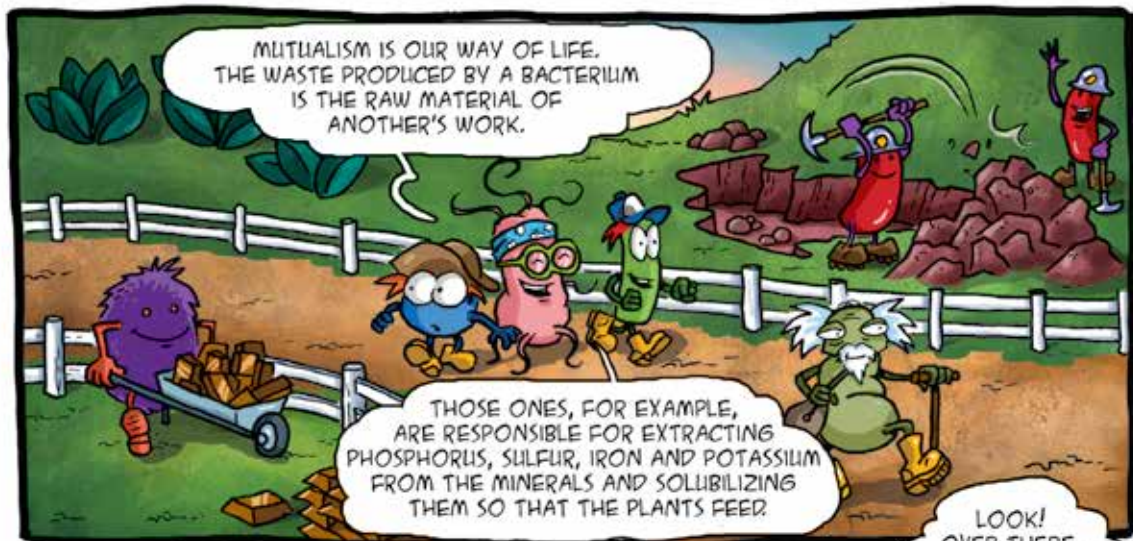
A vibrant, cartoon-style illustration of a village. In the foreground, a white wooden fence encloses a green field where two large, segmented red worms are crawling. To the right, a small blue and red character are visible. In the background, there are several houses with brown roofs and blue windows, a waterfall cascading into a stream, and a large green beanstalk growing from the ground. The scene is set in a lush, green landscape with rolling hills and trees under a soft, pinkish sky.

