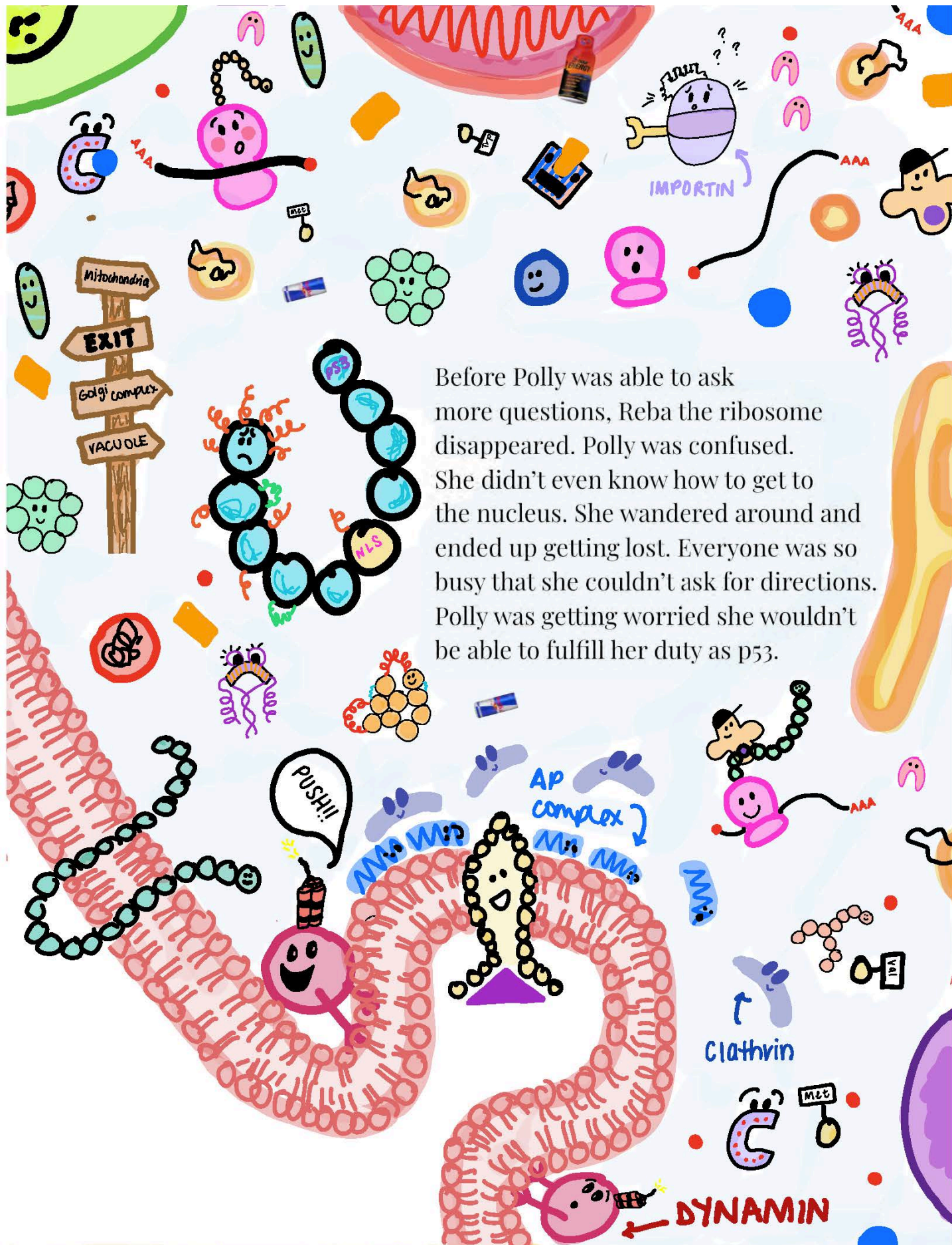




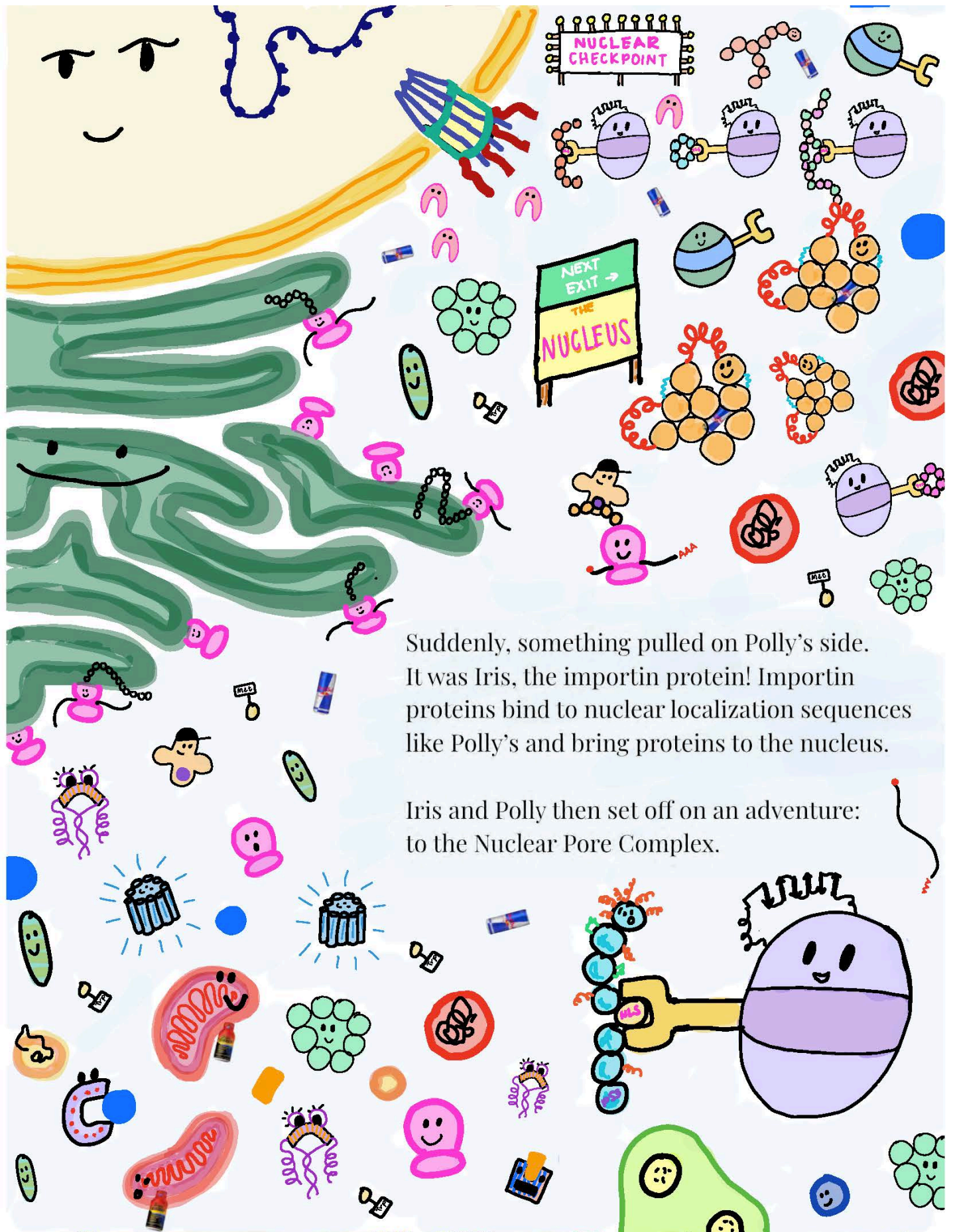
In the town of Celluland, not too far away, a peptide named Polly was born. She was transcribed to mRNA, spliced, stitched, and capped. In the cytosol, Reba the ribosome translated her into protein. Polly loved Celluland already and was excited to see more.



After translation, Polly didn't know where to go next, until Reba the ribosome told her she had an NLS, a nuclear localization sequence. Reba told her that she is a p53 protein and that she had a very important role in Celluland.

