2021-08-19

Emma RNA Saves the Day

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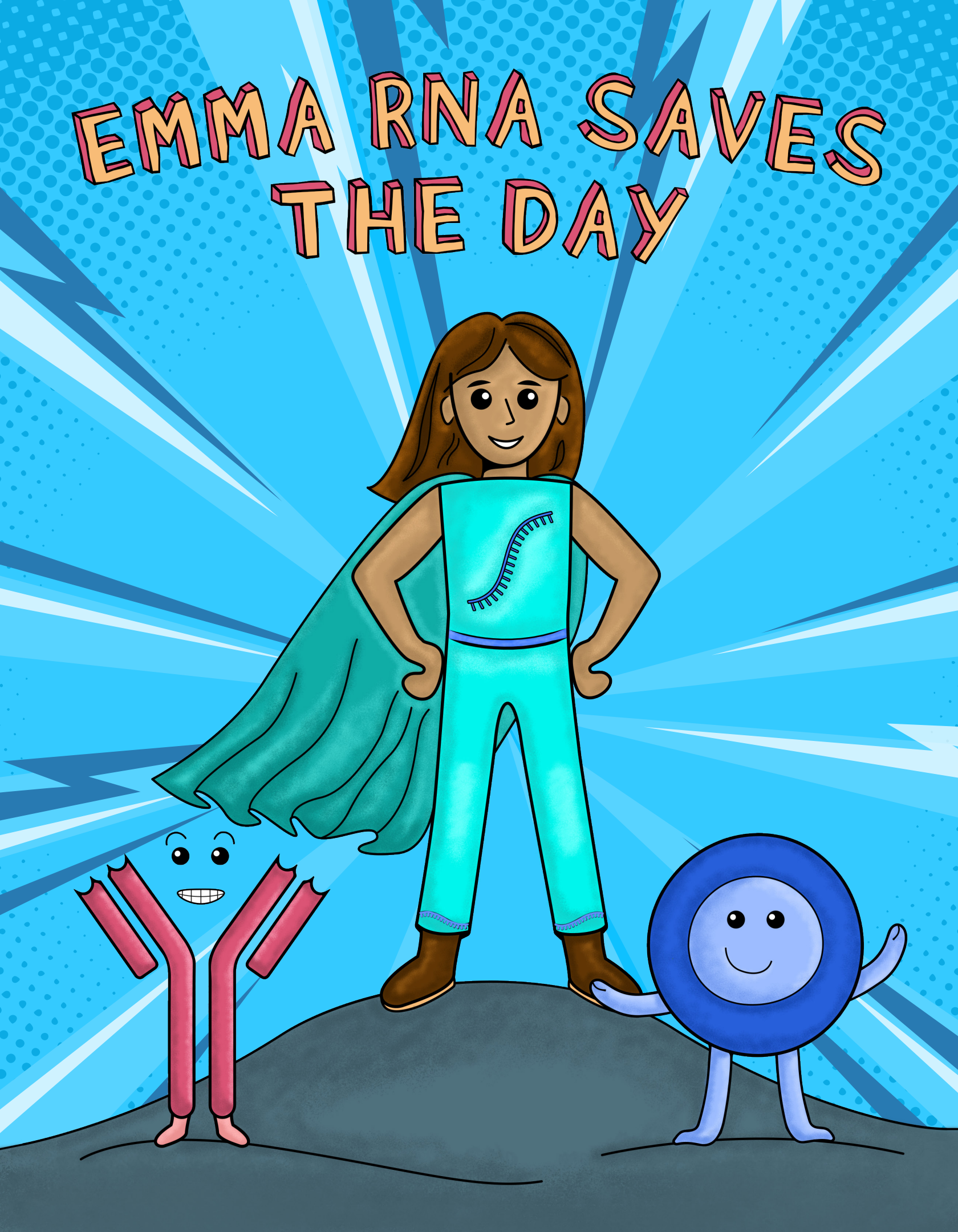
Wellesley College

Et al.

EMMA RNA SAVES THE DAY



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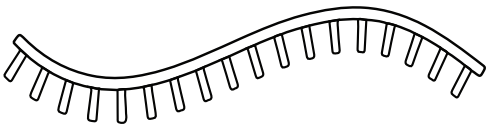

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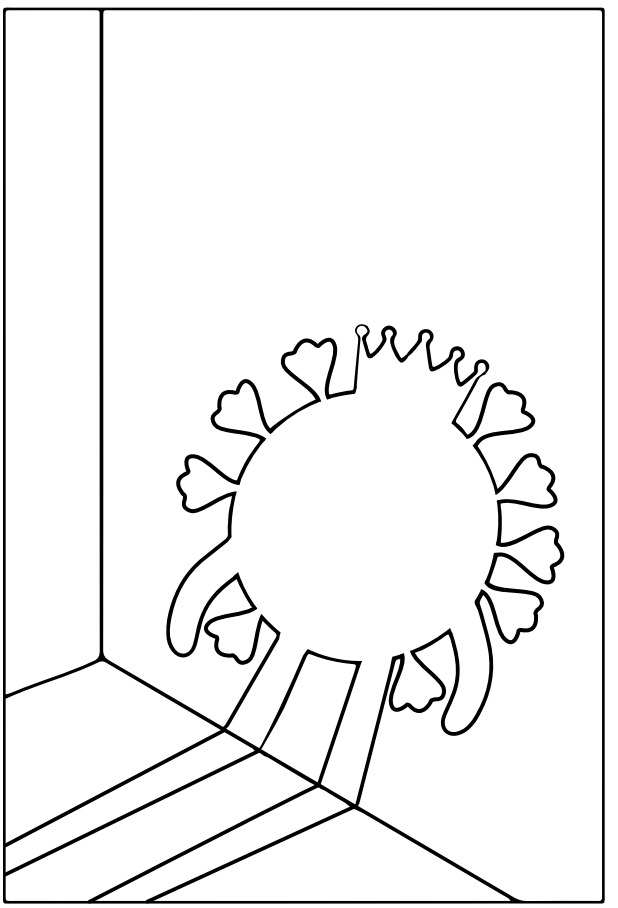
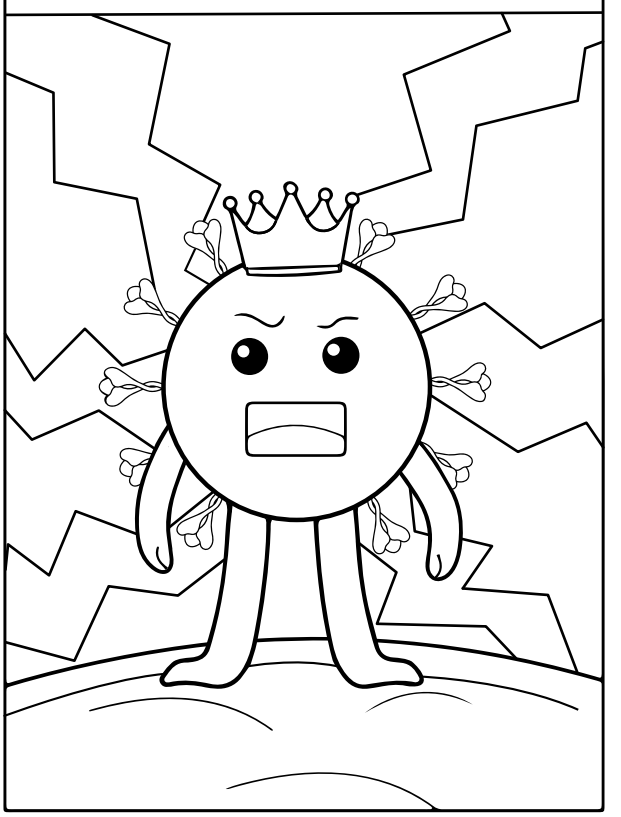
IN 2019, A NEW AND DANGEROUS VILLAIN EMERGED IN THE WORLD.

