My Little Light Box

Observing and Doing Science Responsibly

Luz Yazmin Villagrán Villegas • Patricia Arieta Melgarejo
Suzel Gómez Jiménez • Zujey Berenice Cuevas Carballo
Roberto Alejandro Mateos Rocha

GOBIERNO DEL ESTADO DE VERACRUZ 2024 - 2030
SEV SECRETARÍA DE EDUCACIÓN DE VERACRUZ
COVEICYDET CONSEJO VERACRUZANO DE INVESTIGACIÓN CIENTÍFICA Y DESARROLLO TECNOLÓGICO
POR AMOR A VERACRUZ
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My Little Light Box. Observing and Doing Science Responsibily. **Authors:** Luz Yazmin Villagrán Villegas, Patricia Arieta Melgarejo, Suzel Gómez Jiménez, Zujey Berenice Cuevas Carballo and Roberto Alejandro Mateos Rocha —*Veracruz, Mexico. 2026.*

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HECHO EN MÉXICO | MADE IN MEXICO

Dedication

To Sophi, who brought light into my life and taught me to love living beings not for their beauty or appearance, but for their perfection, their unique characteristics, and their ability to adapt—even now, when that adaptation must happen faster so they can continue to inhabit an increasingly polluted planet.

To Lily, for teaching me to see the world through light; thank you for being part of my world and for the honor of writing the prologue to this project.

To Paty and Suzel, because in 2025 our paths crossed in life, and when something is meant to happen, magic appears: dreams meet and become real. We are united by the desire to write for the children who will inherit this planet, and by the importance of caring for all living beings so that we may continue to live— with respect and balance—on our blue planet

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Fotón Explora is aligned with the Sustainable Development Goals (SDGs): 3 (Good Health and Well-Being), 4 (Quality Education), 13 (Climate Action), and 15 (Life on Land). The project promotes experiential learning in physics, chemistry, biology, and emerging sciences (biomimetics and nanosciences), as well as the care of life and the planet.

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Foreword

Before we begin, it is worth taking a pause.

To breathe. And to remember what it feels like to discover something new.

This book does not arrive to explain the world, but to accompany that unique moment when a curious little soul is amazed at understanding something on its own. Being a witness to that moment invites us to sit nearby, open a page, and let curiosity set the pace. There is no rush here to understand everything. There is space to observe, to ask questions, to be surprised.

Through stories, colors, and small experiments, science appears as something close, almost everyday. As a way of paying attention. Of noticing that one thing leads to another. That nothing happens in isolation. That what we touch, look at, and care for matters.

My Little Box of Light invites us to open, try, and discover without fear. To turn on a flashlight, follow a reflection, pause in simplicity. And in that seemingly small gesture, to recognize something greater: learning is also a way of caring.

This book is best enjoyed together. When someone guides, listens to questions, and allows themselves to be surprised, something special happens: the joy of experimentation returns—fresh, luminous, and shared.

May these pages awaken curiosity in children... and gently transform those who read alongside them, returning to them the curious gaze of childhood.

Liliana González De la Cueva

May this journey be an invitation to learn, to care, and to imagine possible futures where science and life walk together.

Have you ever wondered what nature teaches us?

Leaves, seeds, droplets, wind, animals...

Everything has something to show you if you look at it with care.

On this journey, we will need a safe table.
Your workspace should be:

- Clean
- Dry
- Tidy
- Free of food

This way, your laboratory will be ready to discover and experiment.

And here are the next tips to take care of the planet:

- What gets dirty, we clean it.
- What no longer works and cannot be reused, we throw it away in the proper place.
- If we can use a lid instead of a cup, we do.
- We never pour clean or colored water on the floor or into the street.
- An old laser pointer should be taken for recycling, not thrown in the trash.

Now you need to get to know your materials:

1. The pipette
2. The beaker
3. The Petri dish
4. The cotton swab
5. A flashlight with white light and a laser

All of them will be part of your adventure.