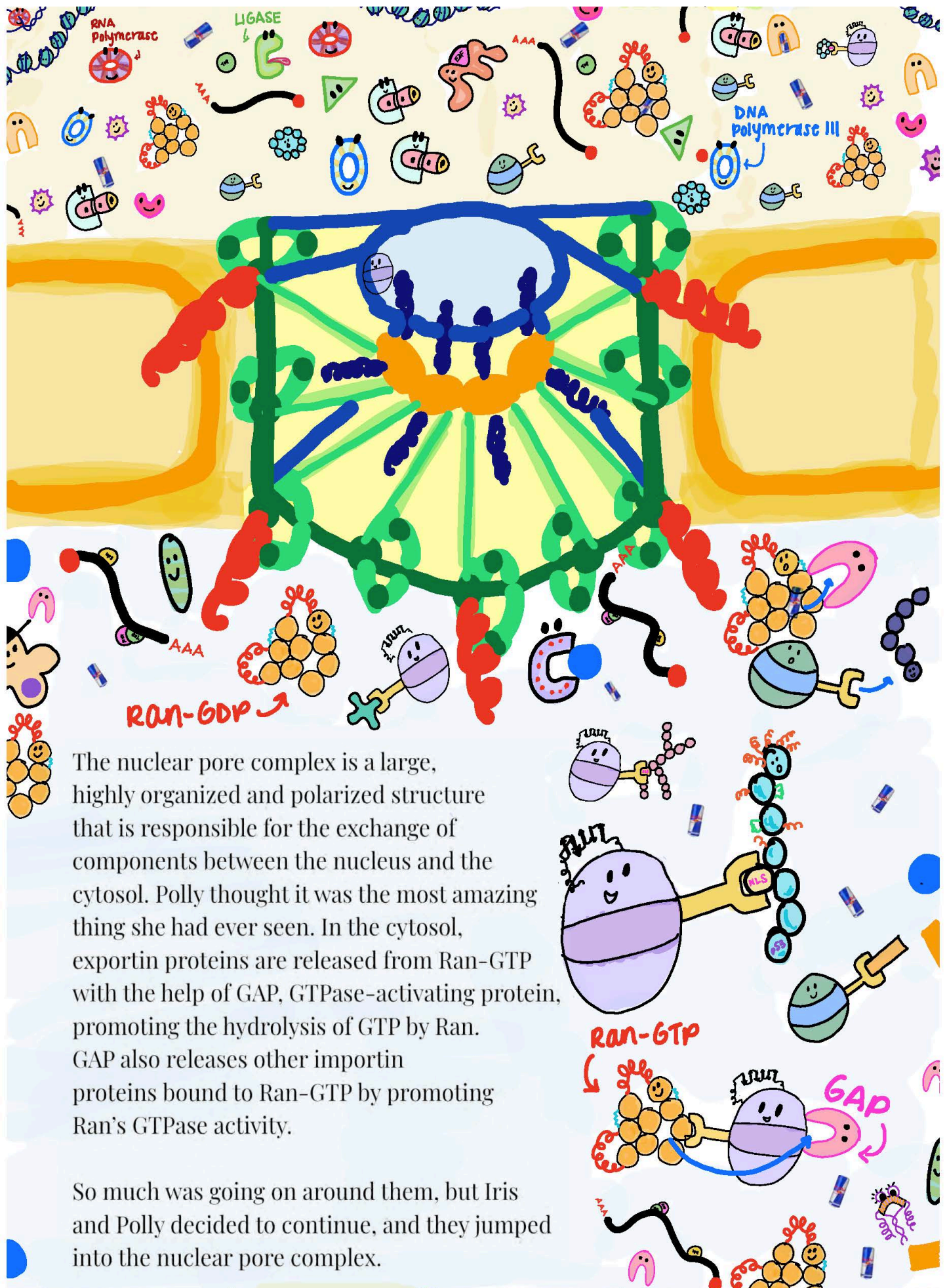


Before Polly was able to ask more questions, Reba the ribosome disappeared. Polly was confused. She didn't even know how to get to the nucleus. She wandered around and ended up getting lost. Everyone was so busy that she couldn't ask for directions. Polly was getting worried she wouldn't be able to fulfill her duty as p53.



Suddenly, something pulled on Polly's side. It was Iris, the importin protein! Importin proteins bind to nuclear localization sequences like Polly's and bring proteins to the nucleus.