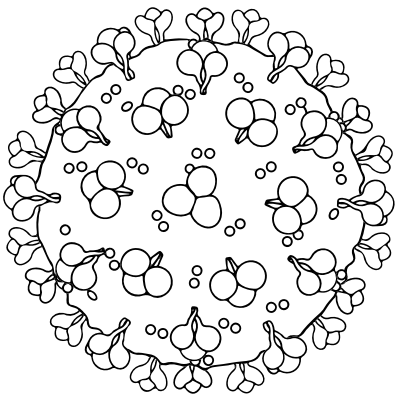


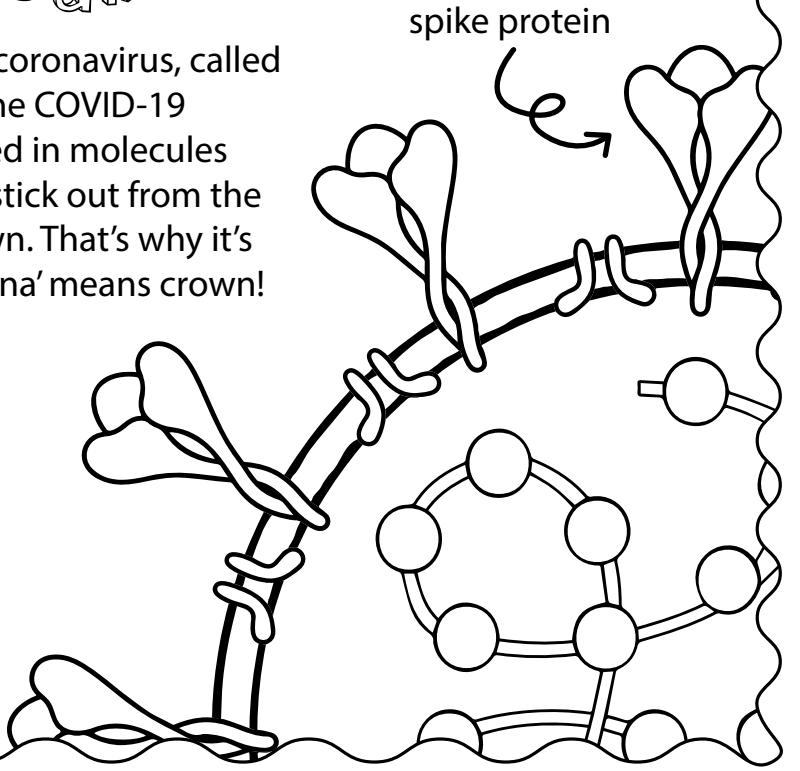
HIS NAME IS SPIKE MAN.

