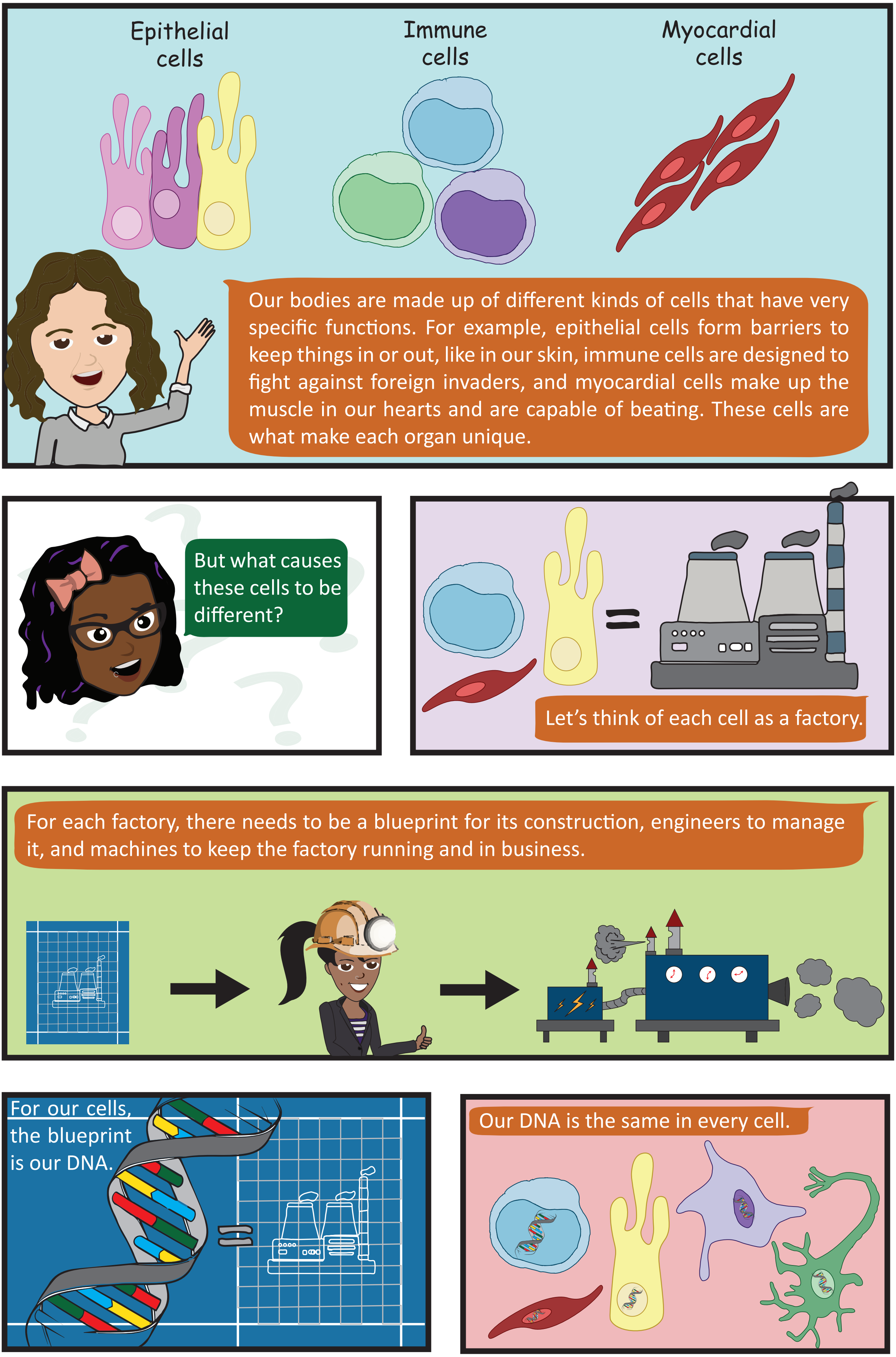
JK²X PRESENTS:

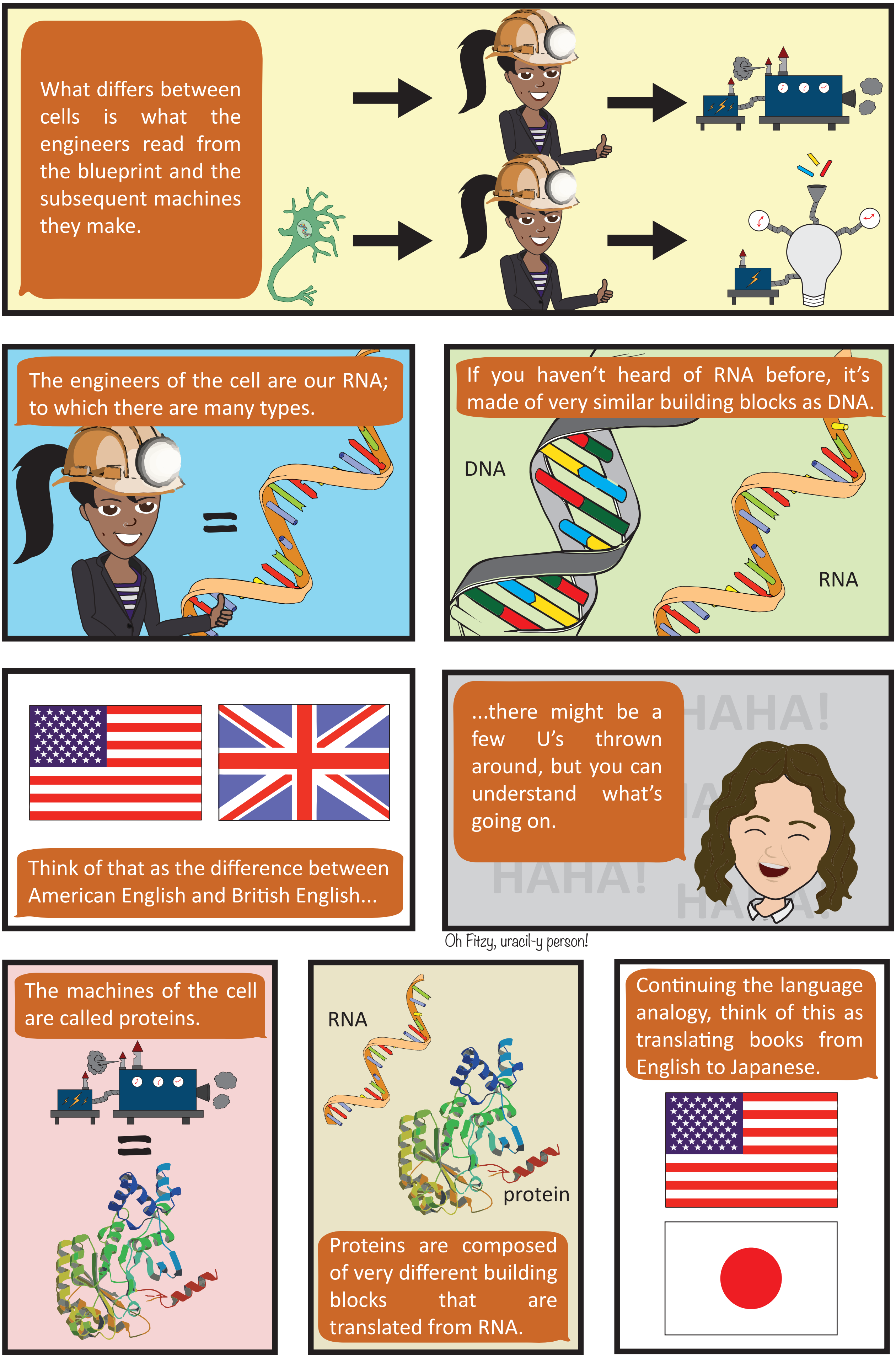
SCIENTIST SPOTLIGHT:

CHRISTINA FITZSIMMONS

To my wonderful friend and scientist, Christina Fitzsimmons.
Happy birthday and congrats on earning your Ph.D.!

