

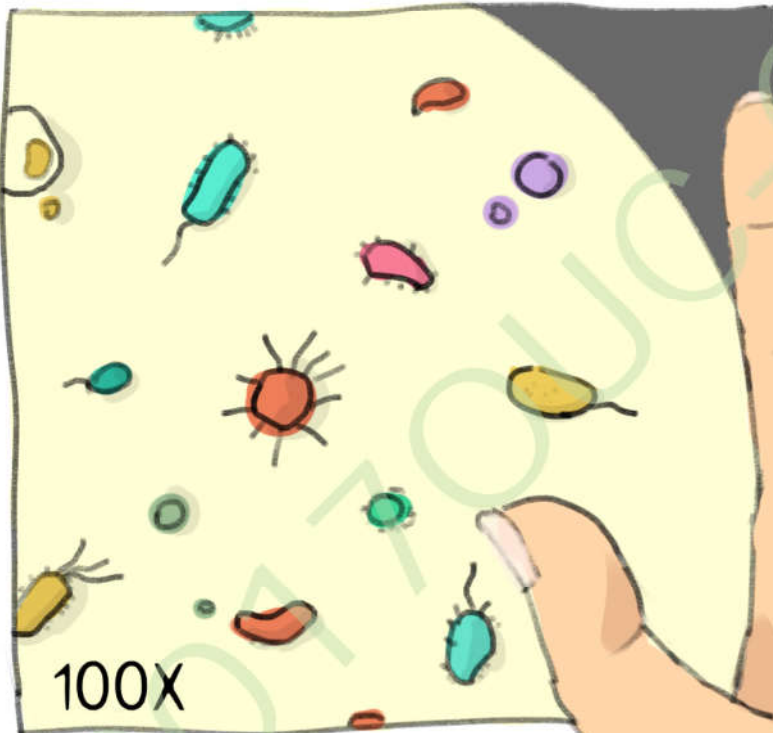
Chapter 1

DAILY IN SPACE SHIP

E.coli



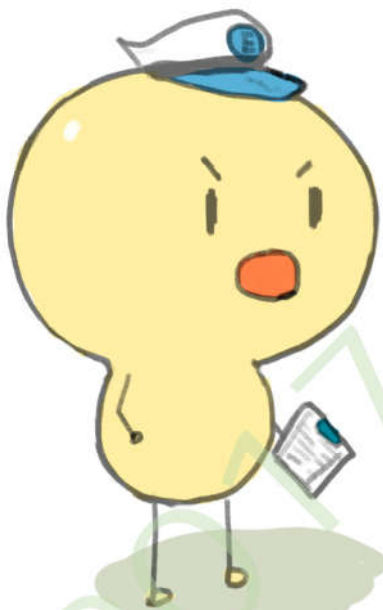
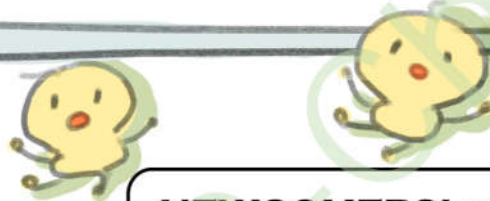
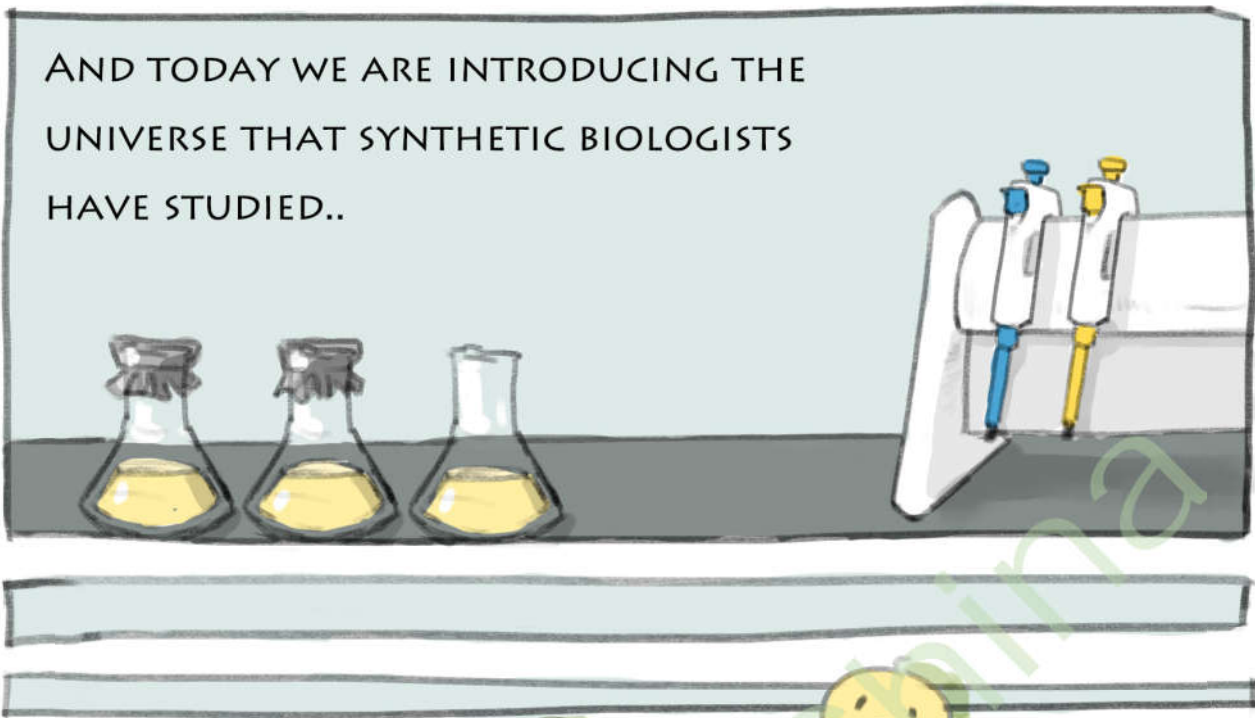
THE UNIVERSE IS VERY FAR AWAY FROM US. BUT IN FACT, THERE ARE NUMEROUS UNIVERSE AROUND US WHICH CAN NOT BE OBSERVED BY NAKED EYE... ..



