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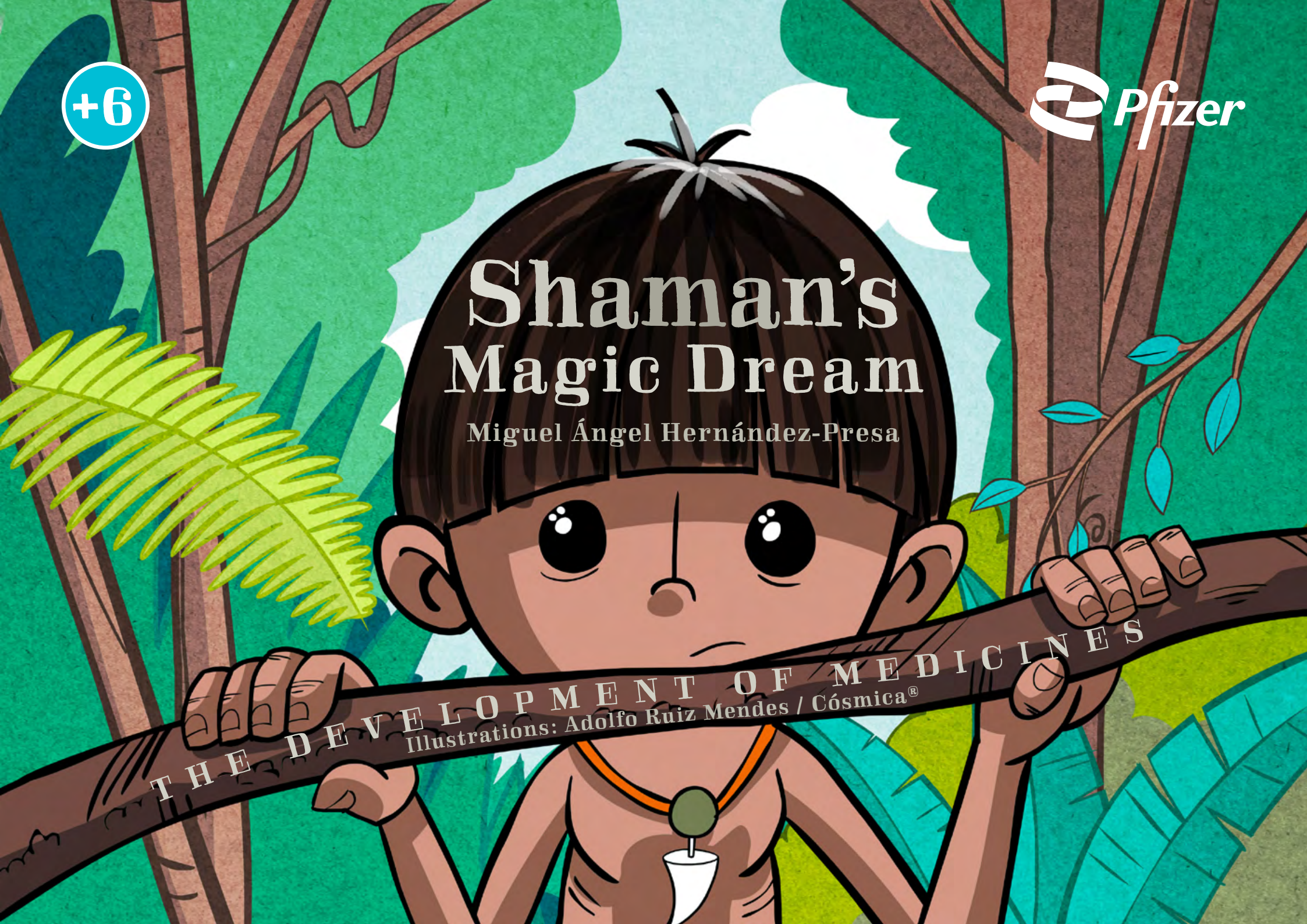


Shaman's Magic Dream

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THE DEVELOPMENT OF MEDICINES

Illustrations: Adolfo Ruiz Mendes / Cósmica®





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Do children know the origin of the medicines we take when we are ill? How do we know that they can cure us? Who made it possible for them to be kept in the medicine cabinets in our homes? Shaman, the boy wizard, and his grandfather, the Great Witch Doctor, will answer these questions through their story, an adventure in the rainforest that is full of fabulous plants, new friends and time travel.

Committed to health education, we at Pfizer have selected the format of the short story as an invaluable teaching tool to explain to the young about the lengthy, complicated scientific process that enables medicines to cure some diseases and relieve their symptoms.

We hope that this educational story provides its readers- children, parents and relatives- with a space for learning and enjoyment. We aim to continue working to bring our daily mission closer to everyone. This is to make this a healthier world, one that is more aware of the value of health.

Shaman's Magic Dream

THE DEVELOPMENT
OF MEDICINES



Our story begins in the deepest part of the Amazon rainforest, on the banks of the Javari River. It's a long way from the hustle and bustle of the big cities in which we live.

It is there that, ten years earlier, **Shaman**, the boy wizard, was born. That is what he was called by the members of his tribe, the Matses.

His grandfather, the **Great Witch Doctor** of the tribe, had transmitted to Shaman his love for Mother Earth and the importance of maintaining a balance between Man, animals and plants.

Plants were precisely what aroused Shaman's curiosity most. His grandfather taught him all about them, how to talk to them and how to draw from them their most precious secrets, including the curing of diseases.



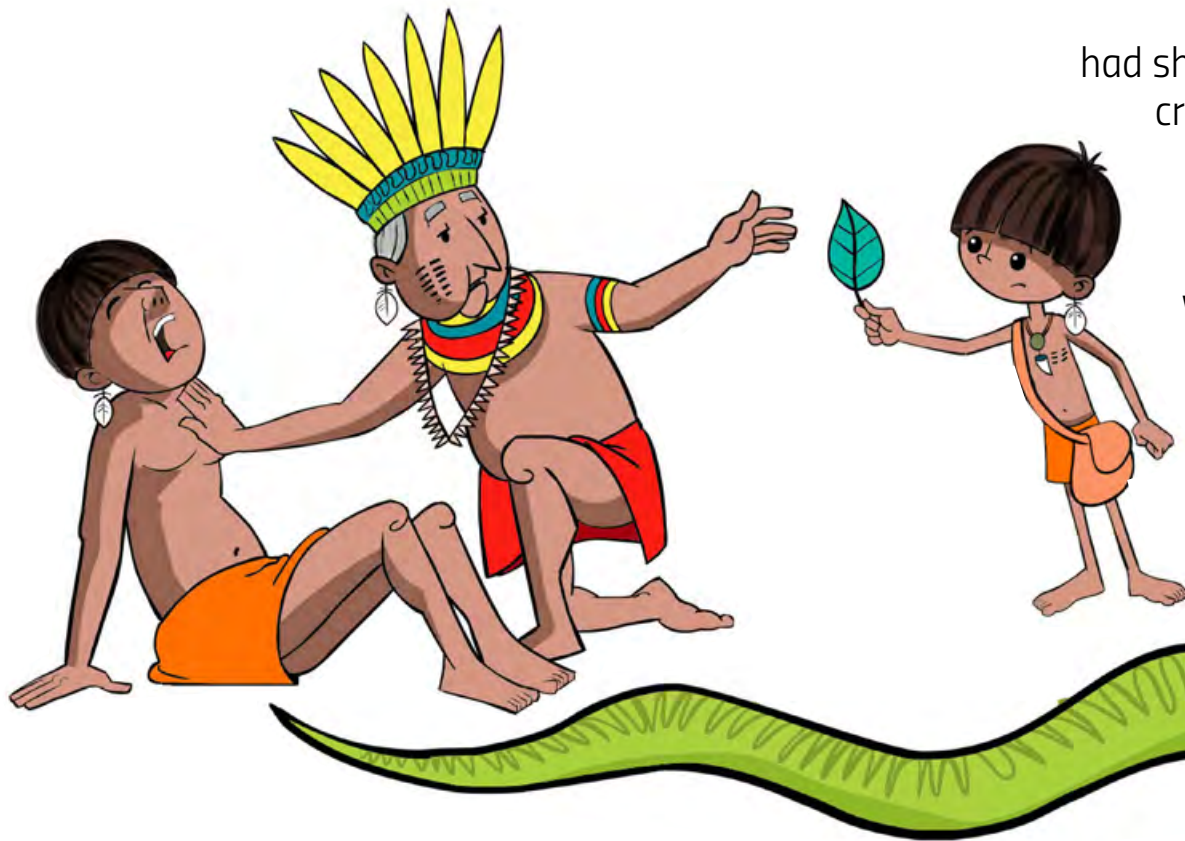
Discovering the secrets of plants

Shaman ran tirelessly all around the rainforest in search of the plants that his grandfather had taught him could be used to prepare remedies against diseases.


One of his favourites was **Guarana**.

His grandfather had shown him that by crushing its seeds until it became a dark powder and then mixing this with water he could make a delicious, refreshing drink that gave him a lot of energy.

He had seen how his grandfather cured one of the tribe's hunters who had been bitten by a snake. He had used the leaves of a plant called **Guaco** or **Snake Grass**.







Shaman listened carefully to his grandfather about how important it was to look after the rainforest. There were plants there that could cure many diseases; the difficult thing was to find them. His grandfather and his ancestors knew how to search and distinguish which plants were helpful and which plants were dangerous but there were still many other ones about which they knew nothing. The rainforest was a great pharmacy to be discovered.