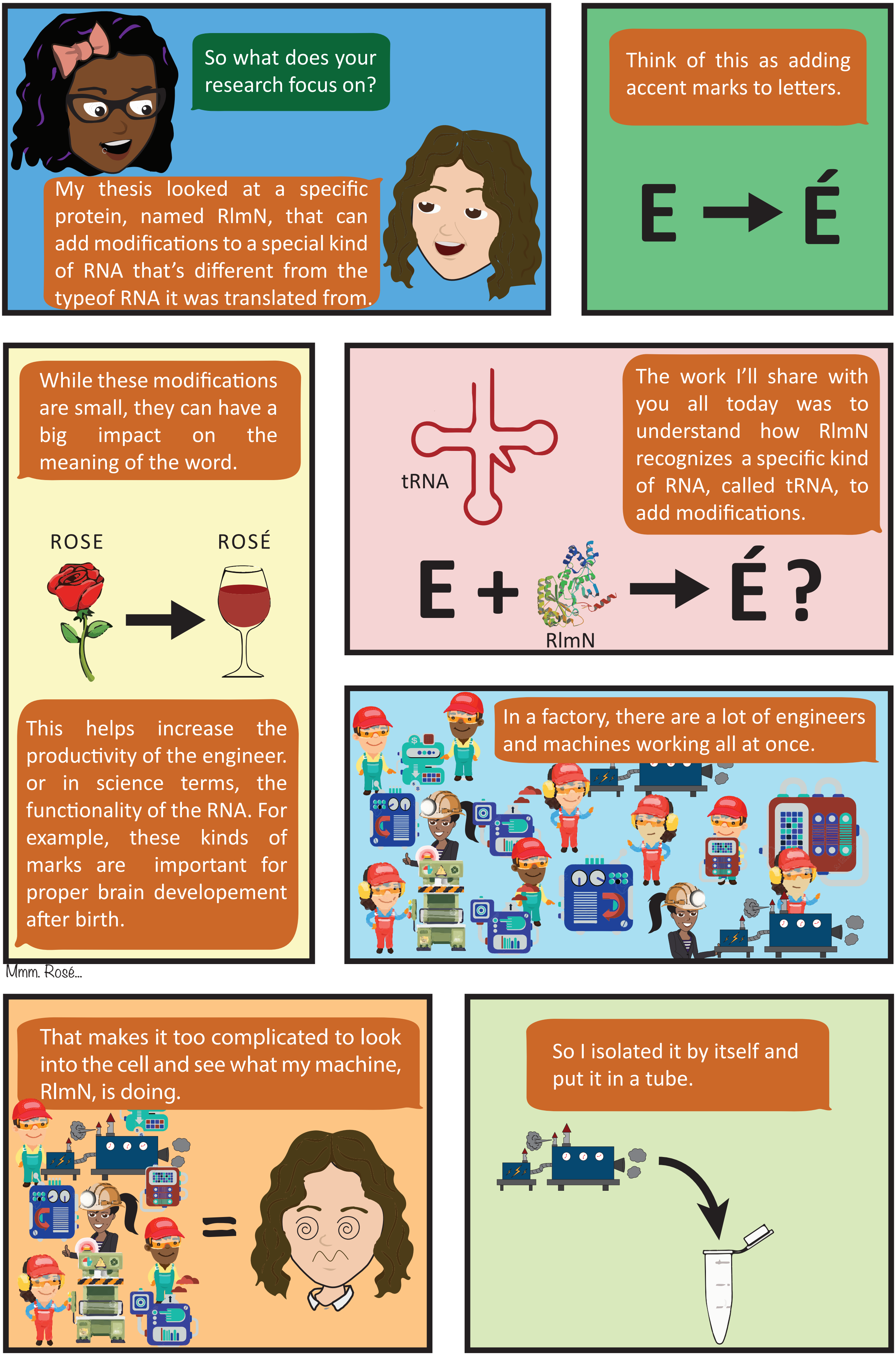

Hi everyone! It's my great pleasure to introduce today's Scientist Spotlight, and my very good friend, Christina "Fitzy" Fitzsimmons! Fitzy and I both graduated from Macalester College in Saint Paul, Minnesota in 2011 where she double majored in Biology and with honors in Chemistry. Since then she went on to have a stellar graduate career at the University of California, San Francisco. There, she worked in the laboratory of Danica Fujimori and recently graduated from the Chemistry and Chemical Biology program with her Ph.D in November 2016. Outside of working in the lab, she is an avid runner, running the San Francisco marathon (with all the hills), swing dancer, and is passionate about science education. This is a bond that we've shared since we were in the Women in Science and Mathematics as well as the BIology club together at Macalester.
You're too kind!
Not at all! Fitzy, would you do us the honor of telling us about your thesis research?
Gladly!

