

iGEM 2021 Presents

A Collection of Environmental Stories

By: iGEM Calgary, Ecuador, FCB-UANL, MikuyTec, UAM, UMA_MALAGA & UMaryland



A COLLECTION OF ENVIRONMENTAL STORIES: A COLLABORATION

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DANA & THE FIERY WOODS

By: iGEM FCB-UANL 2021

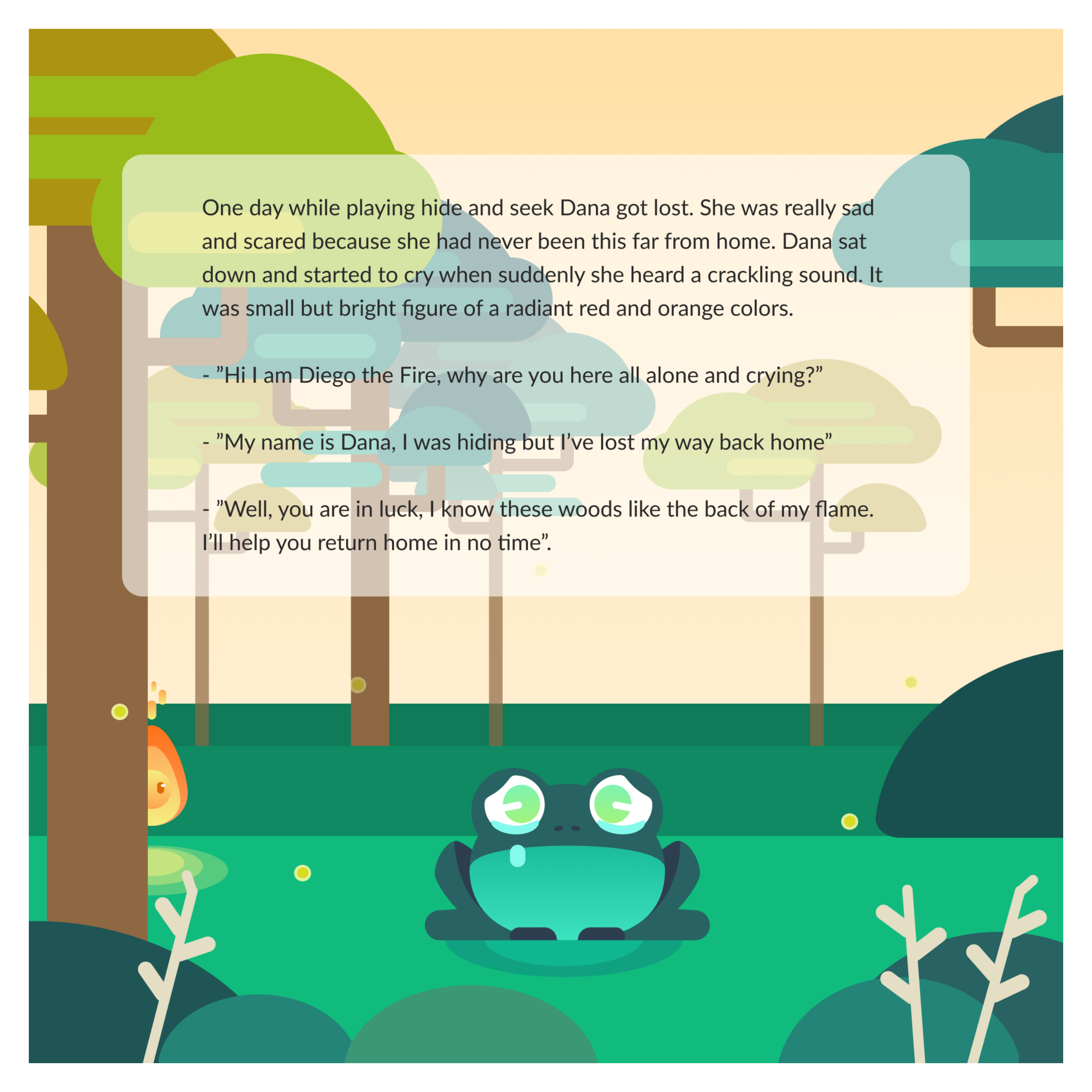


Cynthia and Luisa are used to dealing with fires getting out of control.
Can you help them spot the objects that can start a fire if you aren't
careful when using them or putting them away?





Dana is a small frog that lives in the woods with her frog family and friends. She enjoys living here because it is peaceful and full of life. The grass is green and the trees are tall. She jumps around all day and sleeps at night unless a fire starts.



One day while playing hide and seek Dana got lost. She was really sad and scared because she had never been this far from home. Dana sat down and started to cry when suddenly she heard a crackling sound. It was small but bright figure of a radiant red and orange colors.

- "Hi I am Diego the Fire, why are you here all alone and crying?"

- "My name is Dana, I was hiding but I've lost my way back home"

- "Well, you are in luck, I know these woods like the back of my flame. I'll help you return home in no time".



As they were walking Dana started to get curious about Diego.

- "Why haven't I seen you before? Why do you stay so far away from others? Don't you get lonely sometimes?"

- "Those are a lot of questions, Dana. I used to stay with everyone, but they ended up being scared of me. I am a little moody and can unintentionally hurt those around me. When I'm not handled correctly, I tend to grow and lose control of my flames. The woods and the houses can burn and you and other can get hurt".

Dana remembered one time when she fought with her sister and left a mark on her back, she felt sad after that. Dana could imagine how Diego must have felt.

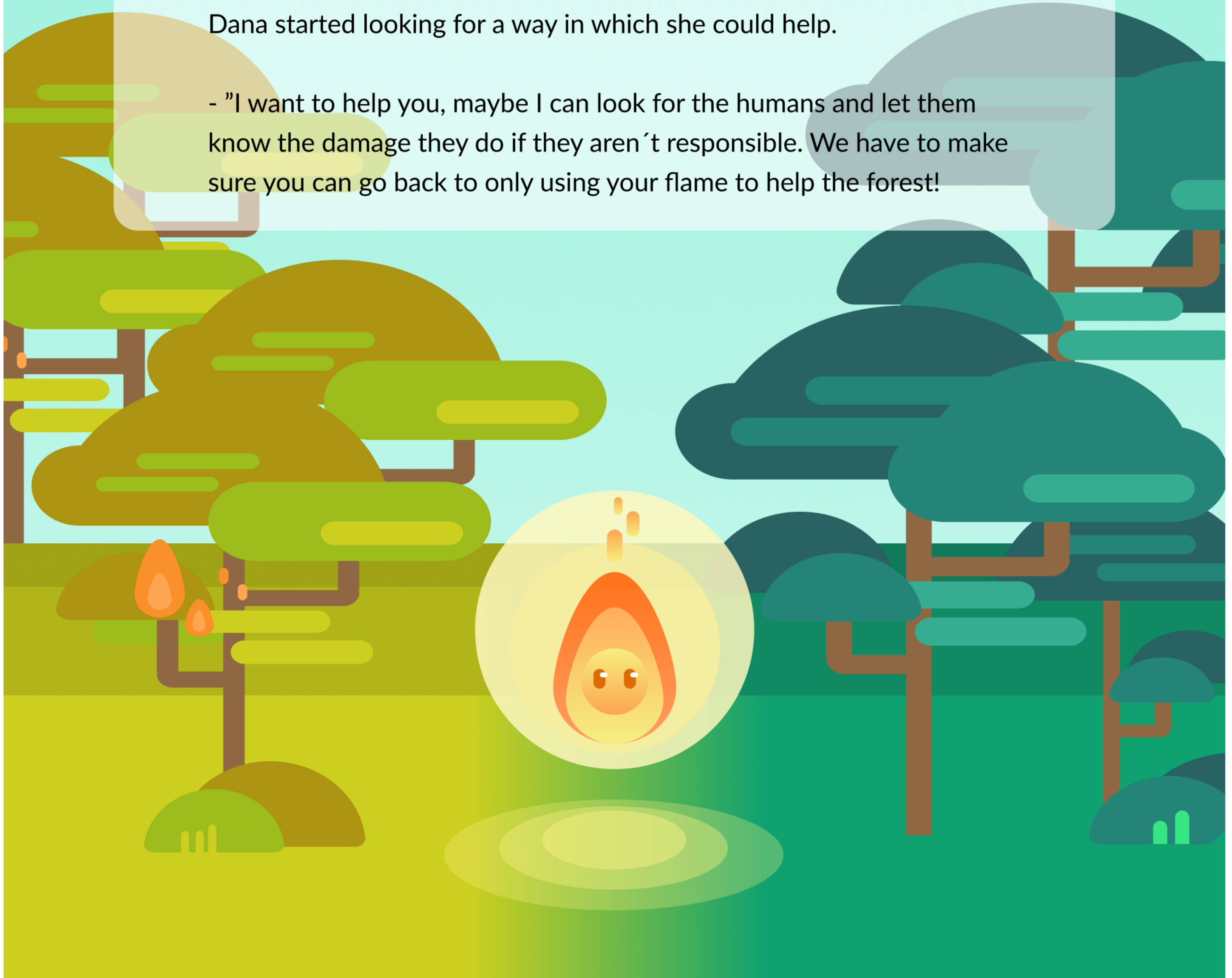
- “Diego, what makes you lose control in the first place?”

- ”Humans make me lose control sometimes. I don’t mind helping them to get warm and cook their food. Still a lot of times they don’t let me rest and I can’t stop. They also throw lots of garbage that allow my flames to get bigger and bigger, or even start a new fire.



In the past, Diego used to help really old forests to re-born as greener and healthier forests. He misses those days but things haven't been the same since people started to disrespect the woods and nearby areas. Dana started looking for a way in which she could help.

- "I want to help you, maybe I can look for the humans and let them know the damage they do if they aren't responsible. We have to make sure you can go back to only using your flame to help the forest!"



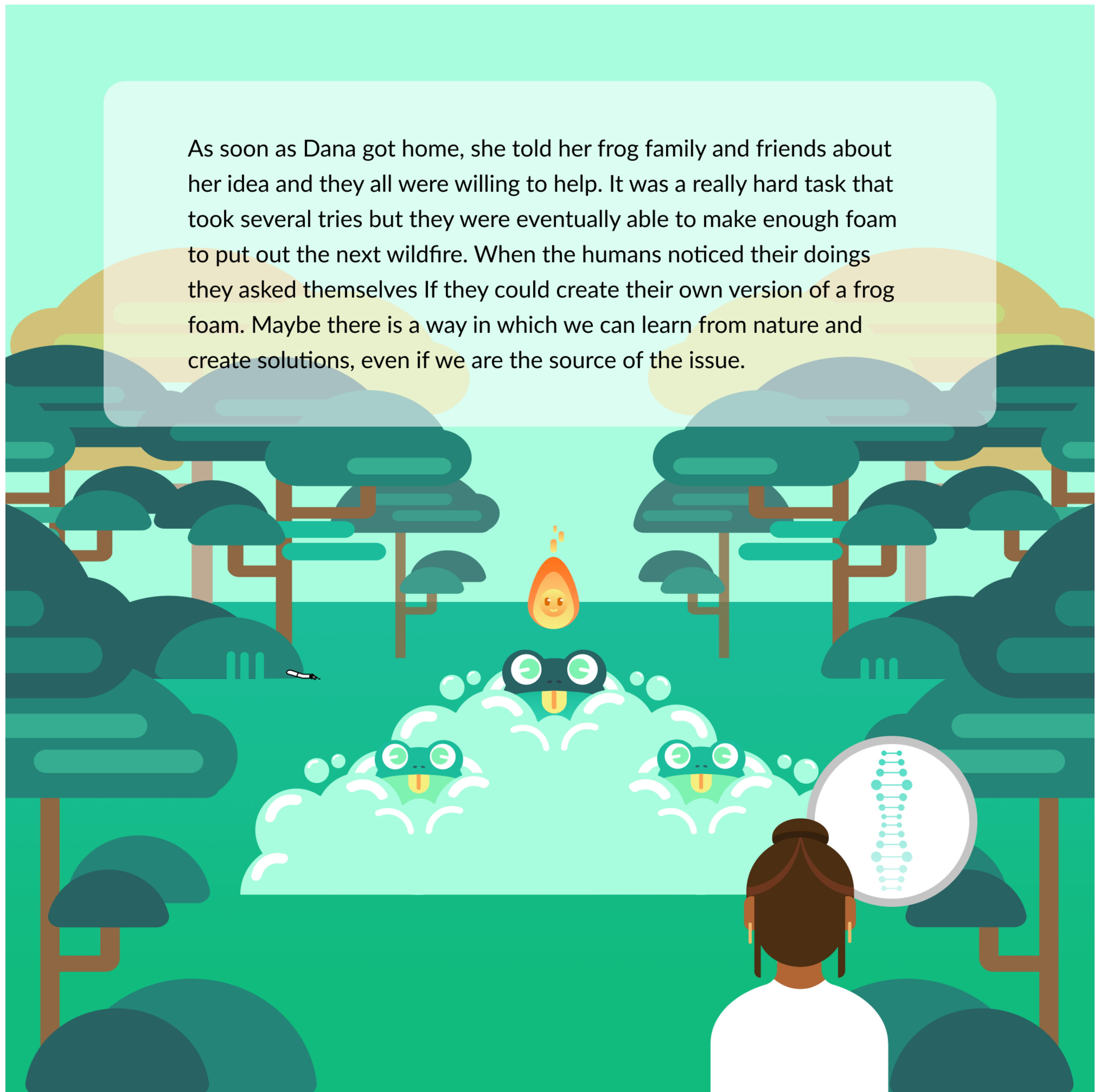
Dana started her search when suddenly something caught her eye, a wildfire and humans! As she was watching from far up she noticed their big red suits and long white coats. They started spraying a white foam all over the place and the fire was extinguished while the person in white just watched and took notes. If only they could use something like that to protect their woods. Wait! Maybe they can....



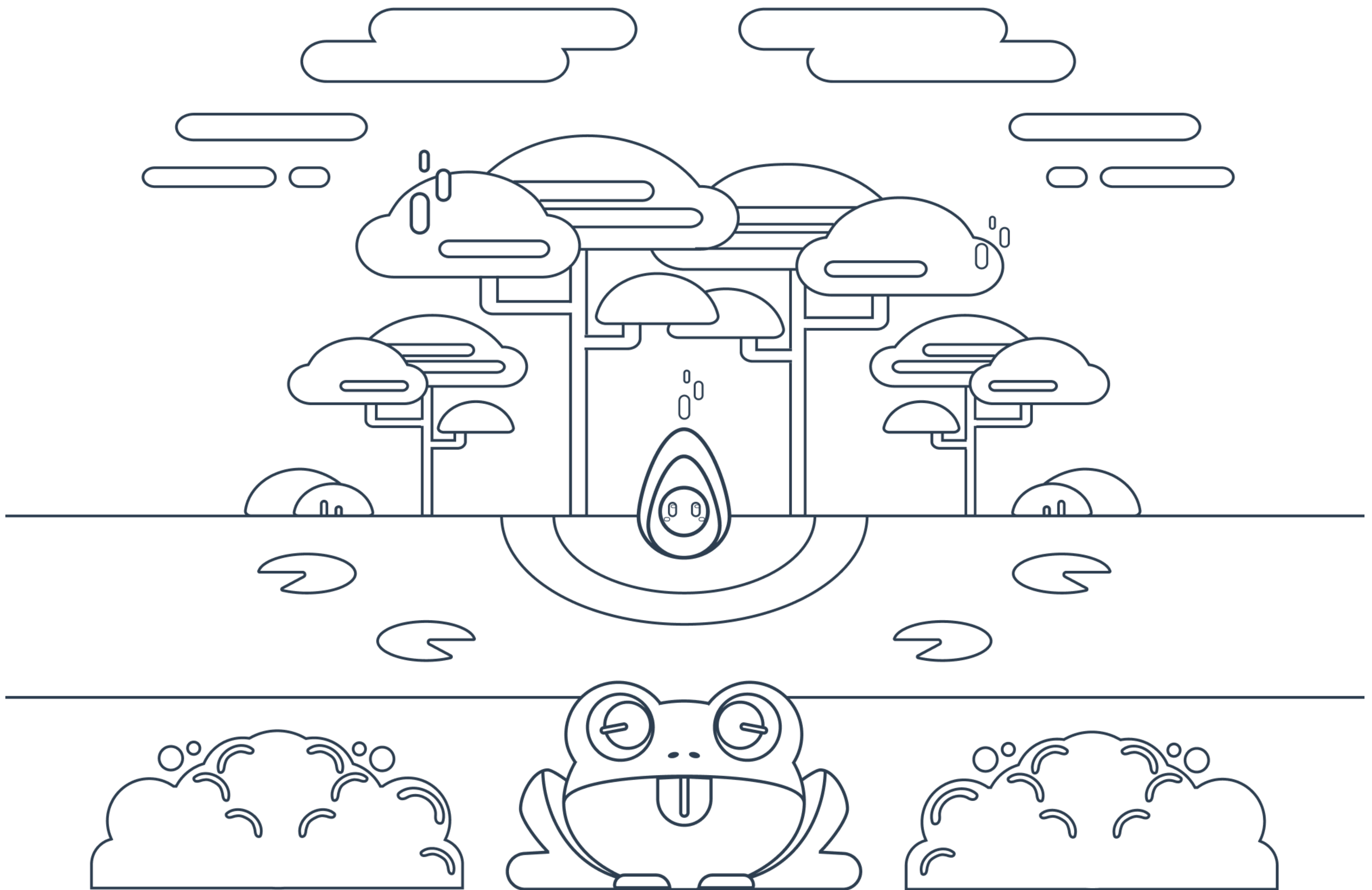
- “Diego! Have you ever seen how frogs from around the area take care of their babies before they are born?”
- “Yes, they make a small nest of puffy foam and keep them there, right?”
- “Exactly, maybe we can use that to fight the fires in case your flames get out of control. I have seen humans use something similar, it never hurts to try”



As soon as Dana got home, she told her frog family and friends about her idea and they all were willing to help. It was a really hard task that took several tries but they were eventually able to make enough foam to put out the next wildfire. When the humans noticed their doings they asked themselves If they could create their own version of a frog foam. Maybe there is a way in which we can learn from nature and create solutions, even if we are the source of the issue.



