

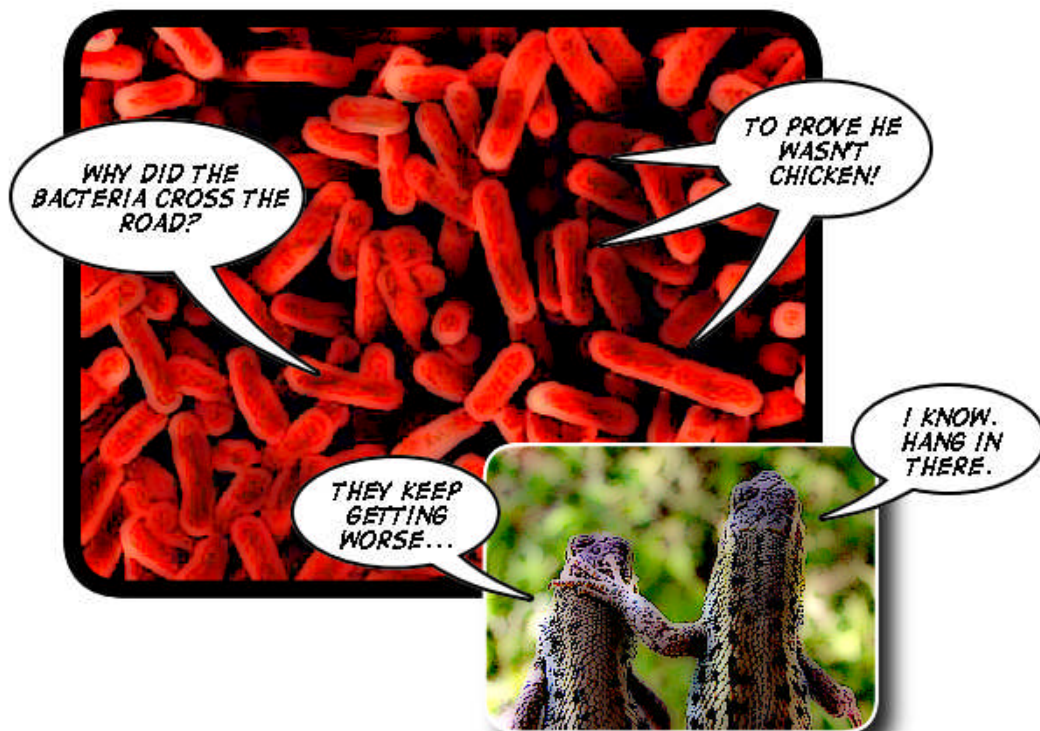
# CHAPTER 16

**I**N THE LAST CHAPTERS, YOU HAVE EXPLORED FOUR DIFFERENT KINGDOMS: ANIMALS, PLANTS, FUNGI AND PROTISTA. THE BIODIVERSITY OF LIFE IN THESE KINGDOMS IS HUGE! HOWEVER, WE ARE NOT YET DONE... THERE ARE TWO MORE KINGDOMS TO STUDY.

BOTH OF THESE KINGDOMS CONTAIN ORGANISMS KNOWN AS **BACTERIA**. BACTERIA ARE VERY SMALL ORGANISMS THAT LIVE IN SOIL, WATER, AND OTHER ORGANISMS. BACTERIA CAN BE FOUND IN EVERY BIOME! THEY CAN EVEN BE FOUND IN PLACES YOU WOULD NEVER EXPECT TO FIND ANY KIND OF LIFE!

IN FACT, THERE ARE PROBABLY SEVERAL THOUSAND BACTERIA ON THIS BOOK! SOME BACTERIA ARE EVEN LIVING **IN** YOU RIGHT NOW!

# **DON'T PANIC!!**



**WITHOUT BACTERIA LIVING IN YOUR BODY YOU WOULD NOT BE ALIVE FOR VERY LONG!**

BACTERIA REPRODUCE BY SPLITTING IN HALF TO FORM A NEW ORGANISM. IN ADDITION, SOME BACTERIA CAN MOVE ON THEIR OWN. THEY HAVE A BODY PART CALLED A **FLAGELLA** ("FLA-GEL-AH"). A FLAGELLA ACTS LIKE A TAIL THAT MOVES THE BACTERIA THROUGH A LIQUID.