The importance of preserving the rainforests

The arrival of scientists

One morning, Shaman rose at dawn with his grandfather. The Great Witch Doctor wanted to teach him something. They walked up to the Great Javari River. It was through this river that he communicated with the outside world.

-Grandfather, what are we doing here?


-Shaman, today I want you to meet two foreigners who I met some time ago and who sometimes come here from a long way away. They are **scientists**.

-Scientists? What's that, grandfather?

-Shaman asked.

-Scientists are people like you and me. They ask why things happen, -the old Witch Doctor replied.

When they first arrived in our village they asked me about the plants and the poisons of some animals in the rainforest. Those things that only you and I know about, -he laughed with Shaman-. They are very nice people.

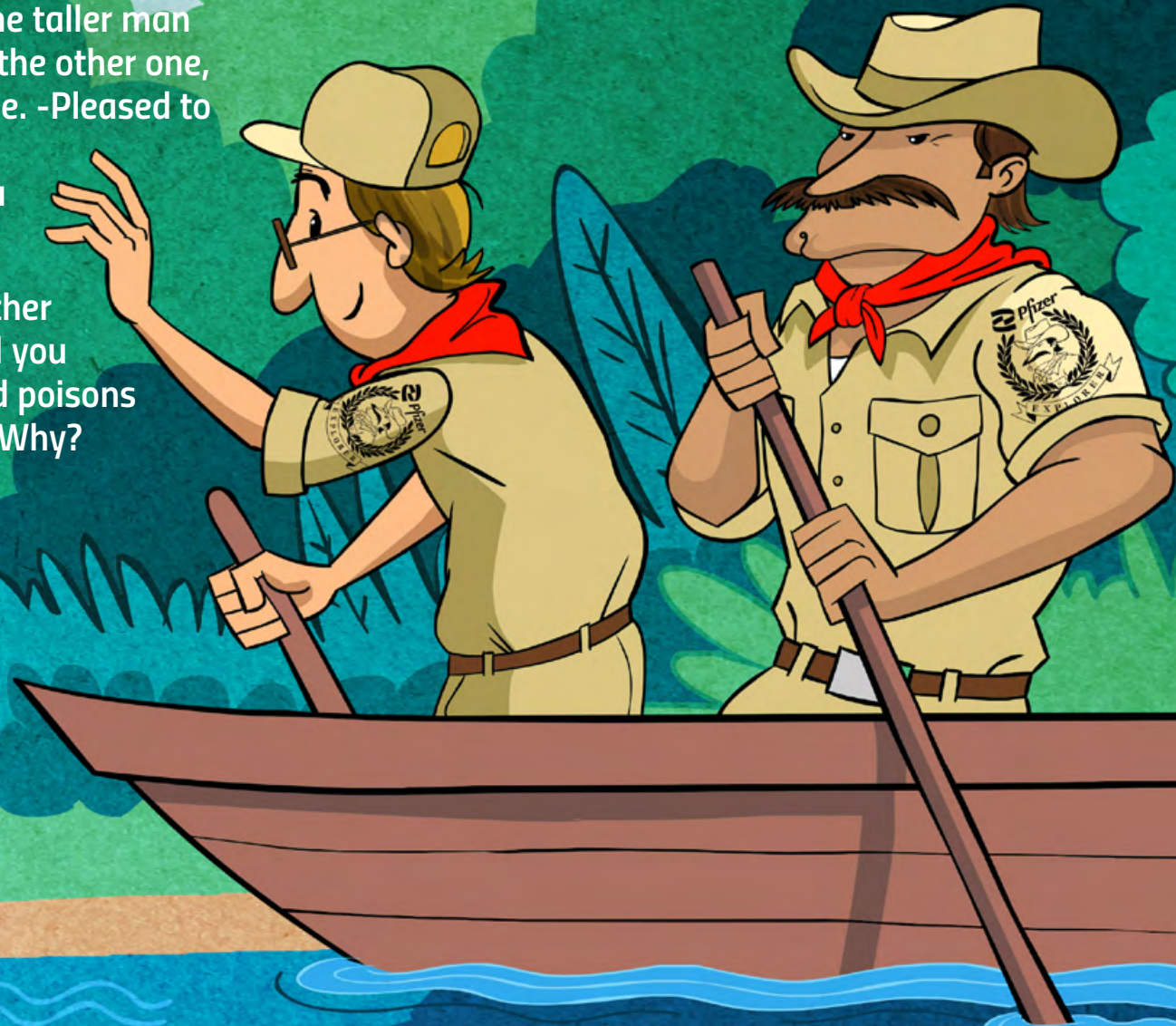


Before long, they saw in the distance a canoe being paddled skilfully by two men. When the men reached the bank they got out and greeted the Great Witch Doctor happily: -How are you, my old friend? I see you've brought company -one said.

-This is my grandson, Shaman. He is learning the secrets of the rainforest.

-Hello, Shaman. I'm Lip Sullivan -the taller man said. -And I'm Tristán Vallés -said the other one, stroking his resplendent moustache. -Pleased to meet you. The last time we came your grandfather told us about you and how keen you are to learn.

-Hello, Shaman said-, my grandfather told me that you are scientists and you are interested in finding plants and poisons of some animals in the rainforest. Why?





-That's a good question -Lip said-. We want to discover **medicines** that help to cure diseases.

-What are medicines? -Shaman asked with his eyes open very wide.

-Medicines are substances that are used to cure or relieve the pain produced by a disease -Tristán replied.

We work for **Pfizer**, which is a place where medicines are made. Many of them are obtained from substances that are found, for example, in plants.

-Nature often gives us ideas about making them- Lip added.

-That's really interesting!- Shaman said. I really like what your shirt says: "**Pfizer Explorer**".

-We are jungle explorers, just like you, Shaman! -they all laughed.

Lip said to the Great Witch Doctor:

- My friend, we need your help to find the plant you told us about. The one that you used to reduce the fever of a hunter from your tribe who had been bitten by a tarantula. We would like to study it.



The cave of the Great Waterfall

That plant is very difficult to find -the Witch Doctor said. You can find it in the cave of the Great Waterfall. I'm too old to get there, but Shaman will take you.

The cave was in a place in the rainforest that was very difficult to find. Very few people knew it. After a four-hour walk, they reached the Great Waterfall. Shaman showed Lip and Tristán an almost hidden path that skirted the majestic waterfall and led to the cave:

-This is the plant that my grandfather told you about.

The scientists took several leaves from the plant and put them carefully into their backpack.



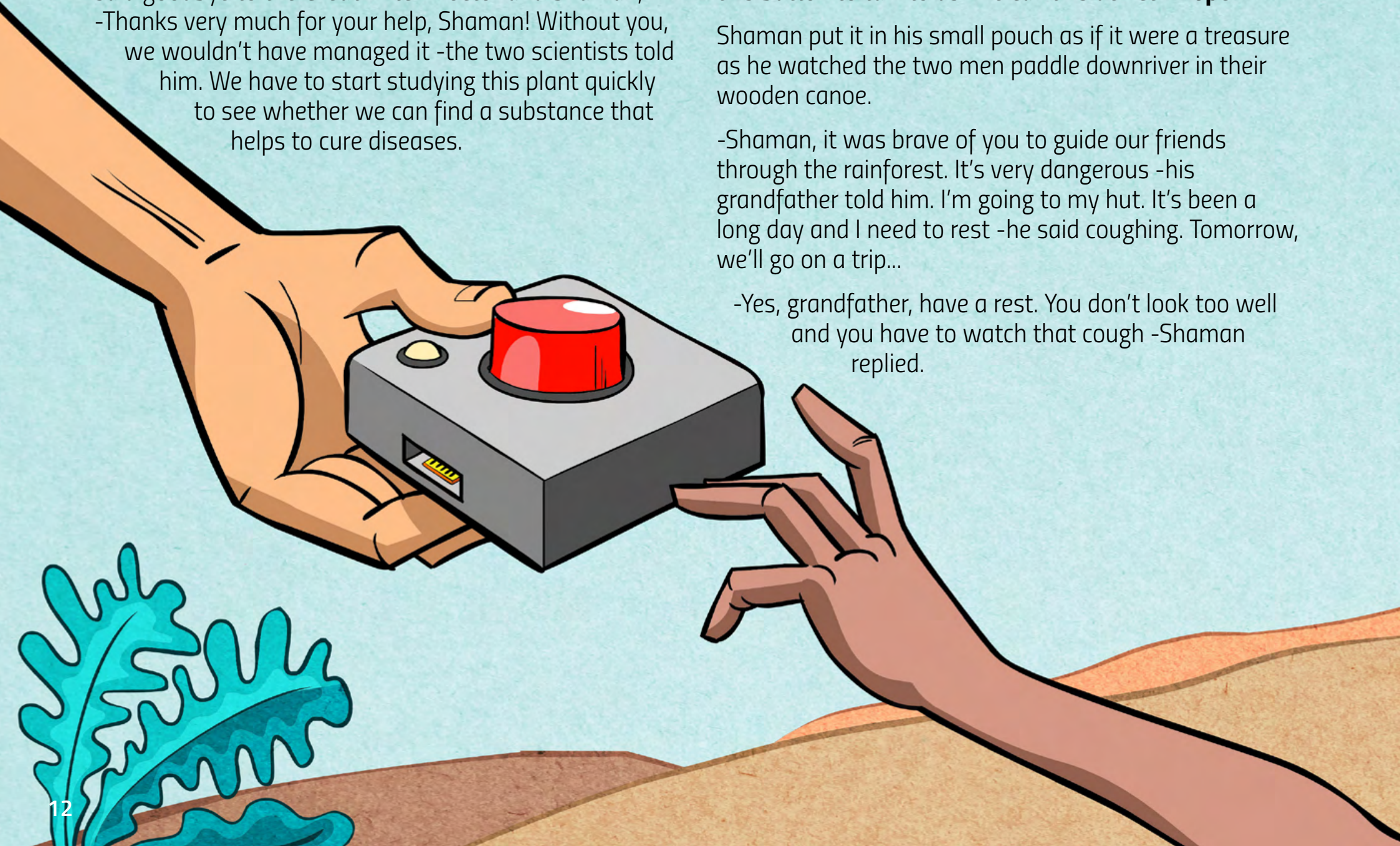
When they returned to the village, Lip and Tristán said goodbye to the Great Witch Doctor and Shaman, -Thanks very much for your help, Shaman! Without you, we wouldn't have managed it -the two scientists told him. We have to start studying this plant quickly to see whether we can find a substance that helps to cure diseases.