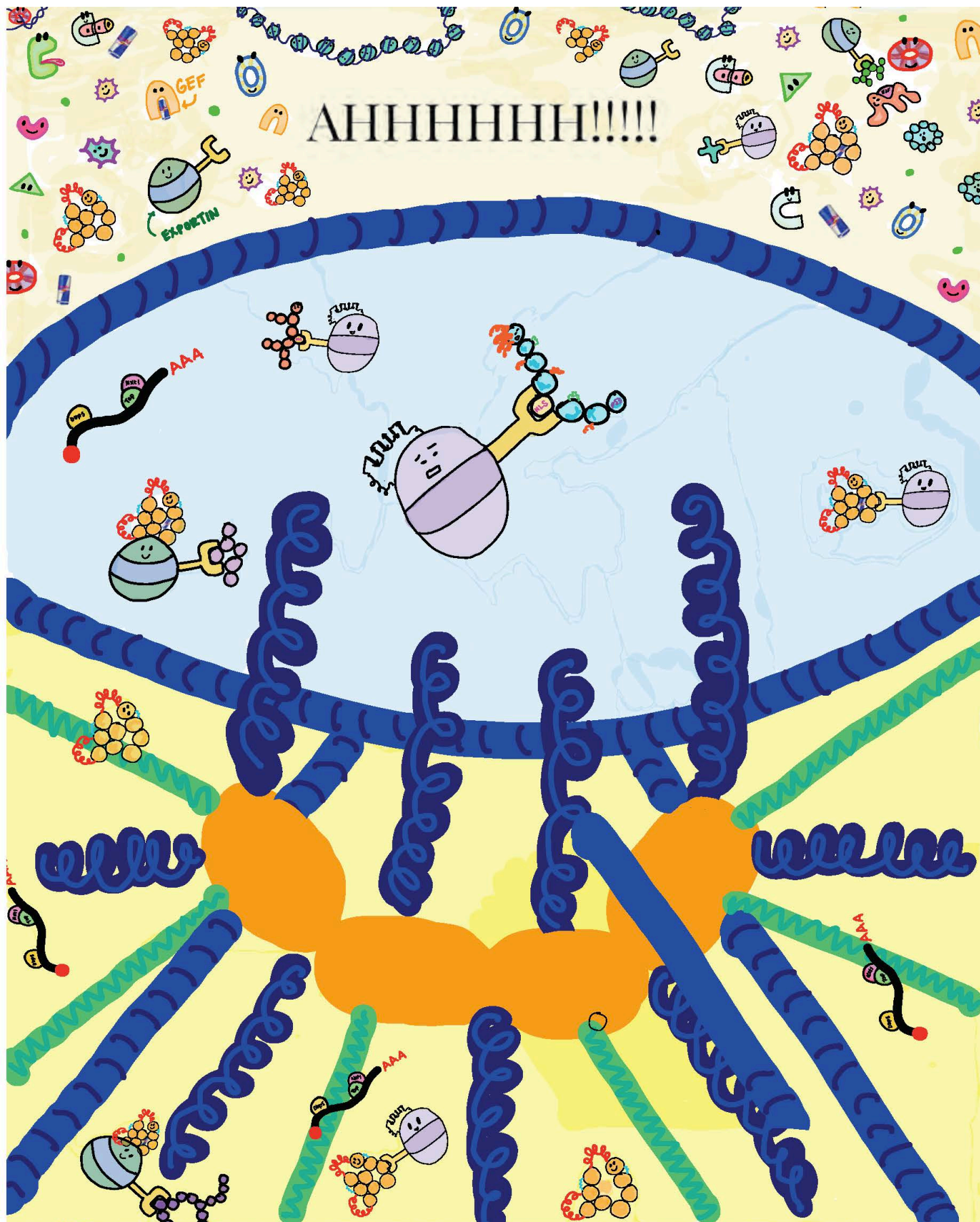
Iris and Polly then set off on an adventure: to the Nuclear Pore Complex.



The nuclear pore complex is a large, highly organized and polarized structure that is responsible for the exchange of components between the nucleus and the cytosol. Polly thought it was the most amazing thing she had ever seen. In the cytosol, exportin proteins are released from Ran-GTP with the help of GAP, GTPase-activating protein, promoting the hydrolysis of GTP by Ran. GAP also releases other importin proteins bound to Ran-GTP by promoting Ran's GTPase activity.

So much was going on around them, but Iris and Polly decided to continue, and they jumped into the nuclear pore complex.

AHHHHHHH!!!!