SINCE WE OWE OUR LIVES TO THESE SMALL ORGANISMS, LET'S START EXPLORING THEM...

THE FIRST KINGDOM OF BACTERIA YOU WILL STUDY THIS WEEK IS CALLED...

# **KINGDOM ARCHAEABACTERIA**

I KNOW IT IS A BIG WORD, JUST RELAX AND SAY...  
"ARK-EE-BACK-TEAR-E-AH"

THE BACTERIA IN THIS KINGDOM LIVE IN AREAS OF THE WORLD WHERE NO OTHER ORGANISMS CAN LIVE. THESE ORGANISMS WERE FIRST DISCOVERED IN PLACES LIKE THE HOT SPRINGS OF YELLOWSTONE NATIONAL PARK, WYOMING. THESE HOT SPRINGS ARE AREAS WHERE BOILING HOT WATER COMES OUT OF THE EARTH ALL DAY LONG.

UNTIL THIS TIME, NOBODY THOUGHT THAT ORGANISMS COULD LIVE IN SUCH A HOT HABITAT. SINCE THEN, SCIENTISTS STARTED LOOKING IN AREAS WHERE THEY ALSO DID NOT THINK LIFE COULD EXIST.

GRAND PRISMATIC SPRING - YELLOWSTONE NATIONAL PARK, WYOMING



**Yep! That water is boiling hot!**

THE RESULTS OF THIS SEARCH FOUND SEVERAL DIFFERENT KINDS OF BACTERIA THAT CAN BE SORTED INTO THREE GROUPS:

**METHANOGENS** ("METH-AN-O-GENS")  
**HALOPHILES** ("HAL-O-FILES")  
AND **THERMOPHILES** ("THERM-O-FILES")

**METHANOGENS** ARE NAMED AFTER THE GAS THEY MAKE - **METHANE!** METHANE IS THE GAS THAT IS USED TO HEAT YOUR HOMES.

METHANOGENS LIVE IN PLACES WHERE THE GAS WE NEED TO BREATHE (CALLED **OXYGEN** - "OX-E-JEN") CANNOT BE FOUND. IN FACT, IF THESE BACTERIA WERE PLACED IN THE AIR WE BREATHE, THEY WOULD DIE!! METHANOGENS CAN BE FOUND IN MANY PLACES, LIKE THE BOTTOM OF SWAMPS OR SEWAGE TREATMENT PLANTS. THEY ARE EVEN FOUND INSIDE MANY ORGANISMS INCLUDING HUMANS!

**HALOPHILES** ARE ALSO KNOWN AS "SALT LOVERS". THESE BACTERIA LIVE IN VERY SALTY WATER. PLACES LIKE THE DEAD SEA AND THE GREAT SALT LAKE ARE HOME TO HALOPHILES. MOST OF THESE BACTERIA ARE AUTOTROPHIC, SO THEY MAKE THEIR OWN FOOD! IF YOU PLACED A HALOPHILE IN A GLASS OF WATER FROM THE FAUCET, IT WOULD NOT SURVIVE! THIS ORGANISM USES SALT TO CREATE FOOD FOR ITSELF!

**THERMOPHILES** ARE ALSO KNOWN AS "HEAT LOVERS". THESE BACTERIA LIVE IN AREAS WITH VERY HIGH TEMPERATURES. THE



BACTERIA FOUND IN THE HOT SPRINGS OF YELLOWSTONE NATIONAL PARK ARE THERMOPHILES! IN ADDITION TO HOT SPRINGS, THESE ORGANISMS HAVE BEEN FOUND IN UNDERGROUND CAVES NEAR VOLCANOES!

**A Thermophile Hot Tub!**

THE LAST KINGDOM YOU ARE GOING TO STUDY MAY BE THE MOST MISUNDERSTOOD GROUP OF ORGANISMS...