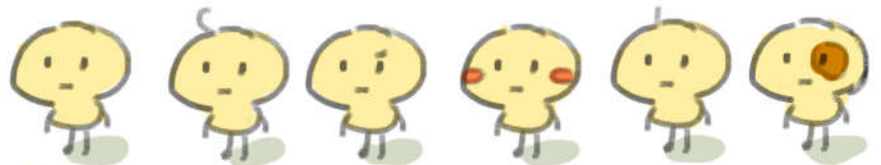
FOR EXAMPLE, YOU CAN ZOOM IN ON YOUR FEET TO A SUFFICIENT NUMBER TO OBSERVE, AND YOU CAN OBSERVE THOUSANDS OF TINY LIVES BACTERIA. BACTERIA ARE EVERYWHERE, PRODUCING LARGE AND SMALL 'UNIVERSE SYSTEMS'.



AND TODAY WE ARE INTRODUCING THE
UNIVERSE THAT SYNTHETIC BIOLOGISTS
HAVE STUDIED..

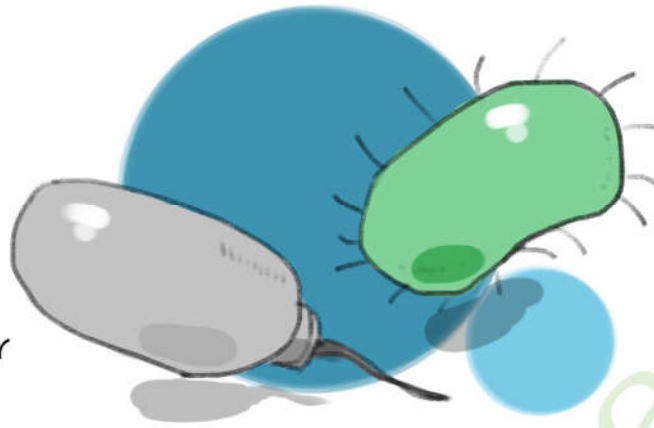


**NEWCOMERS! YOU WILL
BE ONE OF THE CREWS IN
OUR SPACESHIP. I'LL TELL
YOU BASIC SITUATION OF
OUR SPACECRAFT AND
YOUR SPECIFIC WORK!**

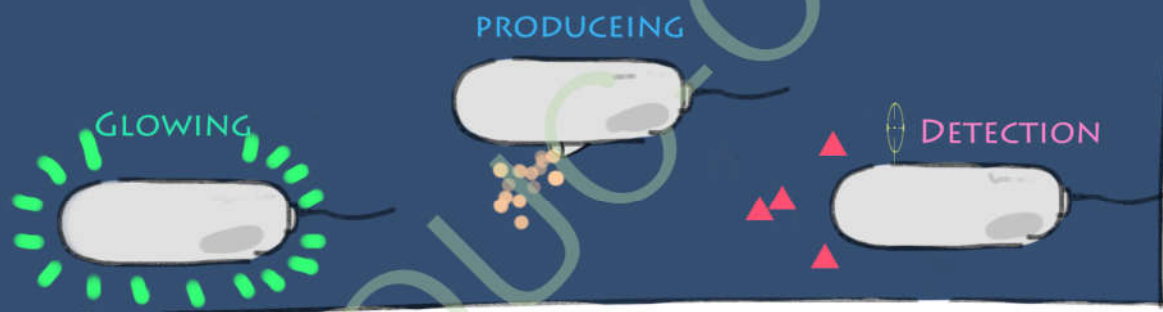


**THIS IS WHERE YOU
ARE NOW, SPACE-
CRAFT E.coli!**

THE SPACESHIP IS MADE BY THE BACTERIA SPACE-CRAFT COMPANY, AND THERE ARE MANY KINDS OF SPACE SHIP! E. COLI IS ONE OF THE MOST WIDELY USED SPACE SHIPS!



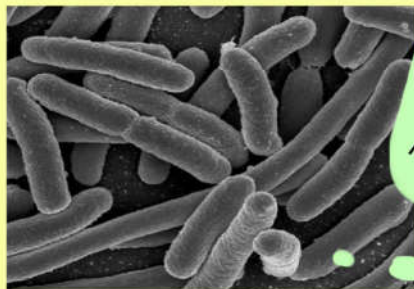
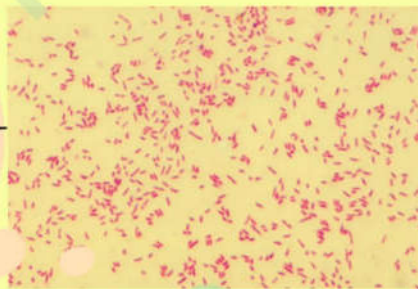
DRIVING SPACESHIP IN THE UNIVERSE AND PERFORMING A VARIETY OF TASKS IS OUR DUTY!



Tip:

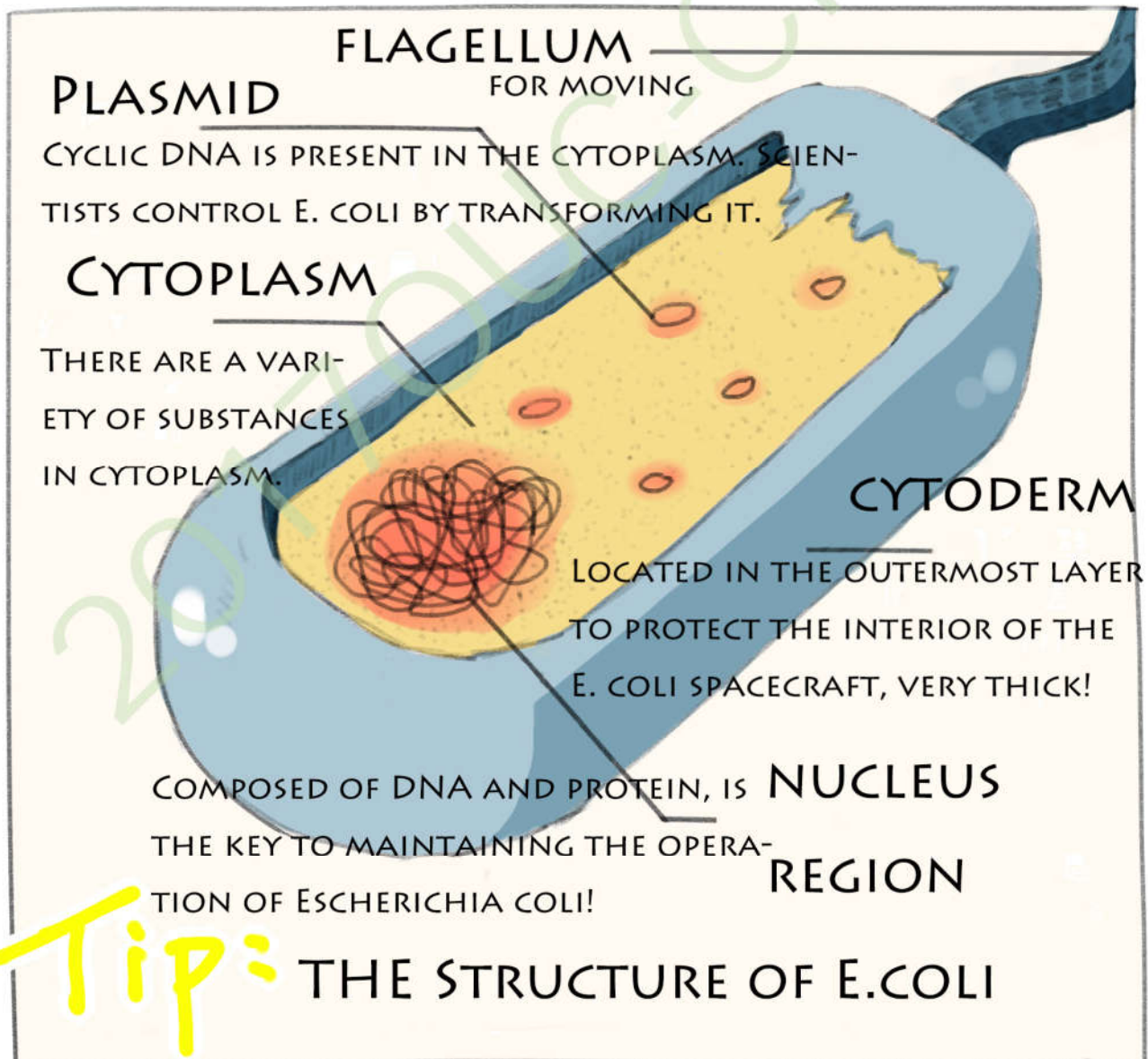
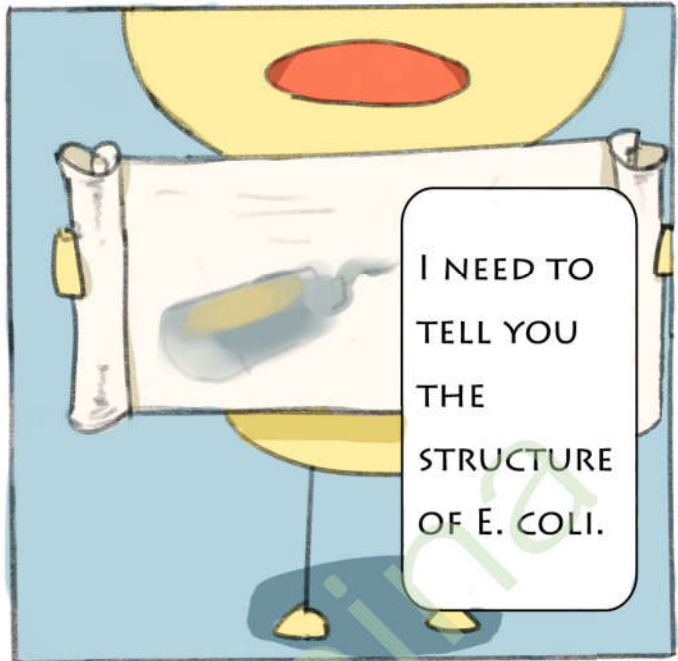
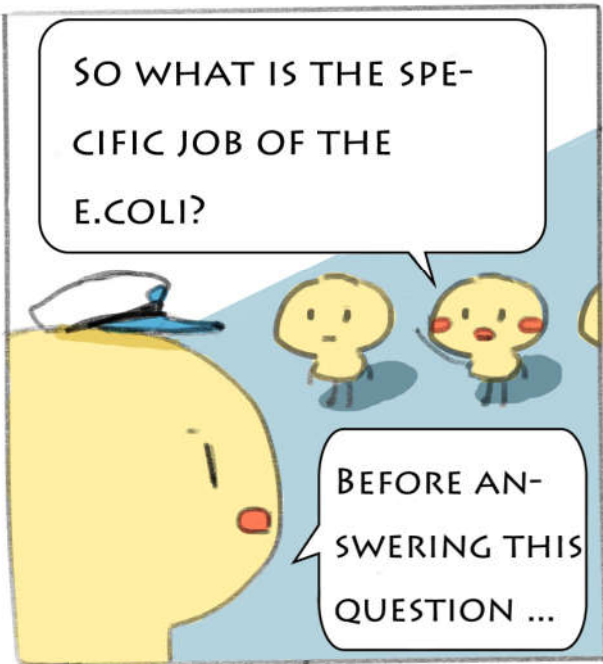
WHAT DOES THE REAL E.COLI LOOKS LIKE?