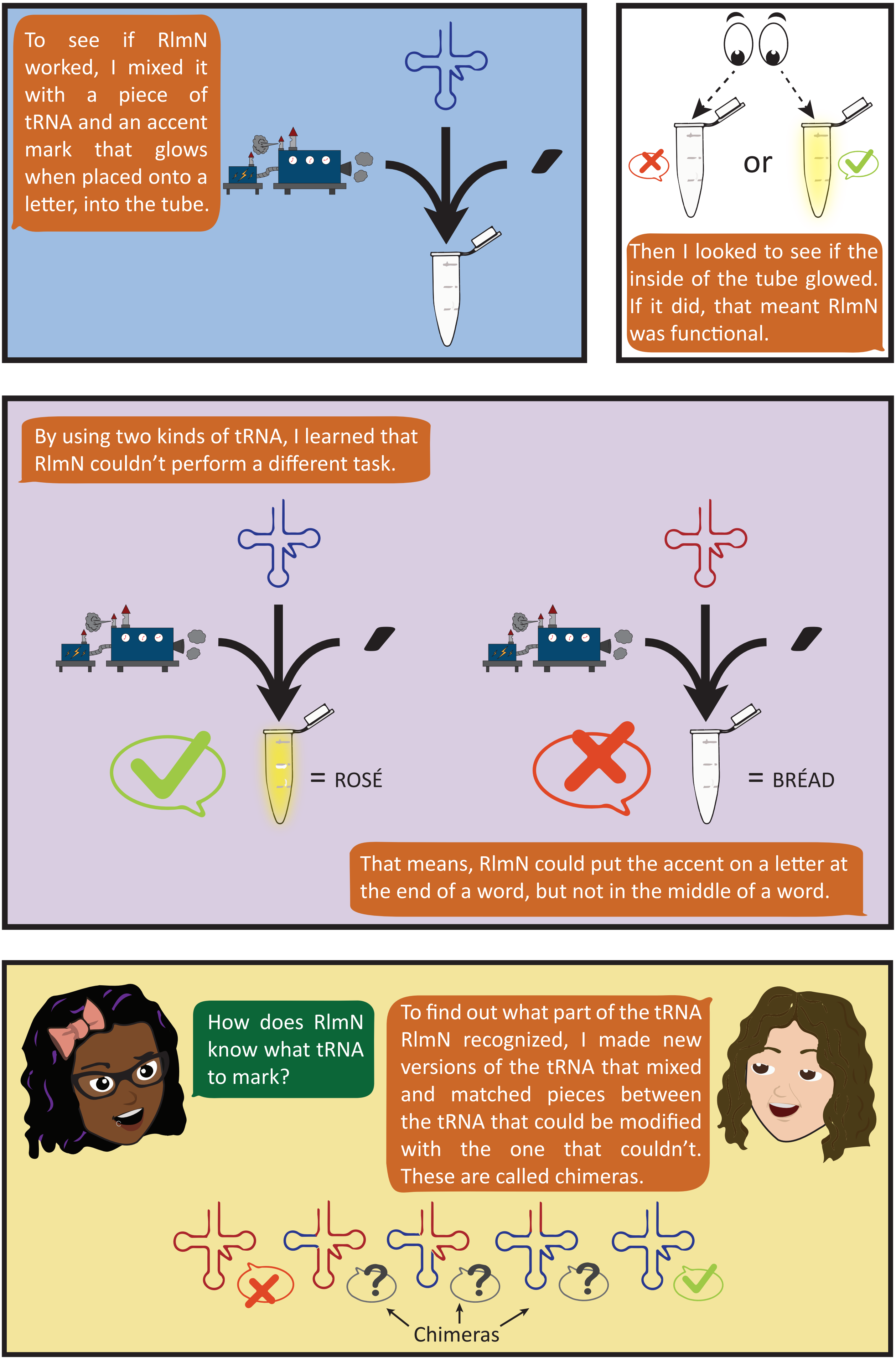

Epithelial cells
Immune cells
Myocardial cells
Our bodies are made up of different kinds of cells that have very specific functions. For example, epithelial cells form barriers to keep things in or out, like in our skin, immune cells are designed to fight against foreign invaders, and myocardial cells make up the muscle in our hearts and are capable of beating. These cells are what make each organ unique.
But what causes these cells to be different?
Let's think of each cell as a factory.
For each factory, there needs to be a blueprint for its construction, engineers to manage it, and machines to keep the factory running and in business.
For our cells, the blueprint is our DNA.
Our DNA is the same in every cell.