Any time you need our help, use this device and push this button to talk to us. We call this device **"Hope"**.

Shaman put it in his small pouch as if it were a treasure as he watched the two men paddle downriver in their wooden canoe.

-Shaman, it was brave of you to guide our friends through the rainforest. It's very dangerous -his grandfather told him. I'm going to my hut. It's been a long day and I need to rest -he said coughing. Tomorrow, we'll go on a trip...

-Yes, grandfather, have a rest. You don't look too well and you have to watch that cough -Shaman replied.



A magic dream

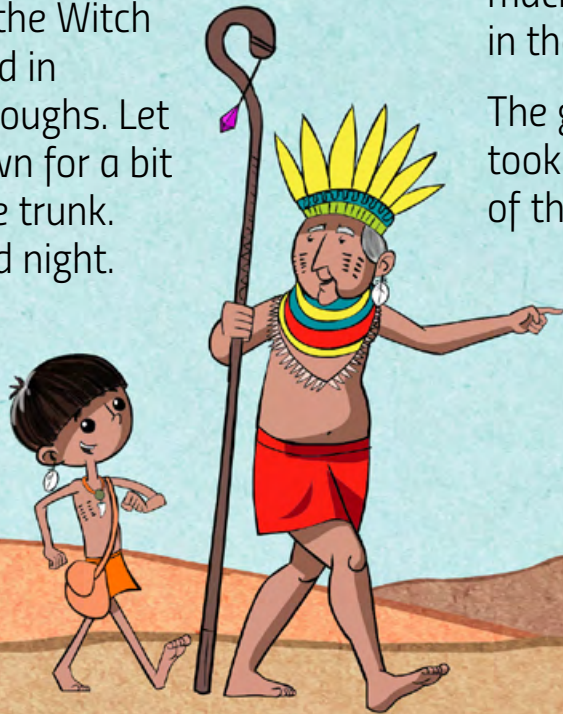
The next morning, Shaman showed up very early at his grandfather's hut. -Grandfather, grandfather, wake up. Where are we going? -he asked in excitement.

You're up really early, Shaman -the Witch Doctor said in between coughs. Let me sit down for a bit on the tree trunk. I had a bad night.

Your grandfather is getting old -he told him, coughing again-. Right, Shaman, as I told you, today we're going on a big trip.

How, grandfather? -Shaman replied-. We don't have those machines that they call planes in the city.

The grandfather smiled and took him to the deepest part of the rainforest...







They walked and walked until they reached a small clearing where there was a hut that in the rainforest they call a **Maloca**.

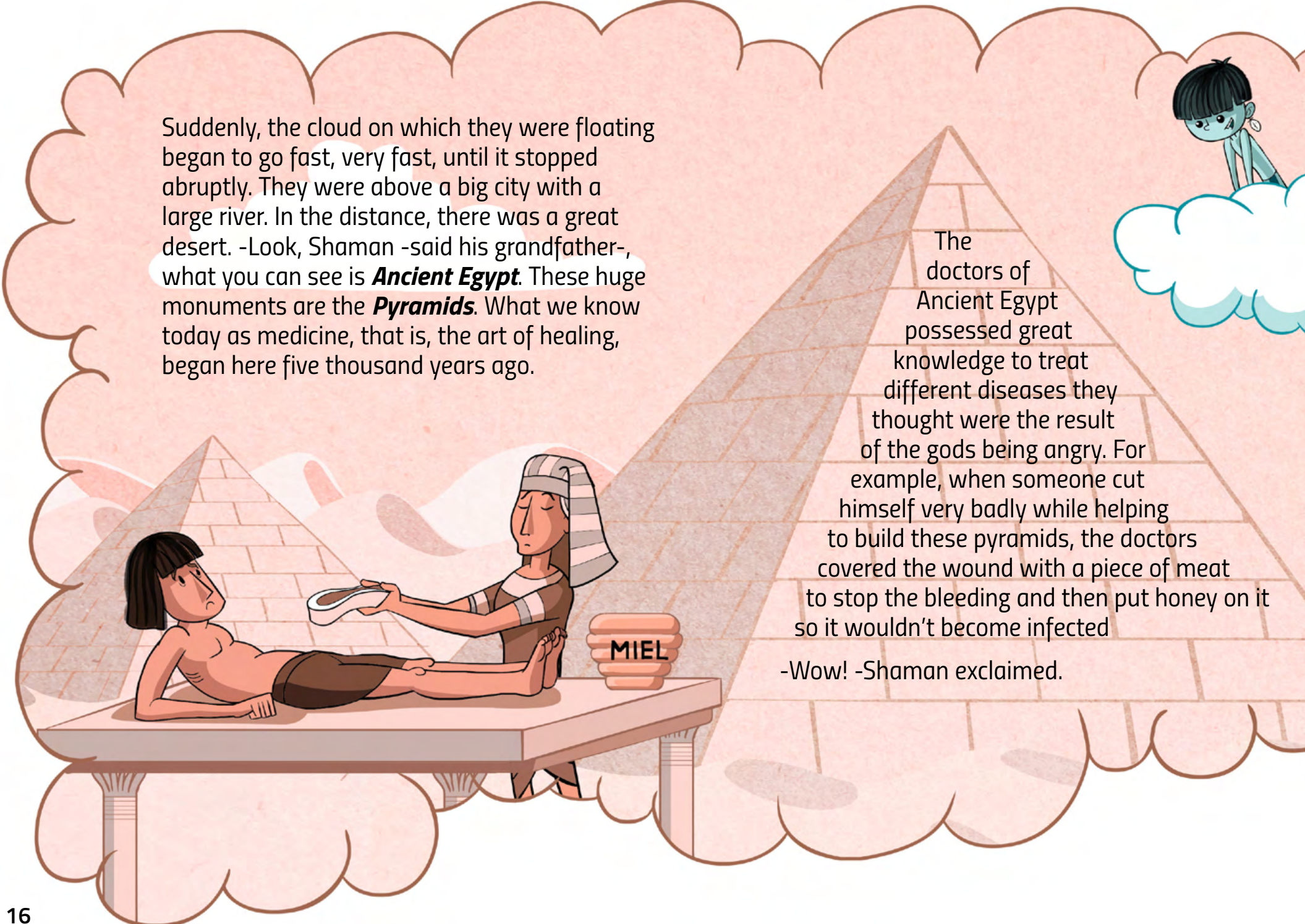
When he entered the maloca, Shaman saw that in the centre there was a large drum in the shape of a turtle shell.

They sat on the floor and the grandfather told Shaman to close his eyes and then began to play the drum. It was a very pleasant sound that rumbled and reminded him of the sounds of the rainforest. Shaman felt very comfortable and was slowly falling asleep ...

Shaman, Shaman, Shaman... he heard his name in his sleep but didn't know where it was coming from. Suddenly, he was flying above the rainforest holding his grandfather's hand, above a cloud.

-Relax -said his grandfather-, you're dreaming, but it is a very special dream. We're going on a voyage, but a voyage through time so you can see how curious men, those they call scientists, have been discovering medicines through history until they arrived at what are now called **drugs**.

Suddenly, the cloud on which they were floating began to go fast, very fast, until it stopped abruptly. They were above a big city with a large river. In the distance, there was a great desert. -Look, Shaman -said his grandfather-, what you can see is **Ancient Egypt**. These huge monuments are the **Pyramids**. What we know today as medicine, that is, the art of healing, began here five thousand years ago.