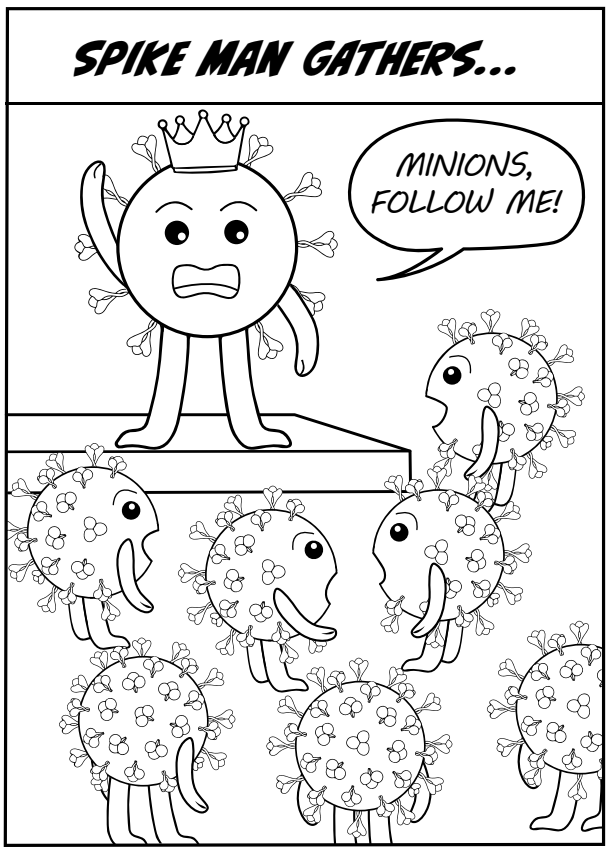


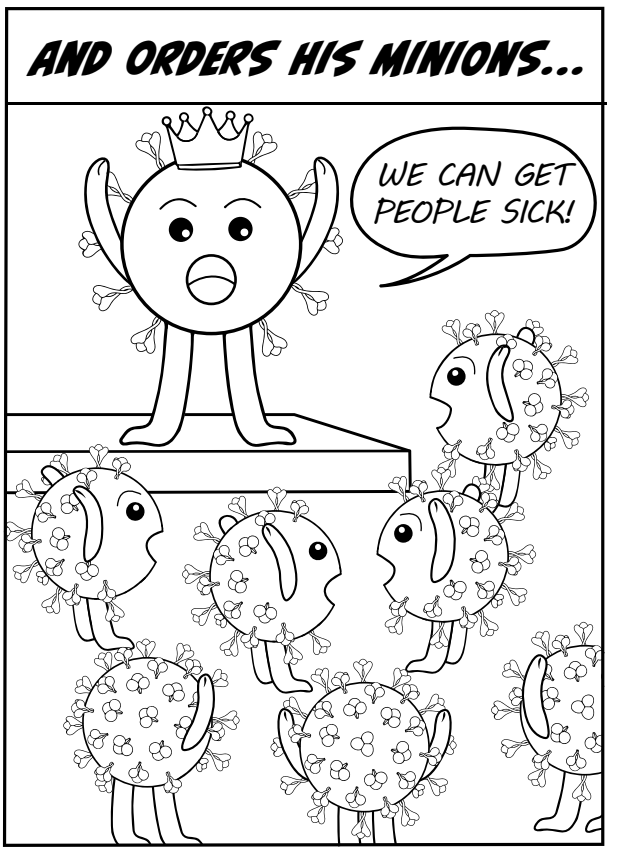
Science Break

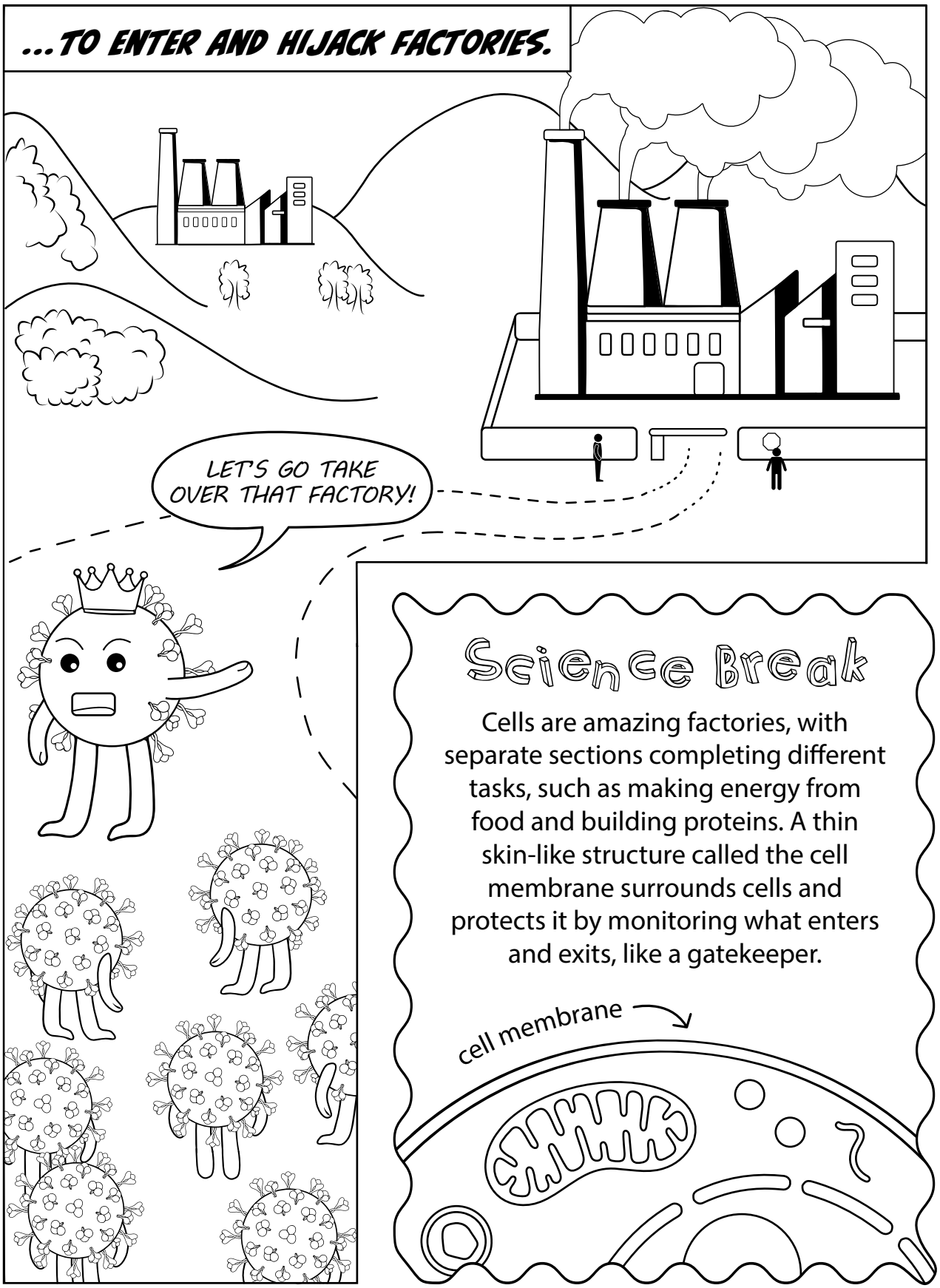
Spike Man represents the coronavirus, called SARS-CoV-2, that causes the COVID-19 disease. The virus is covered in molecules called spike proteins that stick out from the surface, resembling a crown. That's why it's called a coronavirus - 'corona' means crown!