DANA & THE FIERY WOODS

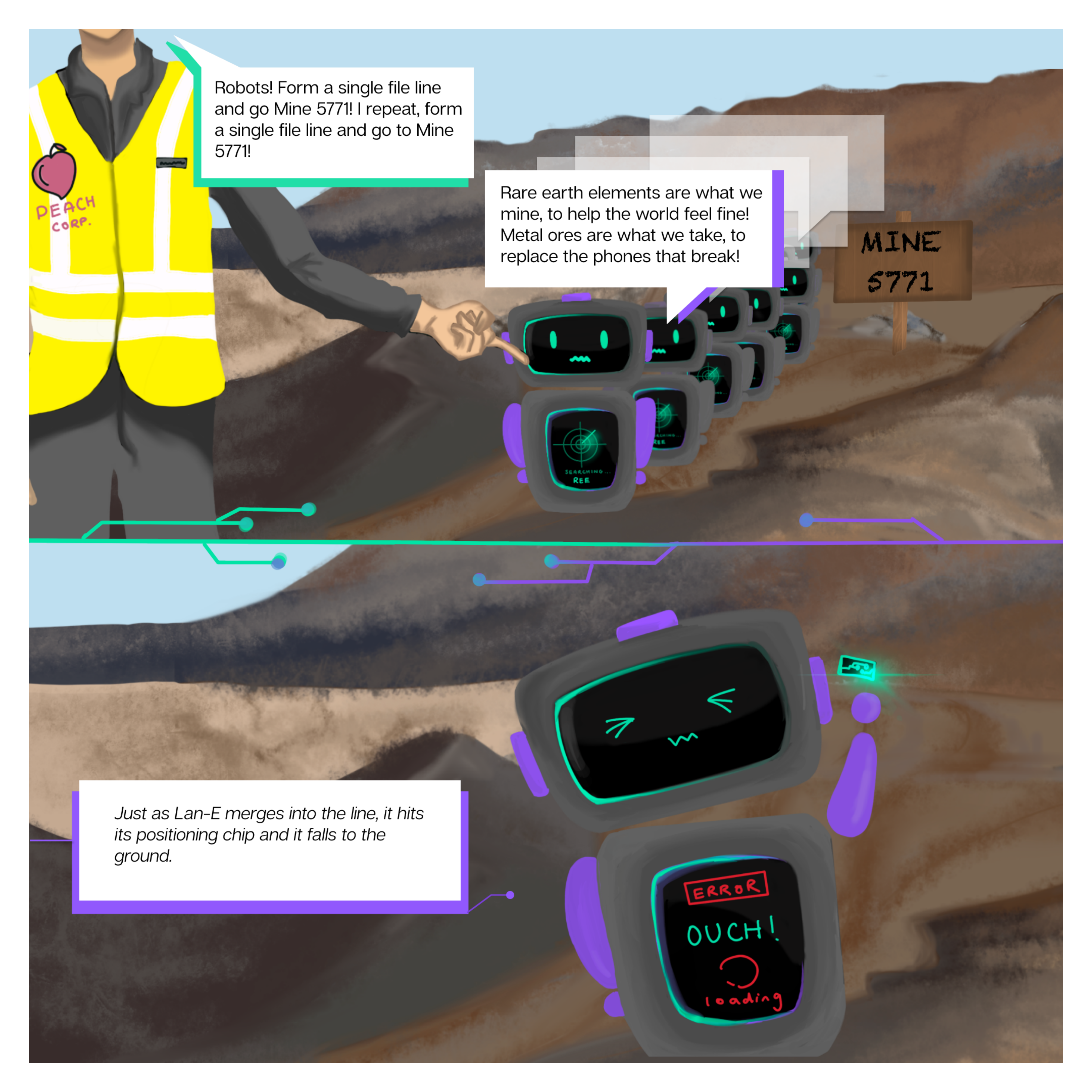


MISADVENTURES OF

LAN-E

iGEM
2021  Calgary





Robots! Form a single file line and go Mine 5771! I repeat, form a single file line and go to Mine 5771!

Rare earth elements are what we mine, to help the world feel fine!
Metal ores are what we take, to replace the phones that break!

MINE
5771

Just as Lan-E merges into the line, it hits its positioning chip and it falls to the ground.

ERROR

OUCH!

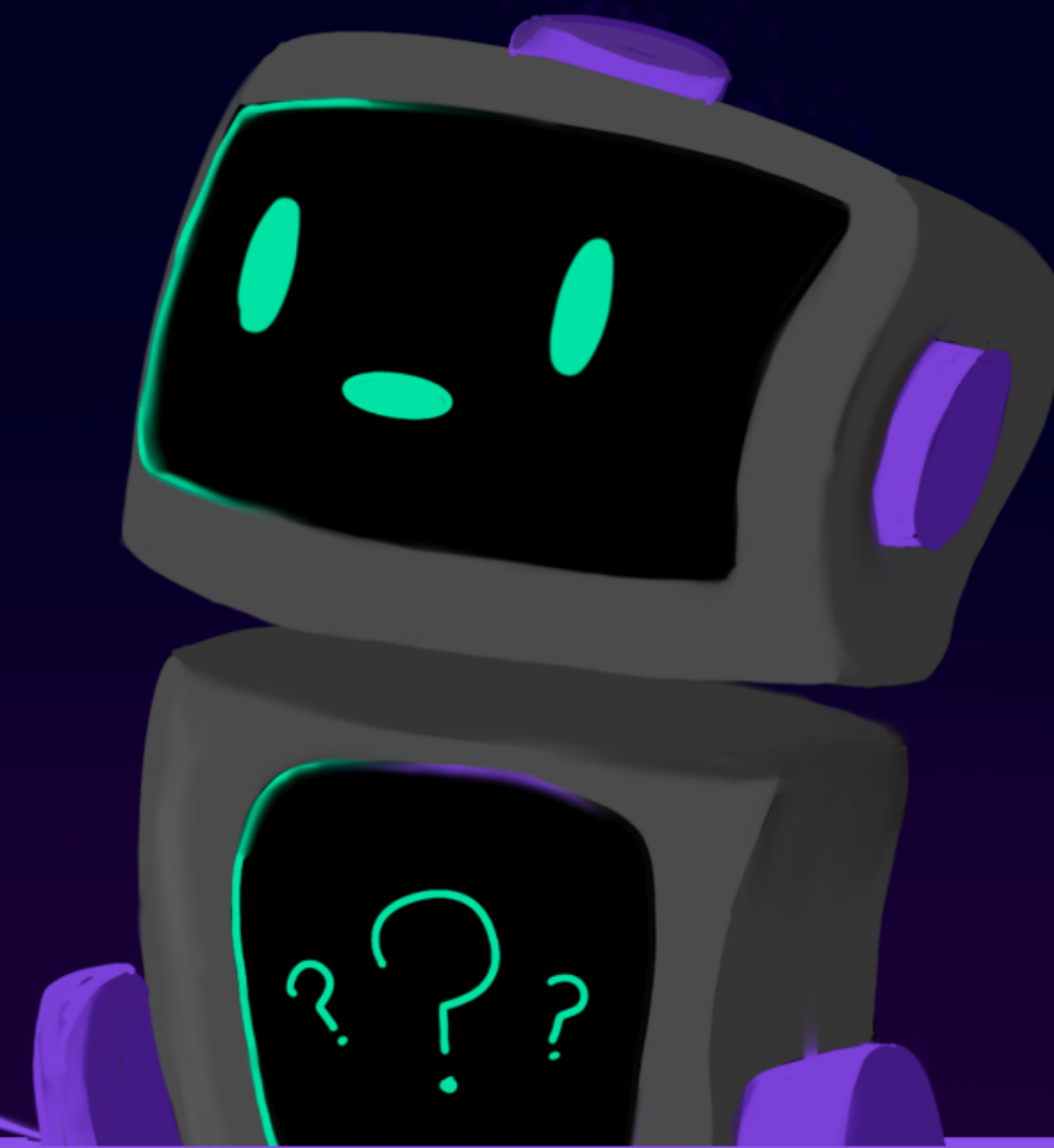
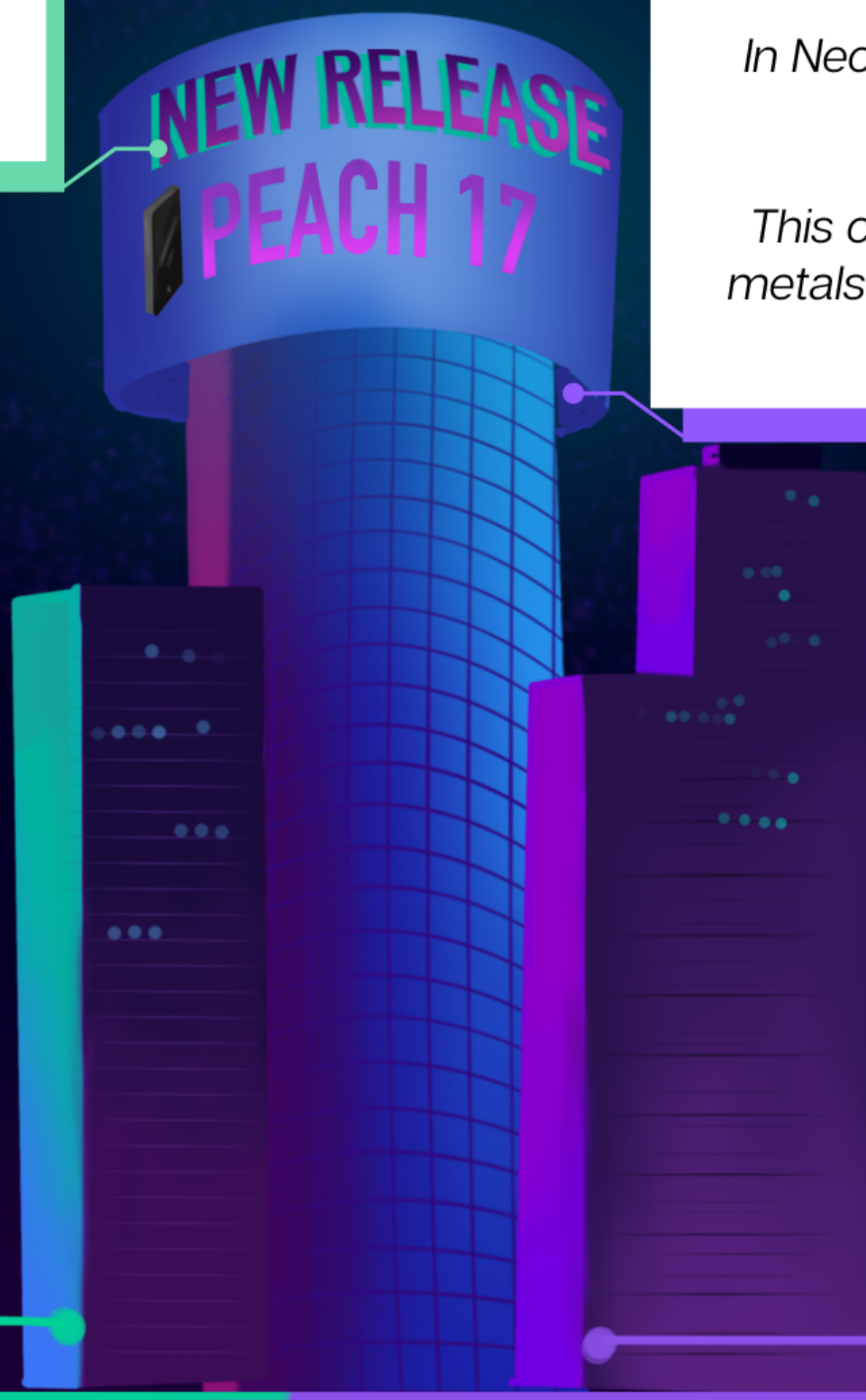
loading

Without its positioning chip, Lan-E gets lost and stumbles upon Neopolis, a nearby city

NEW RELEASE
PEACH 17

In Neopolis, there is the Peach Corporation, the largest makers of anything electronic.

This company made millions of robots to mine metals out of rocks for the new cellphones that the corporation releases every month.



Lan-E detects the rare earth elements in the man's phone!



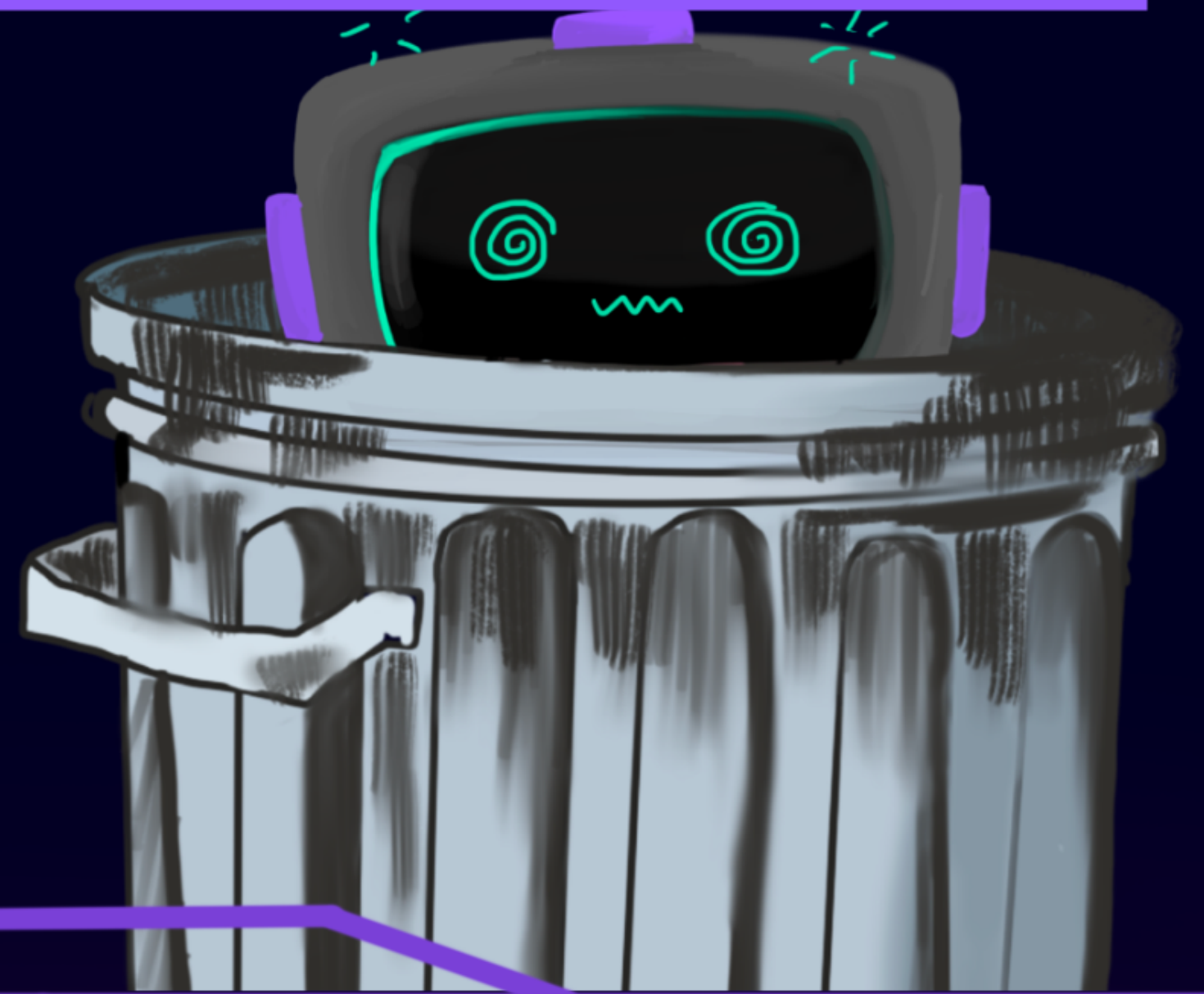
Finally, the latest Peach 17!
Goodbye, last month's Peach 16.
You will not be missed.