Each one has a purpose, and you will use them to make scientific magic.

1. Pipette: It is a dropper used to take just a little bit of water.

How it works:
Press the top of the pipette and, without releasing it, place the pipette into a cup filled with water. Observe that the pipette fills with water (suction). Without stopping pressing, move the pipette to where you want to place the drops. Gently press and count the drops of water. Do not release the water in a stream or too fast—be patient. Science requires patience, order, precision, and accuracy.
Patience = Calm
Precision = Equal drops
Accuracy = 10 drops

Tip:
Press and release the top of the pipette only while it is inside the cup. If you release it before reaching the water, air will enter and mix with the water, forming bubbles that can ruin the experiment.

Practice again by transferring 10 drops of water into another small cup.

Note: If I do not have a pipette, I can use a straw.

2. Petri dish: A transparent little dish where we can see small things.

Note: If I do not have a Petri dish, I can use a clean lid from a jar that I no longer use.

3. Beaker: A small cup used to mix water and colors.

Note: I can use a transparent cup from home.

4. Cotton swab: A small stick with a cotton tip used to move color or make dots, without using our fingers.

Note: I can use a wooden toothpick.

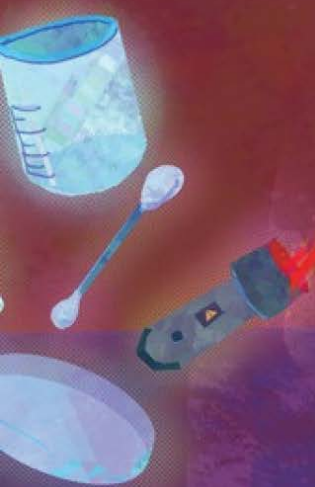
5. A flashlight with white light and a laser: A very strong light that we use only with an adult.

Everything will be part of your adventure.

And don't forget while doing the experiments:

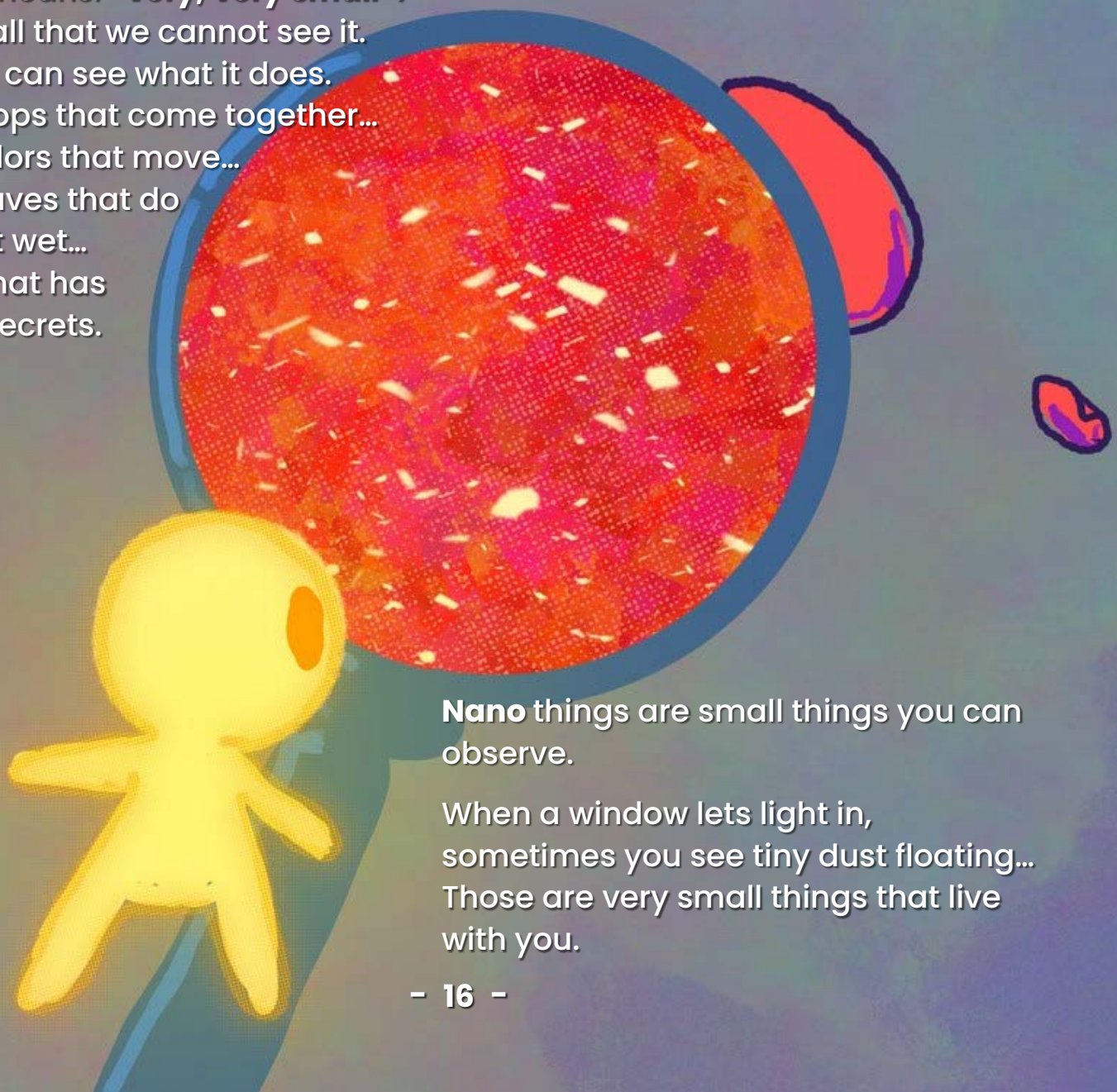
- Take care of the planet.
- What gets dirty, we clean it.
- What no longer works, we throw it away in the proper place.
- What can be used again, we reuse it.