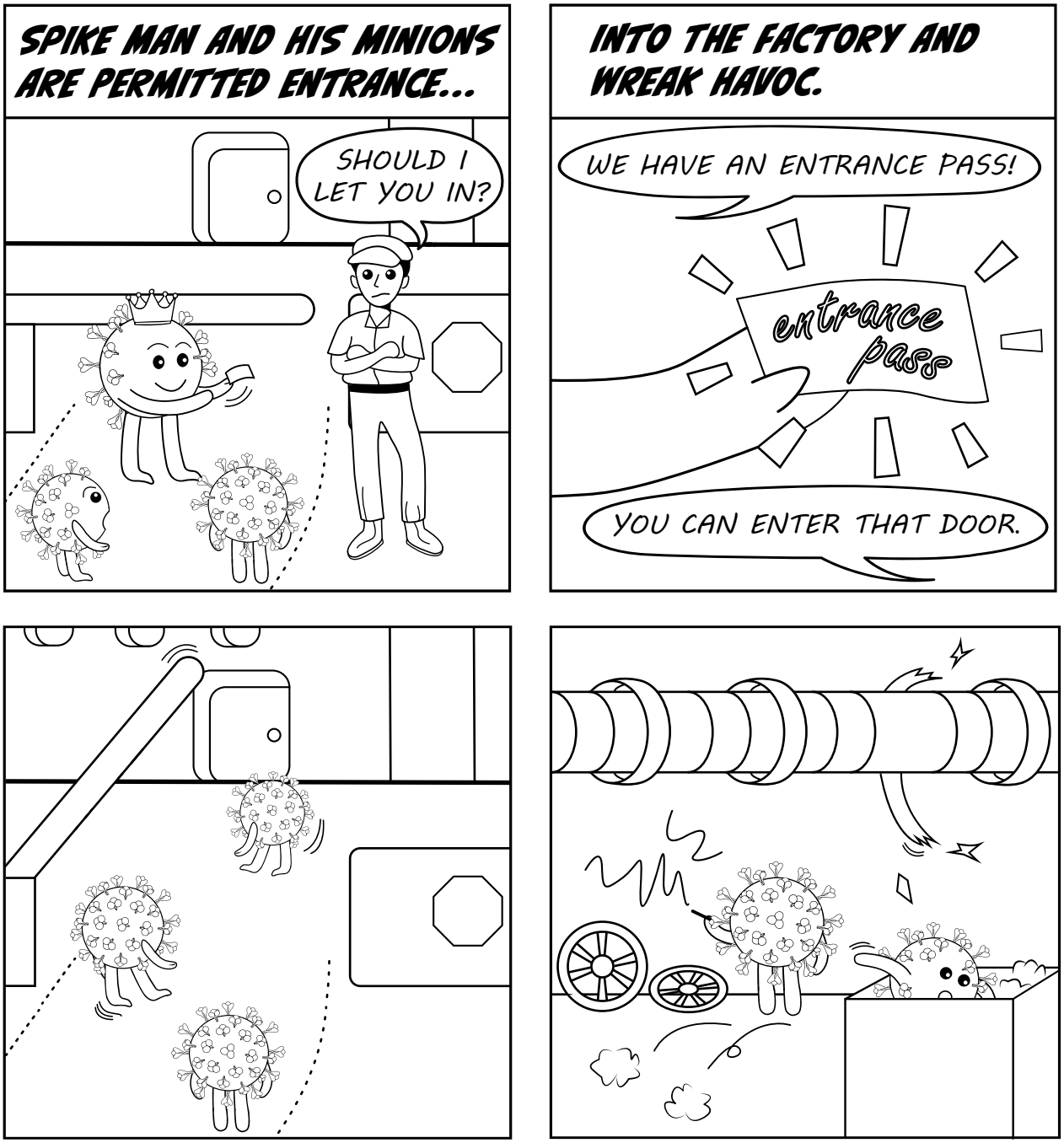






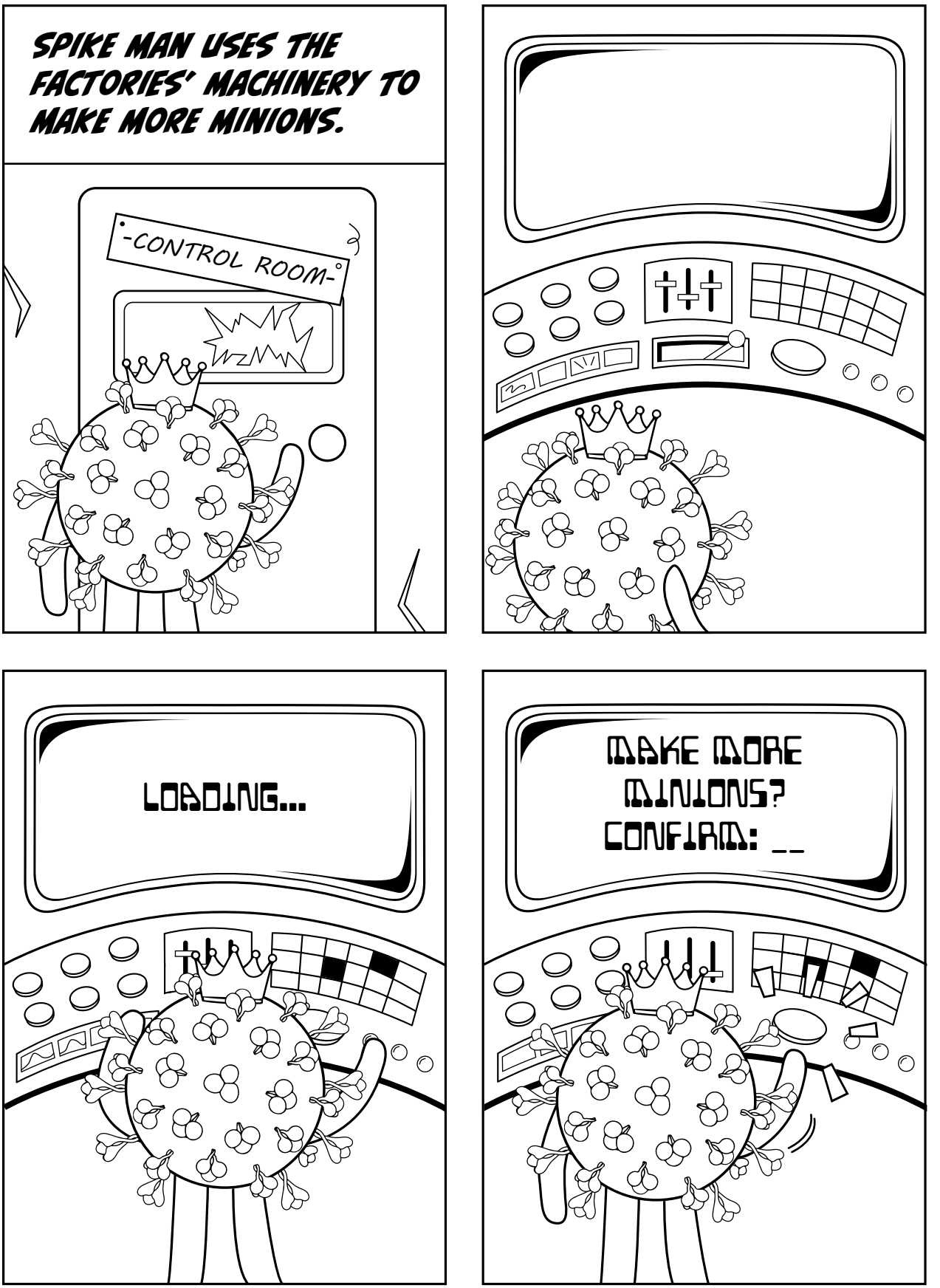
Science Break

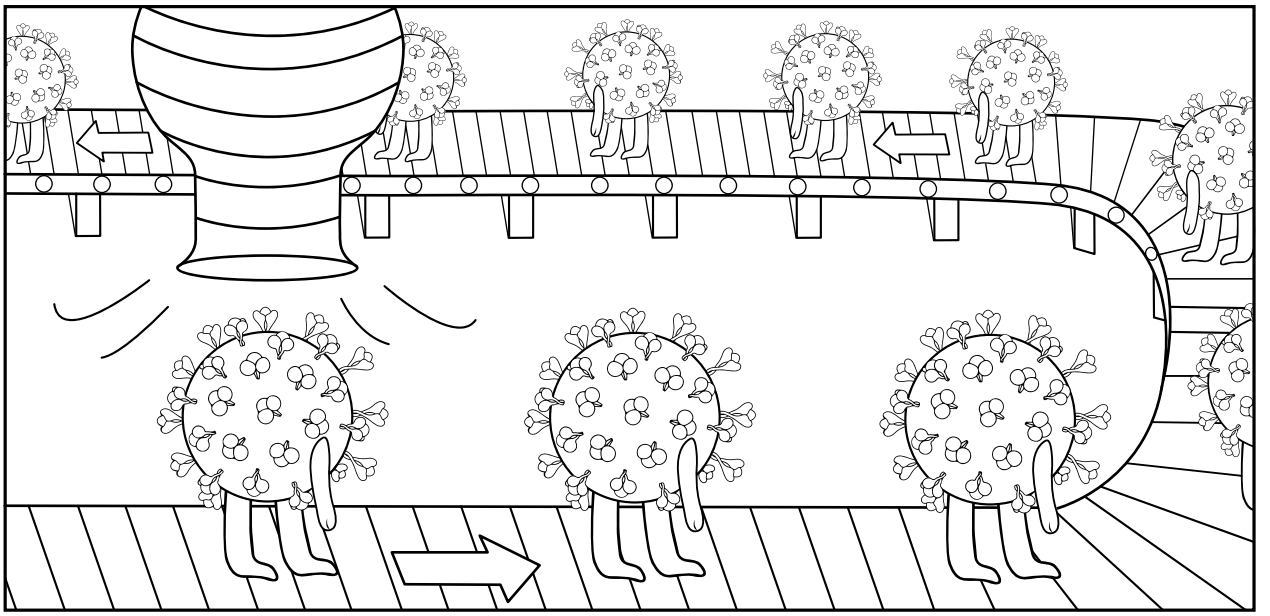
Cells are amazing factories, with separate sections completing different tasks, such as making energy from food and building proteins. A thin skin-like structure called the cell membrane surrounds cells and protects it by monitoring what enters and exits, like a gatekeeper.



Science Break

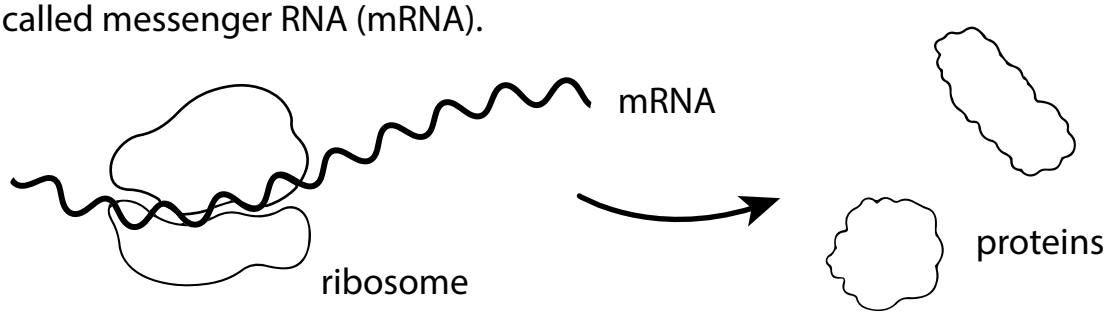
The cell membrane gatekeeper protects cells. It requires special entrance passes for doors called ACE2 proteins that are on the surface of some cells. Using the spike proteins, SARS-CoV-2 has an entrance pass that unlatches the cell's ACE2 receptors and gets inside the cells.