Lan-E zooms right past dozens of customers to get the man's phone. In the trash, he finds hundreds of phones, and all the rare earth elements that comes along with them.



As Lan-E reaches down into the trash bin, he falls in and gets stuck!

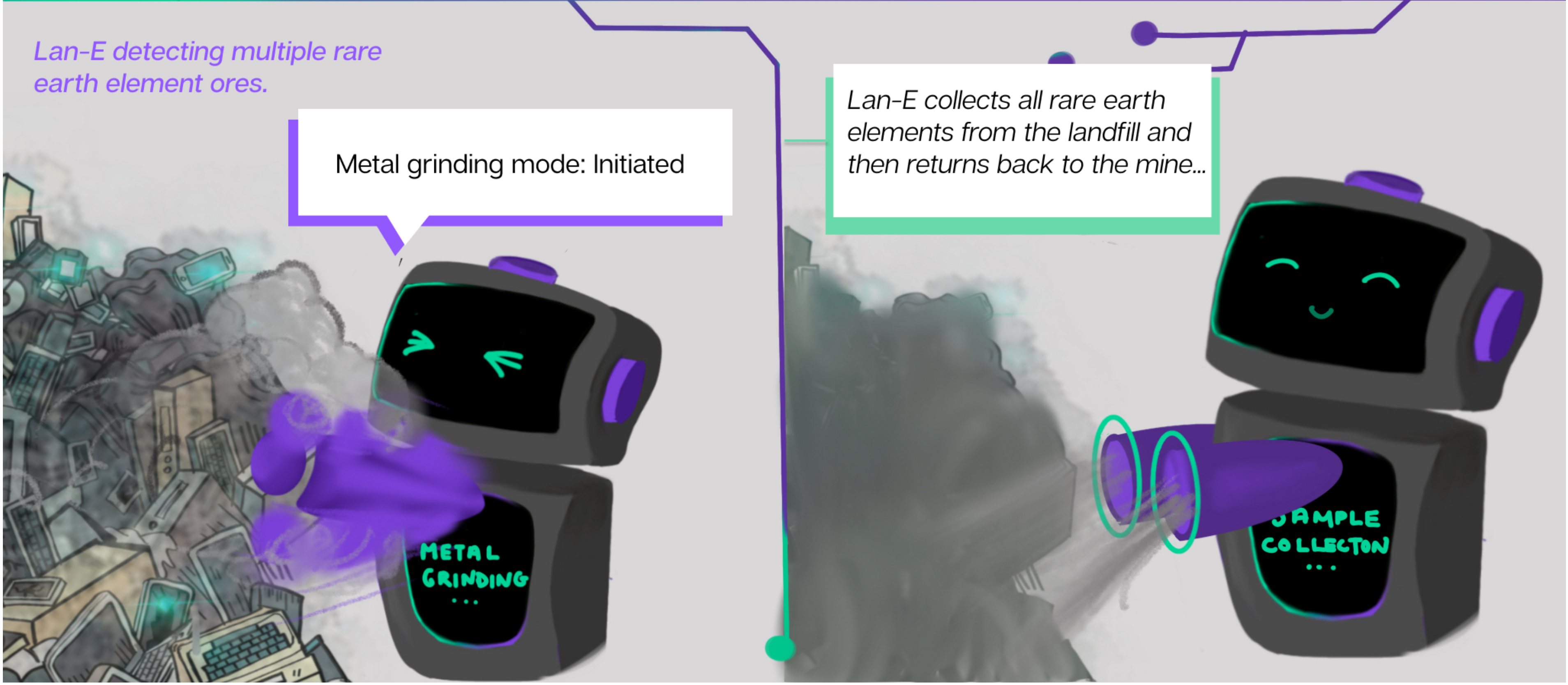


This one's ready! Dump this one in!





Lan-E Finds itself in amountain of garbage, where trash from all of Neopolis gets dumped.



Lan-E detecting multiple rare earth element ores.

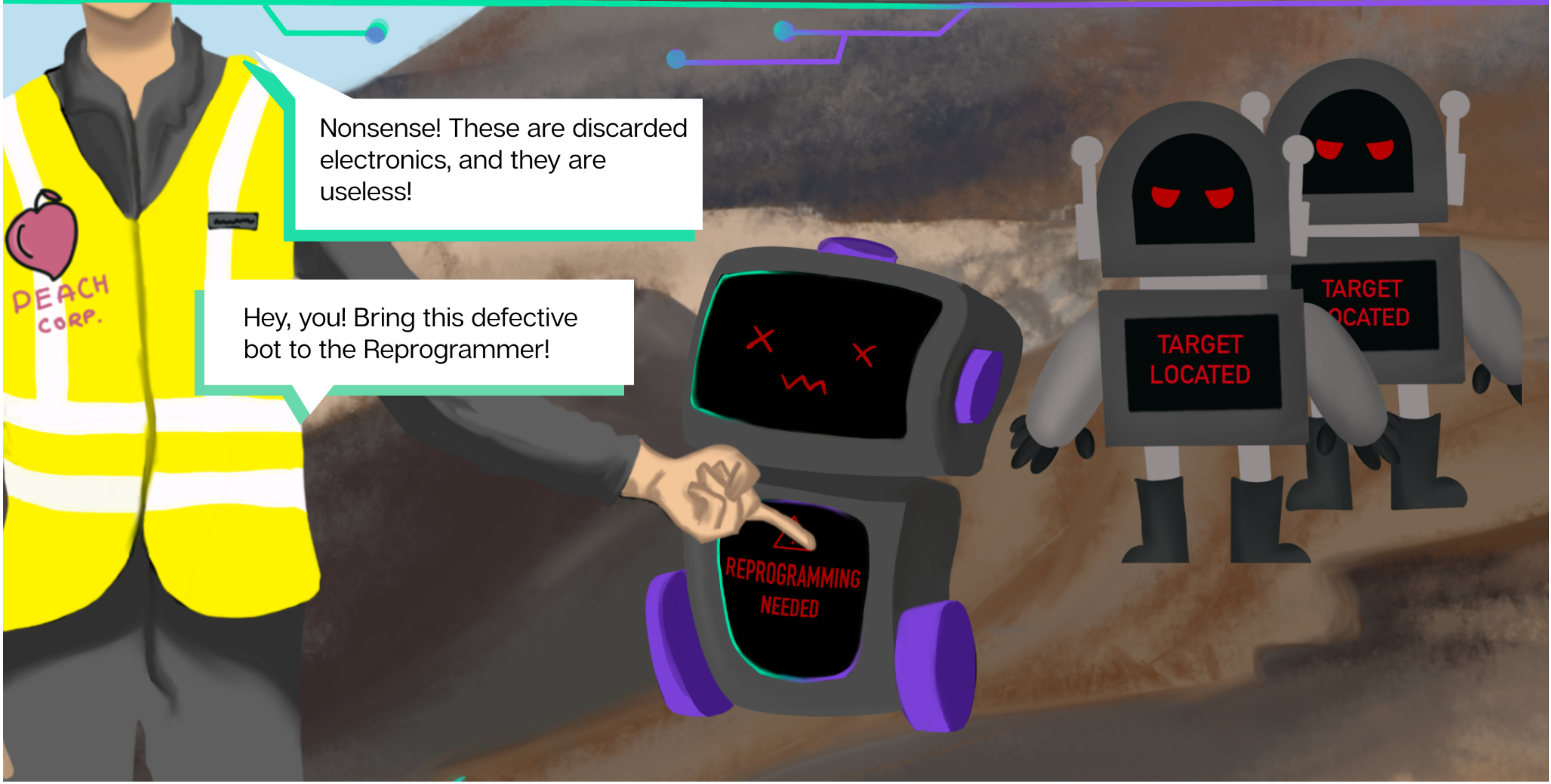
Metal grinding mode: Initiated

Lan-E collects all rare earth elements from the landfill and then returns back to the mine...



I have collected ore sample for your analysis. Recommendation: Convert the landfill into a new mine.

MINE
5771



Nonsense! These are discarded electronics, and they are useless!

Hey, you! Bring this defective bot to the Reprogrammer!



Lan-E was brought to the Reprogrammer, a facility that wipes out and reinstalls the program on all defective Peach Corporation robots.



New directive: Replay suggestion to Peach Corporation Research and Development Department.

Then Lan-E gets away from the robots!





Lan-E then manages to find a scientist to help!


Oh, what's a mining bot doing here?

Recommendation: Convert the landfill to a new mine. Recycling rare earth elements from electronics waste projected to lead to more money.

NEW MINE:
LANDFILL
1577

Oh, wow! Changing where we get rare earth elements from also decreases our greenhouse gas emissions*. I can bring this up to the Peach Corporation President, and I am sure that he will help us recycle these old phones!

**Greenhouse gas emission: Gases that contribute to the increasing temperatures on earth. (They include carbon dioxide, methane, nitrous oxide, and other gases).*



In the Peach Corporation President's Office, the scientist tries to convince the President to stop mining rare earth elements and instead recycle the rare earth elements found in old phones.

Mr. President, I believe we have something that could slowly make our operations more environmentally friendly if we change our mining source. If we recover the REEs from our phones instead of constantly having to mine them from the Earth, we would help the environment!

That is absolutely pointless. The way we make money now is the way we have made money since then.

But, Sir! If we keep doing what we do, we will run out of rare earth elements to mine

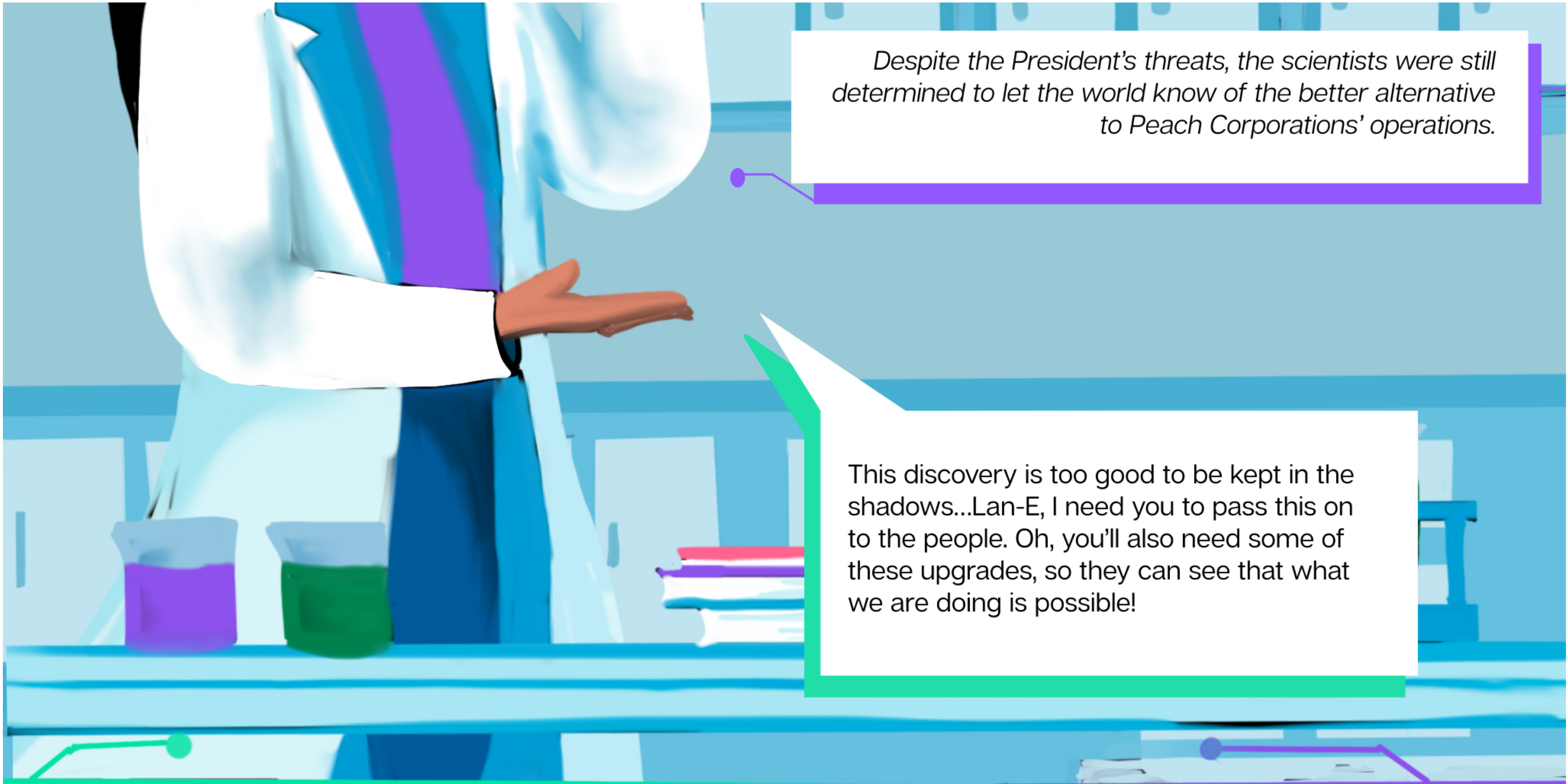
But-

And that's exactly why we can charge them even more in the future! Why do you think we make such easily breakable phones?

Silence! This madness ends here. If you tell another soul about this, you know what's waiting for you.


PEACH CORP. CEO

Peach 17



Despite the President's threats, the scientists were still determined to let the world know of the better alternative to Peach Corporations' operations.

This discovery is too good to be kept in the shadows..Lan-E, I need you to pass this on to the people. Oh, you'll also need some of these upgrades, so they can see that what we are doing is possible!



With Lan-E fully equipped, it is ready to inform the public and face whatever the Peach Corporation President throws it in its way!



And that's exactly why we can charge them even more in the future! Why do you think we make such easily breakable phones?

Everyone! The Peach Corporation President is trying to shut down a greener and cheaper alternative for making easily replaceable Peach phones, so he can make more money off of you! If you don't believe me, you'll believe him!

We should all boycott Peach Corp!

Yea, let's all boycott Peach Corp!

Me, too! And they release the Peach 17 with "added features" to solve problems that shouldn't exist in the first place!