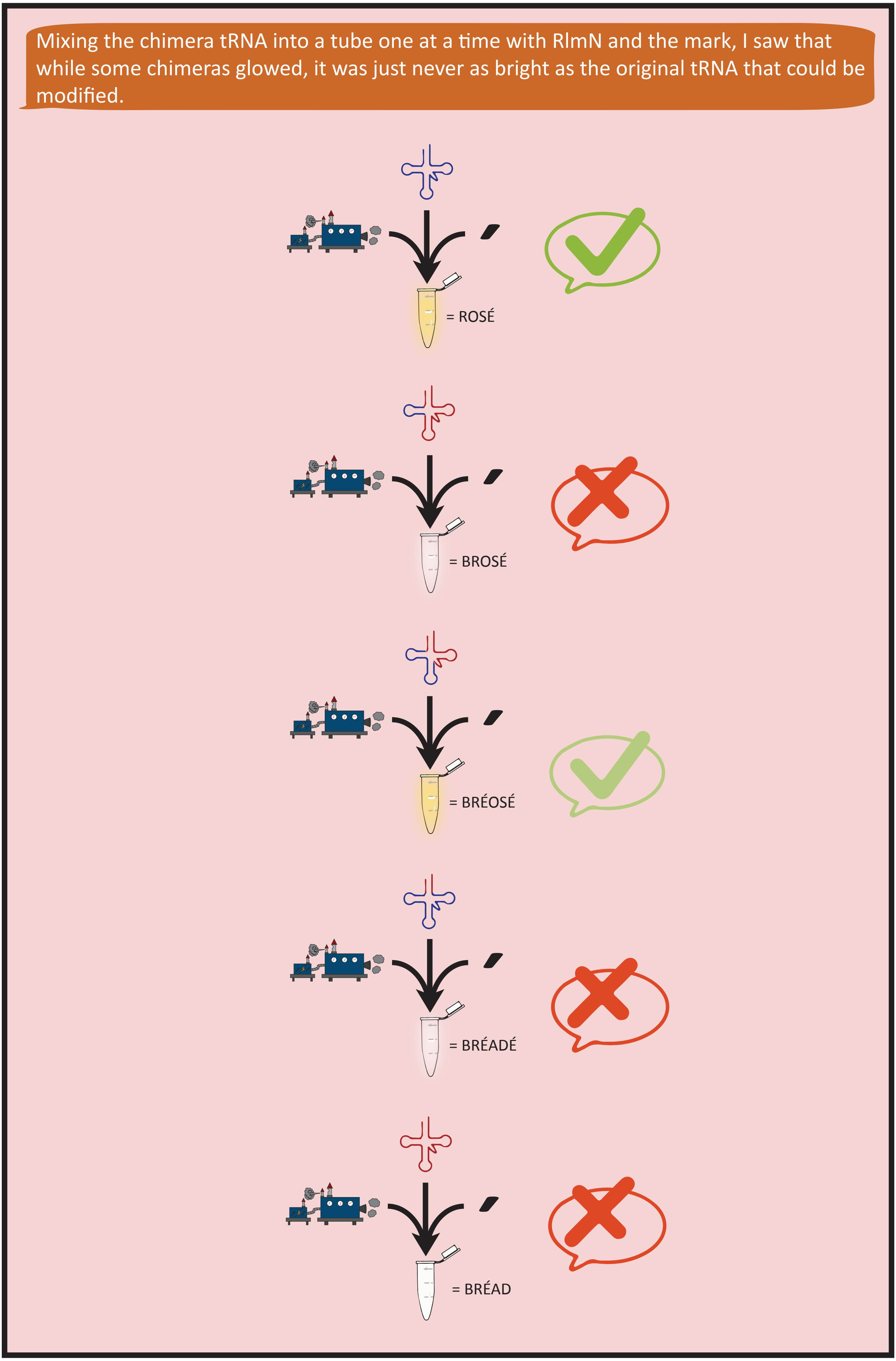
PDB: 3RFA

That's actually what proteins look like.