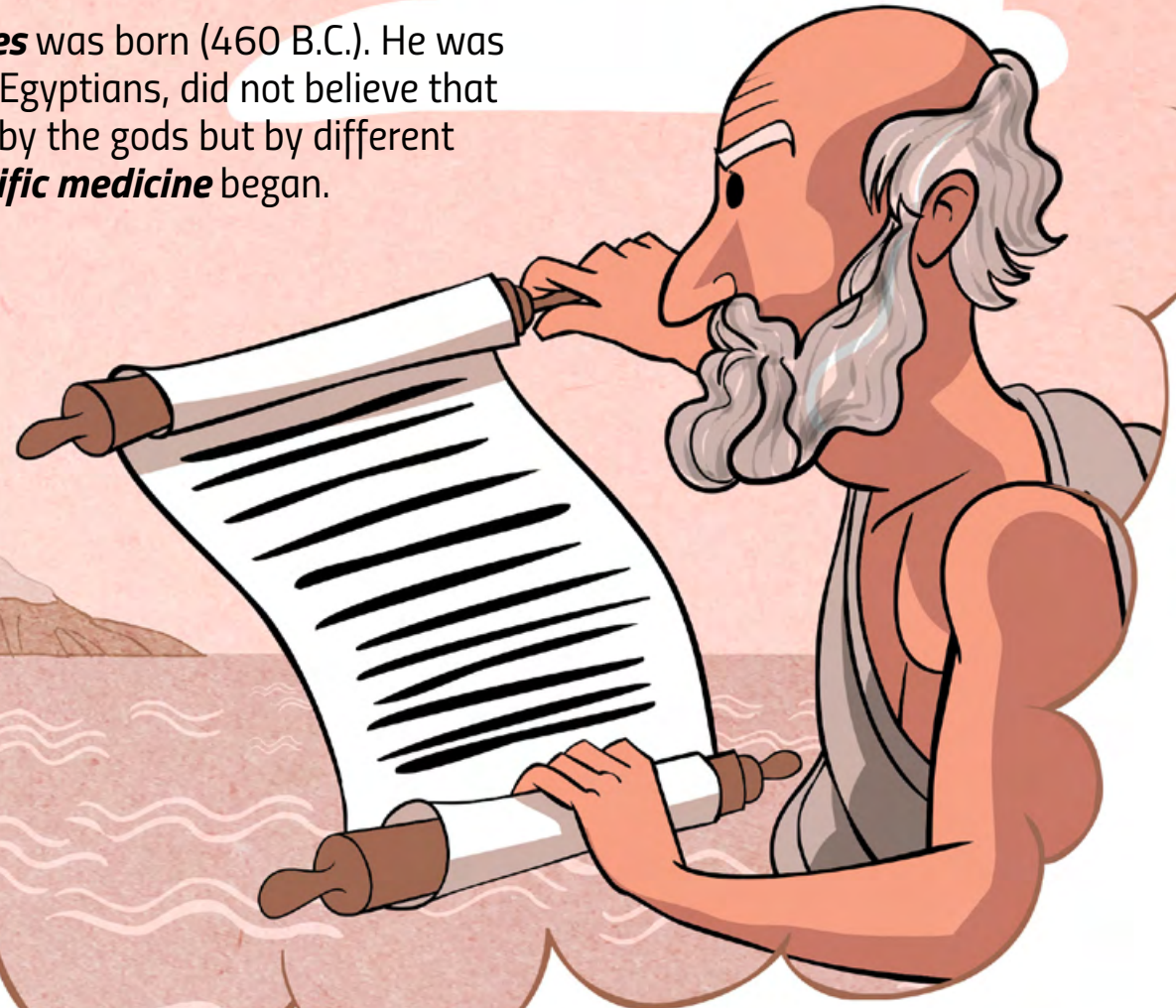
The doctors of Ancient Egypt possessed great knowledge to treat different diseases they thought were the result of the gods being angry. For example, when someone cut himself very badly while helping to build these pyramids, the doctors covered the wound with a piece of meat to stop the bleeding and then put honey on it so it wouldn't become infected

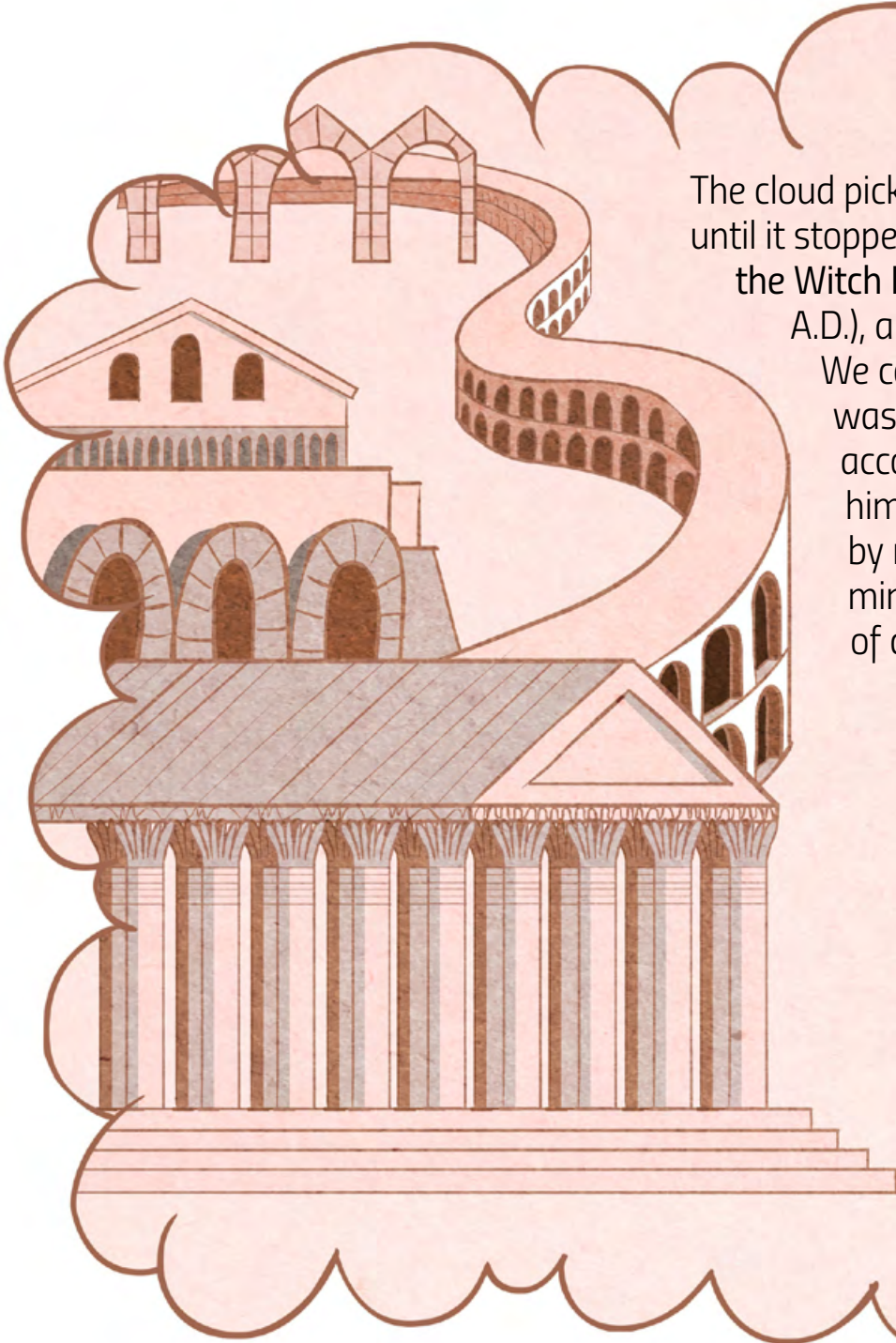
-Wow! -Shaman exclaimed.



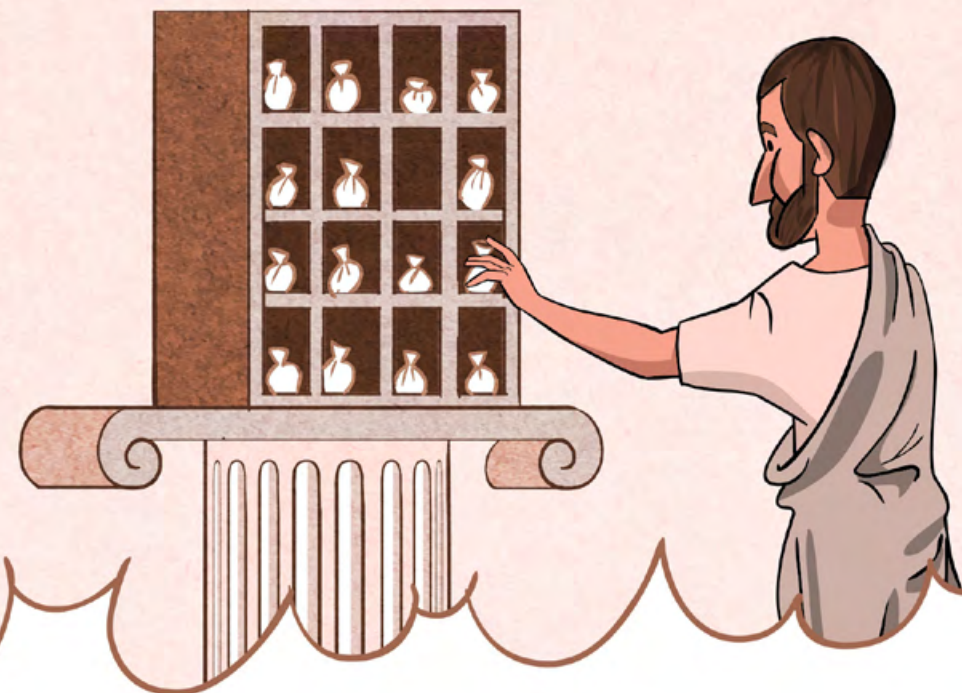
The cloud moved quickly and took them to ***the island of Cos in Greece.***

This is where ***Hippocrates*** was born (460 B.C.). He was a doctor who, unlike the Egyptians, did not believe that diseases were produced by the gods but by different causes. With him, ***scientific medicine*** began.