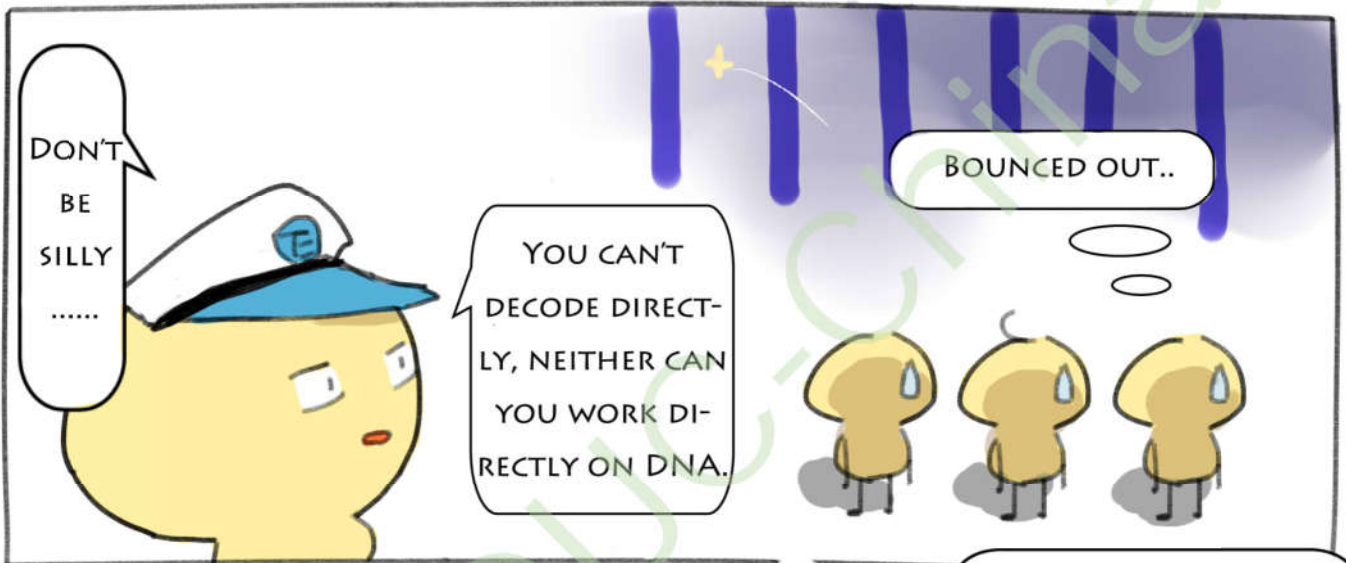
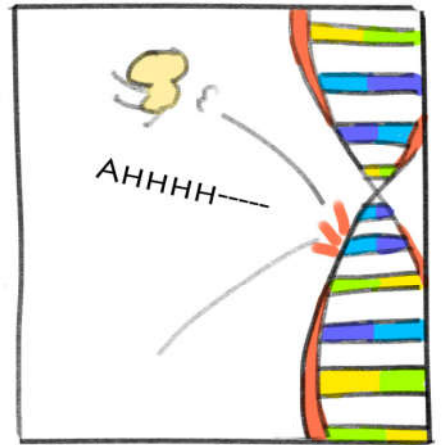
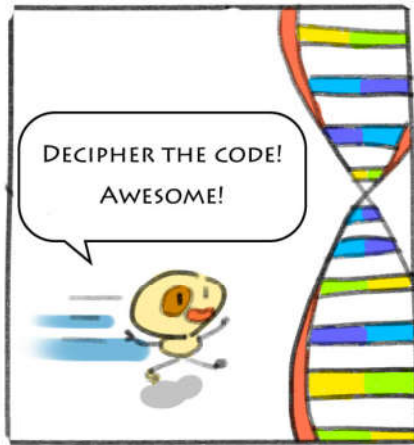
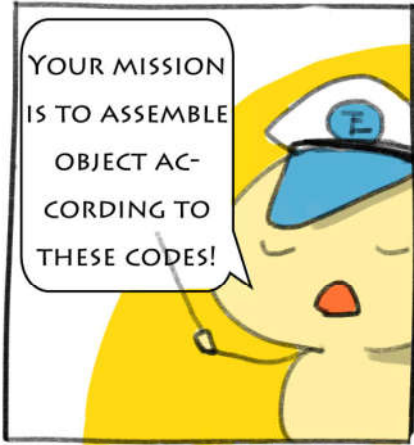
E.COLI UNDER THE OPTICAL MICROSCOPE.



E.COLI UNDER A MORE ACCURATE MICROSCOPES.

THIS IS THE WORKPLACE WHERE A LOT OF SYNTHETIC BIOLOGISTS WORK IN, MOLECULAR BIOLOGY LABORATORY!
E.COLI IS EASY TO CULTIVATE AND BREED QUICKLY SO IT IS ONE OF THE MOST COMMON EXPERIMENTAL MATERIAL.

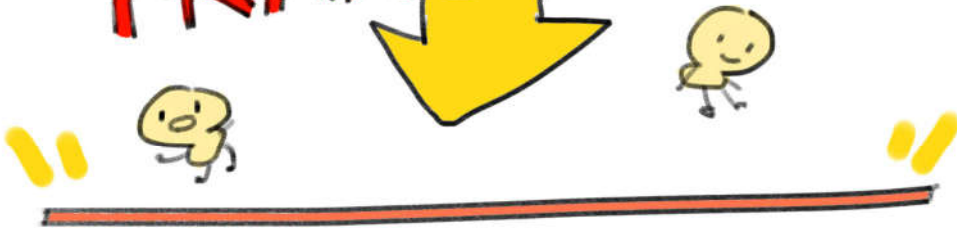




DNA: THE RIBOSOME CANNOT WORK UP HERE.

FIRST OF ALL, YOU NEED TO ASK FOR HELP FROM MR.ENZYME!