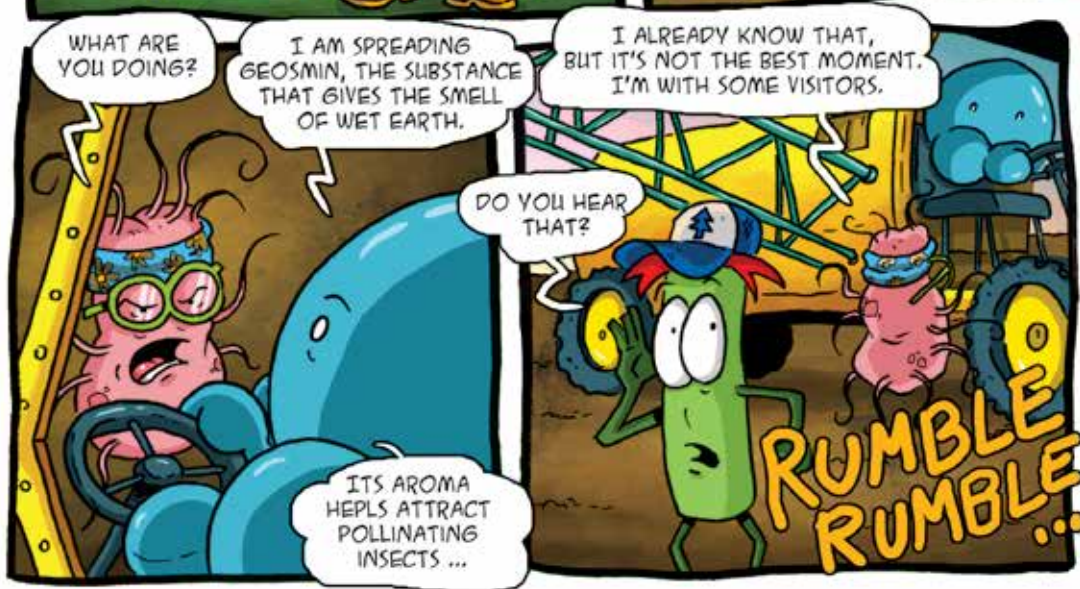
Chapter IV
MUTUALISM

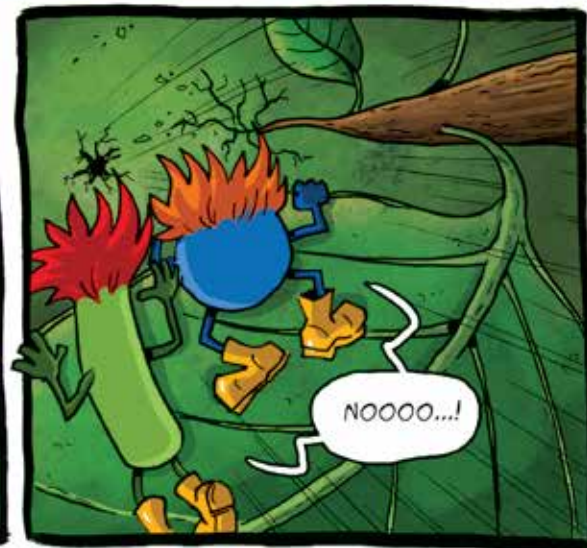
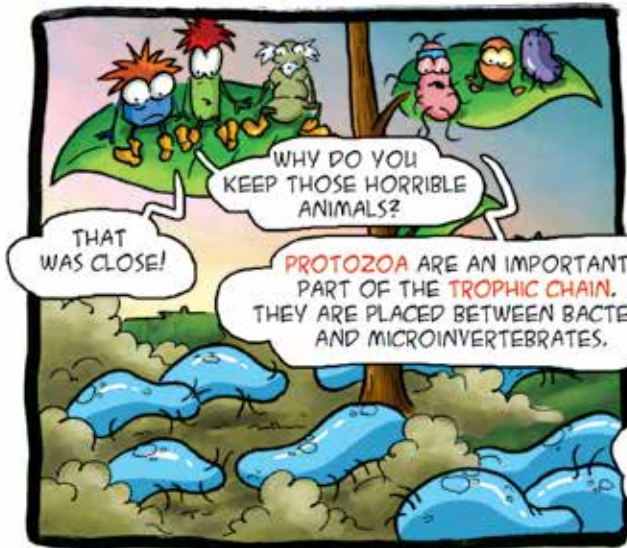