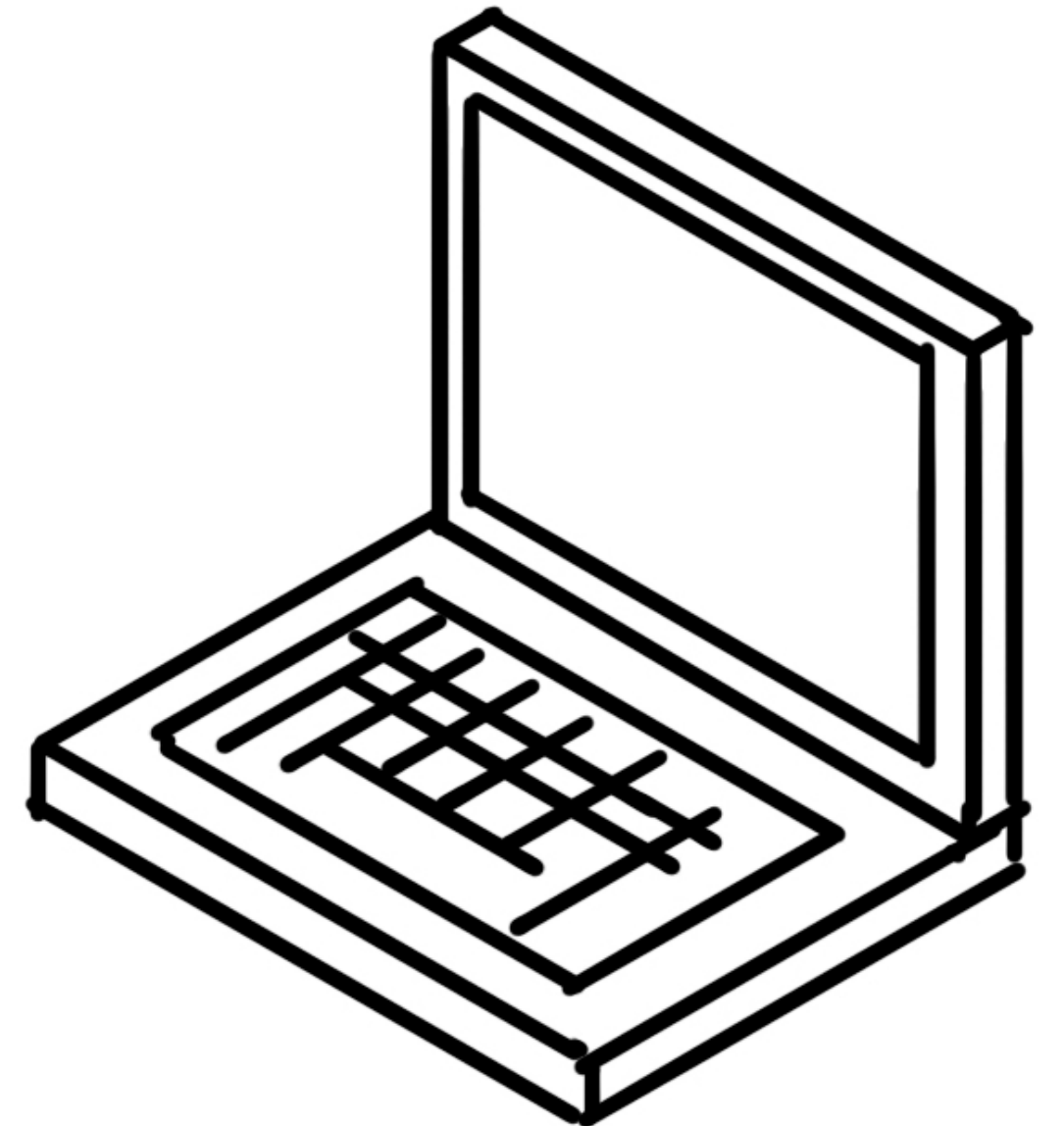
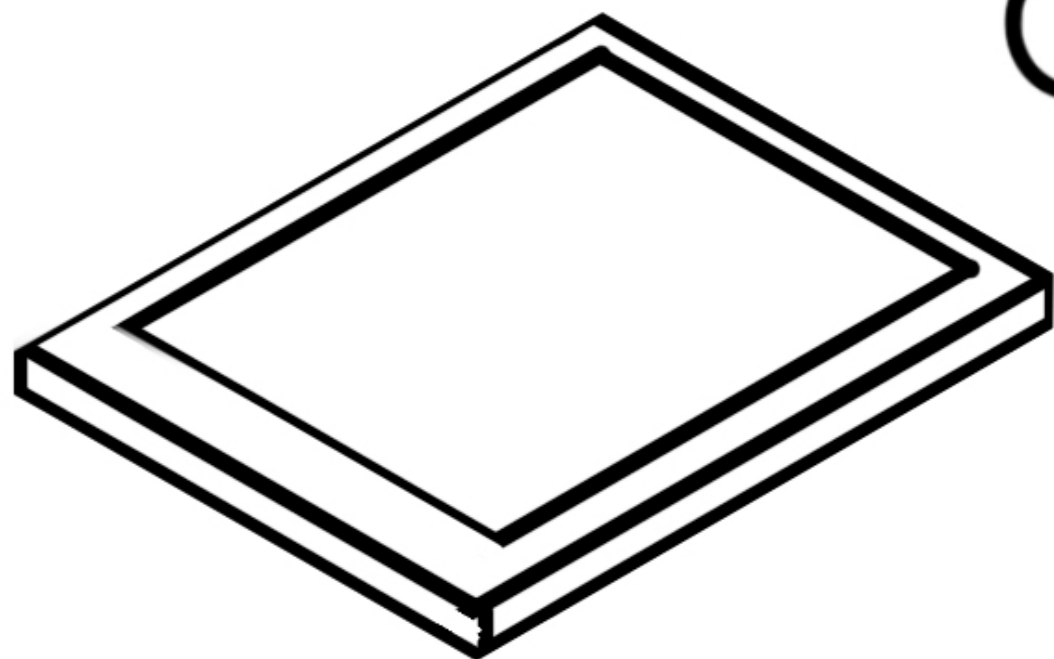
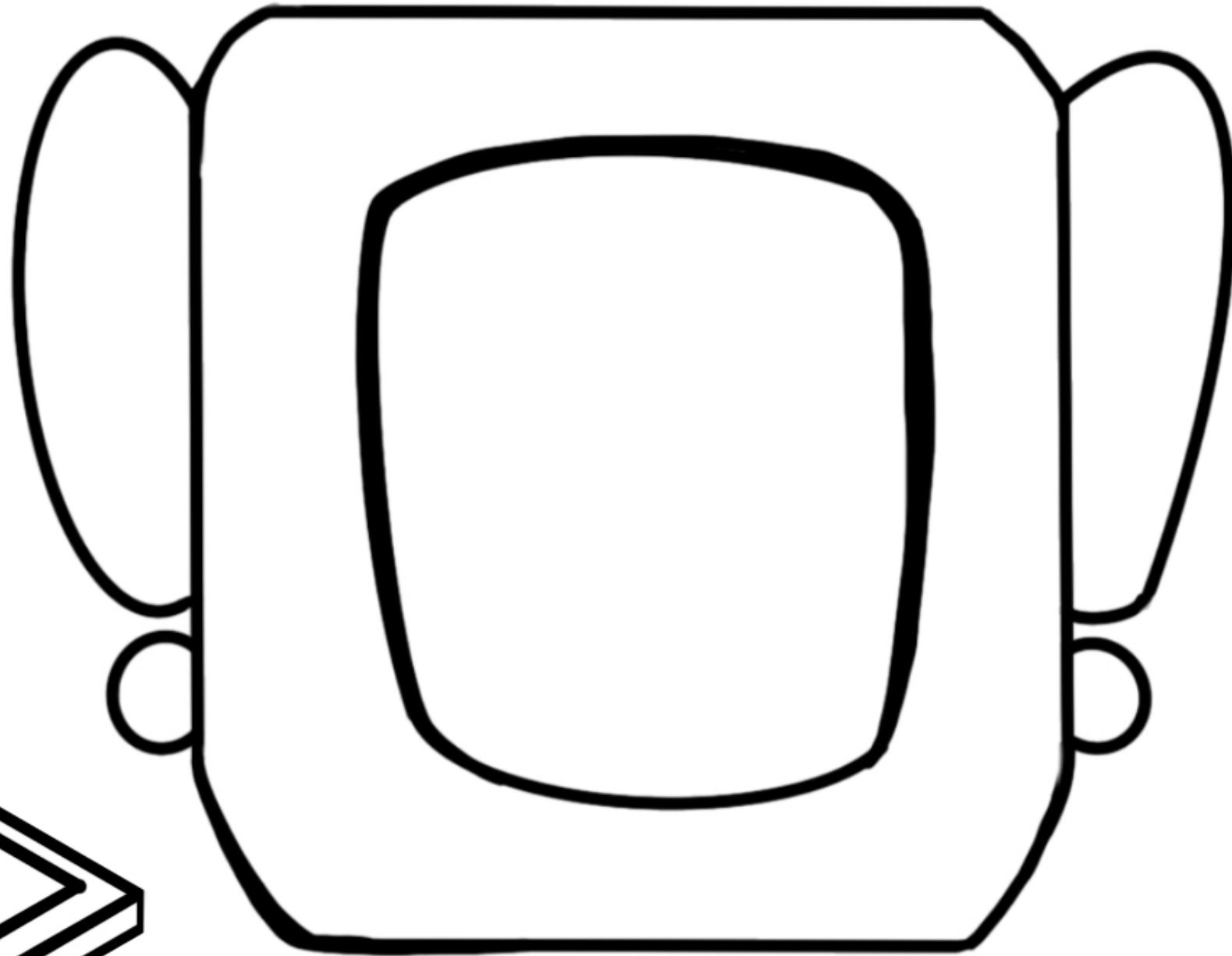
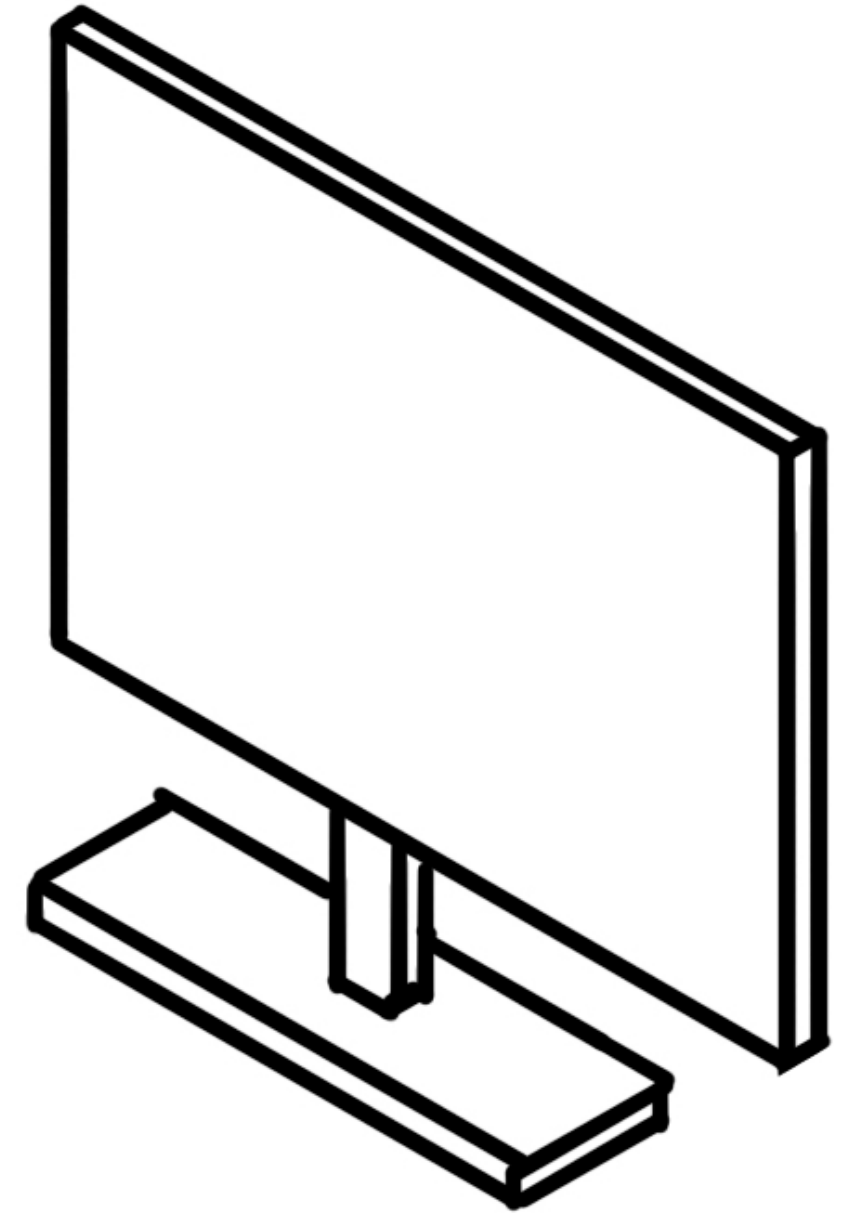
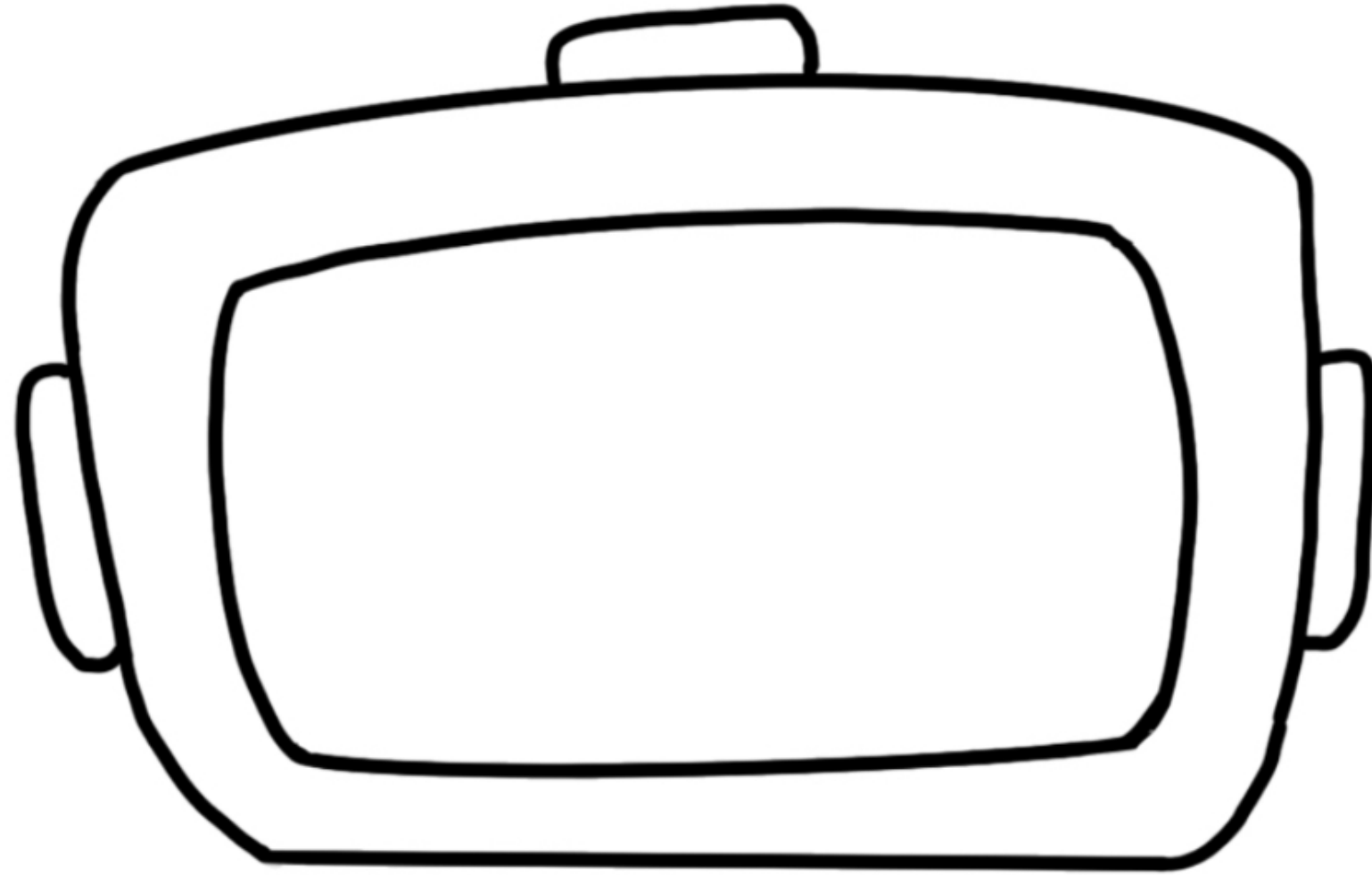
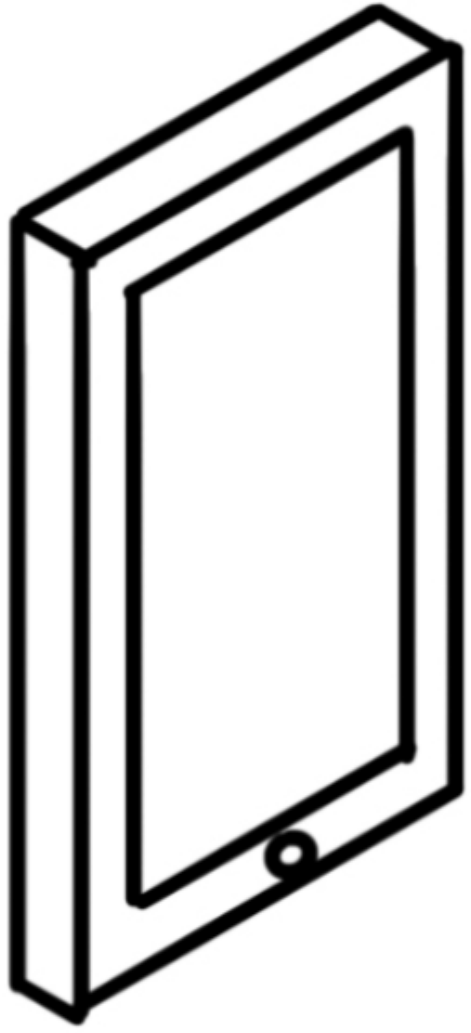
What?! So that's why my Peach 16 is worn out after just 2 weeks!

