

SCIENCE SPAZA

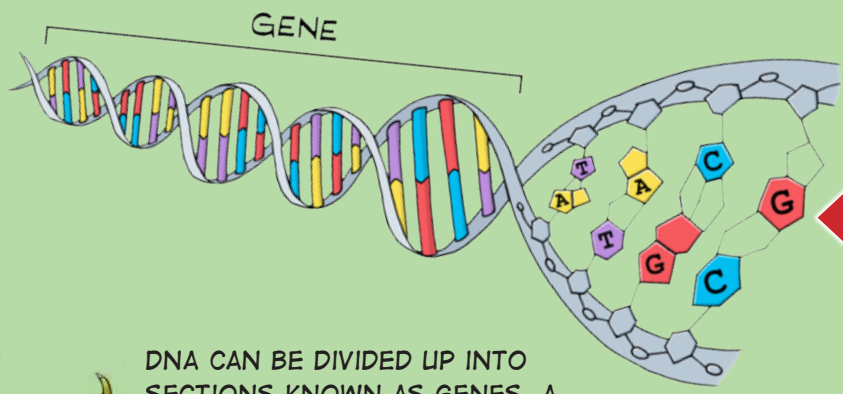
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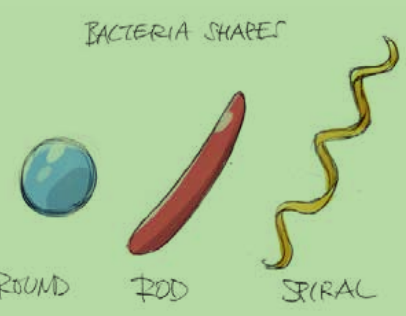
FIGHTING TB - CRACKING THE CODE!

DNA - THE CODE OF LIFE

CELLS ARE THE BUILDING BLOCKS OF ALL LIVING THINGS. PACKED TIGHTLY INSIDE THEM ARE LONG, STRINGY DNA MOLECULES.



FOUR SMALLER MOLECULES CALLED **BASES** LINK TOGETHER TO FORM DNA. THE LETTERS **A, C, G AND T** REPRESENT THE DIFFERENT BASES.



DNA CAN BE DIVIDED UP INTO SECTIONS KNOWN AS GENES. A GENE IS AN AREA OF DNA WITH SPECIFIC INSTRUCTIONS TO MAKE A MOLECULE, USUALLY A PROTEIN. PROTEINS DO SPECIFIC TASKS IN CELLS. GENES CONTROL FEATURES LIKE YOUR EYE COLOUR OR HEIGHT, OR THE SHAPE OF BACTERIA.



GOING BANANAS FOR DNA!

FOLLOW THESE STEPS TO EXTRACT DNA FROM BANANA CELLS:

1 MASH HALF A BANANA WITH A FORK IN A BOWL.



2 ADD HALF A TEASPOON OF SALT TO HALF A CUP OF WARM WATER. STIR. ADD TO THE MASHED BANANA. STIR.



YOU WILL NEED:

- 1/2 BANANA
- HOT WATER (50-60°C - AS HOT AS THE HOT TAP GETS)
- TEASPOONS AND FORK
- SALT
- DISHWASHING SOAP
- METHYLATED SPIRITS
- PAPERCLIP
- PIECE OF CLOTH AND ELASTIC BAND TO MAKE A FILTER
- BOWL
- GLASS



3 ADD HALF A TEASPOON OF SOAP. STIR GENTLY, TRY NOT TO MAKE BUBBLES. WAIT FOR 2 MINUTES. JUST LIKE SOAP BREAKS UP FATTY DIRT ON DISHES, IT WILL NOW BREAK OPEN THE FATTY WALLS THAT SURROUND DNA IN THE CELLS.



4 TIE THE CLOTH TO THE TOP OF THE GLASS TO MAKE A FILTER. SCOOP THE BANANA-MIXTURE INTO THE FILTER AND WAIT FOR THE LIQUID TO RUN INTO THE GLASS. THIS LIQUID CONTAINS THE DNA.



5 SLOWLY ADD METHYLATED SPIRITS TO FORM A LAYER ON TOP OF THE MIXTURE IN THE GLASS. LET IT RUN DOWN THE SIDE OF THE GLASS TO MAKE SURE THE LAYERS DO NOT MIX.



6 YOU WILL SEE SOMETHING WHITE APPEAR WHERE THE SPIRITS AND MIXTURE MEET - THIS IS DNA! YOU CAN SCOOP IT OUT WITH A BENT OPEN PAPERCLIP. DNA DISSOLVES IN WATER BUT NOT IN THE SPIRITS, THAT'S WHY YOU CAN SEE IT.