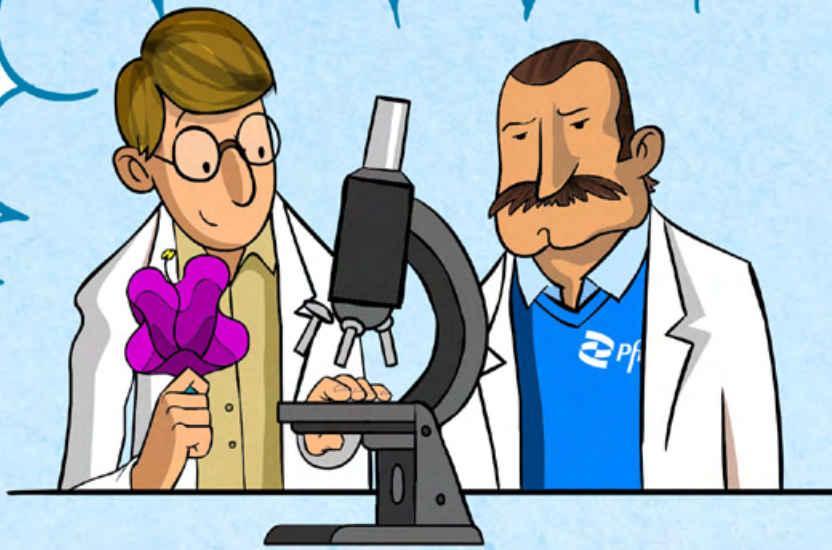
The cloud picked up speed again and crossed the sea until it stopped at a big city. We're in **Ancient Rome** -said the Witch Doctor-. The man you can see is **Galen** (129 A.D.), a very famous Greek doctor who worked in Rome. We could say that he was the **first pharmacist**, as he was the first to make a **classification of medicines** according to the effect they produced. This enabled him to develop the science of preparing medicines by mixing different components of plant, animal or mineral origin. He prepared the **first pills** with the help of clay.





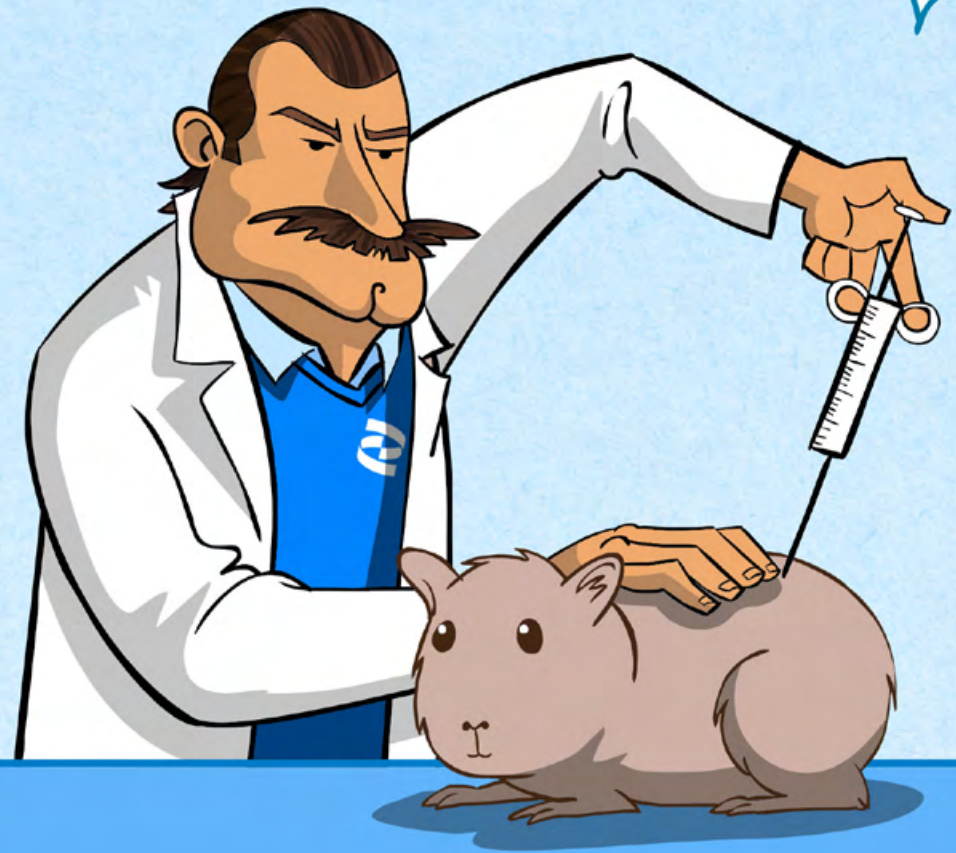
Shaman was excited and in the blink of an eye the cloud transported them to **ancient Persia**, what is now **Iran**. This is where **Avicenna** was born (980 A.D.) -the Witch Doctor said. -He was a famous Arab doctor. He wrote one of the most important medical books (**Canon of Medicine**), in which he explained how many diseases were produced, how to treat them and which drugs could be used. To give drugs to patients he used paper, tablets, syrups, ointments, oils and many more things.



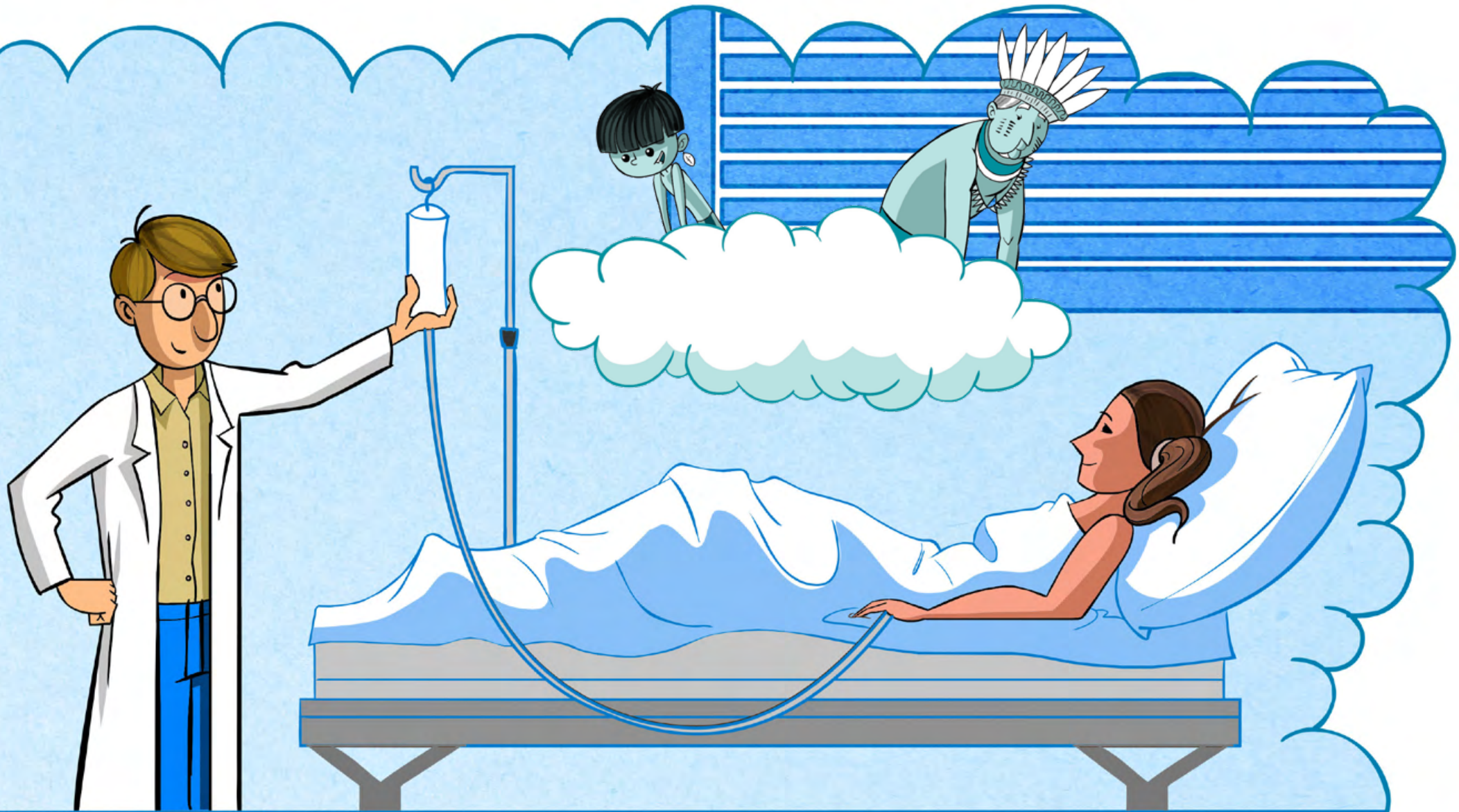


Again the cloud moved, but this time much faster. -Shaman -said the Witch Doctor-, now let's travel to our time, to **2016**, and you will see how **modern medicines** are manufactured in places called **biomedical companies**.