# KINGDOM EUBACTERIA

ANOTHER BIG WORD, I KNOW! JUST RELAX AND SAY...  
"YOU-BACK-TEAR-E-AH"

DO YOU SEE ANYTHING SIMILAR IN THIS KINGDOM'S NAME? YOU GUESSED IT...THIS IS ANOTHER KINGDOM OF **BACTERIA!**

BACTERIA CAN LIVE ANYWHERE! ARCHAEBACTERIA ("ARK-EE-BACK-TEAR-E-AH") HAVE INHERITED TRAITS THAT MAKE THEM LIVE IN HABITATS WHERE NO OTHER ORGANISM CAN. HOWEVER, MOST EUBACTERIA CAN LIVE IN ANY BIOME YOU HAVE STUDIED!

THERE ARE MILLIONS OF EUBACTERIA IN A SINGLE TEASPOON OF SOIL. THEY ARE ON YOUR SKIN, IN YOUR HAIR, ALL OVER THE DOOR KNOBS OF YOUR HOUSE! AND YES, THEY EVEN LIVE INSIDE YOU! MOST OF THESE ORGANISMS ARE HARMLESS TO HUMANS, SO DO NOT WORRY!



LET'S LOOK AT SOME OF THE GOOD THINGS THAT COME FROM EUBACTERIA:

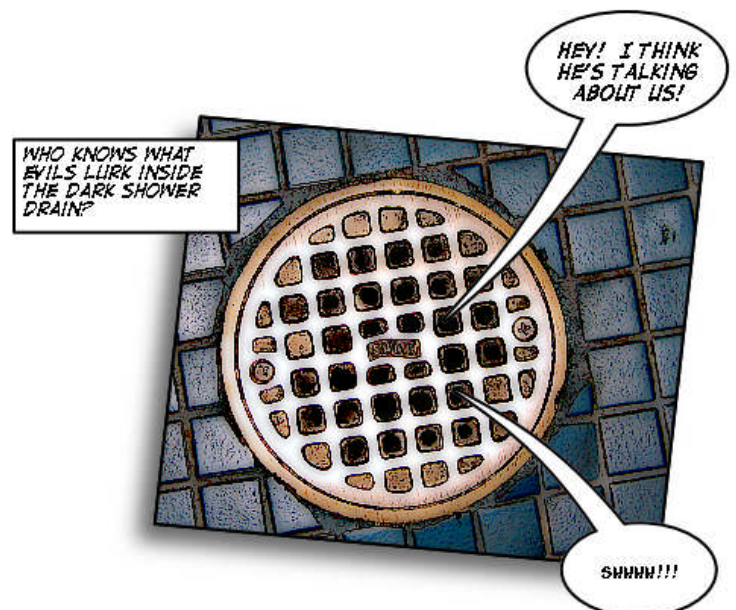
- Ⓢ BACTERIA ARE USED TO MAKE MANY DIFFERENT KINDS OF FOODS SUCH AS CHEESE, PICKLES AND YOGURT.
- Ⓢ IN SOIL, BACTERIA ACT AS **DECOMPOSERS** BY BREAKING DOWN BIOTIC MATERIALS INTO MORE USEFUL FORMS...JUST LIKE FUNGI!!!
- Ⓢ BACTERIA ARE USED TO GROW VARIOUS MEDICINES.
- Ⓢ IN THE HUMAN BODY, SOME BACTERIA HELP TO KEEP US WELL AND TO DIGEST OUR FOOD!

HOWEVER, IT IS TOO BAD THAT SOME OTHER KINDS OF BACTERIA CAUSE DISEASES IN EVERY KINGDOM.

**PLANTS, ANIMALS, FUNGI AND PROTISTS CAN ALL BECOME SICK WHEN CERTAIN SPECIES OF BACTERIA GROW INSIDE THEM!**

BACTERIA CAN GROW VERY QUICKLY IF THEY ARE GIVEN THE RIGHT AMOUNT OF RESOURCES (LIKE HEAT, WATER AND NUTRIENTS). BECAUSE OF THIS, IT IS HARD FOR AN ORGANISM TO DEFEND ITSELF FROM GETTING SICK WHEN BACTERIA IS GROWING INSIDE OF THEM.

SCIENTISTS ARE ADDING NEW SPECIES TO EACH OF THE SIX KINGDOMS OF LIFE YOU HAVE STUDIED SO FAR. AS NEW LIVING CREATURES ARE FOUND AND NEW TRAITS ARE DISCOVERED, SCIENTISTS ARE WORKING TO CLASSIFY ALL OF THESE ORGANISMS!