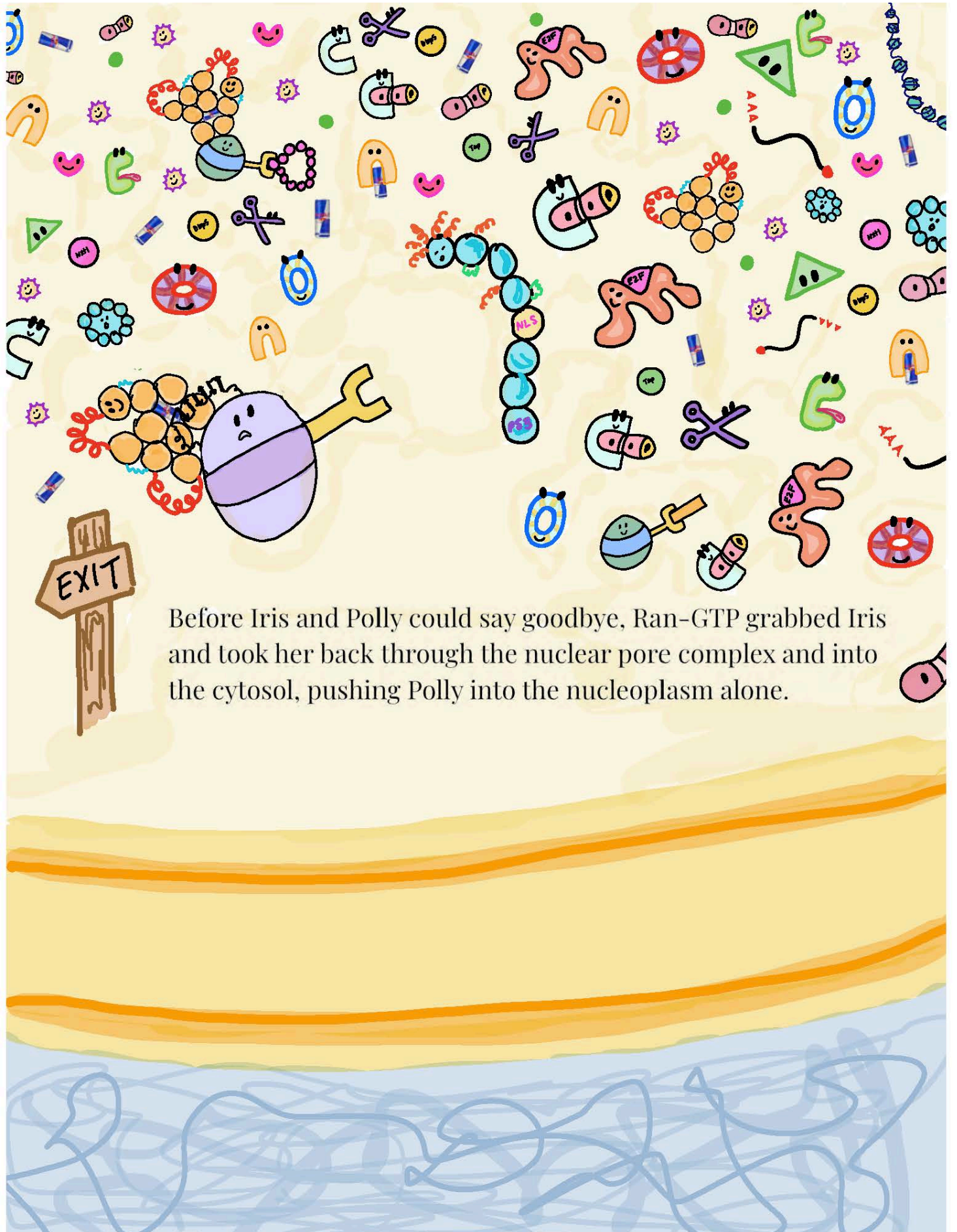




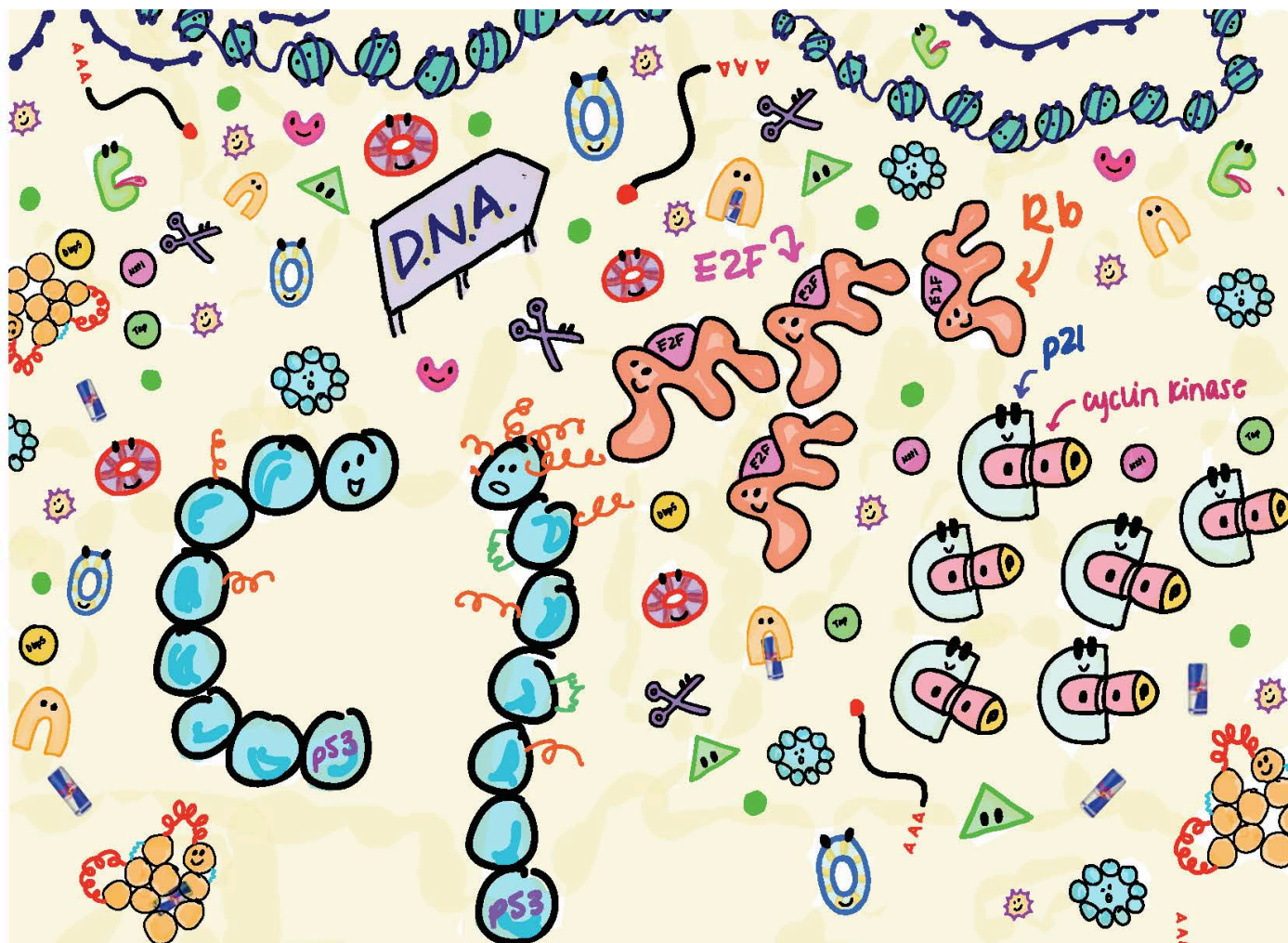
At last, they made it to the nucleus. They were met with proteins, RNAs, enzymes and reactions, of all shapes, colors, and sizes. To her right, exportin proteins, their cargo, and Ran-GTPs were on their way to the cytosol. To her left, GEFs, guanine exchange factors, stimulated the release of GDP and permitted the entry of GTP (shown as Red Bull), and mRNAs were for translation with the help of Dbp5, Tap, and Nxt1 proteins.

Polly knew this was her new home.