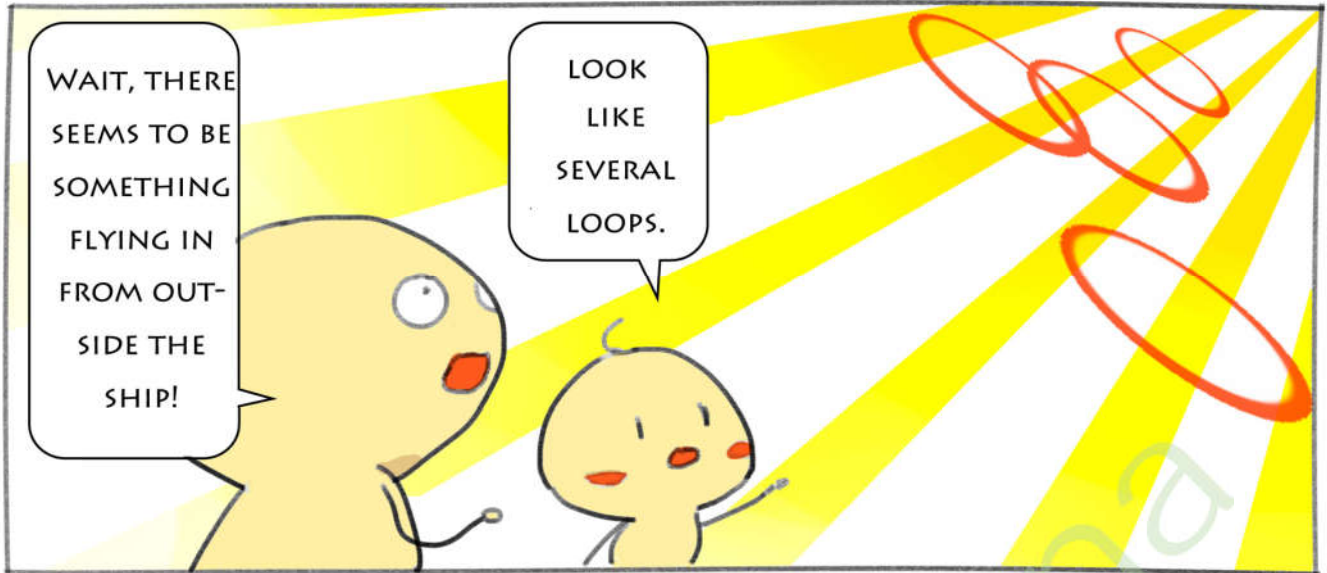
TRANSCRIPT!!!



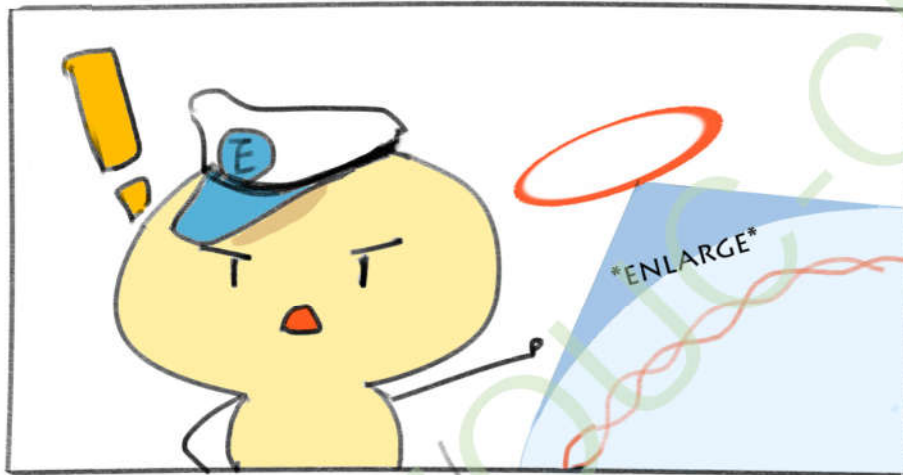
RNA: MR.ENZYME WILL FIRST TRANSCRIPT THE CODE ON DNA. THE RIBOSOME CAN THEN WORK ON IT!