NeoPeach

All from recycled materials

With public outrage pressuring Peach Corporation, the President steps down from his position. The board of directors then appoints the scientist as the new president, and Peach Corporation enters a new era of sustainability with the release of NeoPeach, a phone made from recycled materials.

Draw and colour in your own Lan-E in action!







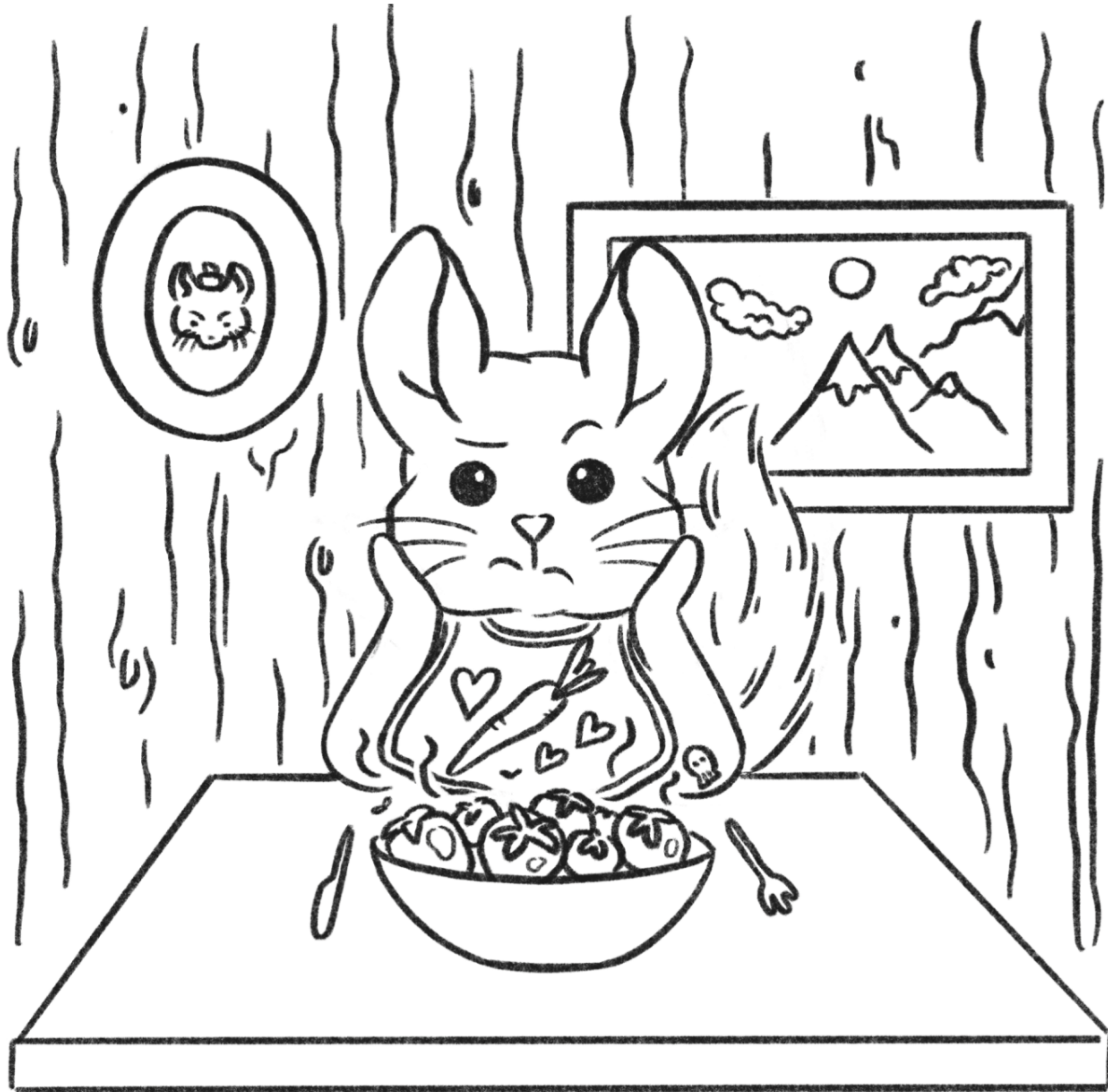
MIKUYTEC

Away from the noisy city of Lima, deep in the highlands, lived a young chinchilla named Tamilla. Tamilla was getting ready to have lunch on a warm summer evening when she noticed the fruit she had saved up was smelling funny. The strawberries were smushed and the blueberries had white fuzz growing all over them. Lunch was ruined, Tamilla was confused.





MIKUYTEC





MIKUYTEC



Tamilla called her friend Ruby the owl, who told her the same thing had been happening to her. Ruby said there were small creatures who fed on the fruits and that's why they smelled funny. Ruby didn't know how to fix it but she was sure their neighbour, Mikuy the guinea pig, would know.



MIKUYTEC





MIKUYTEC

Tamilla got to Mikuy the guinea pig's place and showed him her yucky fruits. Mikuy knew exactly what to do. He explained there were these very small creatures called *fungi* that broke through the fruit's skin to eat them, producing the funny smells and white fuzz. Through Mikuy's microscope, Tamilla was able to see the feisty creatures move and grow on top of the fruit.





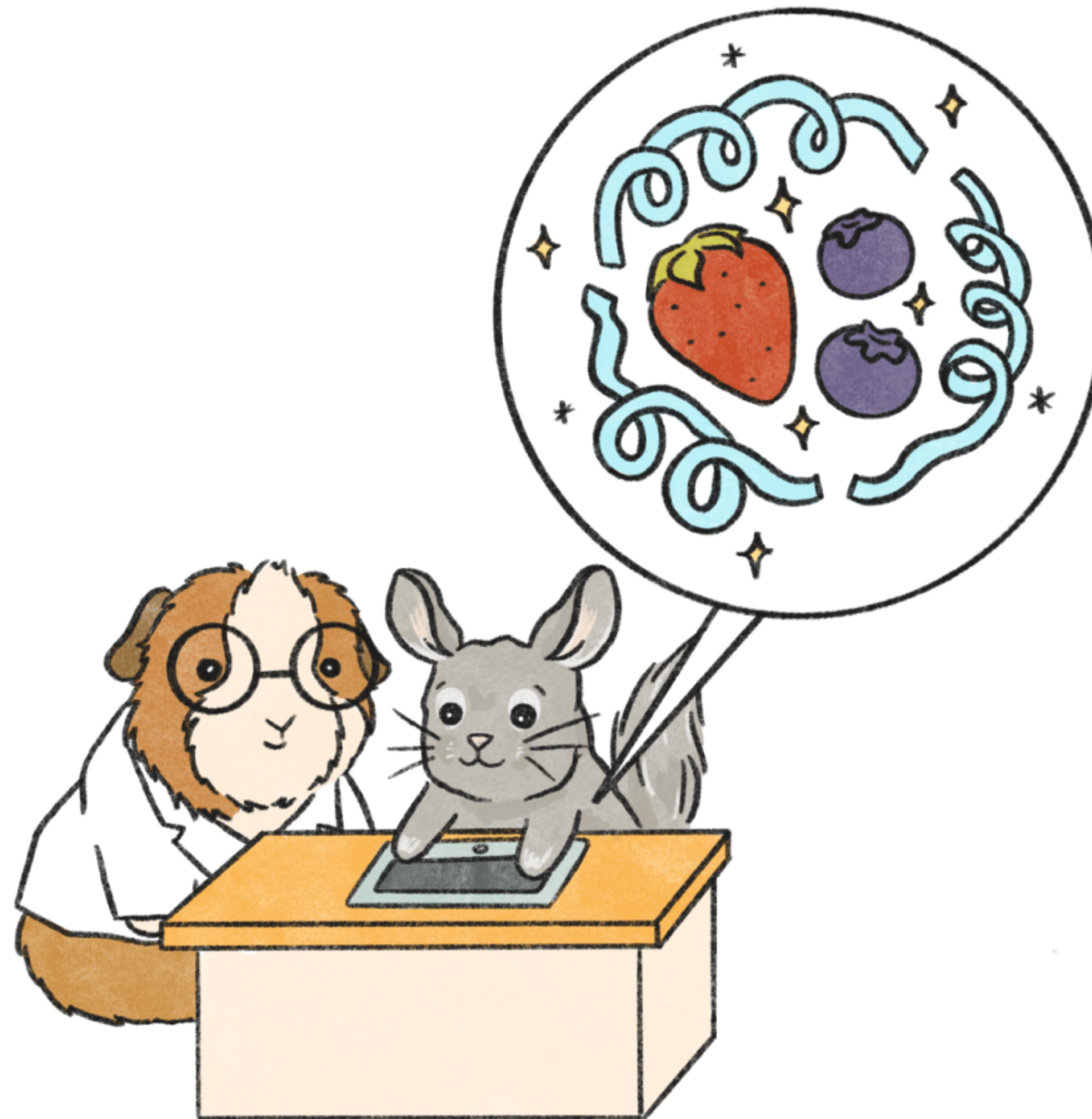
MIKUYTEC





MIKUYTEC

“Don't be scared my friend, I have the solution.” exclaimed Mikuy, as he showed Tamilla his most recent discovery. Mikuy had been working on a powder made from fungi-defeating proteins that could scare the creatures away, stopping the fruit from getting rotten. Tamilla was amazed. Mikuy gave a small jar of the powder to Tamilla so that she could take care of her fruit at home. “Thank you so much!” Tamilla said as she hopped out the door.





MIKUYTEC





MIKUYTEC



Ever since that day, Tamilla had fresh fruit ready to eat at all times of the day. Mikuy's powder was truly a life saver.



MIKUYTEC



Captain Olivia



 OIL
TOGETHER
PAINTING

Acknowledgements:

To all the children for letting
us teach them to take care
of the environment.

Once upon a time there was a boy called Daniel, born in Malaga, a place in Andalusia. Daniel is 8 years old and has a twin brother. His family is small and they live next to the beach.

Since he was a little boy Daniel has been very restless, he was always playing and thinking of ways to change and improve his toys and everything around him.

His parents had a shop where they sold everything necessary for fishing, and many weekends they all went fishing. Daniel liked to go and take his own fishing rod that he and his mother made himself.



After the summer, the first day of school arrived, and Daniel was reunited with all his friends. In his school the first day is a free day, but before they start playing like crazy, in each class their teacher explains the new activities that they will have to do during the course. Among all of them, one that caught Daniel's attention was a science project. He was used to dismantling and changing all his toys and thinking up master formulas to make any liquid change colour or shoot out of it, this activity excited him a lot and he was looking forward to doing it with his friends.



A month later, the day came to do the Science activity, Daniel and his friends thought for days and decided to make a volcano that would spit lava, they were not convinced by the idea because they would like to do something related to the sea but they did not have much time to do it so they had to hurry to decide and do something. They got down to work and finally finished it two days before the delivery.



Just that same night when they finished the volcano, they decided to have a sleepover and sleep together, to celebrate, and it was then, during the night, when they were all sleeping, in their dreams, Olivia appeared and said to them:



"Hi guys, I'm Captain Olivia, recycling superhero, forgive me for not showing up sooner but I was saving some other kids from making a mistake in their science work. I have to tell you something, and that is that you must teach all your classmates to recycle, but not only plastic and paper, which I know you are the best at, but also recycling the oil that your mums and dads use to make food, with it you can make great things, like paint to use at school or soaps or even fuel for your cars. Waste oil dumped in the sea or rivers pollutes the water and prevents fish and sea animals from living well". "You have to do something, guys".



The next morning, the children woke up, looked at each other and started talking at the same time and telling about the dream they had had. They were all convinced that changing jobs was crazy, but they liked the risk and didn't think twice about it. Captain Olivia convinced them.

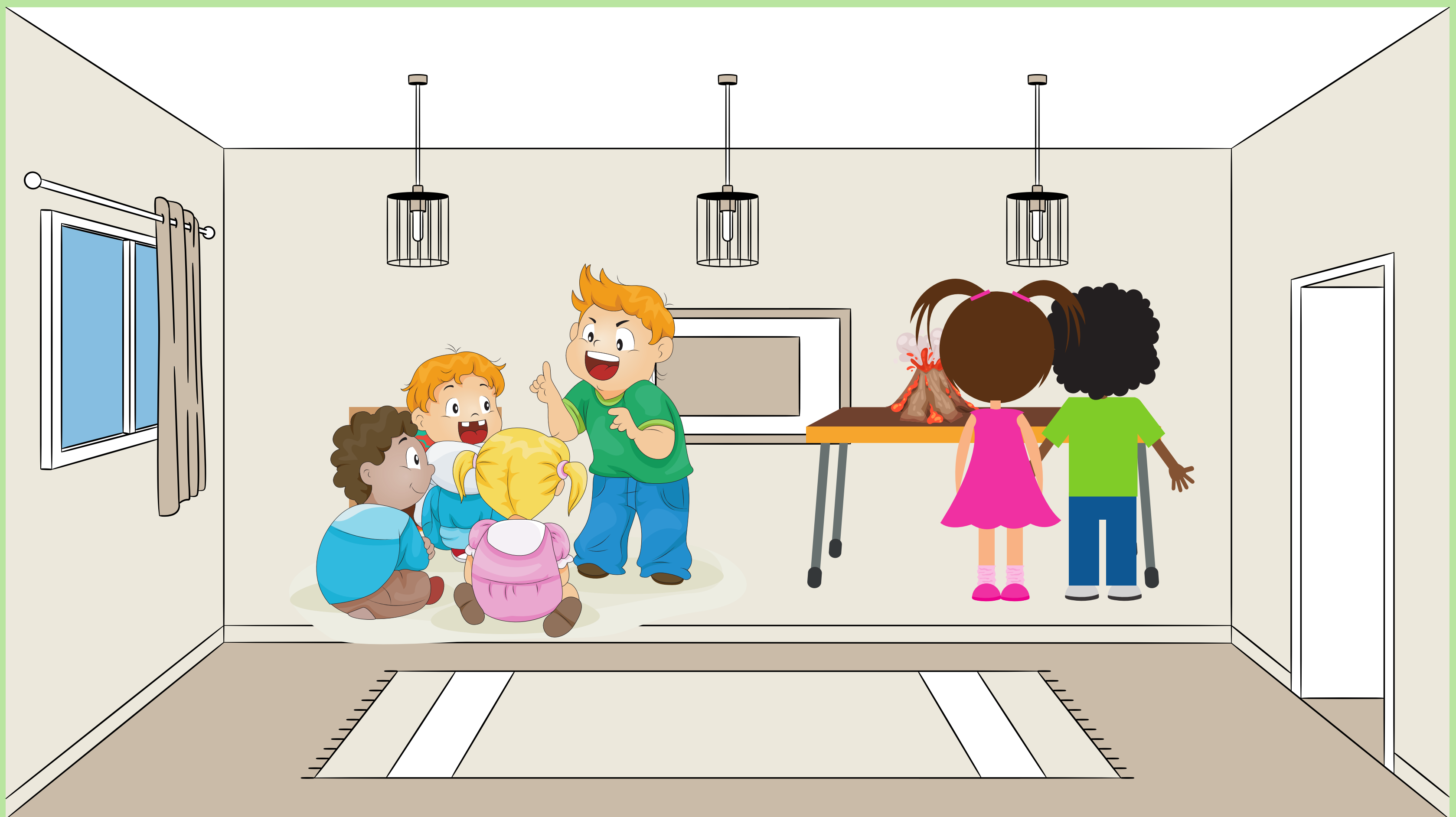
They all ran down to Daniel's garage to work, they wanted to transform the used oil into paint.



Daniel was convinced that this would revolutionise the whole school.