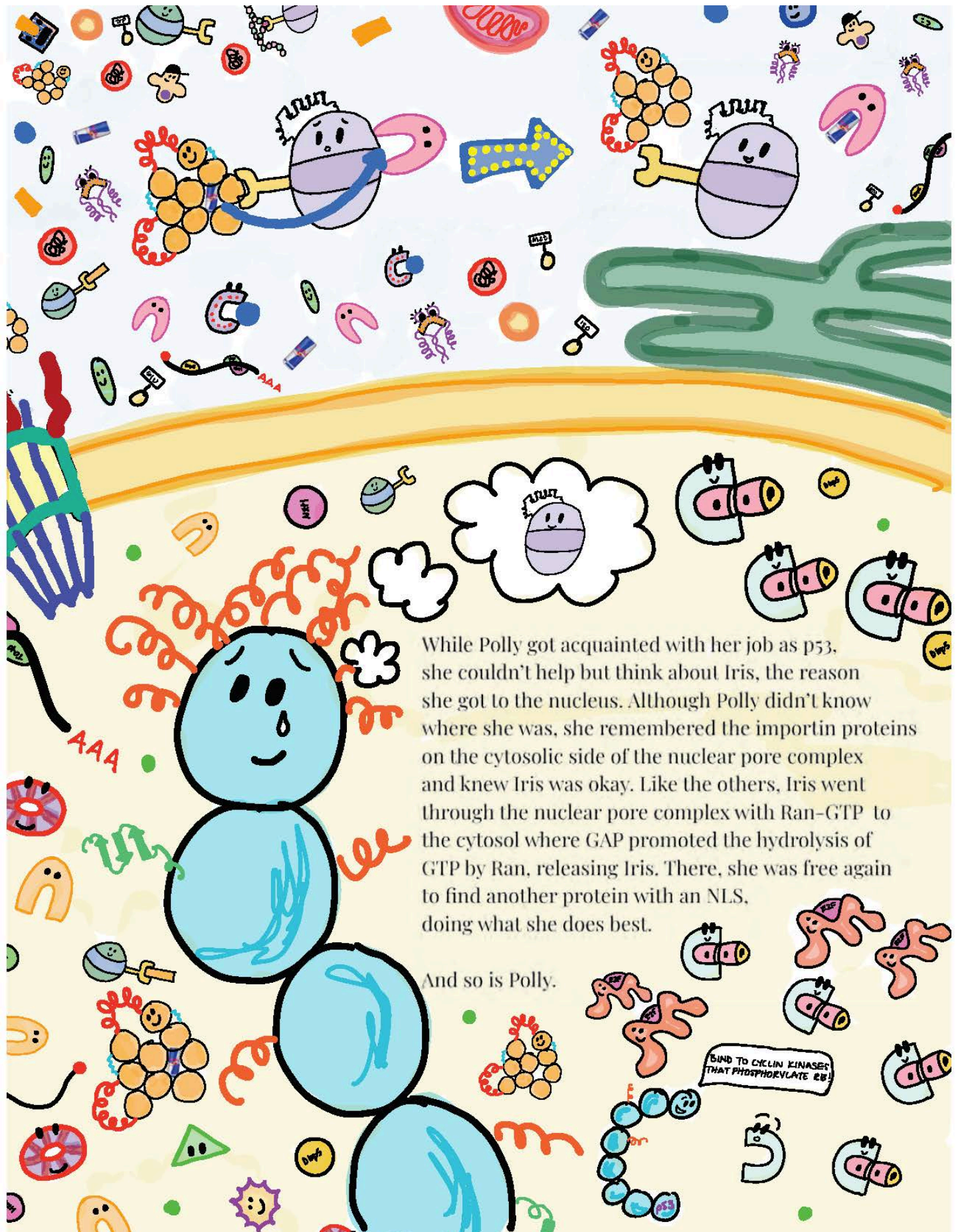


Before Iris and Polly could say goodbye, Ran-GTP grabbed Iris and took her back through the nuclear pore complex and into the cytosol, pushing Polly into the nucleoplasm alone.



Without a moment to think of what to do next, Polly was greeted by a protein that looked very similar to her. This protein, Penny, was also a p53 protein and was there to help Polly get acquainted to her role in the nucleus.

P53 is a tumor suppressor involved in DNA repair, cell cycle control, and many important processes in Celluland. P53 proteins regulate other proteins like p21, which in turn regulate the phosphorylation of Rb proteins by interacting with cyclin kinases. When Rb is dephosphorylated, it binds to E2F, prohibiting the cell cycle to continue. When Rb is phosphorylated, it releases E2F, promoting the cell cycle to continue. As long as p53 promotes p21 and others to sequester cyclin kinases and inhibit the phosphorylation of Rb, the cell cycle is inhibited. This pathway is extremely important for the regulation of the cell cycle and DNA synthesis. If abnormal, it can lead to carcinogenesis.



While Polly got acquainted with her job as p53, she couldn't help but think about Iris, the reason she got to the nucleus. Although Polly didn't know where she was, she remembered the importin proteins on the cytosolic side of the nuclear pore complex and knew Iris was okay. Like the others, Iris went through the nuclear pore complex with Ran-GTP to the cytosol where GAP promoted the hydrolysis of GTP by Ran, releasing Iris. There, she was free again to find another protein with an NLS, doing what she does best.

And so is Polly.

The End!