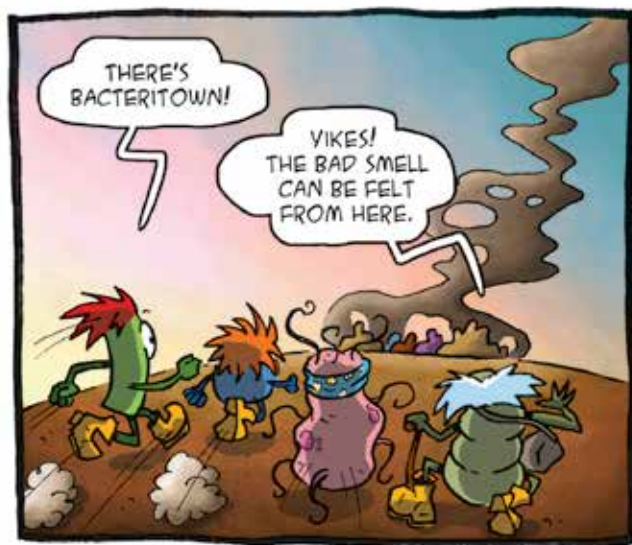


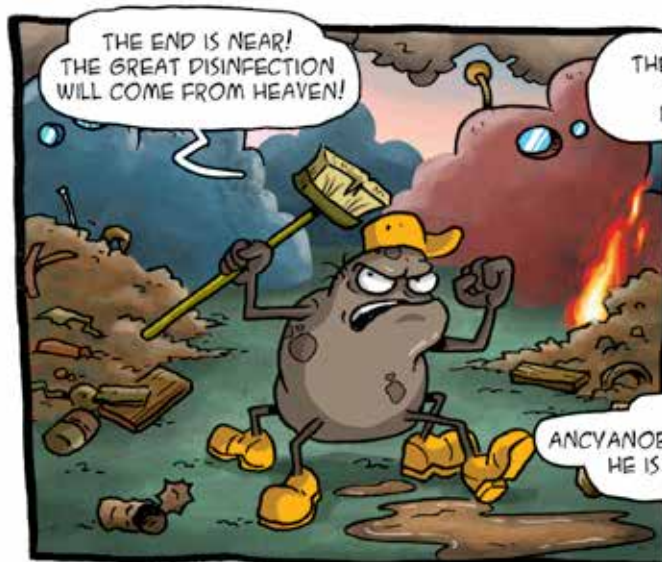




I DON'T KNOW. I'VE BEEN FOR A LONG TIME IN THE REFRIGERATOR

BUT I THINK WE'RE GOING TO BE INGESTED BY A HUMAN.





THE END IS NEAR!
THE GREAT DISINFECTION
WILL COME FROM HEAVEN!



NOT YET!
THERE IS STILL TIME
TO CLEAN UP
BACTERITOWN!

ANCYANOBACTERIUM!
HE IS BACK!



QUICK!
YOU ALREADY KNOW
WHAT TO DO.

MUTUALISM!



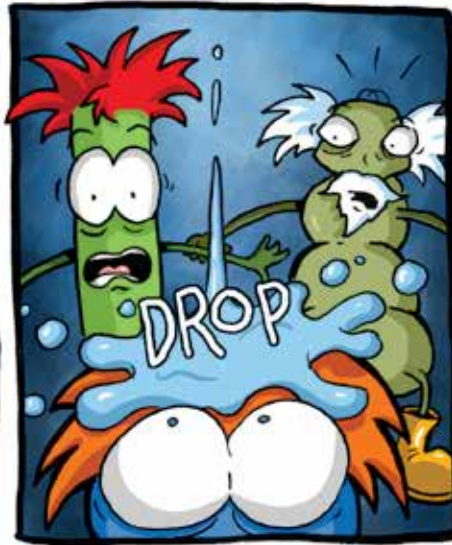
MUTUALISM
LETS US ALL BENEFIT

ENOUGH FOOD
FOR EVERYONE,
FOR EXAMPLE



DAD, WAIT!
IT IS NOT OKAY
TO KILL 99.9%
OF BACTERIA.

AT SCHOOL
WE WERE TAUGHT
THAT THERE ARE
MANY GOOD BACTERIA.





GOODBYE,
SINORHIZOBIVM MELILOTI!
THANK YOU FOR TEACHING
US MUTUALISM!

PUT ON
YOUR SOCKS,
IT'S ALL FRESHLY
WAXED

WE MUST MAINTAIN
THE CLEANLINESS OF BACTERIOTOWN.
WHAT HAPPENED ONCE
CAN HAPPEN AGAIN!

EXCUSE ME FOR NOT
ACCOMPANYING YOU.
I'VE DECIDED TO STAY HERE
LIVING IN THIS BEAUTIFUL LAKE
THAT WAS FORMED
BY THE RAIN.

ESCOLARES

OH!

THANK YOU,
BUT OUR PLANTS
NEED US.

TOO BAD
THEY CAN'T STAY
FOR DINNER.

THE
END