Because the planet is also part of the laboratory.



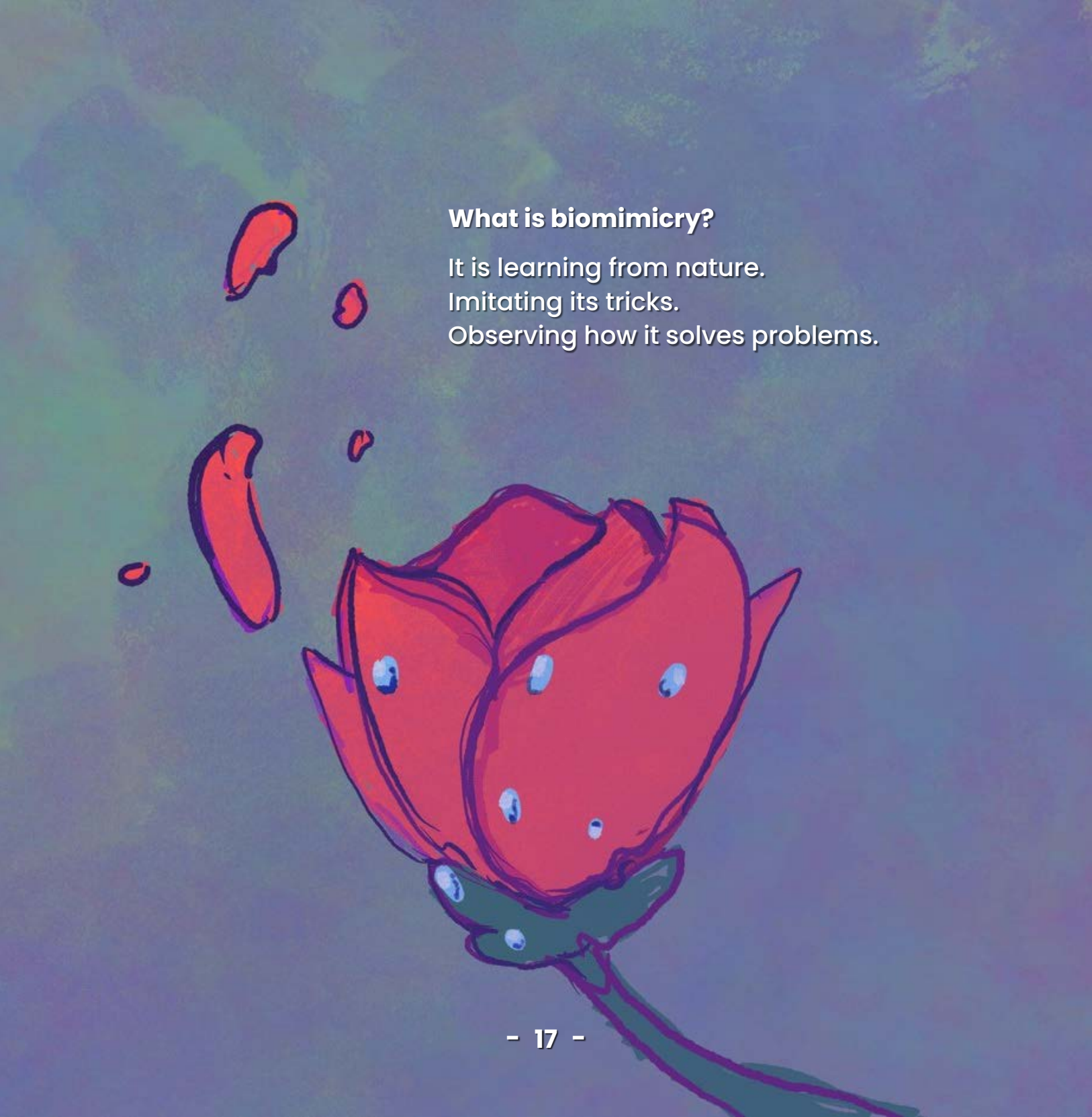
And I want to tell you something more...
Maybe you are wondering:
What is the world of nanosciences?

Nano means: **"very, very small".**
So small that we cannot see it.
But we can see what it does.
The drops that come together...
The colors that move...
The leaves that do
not get wet...
All of that has
nano secrets.



Nano things are small things you can observe.

When a window lets light in,
sometimes you see tiny dust floating...
Those are very small things that live
with you.



What is biomimicry?

It is learning from nature.
Imitating its tricks.
Observing how it solves problems.

Before Fotón was born, there was something very important.

A special place where science could begin. That place was not big or noisy. It was small, calm, and full of possibilities. You can build it with your own hands. It is called your Little Box of Light, and here you will learn to care, to observe, and to do science with kindness.

What is it?

It is a dodecahedron, a shape with 12 faces, and at this moment each face will teach you a care, a rule, an idea to do science safely.

When you use it, you will discover drops of water that move, colors that travel, leaves that shine...

And you will understand how nature speaks to you.

You will need your template, round-tip scissors, glue, and a clean table where you can begin your adventure.

There is no rush.