SPIKE MAN USES THE FACTORIES' MACHINERY TO MAKE MORE MINIONS.
-CONTROL ROOM-
LOADING...
MAKE MORE MINIONS?
CONFIRM: __



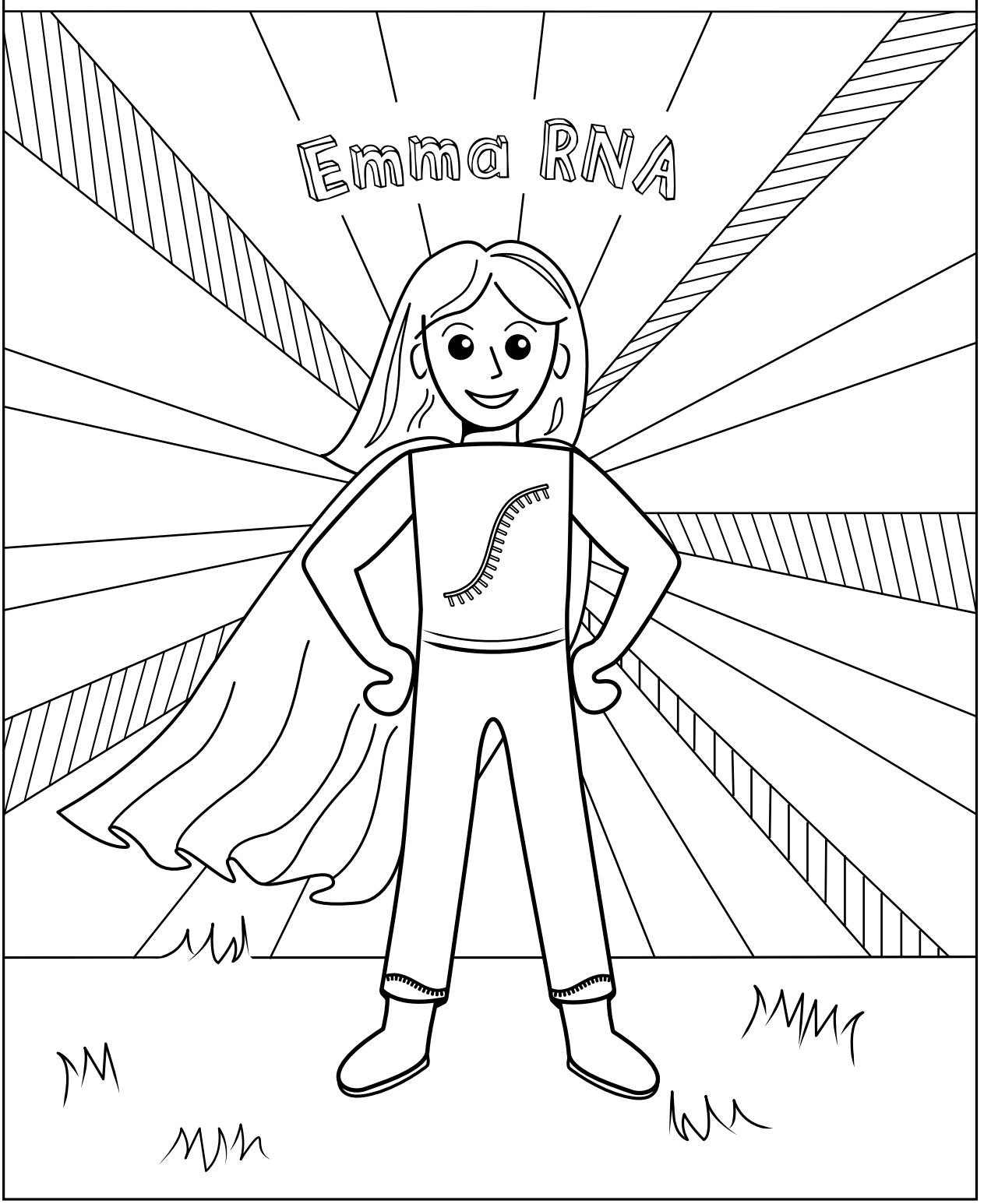
Science Break

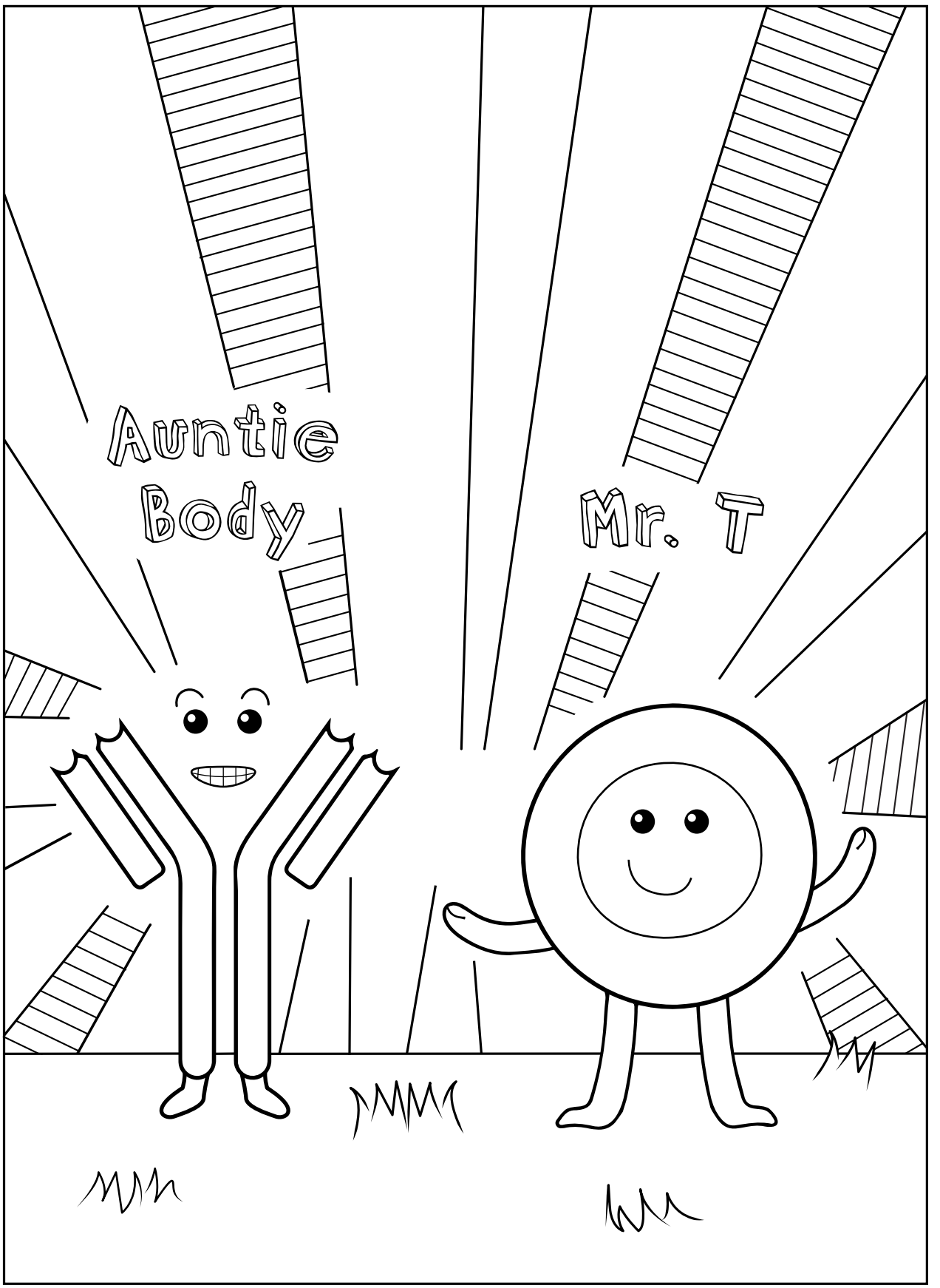
Cells contain the body's genetic material (DNA and RNA). DNA has all of the information needed to build and maintain cells. It's like an instruction manual for the cell and ultimately your body. You can think of a cell like a factory. Like all factories, cells need workers, and those workers are called proteins. Cells make their own protein workers by using machines called ribosomes, but these ribosome machines are separate from the DNA instruction manual. To communicate the instructions from one part of the cell to the machines in a different area, cells use a messenger, called messenger RNA (mRNA).