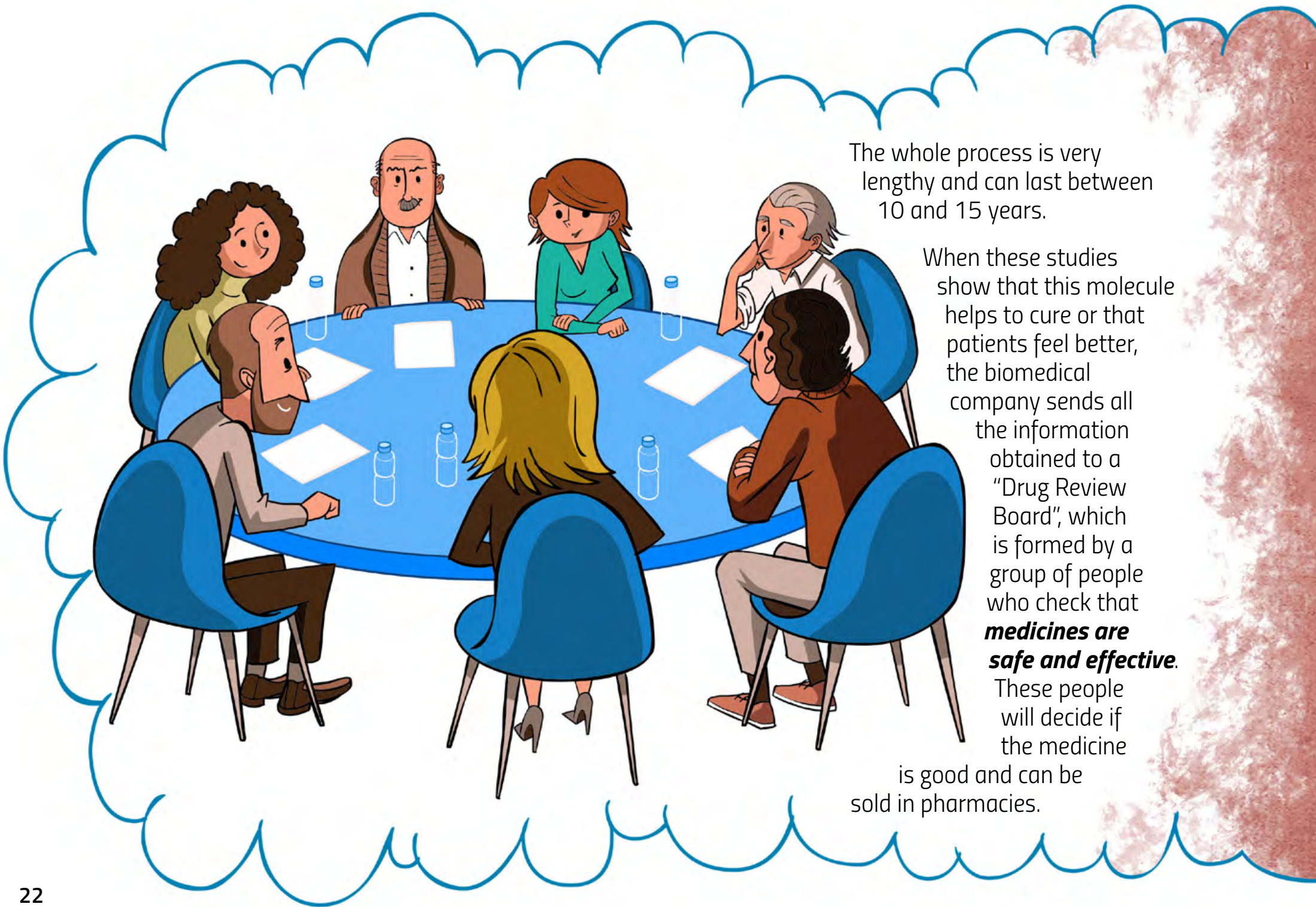
First, you try to search a **molecule** that can be beneficial for treating a disease. This is what our friends Lip and Tristán are doing. This is the **research and molecules selection** phase.



The next phase consists of testing the molecule on animals to check that it is not harmful (**the pre-clinical phase**).



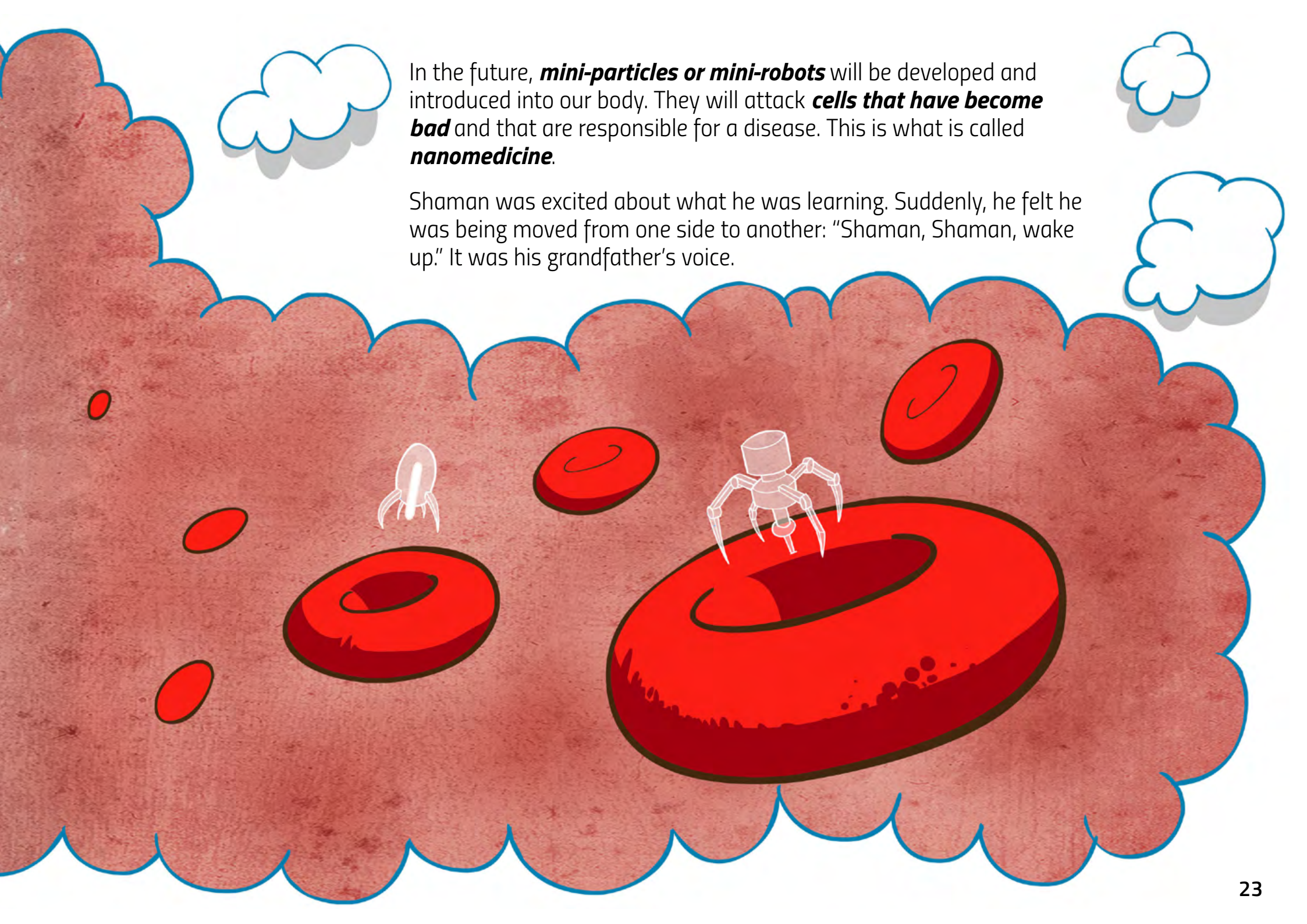
Then, the studies begin, first on healthy people, and then on people who have the disease we wish to cure. This is what is called the **clinical phase**, and the studies conducted are called **clinical trials**.



The whole process is very lengthy and can last between 10 and 15 years.

When these studies show that this molecule helps to cure or that patients feel better, the biomedical company sends all the information obtained to a "Drug Review Board", which is formed by a group of people who check that **medicines are safe and effective**. These people will decide if the medicine

is good and can be sold in pharmacies.



In the future, **mini-particles or mini-robots** will be developed and introduced into our body. They will attack **cells that have become bad** and that are responsible for a disease. This is what is called **nanomedicine**.

Shaman was excited about what he was learning. Suddenly, he felt he was being moved from one side to another: "Shaman, Shaman, wake up." It was his grandfather's voice.

Shaman awoke from the wonderful dream he was having. At that moment, he realized that something was wrong. He saw his grandfather lying on the ground next to the big drum.

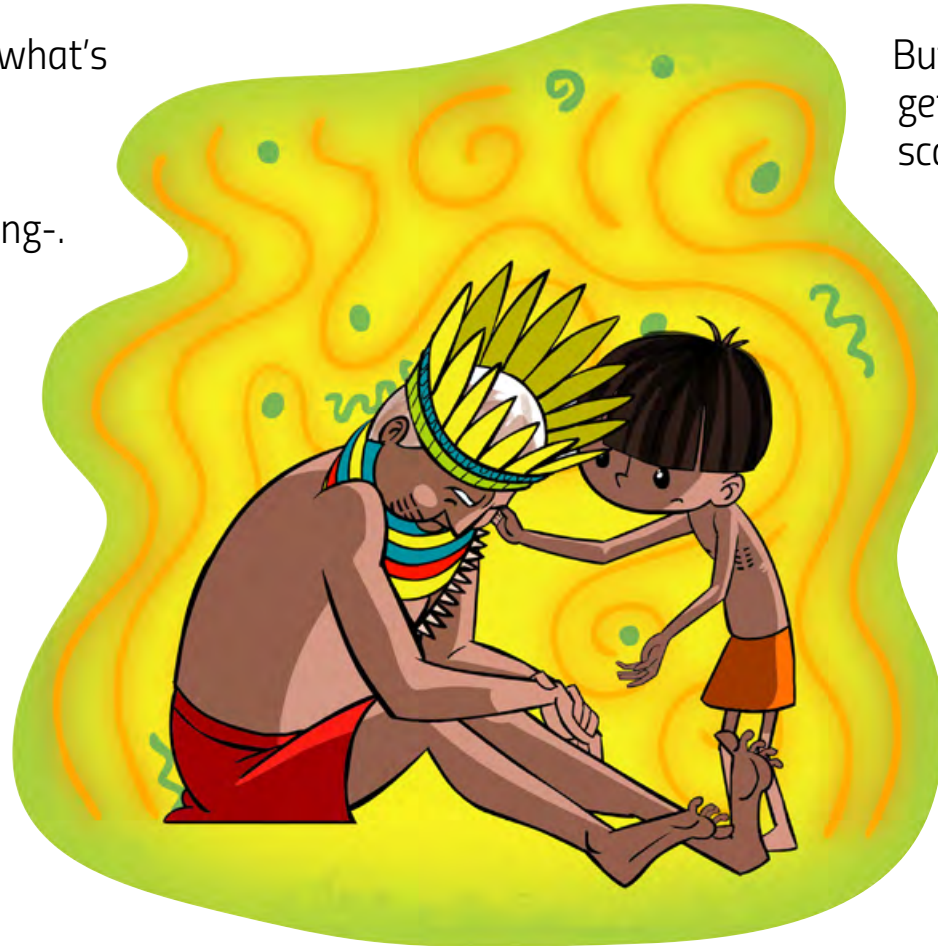
-Grandfather -he shouted-, what's the matter?