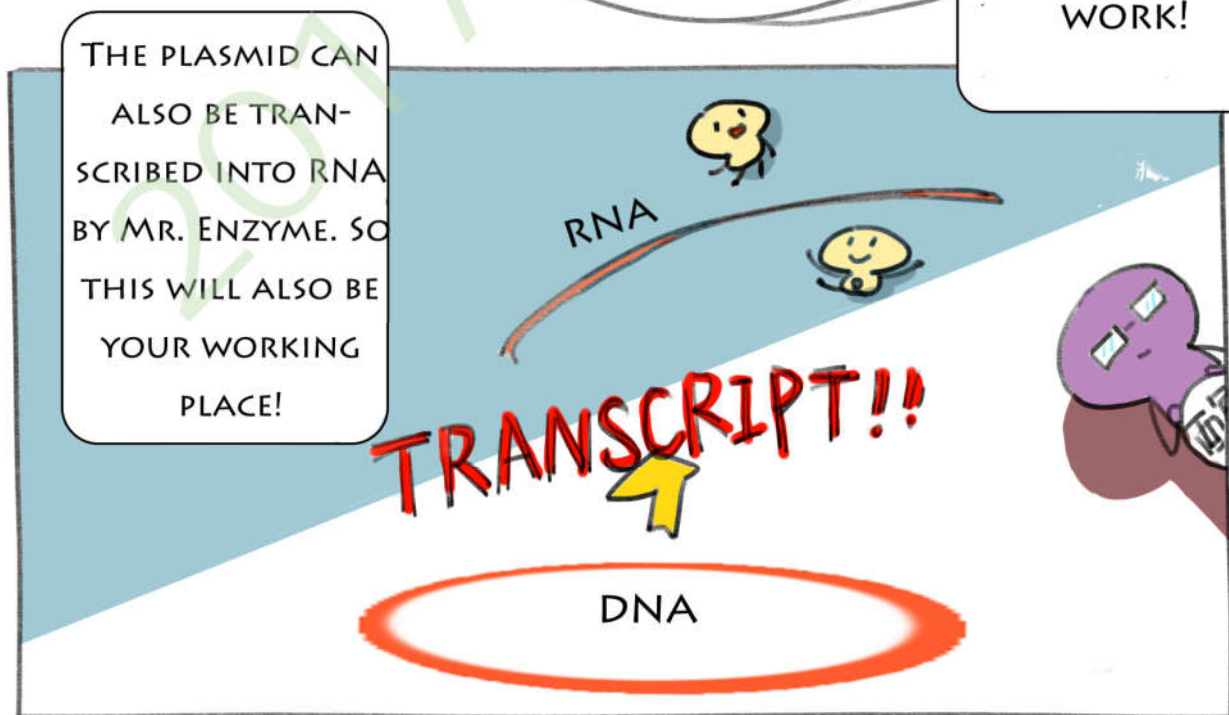
MR.ENZYME
FROM ITERATURE
DEPARTMENT



(PLASMID IS ALSO CONSISTS OF DNA. FOR DETAILS, PLEASE MOVE TO PAGE FOUR.)



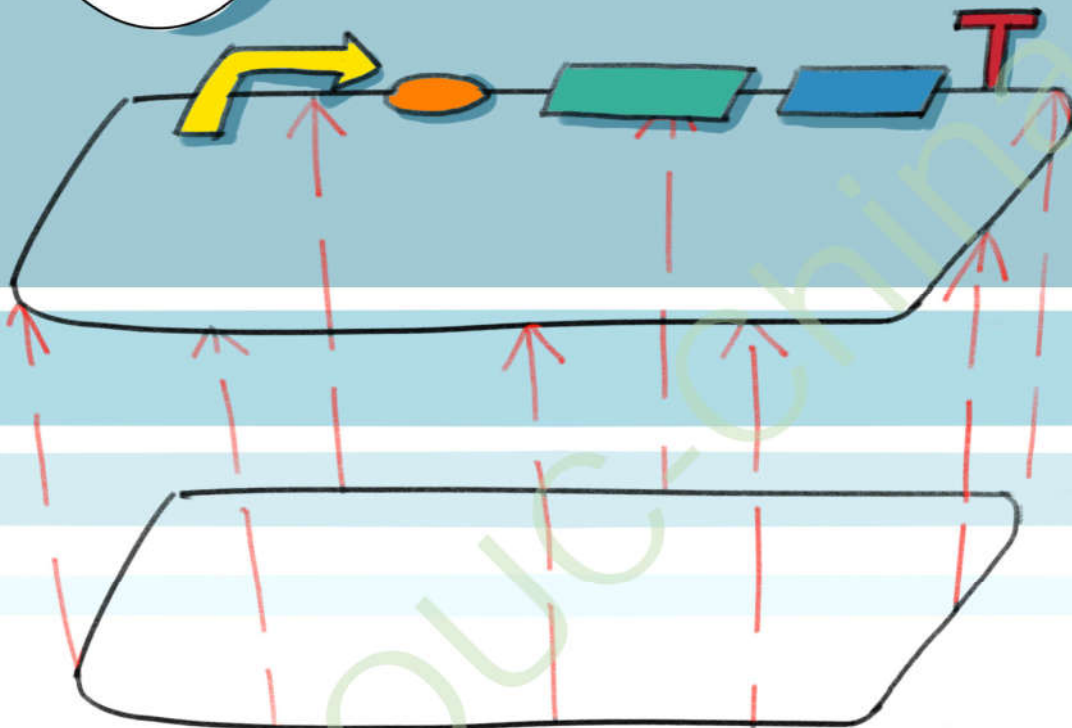
THIS IS WHAT WE CALLED "PLASMID".
COME ON, GUYS!
LET'S GET TO WORK!



GET TO
WORK!

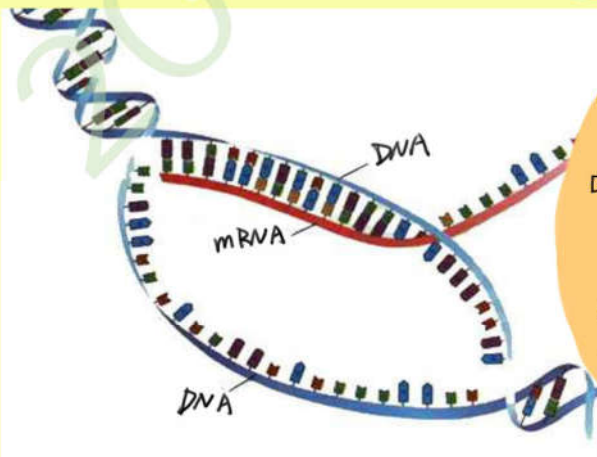


EVERY CODE IS CORRESPONDING
WITH ITS FINAL FUNCTION.