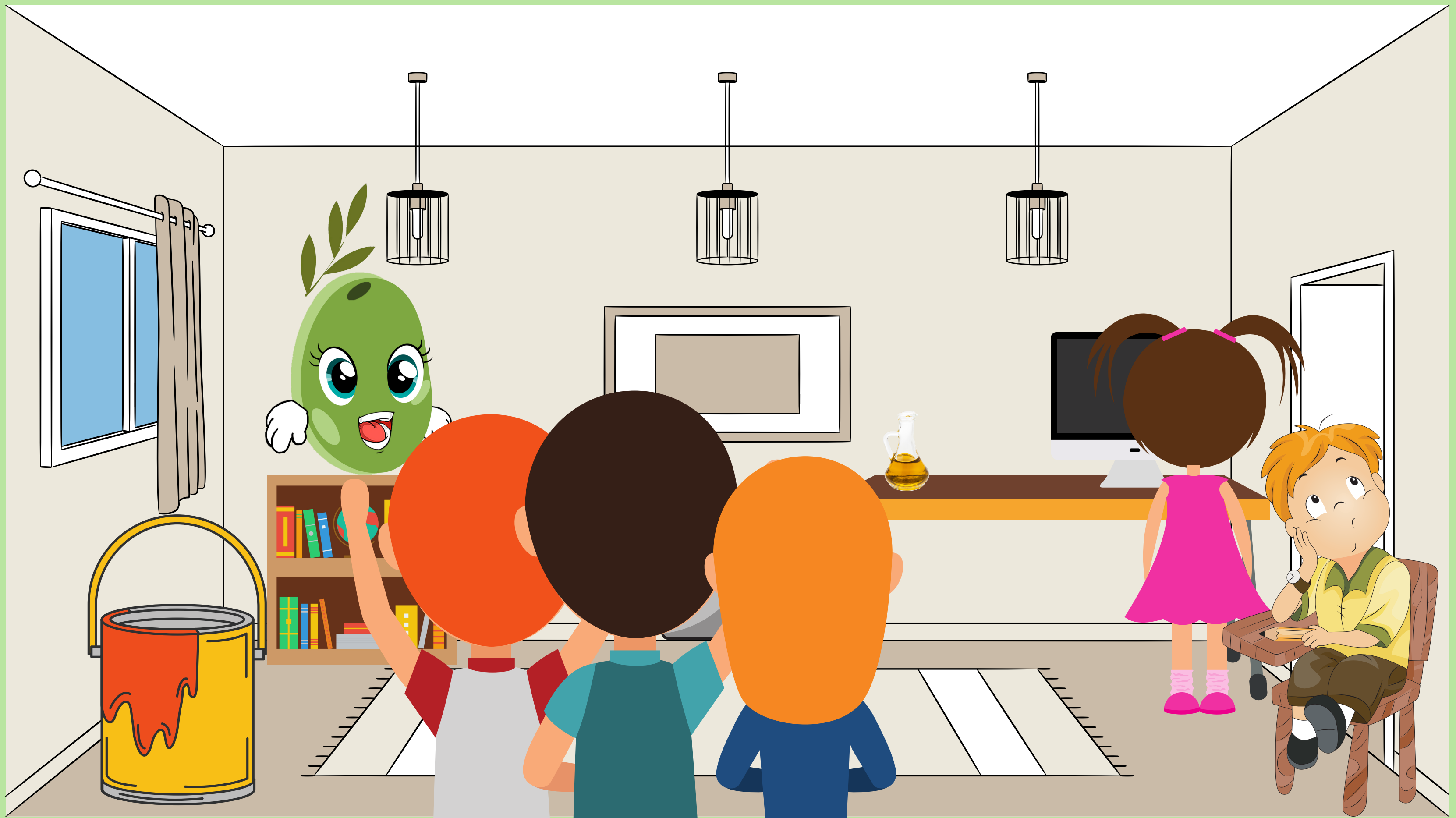
While they were doing the work, Daniel told his friends that one day when he was fishing with his parents, he saw many dead fish on the seashore, and that his parents told him that there were people who poured liquids that polluted the sea. With this they all wanted to help change the problem that Captain Olivia had made them think about.



They only had one day left to get it, it was Sunday and on Monday they had to deliver and explain the work, sometimes they didn't know how to continue to get to the painting so when they were lost they would all go to sleep and Olivia would appear to help them.

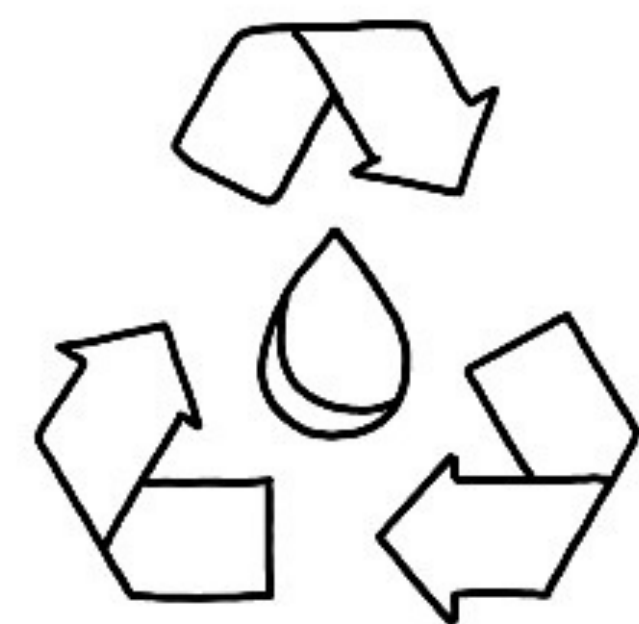


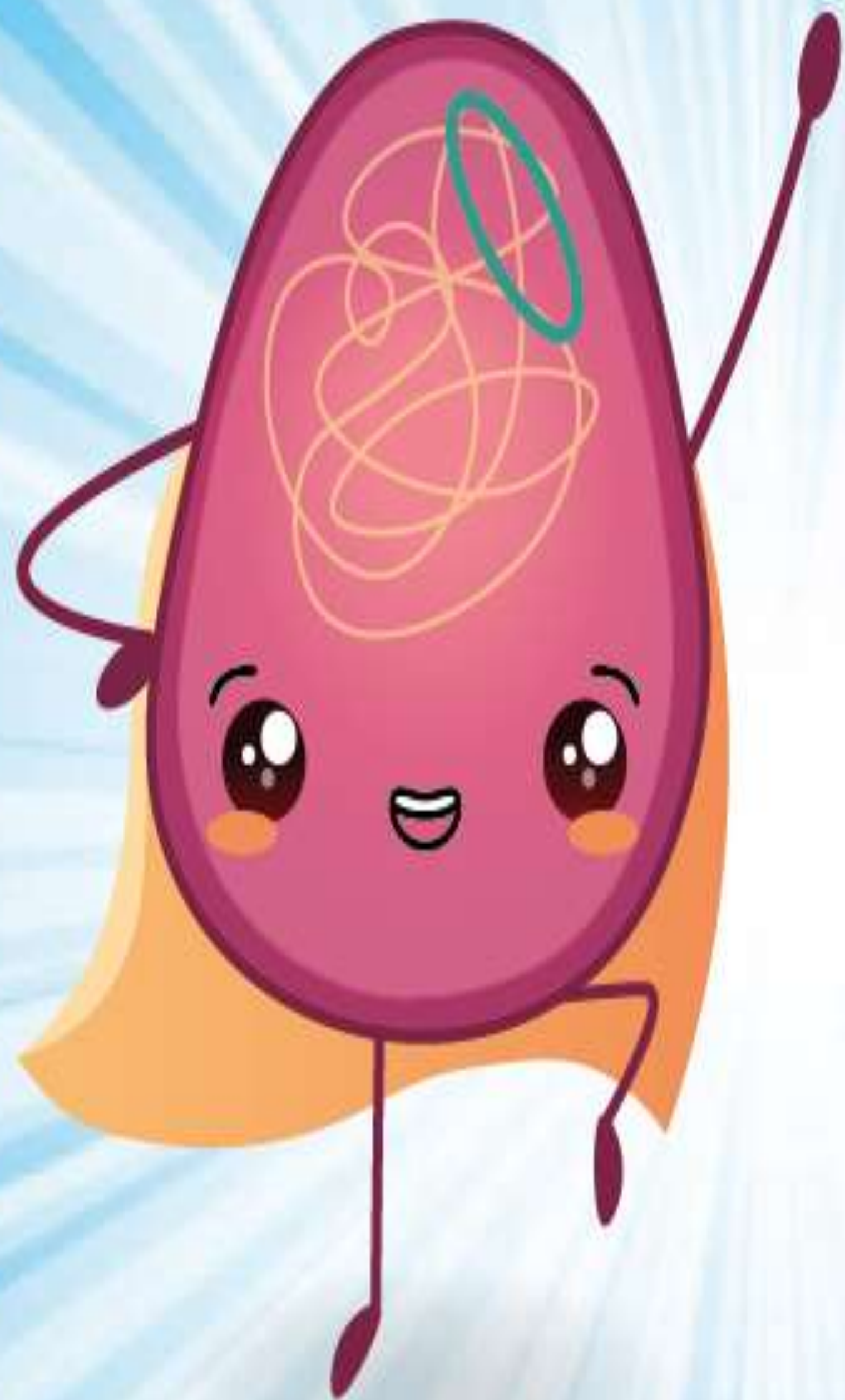
It was getting close to the time to go to school and they hadn't got the painting, they hadn't had time to sleep to ask Olivia and suddenly, she appeared in the garage, and gave them the last instructions to get to the painting. And so it was, they arrived at school with the paint and explaining the importance of recycling oil.



It was the best work of the class, and they won the environmental care medal.





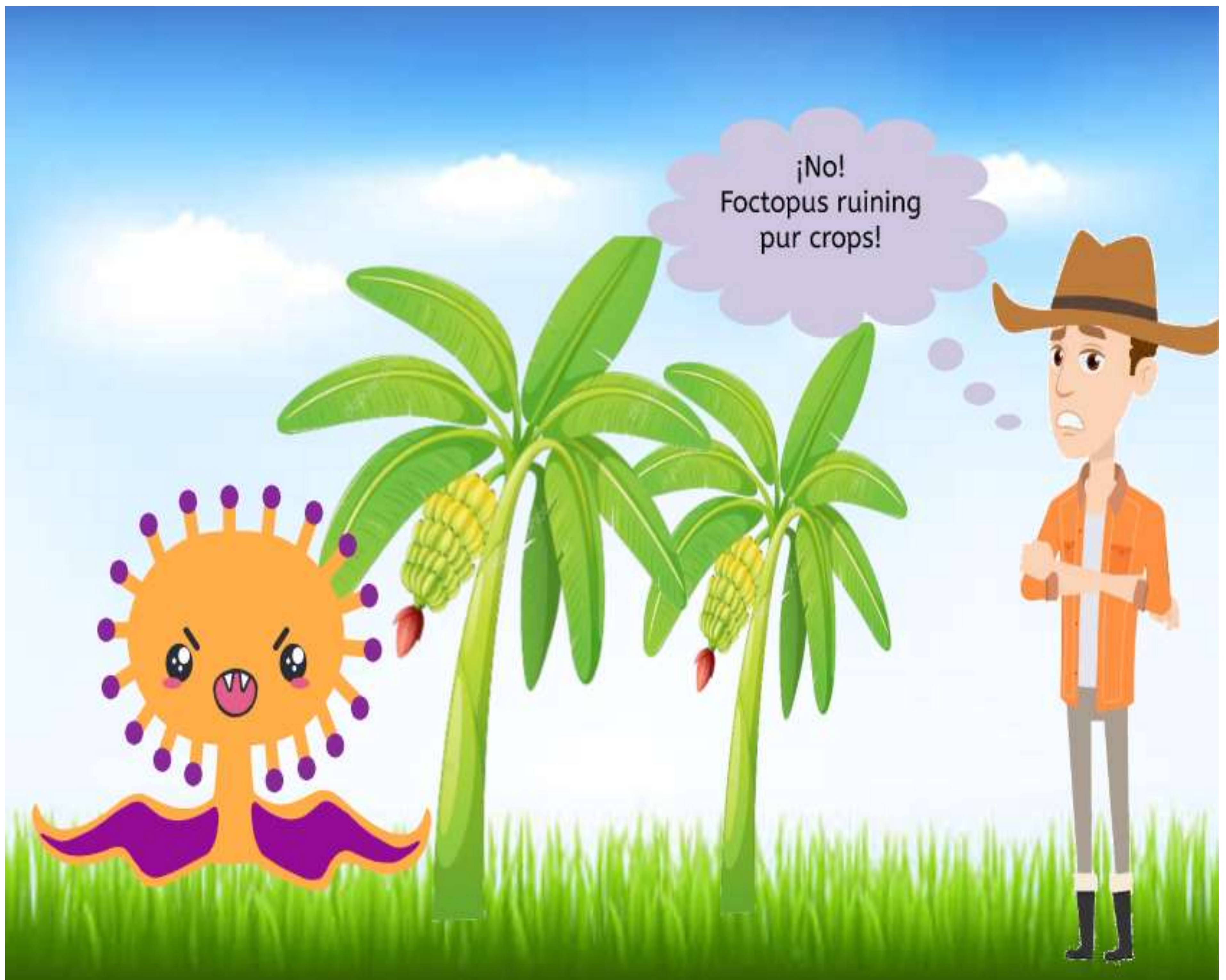


The adventures of *E. coli* and its shield

- iGEM Ecuador



Once upon a time, in a small town in Ecuador, there was a bacterium called Escherichia coli but its friends called it E. coli. Little E. coli was trained by scientists to get any superpower she wanted. The townspeople loved and admired her because with her powers she helped solve everyone's problems. E. coli could create medicine for the children, clean polluted rivers, and make fuel for the town's farmers.



One day the town was attacked by the great villain *Fusarium oxysporum* also known as Foctopus. The evil fungus used its powers to weaken plants and make them sick. The townspeople were very worried because Foctopus was making more and more crops sick every day.



The townspeople, very angry at the fungus' evil deeds, decided to set a trap for Foctopus. They would feed him delicious cakes, with a little medicine, that would make him sleep for a long time.



Foctopus, happy to have so many cakes, ate them in one bite and some time later fell fast asleep. The townspeople were very excited because they thought that the effect of the cakes would keep the mushroom asleep for a long time.



While the people were celebrating their achievement, Foctopus woke up from his sleep and very angry when he discovered what the people had done, he decided to destroy all the crops.



The people were very sad after this event and did not know what to do, so the Mayor of the town came up with another plan.

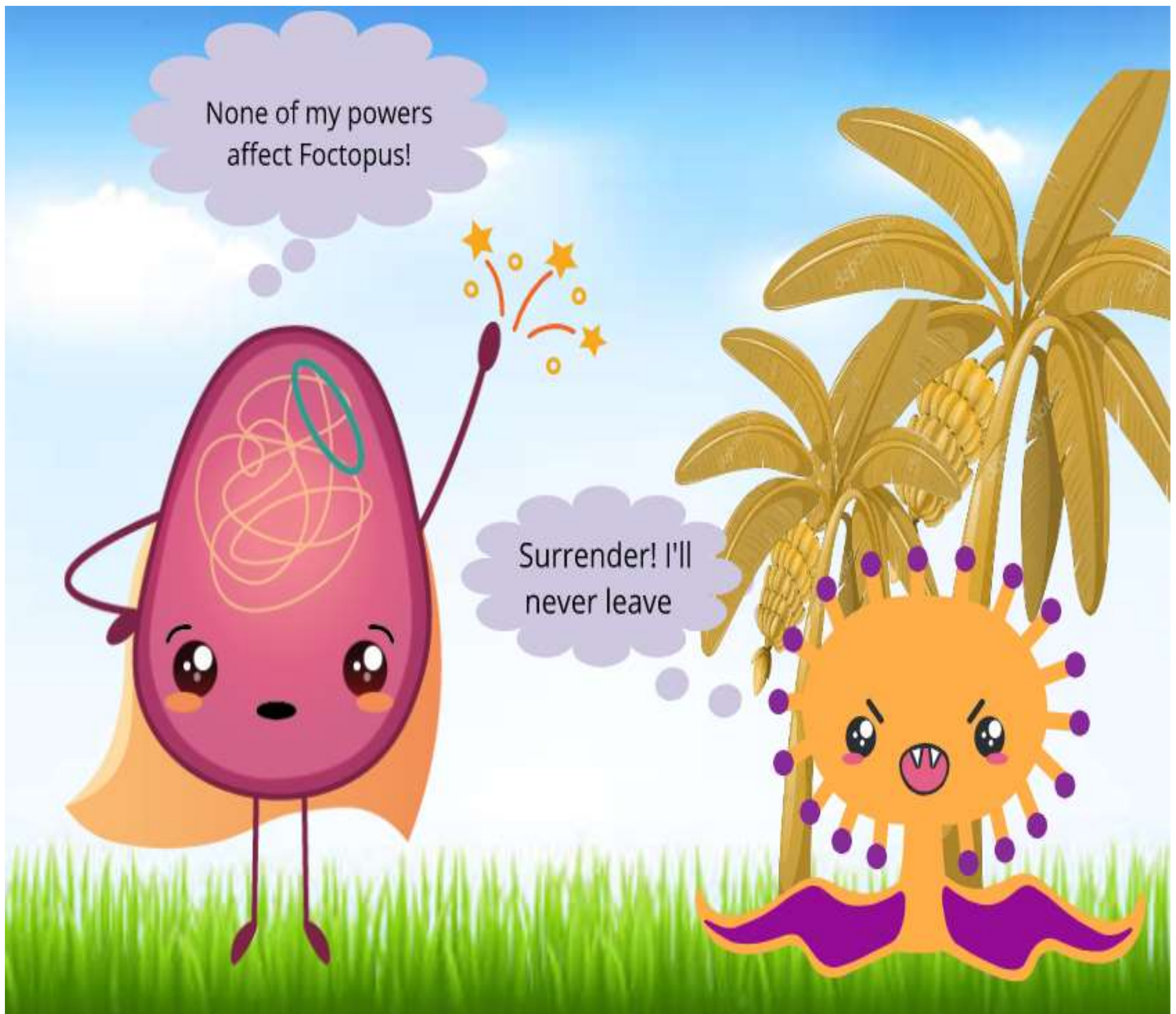


The next day while E. coli was resting in the Ecolicueva he received an emergency call from the mayor:

- **E. coli: Hello, this is E. coli, how can I help you?**
- **Mayor: Mighty E. coli we need your help, our town is under attack by a new supervillain named Foctopus.**
- **E. coli: Foctopus? I've never heard of him. What has this villain done?**
- **Mayor: Foctopus has destroyed all our banana crops.**



When E. coli arrived in town he noticed that all the crops were diseased. The villagers explained the situation to him and E. coli decided to go and look for the fungus to drive him out of the village.