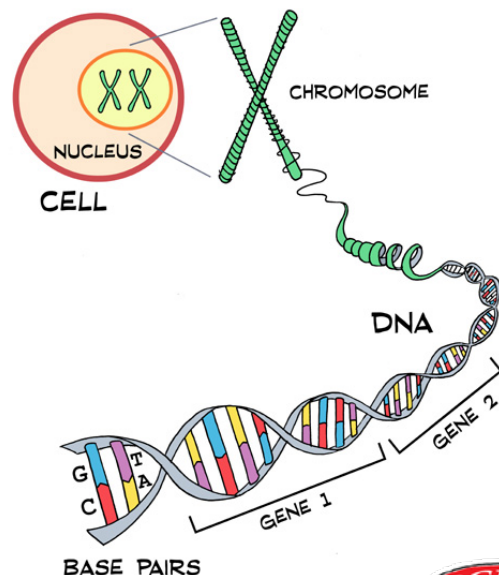


WELL DONE YOUNG SCIENTISTS! REMEMBER TO SEND US PHOTOS OF YOURSELVES WITH THE DNA.



SEEING DNA?

IN YOUR EXPERIMENT YOU SEPARATED DNA FROM THE OTHER PARTS OF THE BANANA CELLS. SCIENTISTS FOLLOW SIMILAR STEPS TO GET DNA FROM ALL KINDS OF LIVING THINGS. THERE ARE MANY REASONS TO STUDY DNA. LET'S LEARN MORE ABOUT ONE OF THEM.

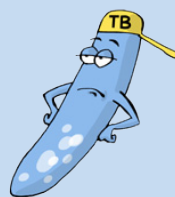
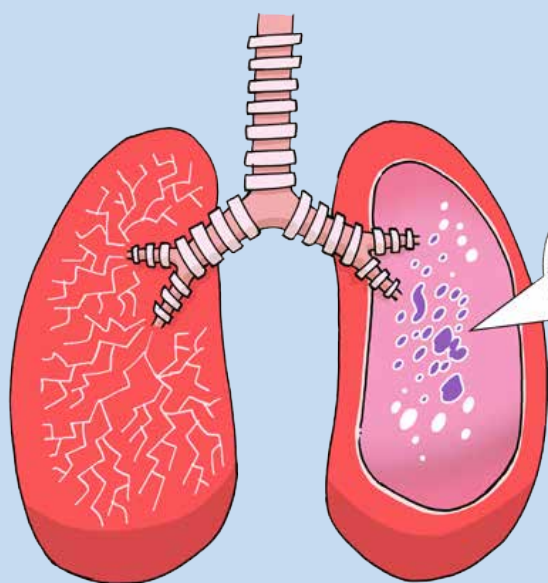


THE FIGHT AGAINST TB

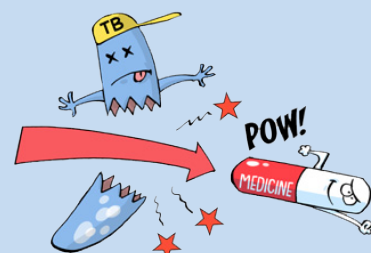
TUBERCULOSIS (TB) IS A LUNG DISEASE. A BACTERIUM CALLED *MYCOBACTERIUM TUBERCULOSIS* CAUSE TB. TB CAN BE DEADLY WITHOUT THE RIGHT TREATMENT.

SOME *MYCOBACTERIA* HAVE CHANGES IN THEIR DNA THAT MAKES THEM STRONGER SO THAT NORMAL TB MEDICINE CAN'T KILL THEM.

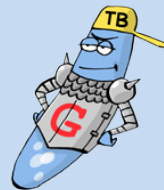
SCIENTISTS STUDY DNA FROM THE BACTERIA IN A TB PATIENT TO FIND OUT WHAT MEDICINE WILL WORK THE BEST FOR THAT PERSON.



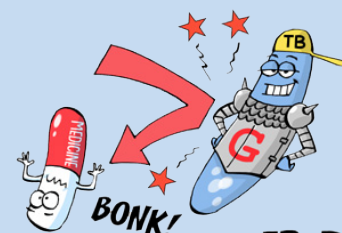
GC CGT TTT CTC



TB DRUG SUSCEPTIBLE



AGC CGT TGT CTC



TB DRUG RESISTANT

CAREERS TO COMBAT TB

The Fight against TB needs experts from various fields. Here are a few career choices where you could make a difference.