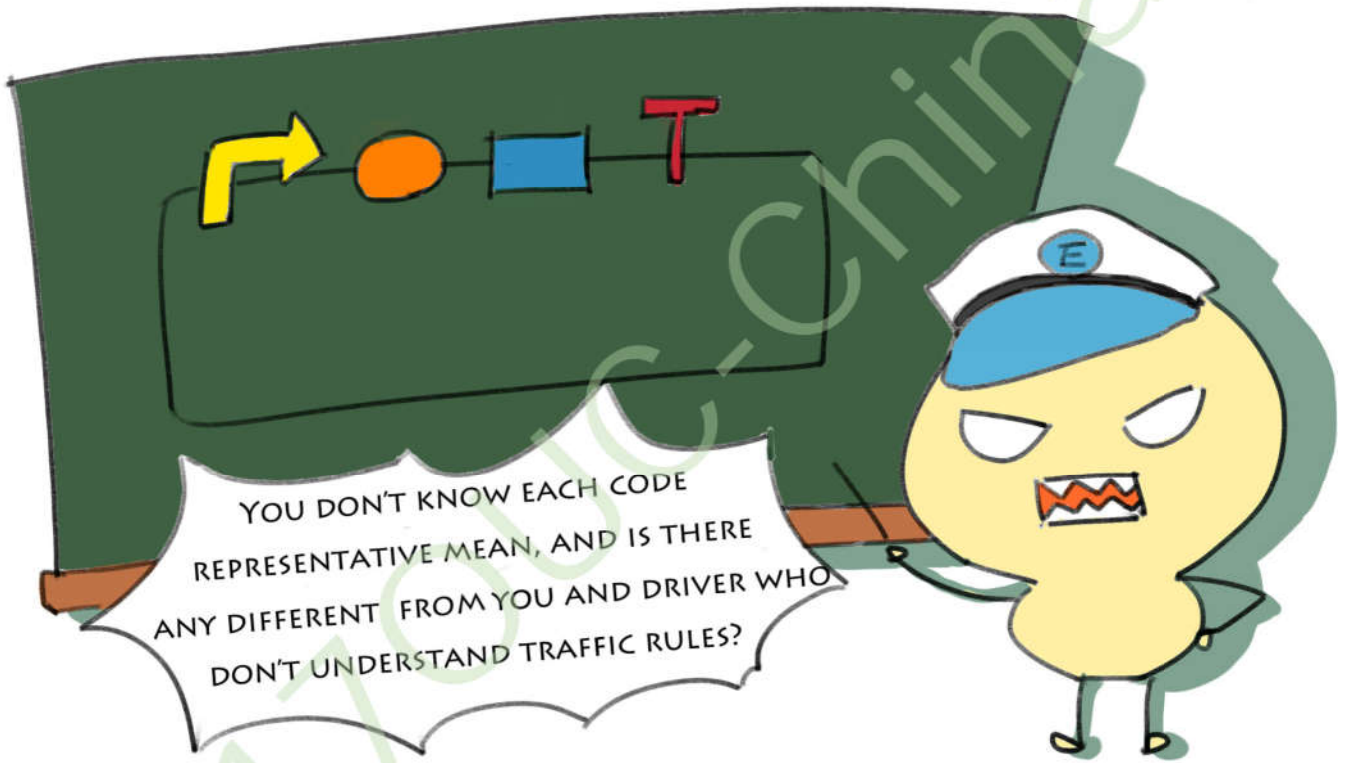
Tip:

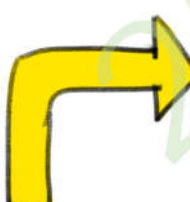



TRANSCRIPTION



THE TRANSCRIPTION PROCESS IN LIVING CREATURE IS RATHER COMPLICATED. IT NEEDS INTERACTION BETWEEN VARIOUS ENZYMES. IN PRESENT OF DNA HELICASE, TWO STRAINS OF DNA SPLIT AND REFORM MRNA WITH THE HELP OF RNA POLYMERASE. THE REASON MRNA POSSESS THE SAME INFORMATION AS DNA IS THAT IT IS CONSIST OF FOUR KINDS OF NUCLEOTIDE, SIMILAR TO THAT IN DNA. WHEN SYNTHESIZING MRNA, THESE FOUR NUCLEOTIDES WILL PAIR WITH THEIR COMPLEMENTARY DEOXYNUCLEOTIDES.

THERE IS ANOTHER PHENOMENON IN LIVING CELLS CALLED **REVERSE TRANSCRIPTION**, IN WHICH MRNA CAN BE TRANSCRIBED TO DNA. THE NOTORIOUS AIDS VIRUS-HIV IS A TYPICAL RETROVIRUS.

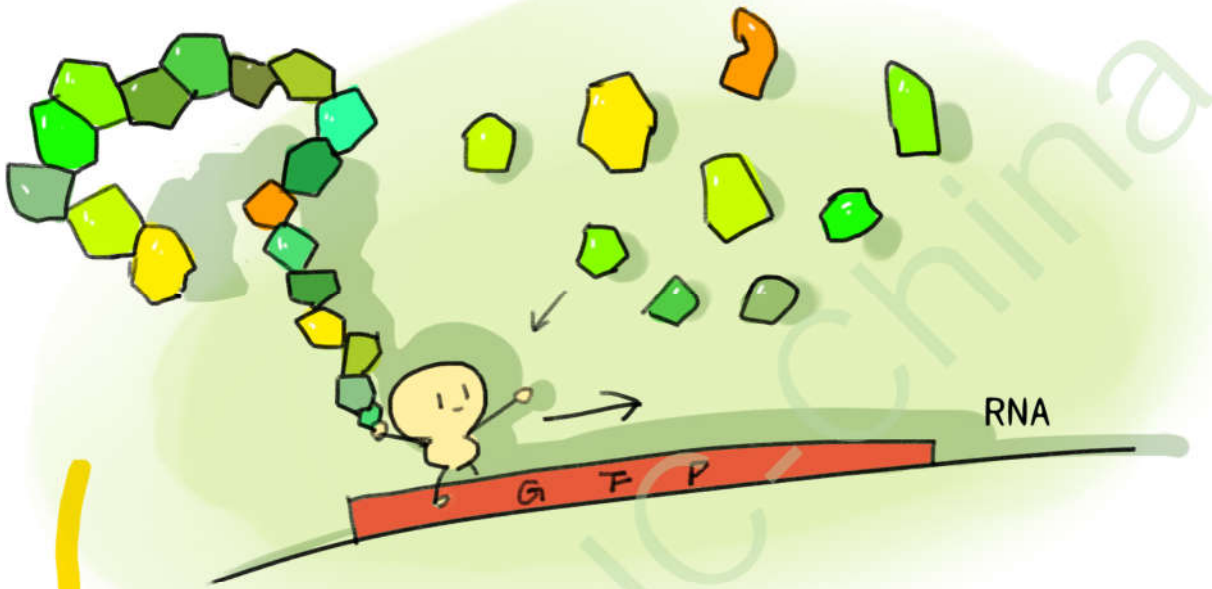


- | | |
|--|---|
|  <p>PROMOTER
THEY WHICH HAVE DIFFERENT STRENGTH ARE A SYMBOL OF GETTING STARTED TASKS.</p> |  <p>GENE
THEY HAVE UNLIKE CODE TO SYNTHESIZE DIFFERENT PROTEIN, RESPECTIVELY.</p> |
|  <p>RBS
AS AN INDISPENSABLE ELEMENT IN E.coli, THEY HAVE DIFFERENT STRENGTH.</p> |  <p>TERMINATOR
AS A STOPPING TASK SYMBOL.</p> |

GENES ARE DIVERSE, AND EACH GENE HAS DIFFERENT CODE.