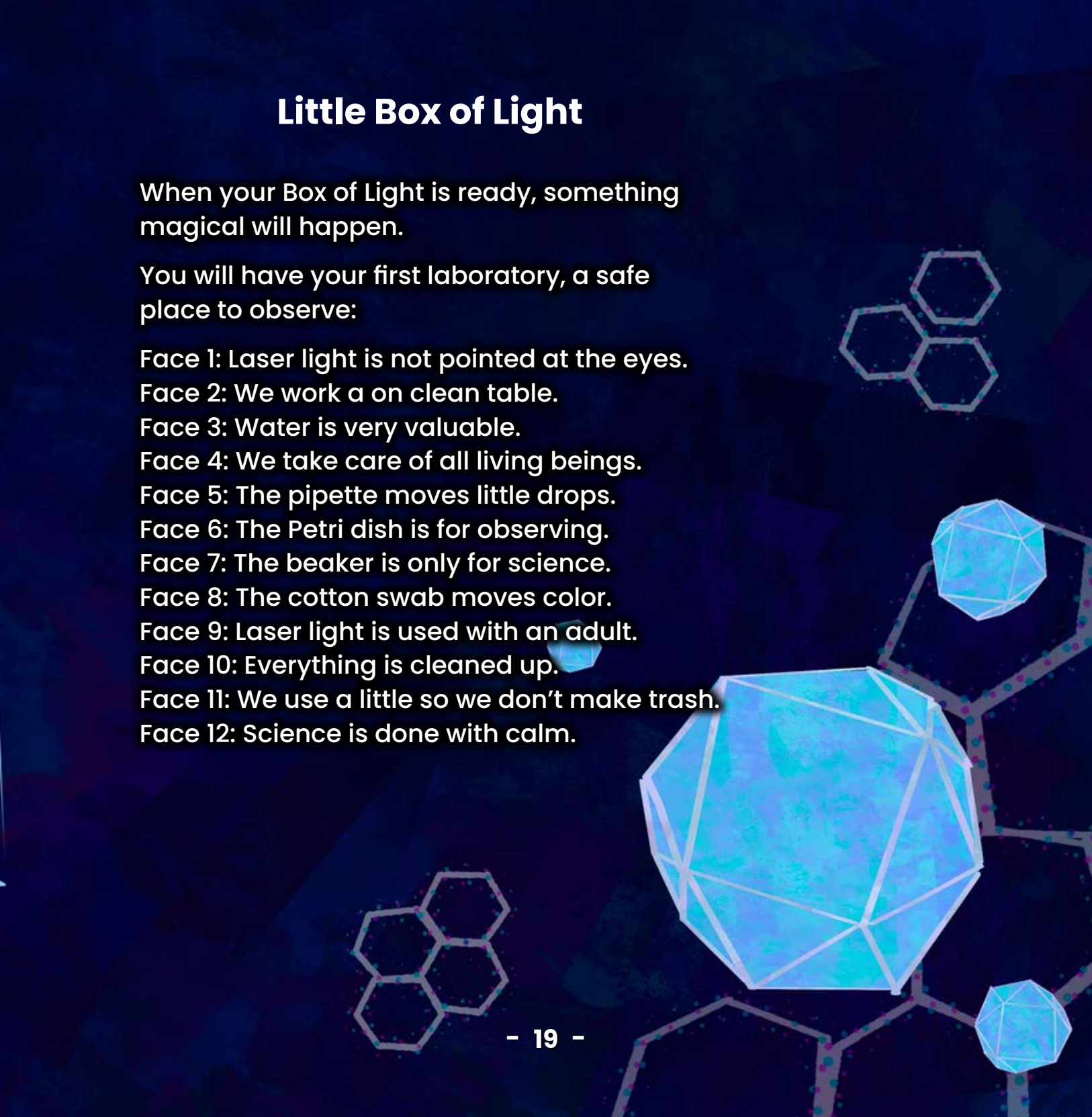
Science is born with calm.

Little Box of Light

When your Box of Light is ready, something magical will happen.

You will have your first laboratory, a safe place to observe:

Face 1: Laser light is not pointed at the eyes.
Face 2: We work a on clean table.
Face 3: Water is very valuable.
Face 4: We take care of all living beings.
Face 5: The pipette moves little drops.
Face 6: The Petri dish is for observing.
Face 7: The beaker is only for science.
Face 8: The cotton swab moves color.
Face 9: Laser light is used with an adult.
Face 10: Everything is cleaned up.
Face 11: We use a little so we don't make trash.
Face 12: Science is done with calm.



From here on, each face will teach you a principle...

but it will also tell you a little piece of real science.

You fold, glue, and close your Box of Light.

1. Light is not pointed at the eyes.

One day, when you use light inside your Box of Light, you will see how it travels, how it shines...