*SCIENCE IS ALWAYS CHANGING BECAUSE SCIENTISTS ARE ALWAYS SEARCHING FOR NEW INFORMATION ABOUT THE WORLD WE LIVE IN!*

***THIS MEANS THAT YOU MUST KEEP ASKING QUESTIONS ABOUT THE WORLD AROUND YOU AND KEEP LOOKING FOR THE ANSWERS!!!***

**THE TABLE BELOW CONTAINS WORDS AND PHRASES THAT HAVE BEEN CHOPPED IN HALF. FIND THE PIECES THAT FIT TOGETHER AND WRITE THEM IN THE ANSWER AREA BELOW.**

OXY	FLAG	METHA	KINGDOM ARC
KINGDOM E	NOGENS	HAEBACTERIA	ELLA
UBACTERIA	HALOP	GEN	HILES
THERMO	BACT	ERIA	PHILES

**ANSWERS:**

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**MATCH THE WORDS IN THE FIRST COLUMN TO THE BEST AVAILABLE ANSWER IN THE SECOND COLUMN.**

\_\_\_\_ BACTERIA

1) BACTERIA THAT LIVE IN VERY DANGEROUS HABITATS

\_\_\_\_ FLAGELLA

2) SINGLE CELLED ORGANISMS THAT CAN LIVE IN SOIL AND WATER AND OTHER ORGANISMS

\_\_\_\_ KINGDOM  
ARCHAEBACTERIA

3) COMMON BACTERIA THAT CAN LIVE IN EVERY BIOME OF THE WORLD

\_\_\_\_ METHANOGENS

4) ARCHAEBACTERIA THAT LIVE IN AREAS WITH VERY HIGH TEMPERATURES

\_\_\_\_ HALOPHILES

5) THE GAS HUMANS NEED TO BREATHE TO STAY ALIVE

\_\_\_\_ THERMOPHILES

6) BODY PART OF A BACTERIA THAT ACTS LIKE A TAIL WHICH MOVES THE BACTERIA THROUGH A LIQUID

\_\_\_\_ OXYGEN

7) ARCHAEBACTERIA THAT LIVE IN VERY SALTY WATER

\_\_\_\_ KINGDOM EUBACTERIA

8) ARCHAEBACTERIA NAMED AFTER THE GAS THEY MAKE - METHANE

# UNIT FOUR REVIEW

**FILL IN THE BLANKS IN THE STORY BELOW WITH THE FOLLOWING WORDS:**

**DECOMPOSERS  
AUTOTROPHIC  
HETEROTROPHIC**

SINCE I AM \_\_\_\_\_, I HAVE TO EAT OTHER ORGANISMS TO STAY ALIVE! THIS IS MUCH DIFFERENT THAN PLANTS WHO ARE \_\_\_\_\_. OTHER ORGANISMS, CALLED \_\_\_\_\_, BREAK DOWN ALL KINDS OF BIOTIC MATERIAL INTO MORE USEFUL FORMS.

**MATCH THE WORDS IN THE FIRST COLUMN TO THE BEST AVAILABLE ANSWER IN THE SECOND COLUMN.**

_____	PLANTS	1. A GROUP OF ORGANISMS THAT CAN MOVE ON THEIR OWN AND ARE HETEROTROPHIC
_____	FUNGI	2. COMMON BACTERIA THAT CAN LIVE IN EVERY BIOME OF THE WORLD
_____	ANIMALS	3. ORGANISMS THAT ACT AS DECOMPOSERS AND ABSORB THEIR FOOD THROUGH THEIR BODIES
_____	PROTISTS	4. BACTERIA THAT LIVE IN VERY DANGEROUS HABITATS
_____	ARCHAEBACTERIA	5. ORGANISMS THAT SHARE TRAITS WITH PLANTS AND ANIMALS AND FUNGI
_____	EUBACTERIA	6. A GROUP OF ORGANISMS THAT ARE AUTOTROPHIC AND HAVE SOME FORM OF LEAF AND STEM AND ROOT

**BE CERTAIN TO GO OVER YOUR DEFINITIONS FOR THE TEST!!!**