-Shaman, I don't feel well. I can't breathe and I'm shivering-. His grandfather had a high fever and was trembling.

-Grandfather, I'm going for help. I'll be back in a minute.

Shaman ran out of the maloca and headed for the village for help. After a while, the Chief and various members of the tribe arrived at the maloca with Shaman. They lifted the old Witch Doctor up and took him to the village, laying him in his hut. The fever had worsened and he was finding it very hard to breathe.

-Grandfather, you'll get better -said Shaman very anxiously, while he crushed some **Guarana seeds** to mix them with water and give to his grandfather as a drink.

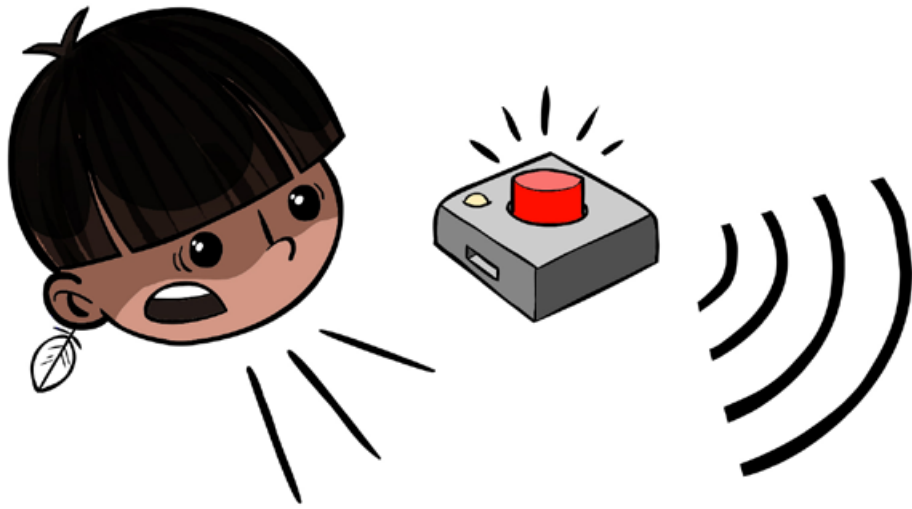


But the old Witch Doctor didn't get better. Shaman was very scared.

The members of the tribe looked to Shaman as if he was the only who could do something to save him.

For the first time, Shaman realised that none of the remedies in the rainforest worked. It was as if he had a **major infection**, just as his grandfather had taught him, but he couldn't control it. He didn't know what to do. He felt desperate and burst into tears.

-Don't worry, Shaman. You can do it -the Chief of his tribe told him, stroking his shoulder-. You are our only **hope**.



Suddenly, Shaman remembered something: **-Hope!** -he shouted-, **That's it!** That was the name of the **device** he had been given by Lip and Tristán for when he needed help.

Shaman quickly pulled out the strange machine from his pouch and **pressed the button** as they had instructed him. A few seconds later, he was surprised to hear Lip's voice coming out of the device: -What's wrong, Shaman? -it asked him.

-Lip, I need your help. My grandfather is ill. He has a very high fever and he can hardly breathe and my remedies from the rainforest are not working.

-Don't worry, Shaman. Can your grandfather speak?

Shaman carried the device to his grandfather:
-Grandfather, it's Lip. He wants to speak to you.
-Hello, Lip -the grandfather mumbled.
-Hello, old friend. What's the matter? Describe the symptoms to me.
-I have a very high fever, I can't breathe properly and my chest is hurting a lot. It's as if my lungs were not working properly -the Witch Doctor said until he lost consciousness.

Shaman took the device and said: -Grandfather has lost consciousness, Lip. The fever is very high.
-Don't worry, Shaman. We're on our way!!
The sound went off suddenly and Shaman dropped the device in fear.



Shaman spent all day and night looking after his grandfather until his tiredness made him drop off to sleep.

When the first rays of the morning sun fell on the rainforest, Shaman was awoken with a start by a loud noise coming from the Great River. Everyone made their way there. Shaman was amazed to observe a large flying machine that he had never seen before resting on the river. It was the machine that his grandfather had told him about: a **seaplane**.

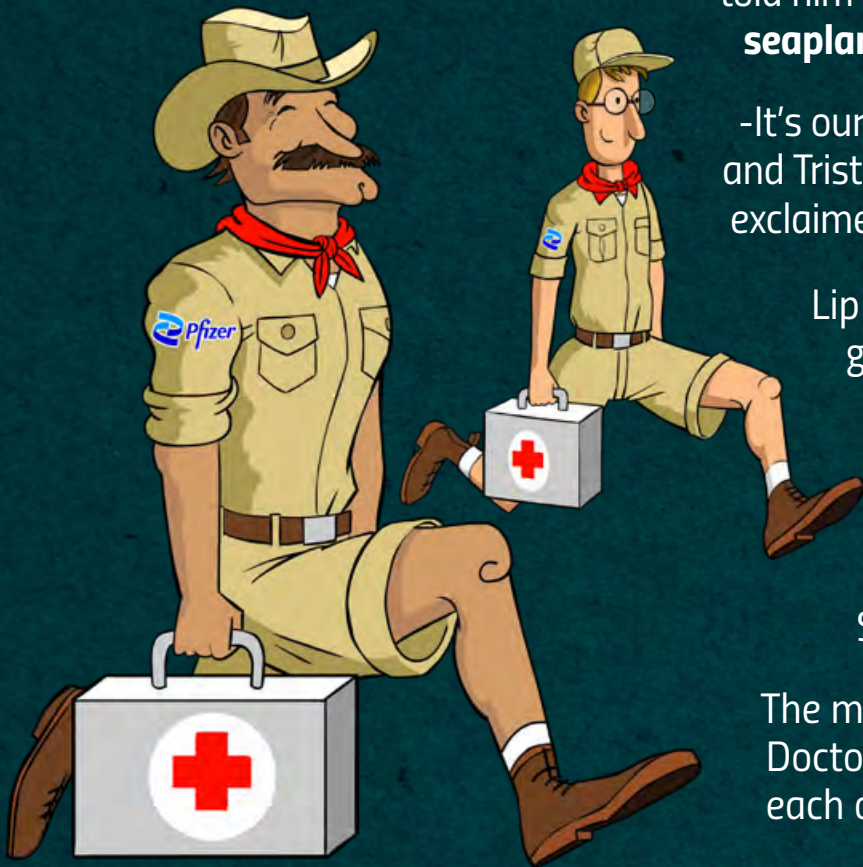
-It's our friends, Lip and Tristán -Shaman exclaimed.

Lip and Tristán got out of the plane carrying several boxes.

They had brought **medicines from the modern world** to cure his grandfather. They hurried to the hut to give him a medicine called **antibiotic**.

Shaman was very happy. **They had arrived in time!**

The medicine began to take effect after a few hours and the old Witch Doctor gradually started to feel better. Shaman, Lip and Tristán hugged each other: -We did it!! -they all exclaimed.





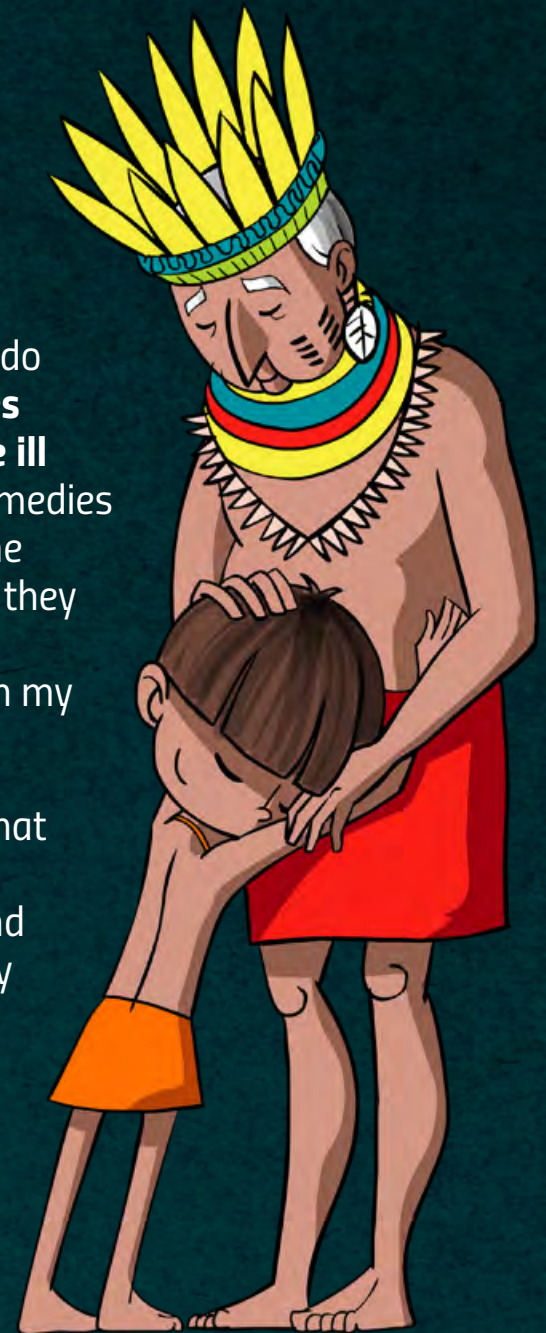
-Shaman, your grandfather has had a lung infection -Tristán told him-. We have realised that it is us, the **men of the modern world**, who bring this disease to the rainforest without realising -he added-. It is a disease that can be very dangerous if it is not treated in time.