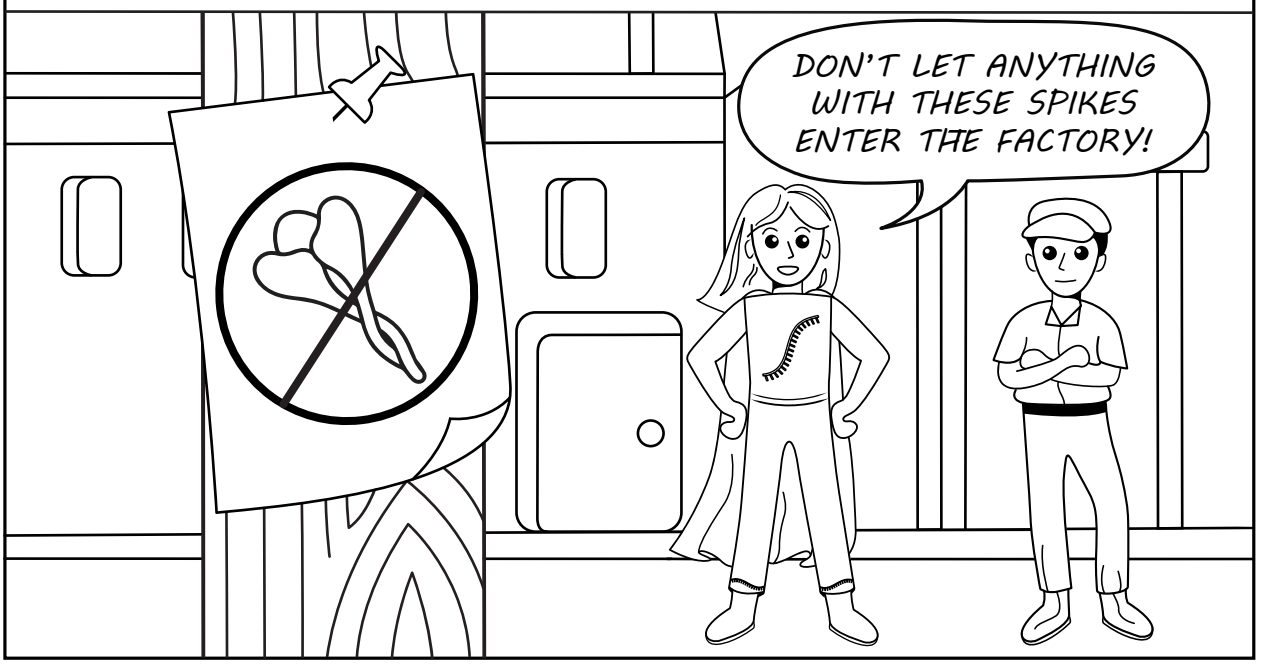
SARS-CoV-2 has many molecules, including RNA, inside the virus. When the virus infects a cell factory by entering the ACE2 door, the ribosome machinery sees the virus RNA and makes virus proteins, instead of seeing cell mRNA and making cell proteins!

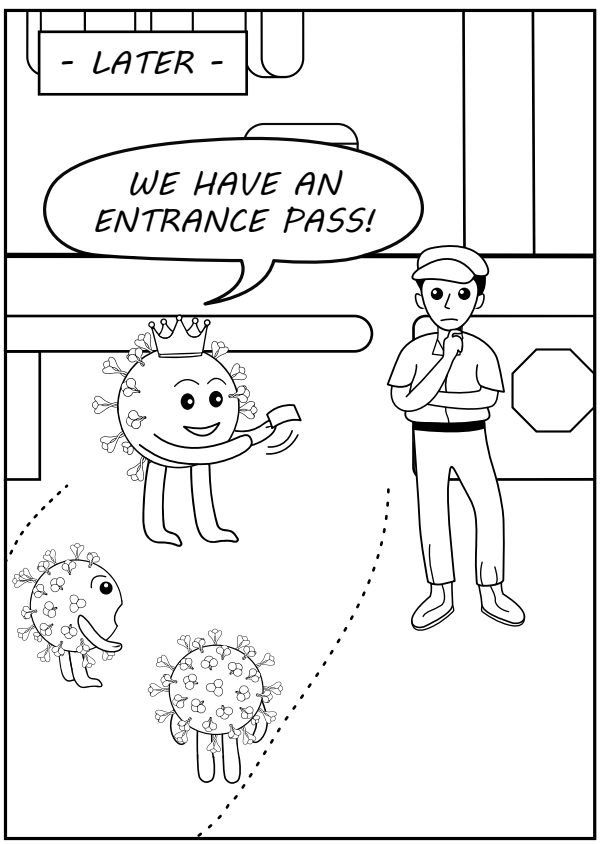
WHAT CAN WE DO TO STOP OTHER FACTORIES FROM GETTING HIJACKED? WHO CAN HELP US? LUCKILY, EMMA RNA AND HER LEGION OF MOLECULAR SUPERHEROES CAN!