Bioinformatics

Mathematics, statistics and computer science are used to make sense of masses of biological information coded by DNA.

Molecular biology

Looking at molecules and chemical reactions in living things. This includes genetics and biochemistry.

Biomedical technology

The technical job of doing tests and experiments in the laboratory.

BE SURE TO CHECK OUT **INTERVIEWS WITH SCIENTISTS** IN THIS EDITION OF **SPAZA SPACE!**



CURRICULUM LINKS

- **Grade 6 Life skills:**
Communicable diseases.
- **Grade 7-9 Natural Sciences:**
Cells, the basic unit of life;
Cells structure.
- **Grade 10-12 Life sciences:**
Cells, DNA – Code of life;
Protein synthesis.

Knowledge is Ncah!

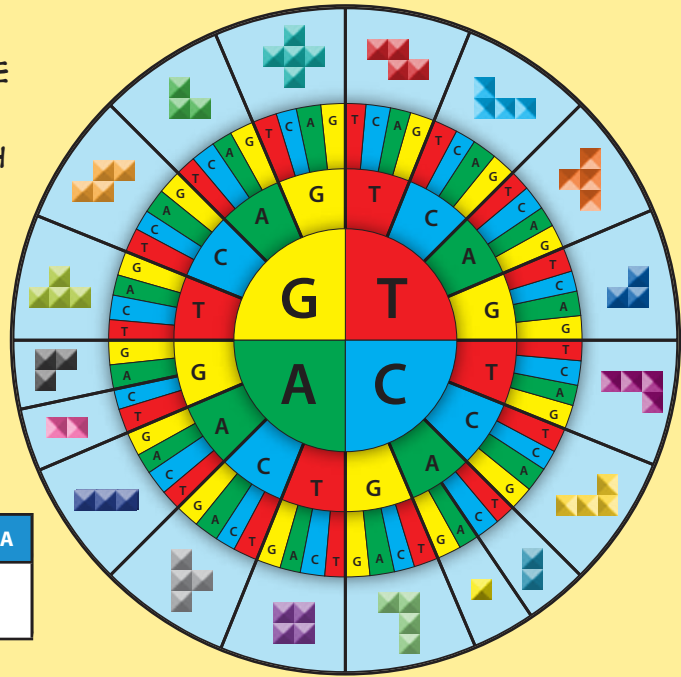


CAN YOU CRACK THE CODE?

TB MEDICINES TARGET SPECIFIC BACTERIAL PROTEINS. THE MEDICINE WORKS BY FITTING INTO THE TARGET LIKE A KEY FITS INTO A LOCK, OR TETRIS BLOCKS FIT ONTO EACH OTHER.

YOUR TURN!

DRAW THE MATCHING TETRIS BLOCKS FOR EACH OF THE THREE DNA CODES. **TIP: READ THE THREE LETTERS OF EACH BIT OF CODE FROM THE CENTRE OF THE WHEEL OUTWARDS.**



DNA Code 1	ATG	AAG	TCA	GCT	GTT	TTA	CCC	CTT	CGA
Cracked Code									

DNA Code 2	ATG	CGA	TCA	GCT	GTT	TTA	CCC	CTT	CGA
Cracked Code									

DNA Code 3	ATG	CGA	TCA	GCT	CTT	TTA	CCC	GTT	CGA
Cracked Code									

MATCH EACH DNA CODE WITH THE CORRECT **PROTEIN CARD** AND TO SEE HOW SCIENTISTS USE THE **CODE OF LIFE** TO TREAT TB PATIENTS.

Protein A

CRACKED CODE

What is it?
Drug susceptible TB

What does it mean?
No genetic variation. Normal TB medicine can be used to treat the patient and help them get better.

Protein B

CRACKED CODE

What is it?
Drug resistant TB

What does it mean?
A single genetic variation causes resistance to one of the TB medicines. Normal medicine will not work. Adapted treatment (swapping TB drug 1 with a new TB drug) is needed.

Protein C

CRACKED CODE

What is it?
Multi-Drug resistant TB

What does it mean?
Multiple genetic variations cause resistance to multiple TB medicines. Normal medicine will not work and a special treatment with new, stronger TB medication for a much longer period of time is needed.

WIN! KEEP AN EYE OUT ON OUR SOCIAL MEDIA CHANNELS.

LOOK FOR US ON FACEBOOK (@SUMBHG) AND INSTAGRAM (@SU_MBHG) TO LEARN MORE ABOUT WHAT WE DO.

START YOUR OWN SCIENCE SPAZA

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