GFP

GFP= GREEN FLUORESCENT PROTEIN IS A KIND OF PROTEIN, WHICH CAN EMIT GREEN FLUORESCENCE.



SCRUNCHED UP

THE FUNCTION OF RIBOSOME IS ASSEMBLING FREE SUBSTANCE IN CYTOPLASM, WHICH IS ACCORDING TO CODE SEQUENCE.

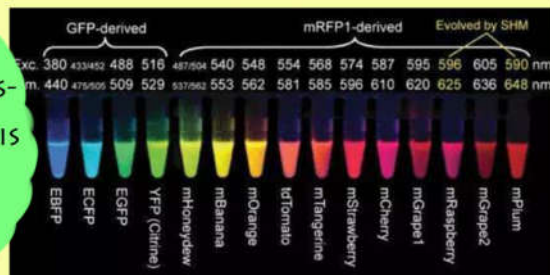


Tip:

FLUORESCENT PROTEIN IS A PROTEIN OF STEADILY EMITTING FLUORESCENCE. THEREFORE, IT IS USUALLY USED TO A REPORTER PROTEIN. IN OTHER WORDS, WE CAN THROUGH FLUORESCENT STRENGTH GET THIS CIRCUIT'S GENERAL STRENGTH.

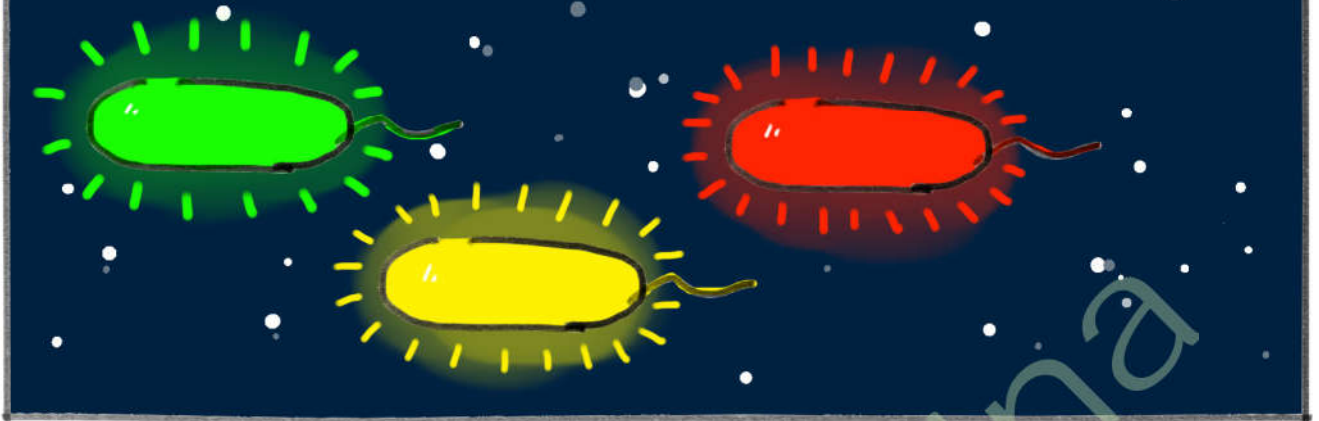


MANY FLUORESCENT PROTEIN IS FOUND FROM JELLYFISH.



VARIOUS FLUORESCENT PROTEIN.

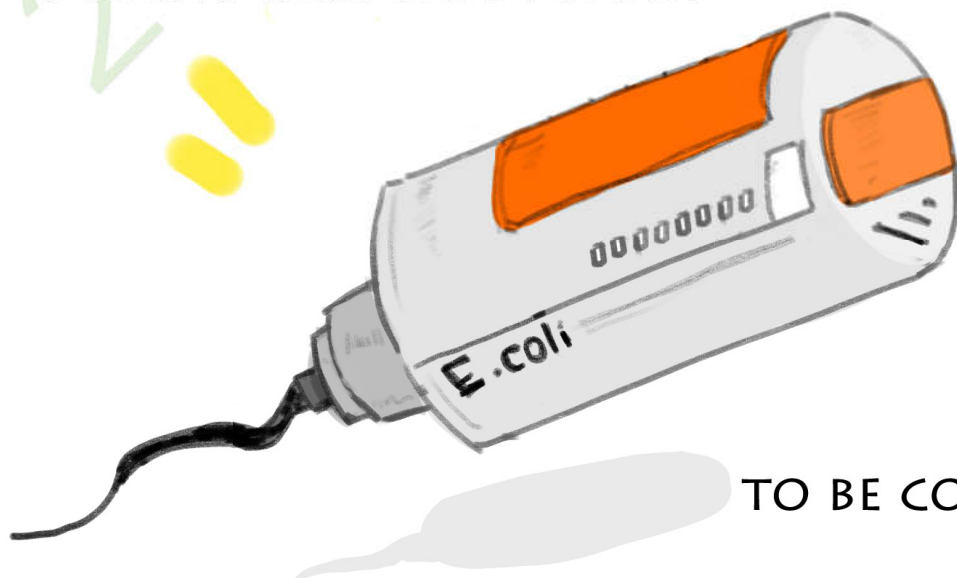
OF COURSE, WE NOT ONLY CAN EMIT GREEN FLUORESCENCE.



BUT ALSO PRODUCE SOME USEFUL THINGS!



CERTAINLY, SYNTHETIC BIOLOGISTS USE E.coli
MUCH MORE THAN THAT!



TO BE CONTINUED....