The next day, the old Witch Doctor, although still a little weak, was able to stand.

Grandfather, today I have learned how important it is to do **research to discover medicines that help cure people who are ill** -Shaman said happily-. Our remedies with plants or animals from the rainforest work really well but they are often not enough and the **advanced science** that I saw in my dream is necessary.

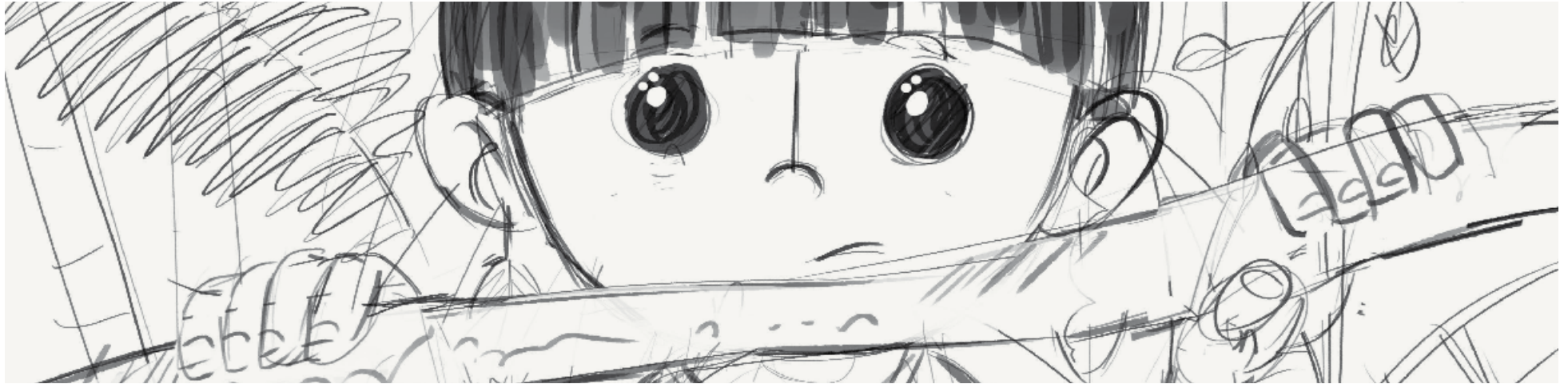
-You have learned very well what the **magic dream** taught you. You have also saved my life and almost certainly those of many others.

You have won the **respect of our tribe**, my young apprentice! -said the old Witch Doctor, giving Shaman a hug.





-The End-



Learning with Shaman

Ancient Egypt

A civilization that developed for over 3000 years. It began with the unification of several towns near the banks of the River Nile in Africa. The Egyptians brought great knowledge to humanity in the fields of art, architecture and medicine. Popular and respected, the Ancient Egyptian doctor was known as *Sun-Nu*, "the man who takes care of those who suffer." They used willow bark, which has similar effects to aspirin. It is thought that they used honey to prevent and fight infections.

Avicenna

A Muslim doctor, philosopher and scientist who was born (980 A.D.) in Persia, now Iran. He wrote about three hundred books on different subjects, especially philosophy and medicine. His most famous texts are *The Book of Healing* and *The Canon of Medicine*, which are five books that gather all the medical knowledge that existed at the time. His disciples called him Cheikh el-Rais, that is, "prince of the wise".

Scientist

A highly curious person who wonders why things happen. For this reason, he/she performs experiments using what is called the "scientific method".

Clinical trials

Studies that investigate whether a medicine is effective and safe to be used on human beings.

They are classified into:

Phase I trials: The drug is tested for safety on healthy people, for how it is accepted (tolerability) and for the time interval in which it is safe to take it.

Phase II trials: Their purpose is to determine the efficacy and safety of the new drug in a larger group of patients (100-300 people) who suffer from the disease for whose treatment the drug is intended. They also find out which dose of the drug is the most suitable.

Phase III trials: Their purpose is to confirm that the new drug is effective and to do so it is compared with a placebo (sugar or water) or with other drugs that are already available for the treatment of the disease being studied. Involving hundreds or thousands of patients, these studies can take several years to also check whether it is safe.

Phase IV trials: These take place after the drug has been approved for use as a treatment for the disease that has been studied and is therefore now available in pharmacies. This is when there is study of aspects that have not been investigated in previous phases.

Pharmacist

A person who works in a pharmacy or a hospital. The pharmacist provides patients with drugs prescribed by doctors. They also advise and inform patients about how to take medicines.

Galen

A doctor who was born in Pergamum (Turkey) in 129 A.D. He was one of the most famous doctors in antiquity; he lived in Greece and then in Rome. His studies and research proved very important for medicine to keep progressing in subsequent centuries. He saw the body as a large map whose details had yet to be described.

Guarana

A bush of the Amazon rainforest with a shiny black fruit. The tribes living there have used it as a medicinal plant since time immemorial. It provides so much energy that the indigenous peoples take it if they have to travel long distances for days when hardly eating.

Witch Doctor or Shaman

A person who makes predictions, invokes the spirits and engages in curative practices using products of nature; he often advises and guides people who visit him for a consultation.

Seaplane

Plane equipped with floats that allow take-off and landing on water.

Hippocrates

A doctor from Ancient Greece. Born on the island of Cos, he is considered one of the most prominent figures in the history of medicine, with many referring to him as the "father of medicine." He is regarded as the first doctor to reject the superstitions, legends and popular beliefs that pointed to supernatural or divine forces as the cause of disease.

Guaco

A plant that grows in the Amazon rainforest and is used for snake or spider bites or even for scorpion stings.

Infection

Invasion of germs or pathogenic microorganisms (bacteria, fungus, virus etc.) that reproduce and multiply in the body, causing an illness.

Medicines

Substances used to prevent or treat a disease. Today's drugs are manufactured in pharmaceutical laboratories and many of them are obtained from substances found in nature.

Molecule

Array of atoms, which constitutes the smallest part by which a pure substance is formed and which possesses its properties. For example, a water molecule (H₂O) is composed of two hydrogen atoms and one of oxygen.

Nanomedicine

Technology using instruments or very small particles that will enable diseases to be cured from within the body and at cellular or molecular level.

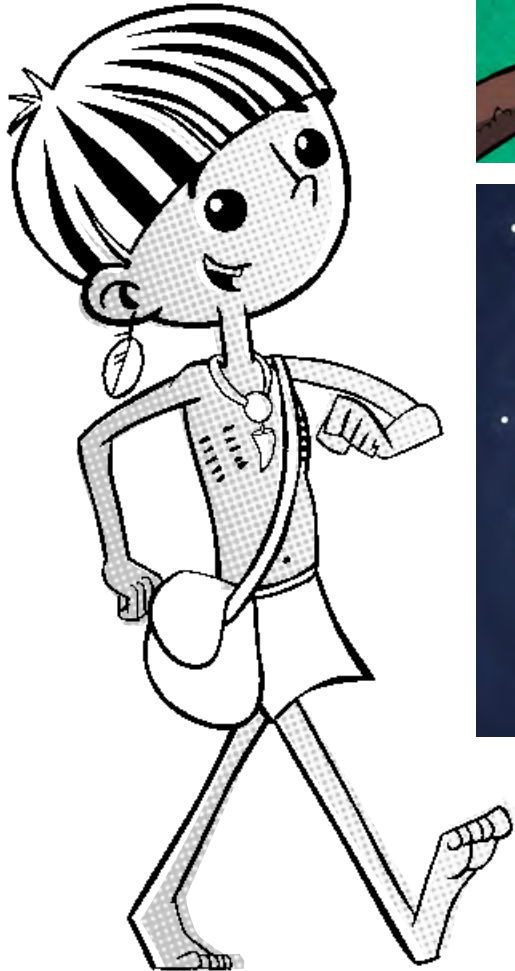
Pfizer

An American biomedical company whose mission is to discover, develop and manufacture medicines that are safe and effective. It was founded in 1849 by the cousins Charles Pfizer and Charles Erhart. Pfizer's headquarters in Spain are located in Alcobendas (Madrid). It has a medicine manufacturing plant in San Sebastián de los Reyes (Madrid). The Global headquarter is in New York City and its research headquarters in Groton, Connecticut.

Pyramids

The most enormous monuments of Egyptian civilisation. They have a square base, whose four sides are raised as triangles and join in an apex. Pyramids could house the remains of kings or pharaohs but they also served for the worship to a god.

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