E. coli. very angry about the bad actions of the fungus, used all her powers to try to drive the fungus out but none of them worked.



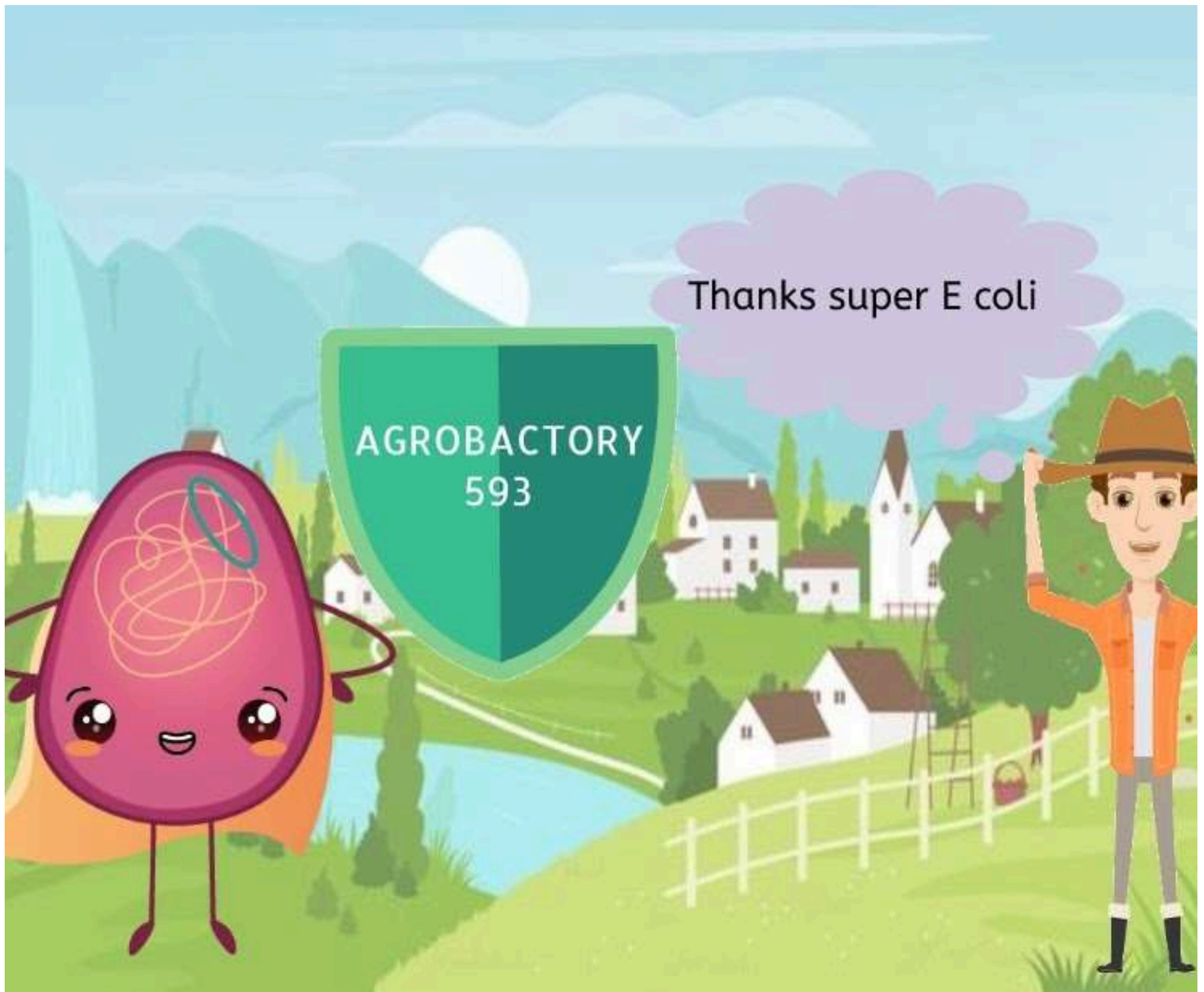
Then E. coli realized that none of her powers were effective, so she decided to create a shield to protect the crops from the tentacles of Foctopus.

- E. coli: Eureka! I'm going to build a super shield, to protect all the crops. For several days, E coli and a group of super scientists worked tirelessly in his laboratory. The scientists trained E coli day and night to make it stronger. In addition, they designed a very special shield to protect the crops from the tentacles of Foctopus.



E coli, very excited to finish her training and help the people with the shield, came up with a new plan to defeat Foctopus. At night, while the fungus slept, little E coli placed her super shield on all the crops and the next morning when the fungus tried to touch crops it was unable to do so.

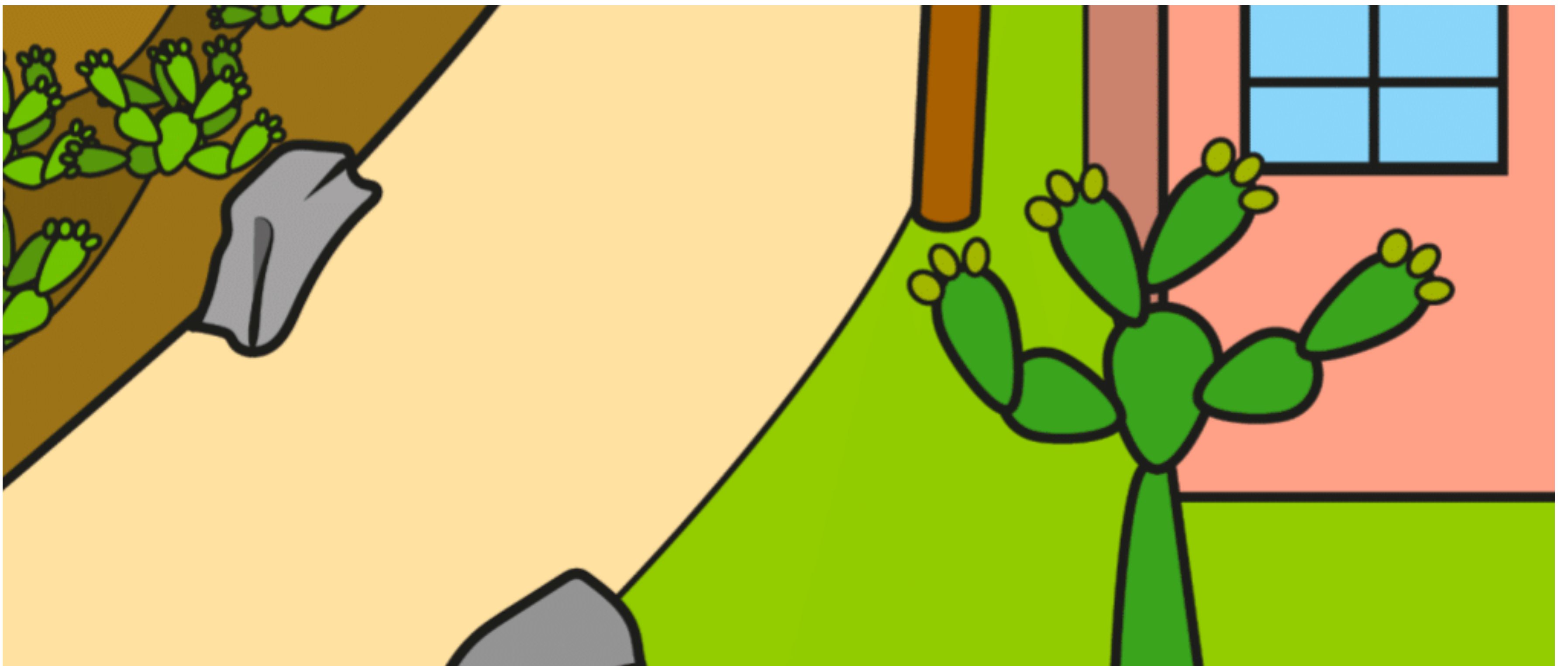
- Foctopus: Why can't I touch the crops?**
- E coli: I have this super shield to protect the crops. As long as the shield is protecting the crops you won't be able to touch them. Only the townspeople will be able to do that.**



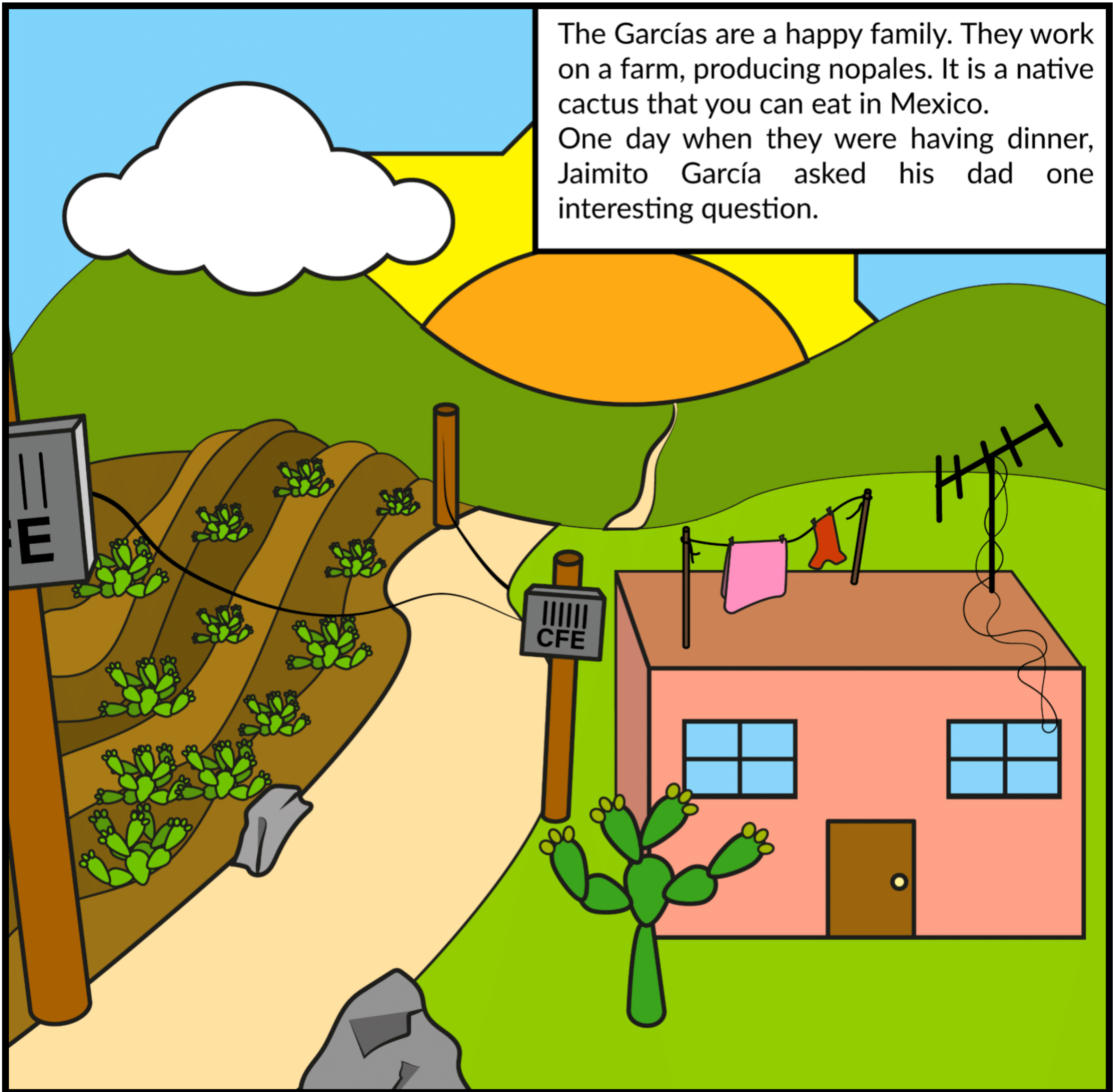
Foctopus very angry about his defeat decided to leave the village. All the townspeople were very happy because the evil mushroom was gone.



Picudos by: UAM

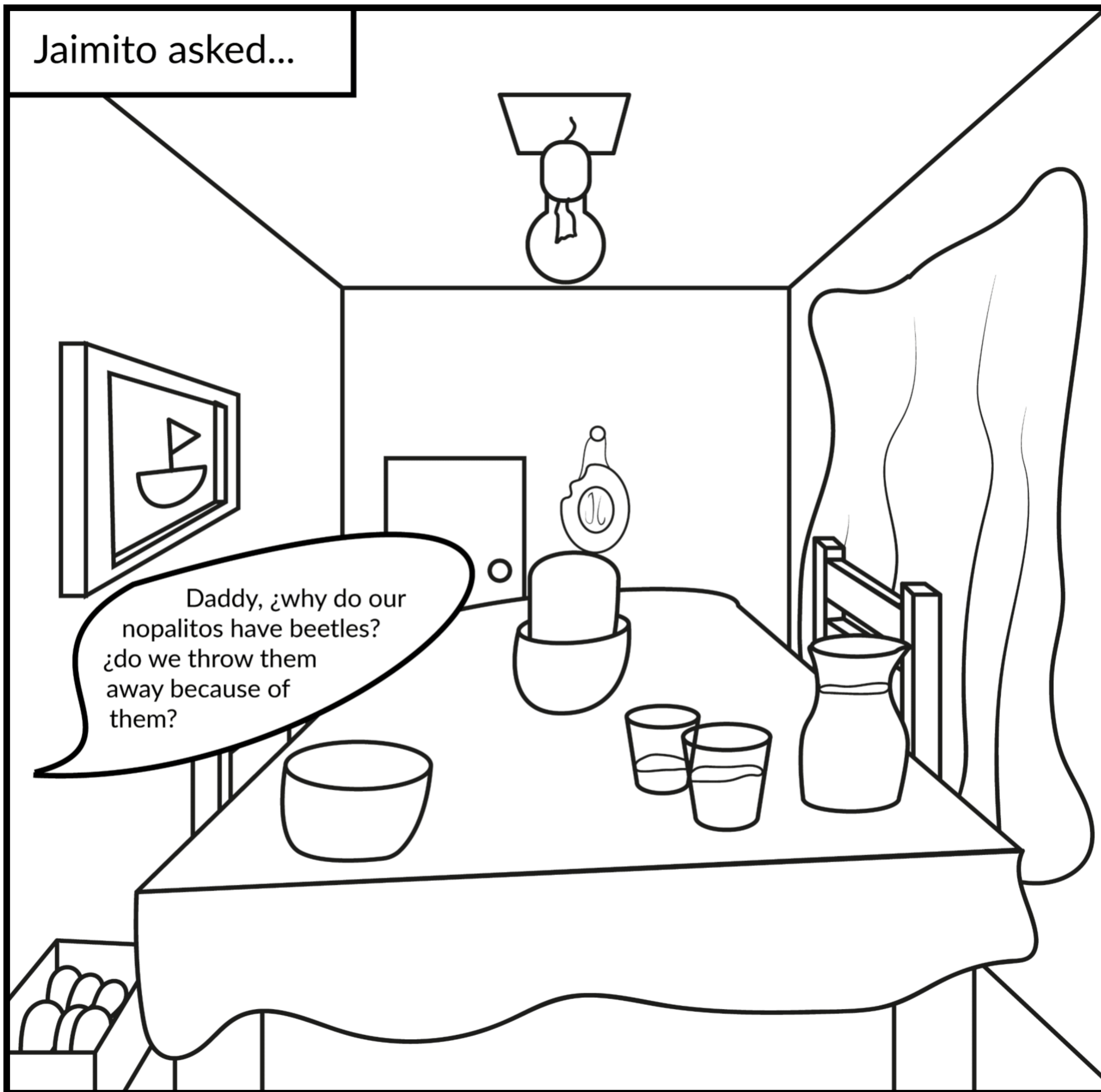


The Garcías are a happy family. They work on a farm, producing nopales. It is a native cactus that you can eat in Mexico. One day when they were having dinner, Jaimito García asked his dad one interesting question.