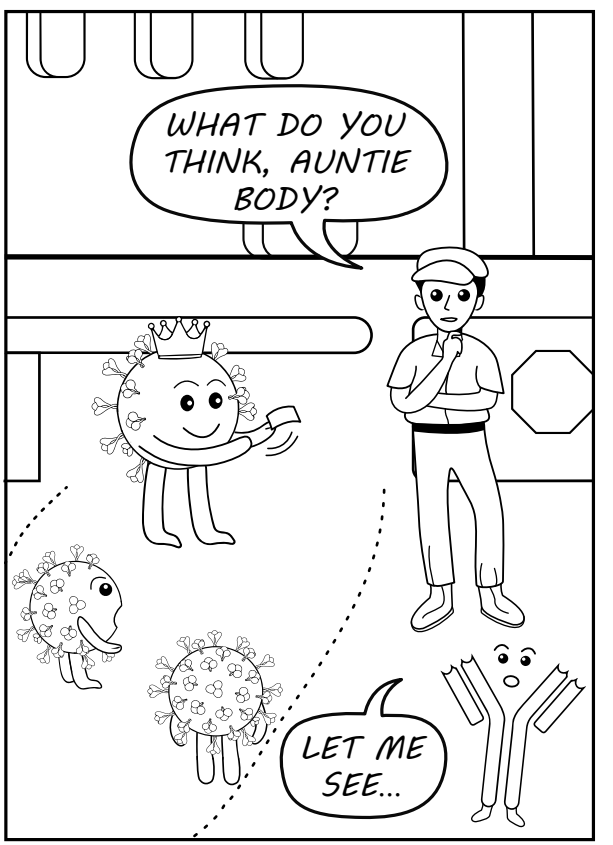


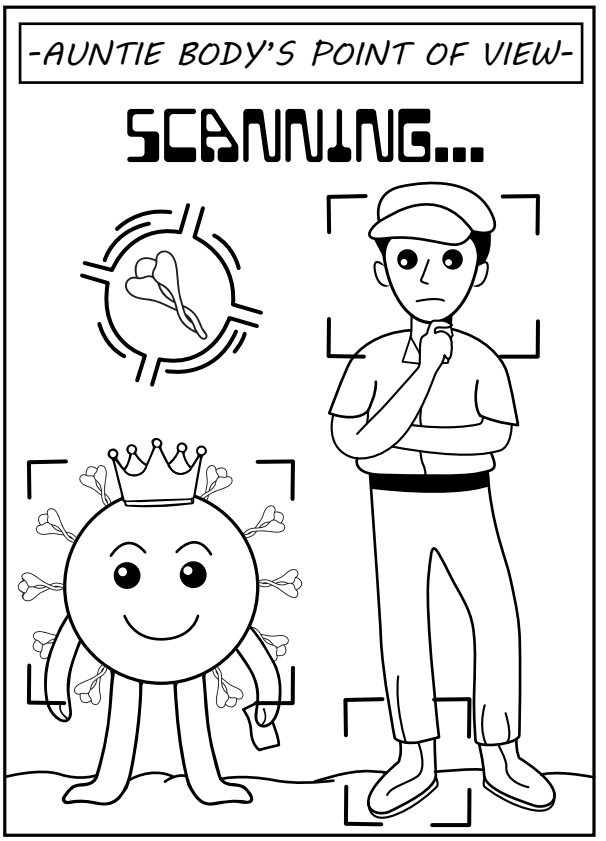

Auntie Body
Mr. T

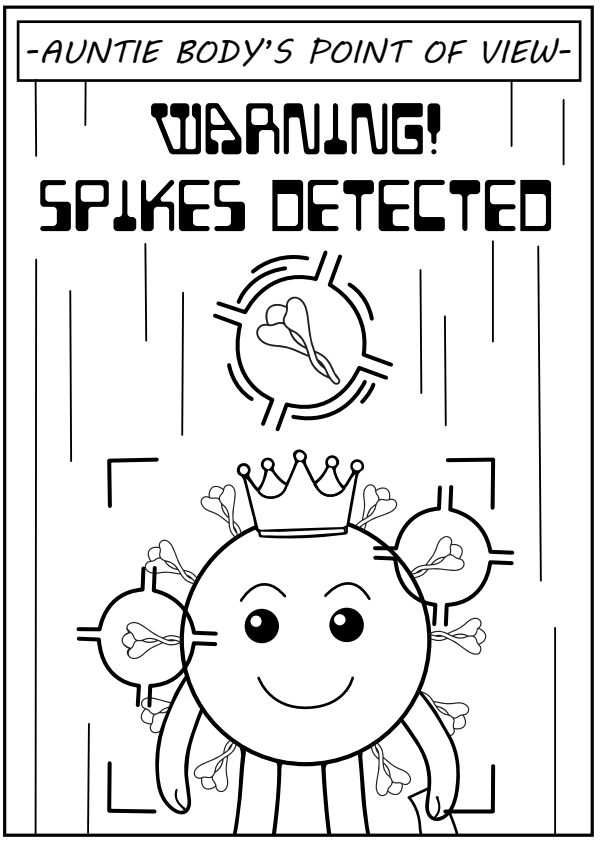
EMMA RNA AND HER CREW HELP THE GATEKEEPER RECOGNIZE SPIKE MAN AND HIS MINIONS AND PREVENT THEIR ENTRY INTO THE FACTORY.

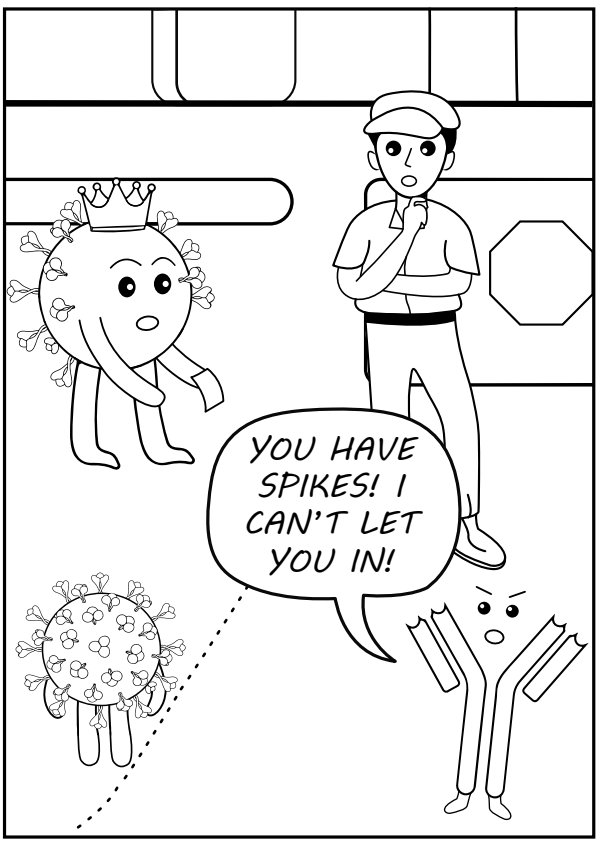


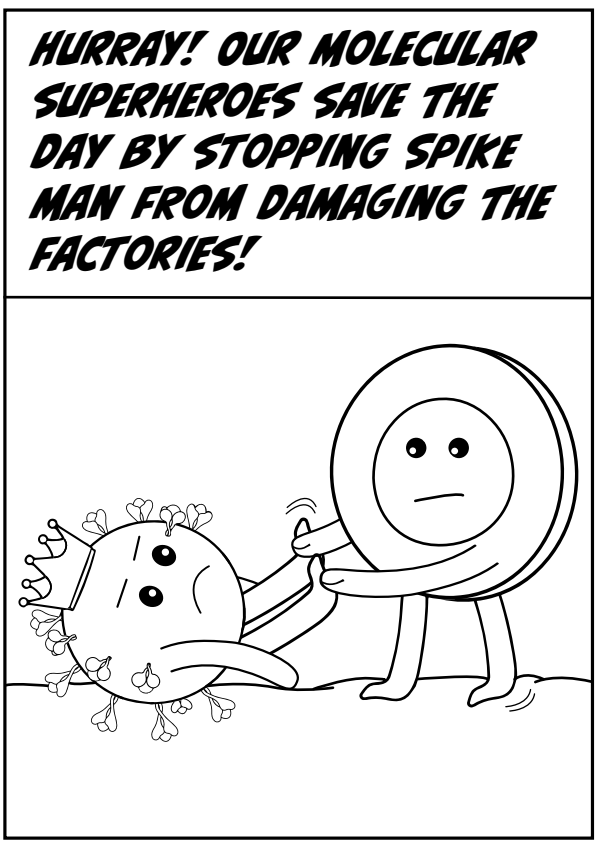





-AUNTIE BODY'S POINT OF VIEW-
SCANNING...

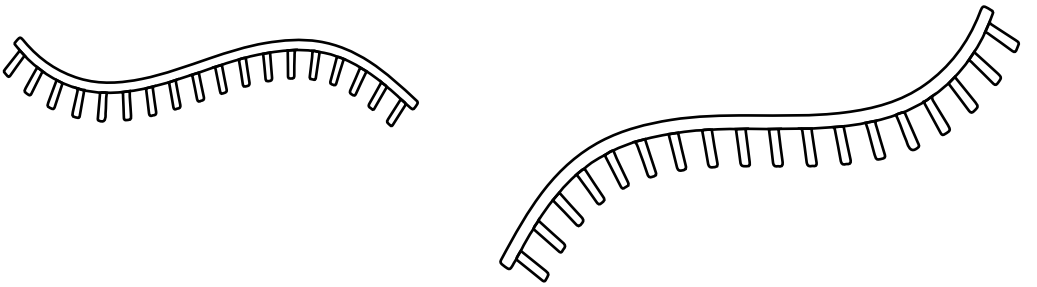

-AUNTIE BODY'S POINT OF VIEW-
WARNING!
SPIKES DETECTED


YOU HAVE SPIKES! I CAN'T LET YOU IN!