So what does your research focus on?
My thesis looked at a specific protein, named RlmN, that can add modifications to a special kind of RNA that's different from the typeof RNA it was translated from.
Think of this as adding accent marks to letters.
E → É
While these modifications are small, they can have a big impact on the meaning of the word.
ROSE
ROSÉ
This helps increase the productivity of the engineer. or in science terms, the functionality of the RNA. For example, these kinds of marks are important for proper brain developement after birth.
Mmm. Rosé...
tRNA
The work I'll share with you all today was to understand how RlmN recognizes a specific kind of RNA, called tRNA, to add modifications.
E + → É ?
RlmN
In a factory, there are a lot of engineers and machines working all at once.
That makes it too complicated to look into the cell and see what my machine, RlmN, is doing.
=
So I isolated it by itself and put it in a tube.



To see if RlmN worked, I mixed it with a piece of tRNA and an accent mark that glows when placed onto a letter, into the tube.
or
Then I looked to see if the inside of the tube glowed. If it did, that meant RlmN was functional.
By using two kinds of tRNA, I learned that RlmN couldn't perform a different task.
= ROSÉ
= BRÉAD
That means, RlmN could put the accent on a letter at the end of a word, but not in the middle of a word.
How does RlmN know what tRNA to mark?
To find out what part of the tRNA RlmN recognized, I made new versions of the tRNA that mixed and matched pieces between the tRNA that could be modified with the one that couldn't. These are called chimeras.
?
?
?
Chimeras


Mixing the chimera tRNA into a tube one at a time with RlmN and the mark, I saw that while some chimeras glowed, it was just never as bright as the original tRNA that could be modified.
= ROSÉ
= BROSÉ
= BRÉOSÉ
= BRÉADÉ
= BRÉAD

She was waving the entire time.

Can you find all EIGHT words related to today's comic? Answer the questions below for help!

I	S	O	K	I	U	P	R	A	N	R	T	E	N	F	M	T	G	Q	Q
A	E	K	W	A	G	T	H	Q	Y	F	R	O	M	G	P	C	X	S	X
B	N	I	L	W	D	S	Y	P	J	Y	R	R	L	P	A	K	N	H	S
G	Q	R	H	W	P	Q	K	L	N	E	G	S	R	H	D	R	Q	H	H
B	I	A	R	X	A	E	L	X	L	W	P	A	R	U	J	J	W	R	P
G	U	N	K	F	A	U	Q	W	O	Y	E	O	Q	M	S	Z	R	P	O
A	R	X	I	E	K	W	M	K	A	F	B	W	K	C	O	H	O	R	Q
R	X	T	P	S	H	U	Y	Y	H	D	B	L	J	F	B	T	Q	O	Y
J	Z	L	Y	E	N	S	F	J	G	D	H	J	W	T	S	U	R	T	D
Y	C	F	B	F	K	W	J	S	W	O	G	M	T	U	H	L	Q	E	C
X	J	B	V	T	G	N	E	S	R	Q	W	P	G	I	U	G	Q	I	M
T	G	B	L	B	N	W	W	C	L	E	U	Z	X	M	A	B	Q	N	Y
F	E	K	K	U	T	Y	B	Q	L	W	T	S	G	V	F	N	I	S	Z
Q	W	P	Q	P	E	K	A	Q	E	E	O	U	M	D	I	S	I	E	U
S	E	D	L	G	K	P	I	O	G	R	Z	I	Z	S	J	C	D	D	T
C	X	V	X	D	Q	H	R	Q	S	P	J	V	L	Y	C	K	K	A	E
X	H	T	C	X	E	Q	C	I	D	A	P	Y	N	F	H	A	H	N	K
P	A	U	O	K	Y	E	H	S	N	U	T	M	R	L	N	F	B	K	I
O	B	M	A	N	T	I	B	I	O	T	I	C	S	D	E	Z	A	D	Y
Z	N	J	Z	S	B	S	N	U	A	R	L	Y	C	Z	C	K	V	V	P