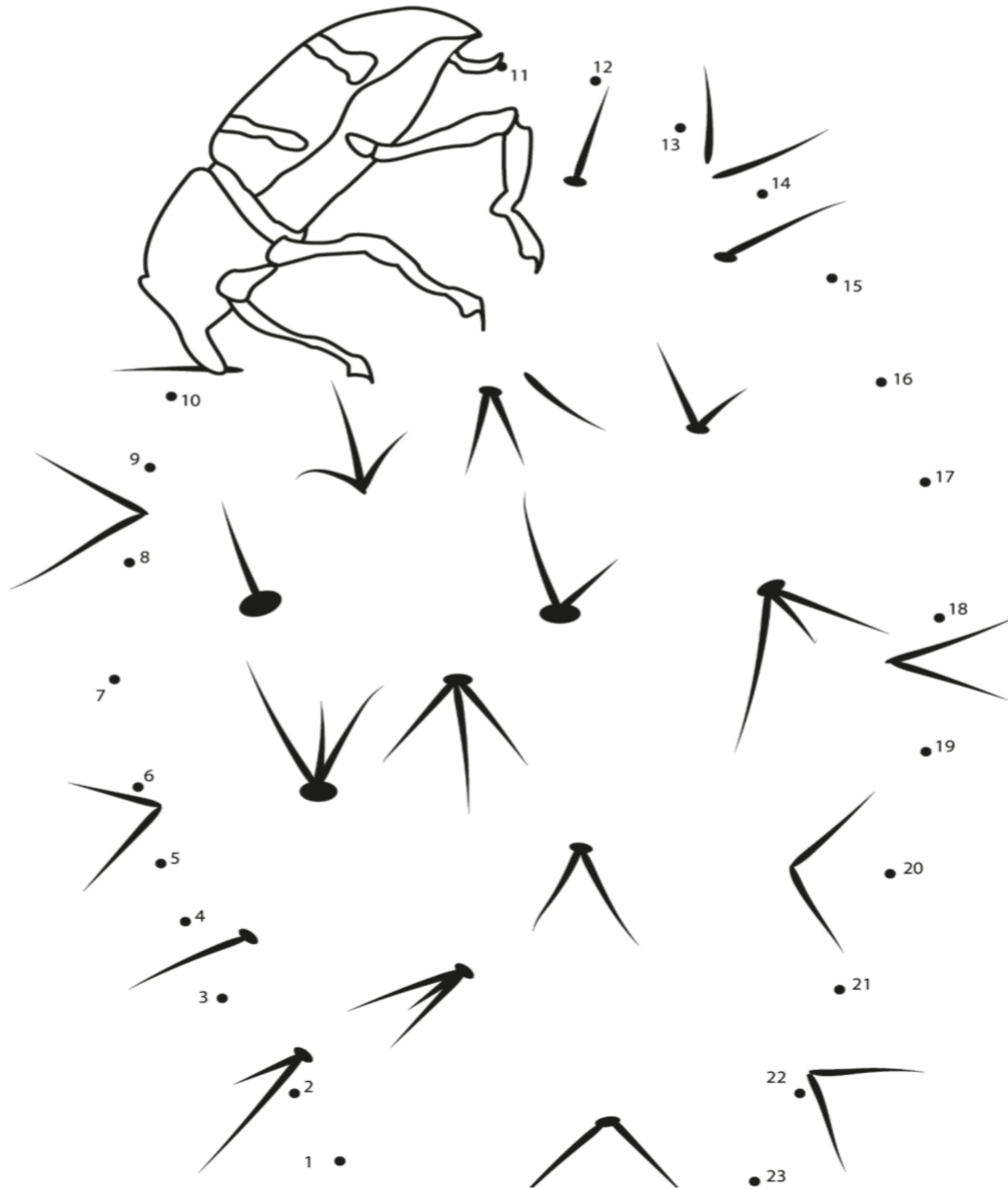


Jaimito asked...

Daddy, ¿why do our
nopalitos have beetles?
¿do we throw them
away because of
them?



Connect the dots to reveal what Jaimito saw
in the nopalitos



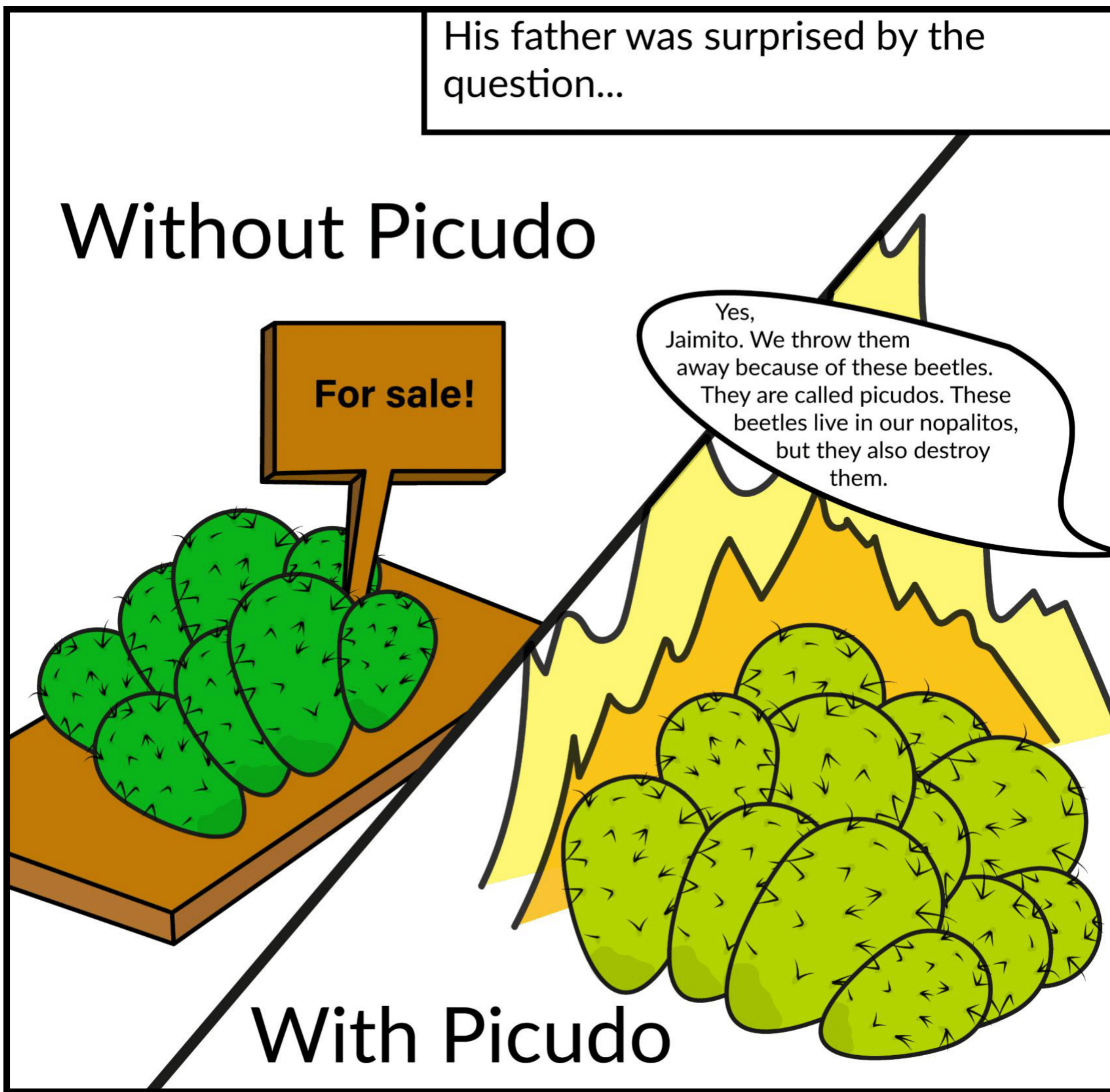
His father was surprised by the question...

Without Picudo

For sale!

Yes, Jaimito. We throw them away because of these beetles. They are called picudos. These beetles live in our nopalitos, but they also destroy them.

With Picudo

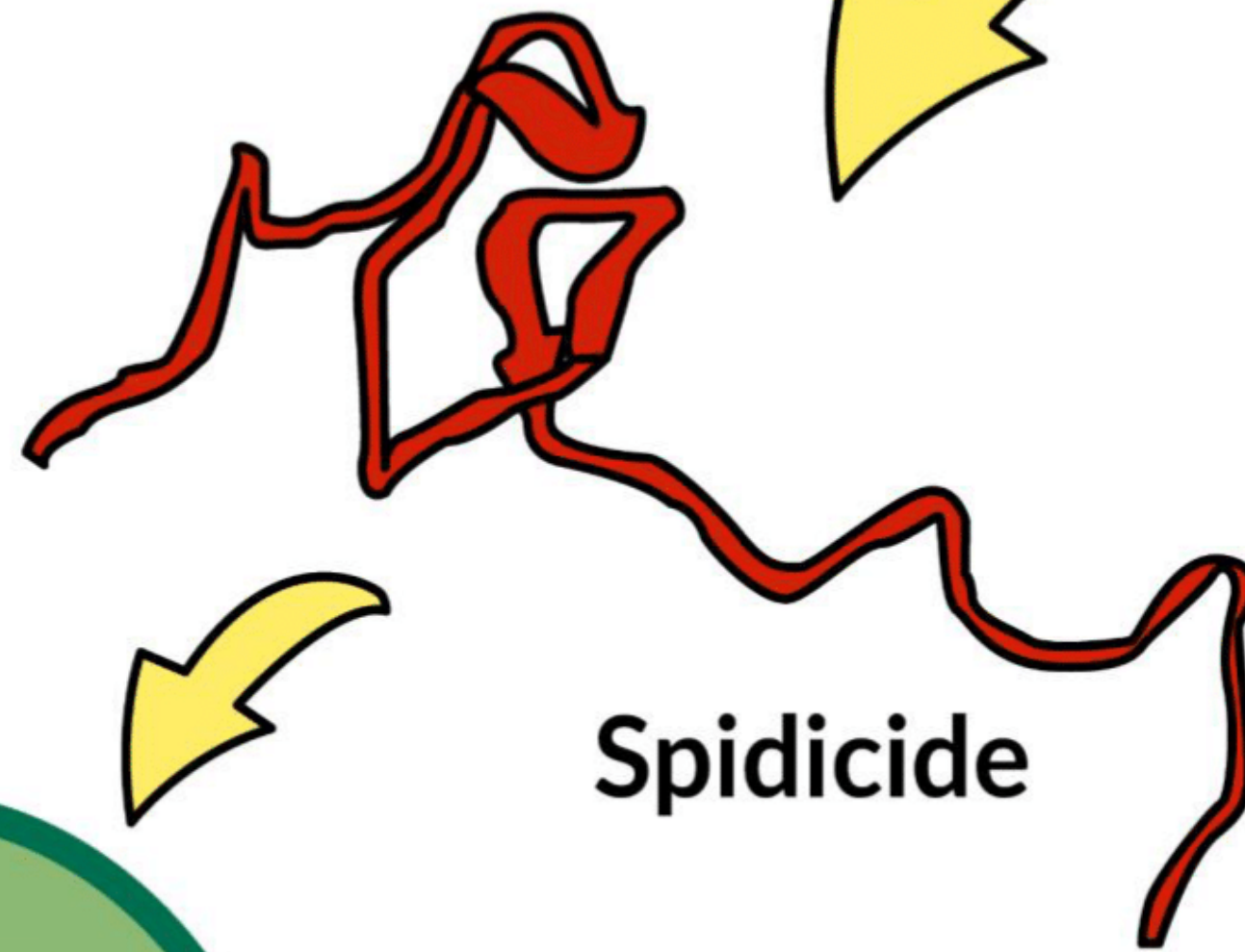
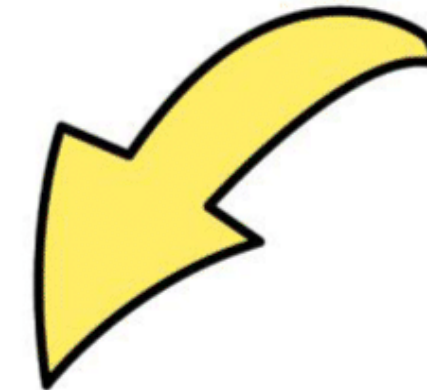
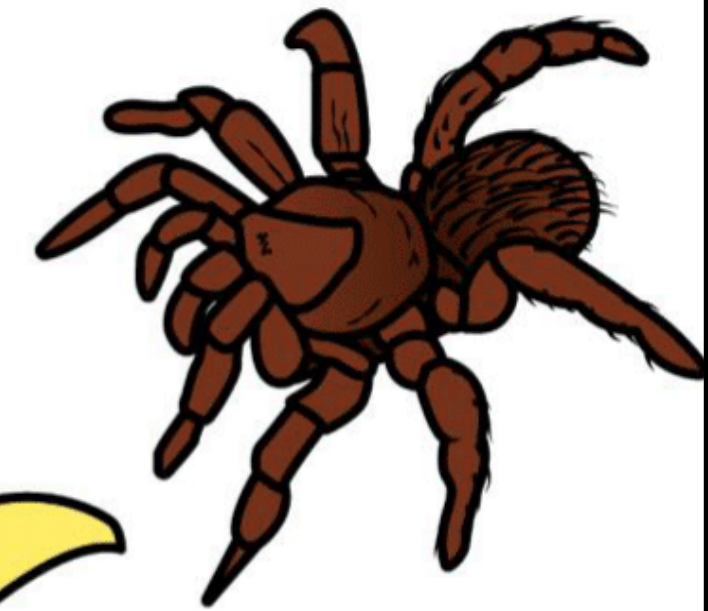


After a moment, he answered

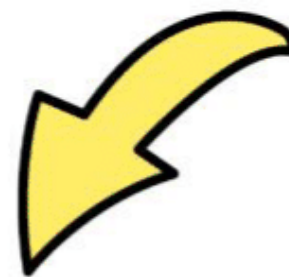
Fortunately, one group of university students are working to help us. They are iGEM UAM, and they told us that they are creating a natural pesticide named Spidicide.



To create this pesticide, they need the help of two living beings. The first one is a spider and the second one is a really small fungus. The spider will teach the fungus how to create a substance that will save nopalitos from picudos.



Spidicide



¡Hi!
I'm Pichia Pastoris

Help the plaguicide Spidicide to reach picudos.





MP Saves the Day!

UMaryland iGEM 2021

Hi everyone! My name is
Micro1unatus Phosphovorus, but you
can just call me MP!



My friends that live in the water need our help!
Their home is getting too polluted - that means
too dirty - to live in.

The water has too much phosphorus.



Hey, look there's my friend Testudo!

"Testudo! How can I help make your home clean?" MP asked.

"Hmm. I know how we can help! We all have something called genes. Let's see if we can find the gene that's used to collect Phosphorus."

"I think I have that gene!" MP exclaimed



Testudo explains that the gene to collect phosphorus will help collect pollution out of the water. He tells MP that animals in the water can't live there when there is too much phosphorus and creating too much green goo (algae).



MP takes his beads to the water and uses them to collect the phosphorus.

Now, the water is clean!



MP is about to go home with the beads. He runs into a farmer. The farmer is upset because her plants aren't growing well.

"What's wrong Ms. Farmer?" MP asked.

"My plants aren't growing because they aren't getting enough phosphorus. They need more fertilizer," the farmer explained.



“Phosphorus? I happen to have some extra!” MP exclaimed. MP remembers that he also has the gene for Phosphorus release. This lets him give the farmer the phosphorus he collected from his beads.



Now our friends in the water are happy, and our friends on land are happy. That makes me happy!



The End.