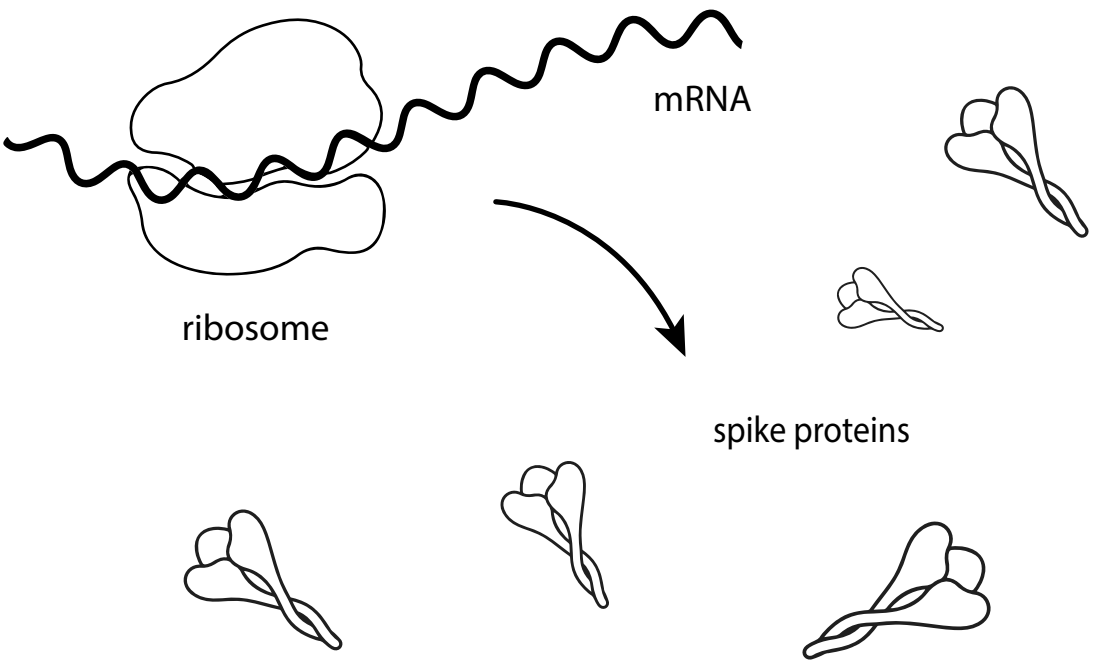

HURRAY! OUR MOLECULAR SUPERHEROES SAVE THE DAY BY STOPPING SPIKE MAN FROM DAMAGING THE FACTORIES!

Science Break

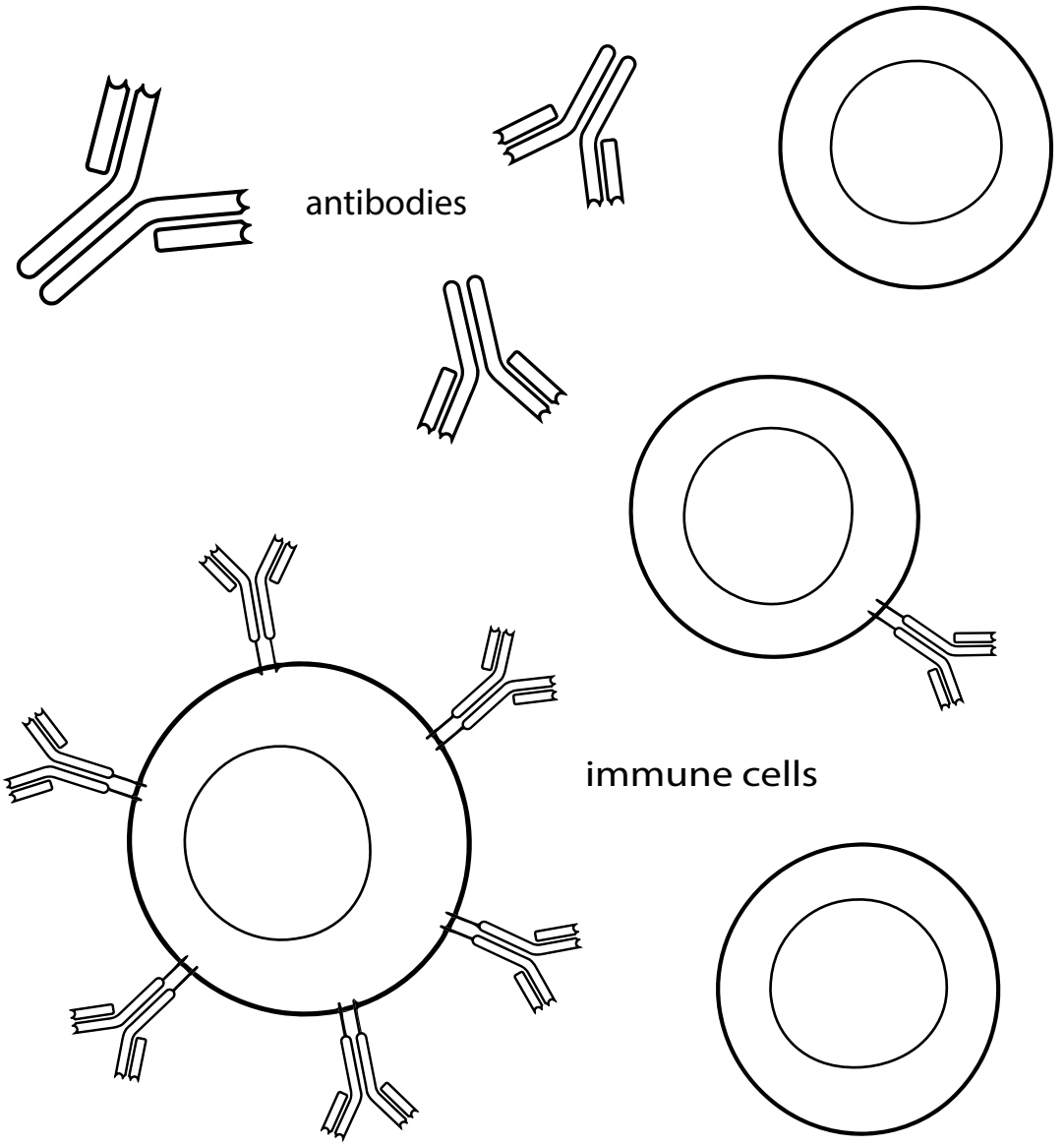
Remember, mRNA is the messenger of the instructions for our cells to make more proteins. Just as factories need instructions to assemble a piece of furniture, cells need instructions to make proteins.



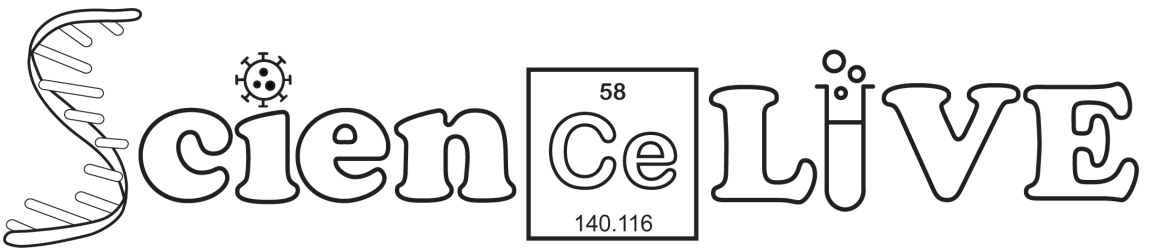
The mRNA vaccine does not contain all the instructions to create a complete SARS-CoV-2 virus. It provides instructions to ribosomes in cells to make only one protein: the spike protein! Because the spike protein is not a human protein, the immune system attacks the cells that have instructions to make spike proteins. Although this sounds like a bad thing, it is a good thing! It means the vaccine is preparing the body's immune system to fight if SARS-CoV-2 ever invades.



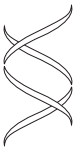
For the immune system to defend cells from intruders, like SARS-CoV-2, antibodies (like Auntie Body) and T cells (like Mr. T) work together. They roam the body to search, recognize, and destroy things that don't belong.



When vaccinated, the immune system prepares with a strong arsenal of antibodies and T cells, ready to fight! Our bodies' molecular superheroes work hard so that we don't get sick!



Microbiology and Physiological Systems



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