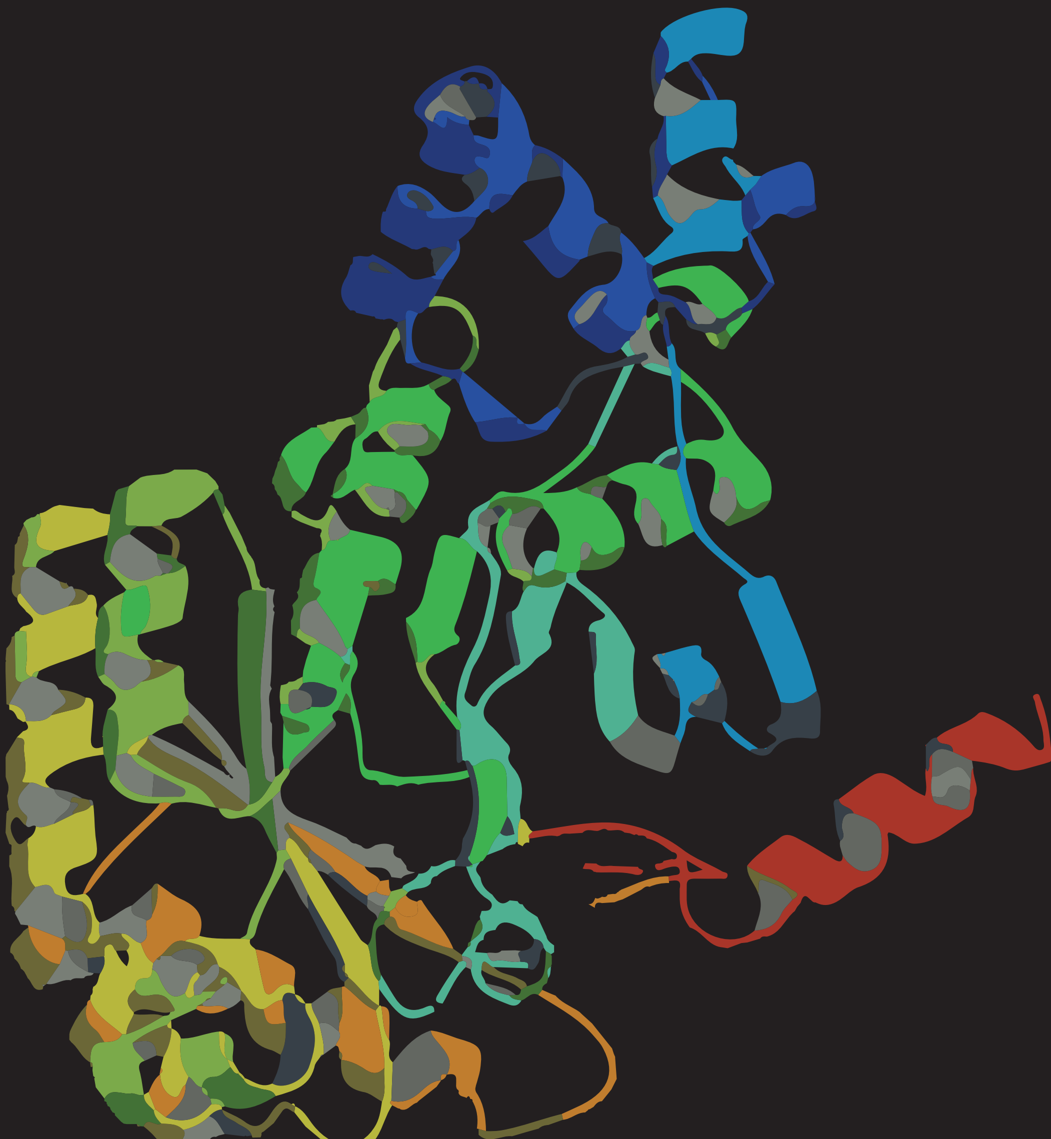
1. ____ is the same in every cell.
2. Fitzy studies modifications, the accent marks on letters, on this type for RNA:
3. The kind of RNA the machine Cfr modifies:
4. The machines of the cells:
5. DNA is the ____ of the cell:
6. Nickname of our Scientist Spotlight:
7. Modifications by Cfr causes _____ to stop working:
8. The machine Fitzy specifically works on is ____

Storyboard by:
Jaye Gardiner
Christina Fitzsimmons

Artwork by:
Jaye Gardiner

1. **DNA** is the same in every cell.
2. Fitzy studies modifications, the accent marks on letters, on this type for RNA: **tRNA**
3. The kind of RNA the machine Cfr modifies: **rRNA**
4. The machines of the cells: **proteins**
5. DNA is the **blueprint** of the cell.
6. Nickname of our Scientist Spotlight: **Fitzy**
7. Modifications by Cfr cause **antibiotics** to stop working.
8. The machine Fitzy specifically works on is: **RlmN**

...RlmN doesn't see one part at a time, but
instead sees the whole picture at once.



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