But laser light is strong. Only an adult can help you turn it on.

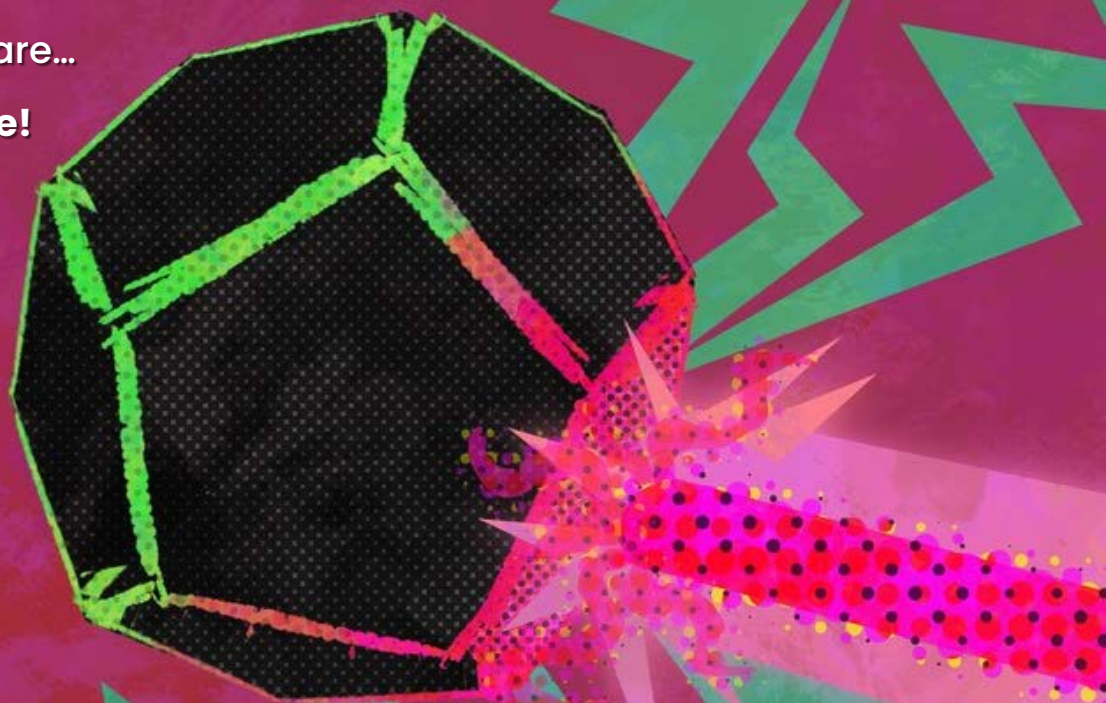
Eyes also do science. Eyes look very carefully. They see colors, shapes, and movements.

When we look with care...

We are doing science!

That is why we must take very good care of them.

Inside the eye lives the retina, a very special part that helps us see.



2. Let's work on a clean table.

Your table should be dry and tidy.
When you clean your table...
The world gets ready to teach you something.

And now that it is ready, your scientific story begins.

3. Water is very valuable.

With your pipette or straw, you will take just a few drops. Not more, not less. Because every drop is important.

And here your first discovery begins...

Remember: press the top of the pipette and release it only when it is inside the water.

If you release it before reaching the cup, air will enter and mix with the water, forming bubbles inside the pipette that can affect the experiments.

Practice again by transferring 10 drops of water into another small cup. If you use a straw, cover the top with your finger and place it into the cup with water. Without removing your finger, move it to the other cup and, little by little, lift your finger so the drops come out of the straw.

Experiment 1: Friendly Drop

Place one big drop in your Petri dish or lid.
Now let a small drop fall nearby, very close...

Do you see it move slowly?

Do you see it join the other one, as if they were friends hugging?

This little magic is called surface tension, but for now you can call it: **"The drops like each other."**

4. We take care of all living beings.

Leaves, plants, seeds...

All of them have their own story.

You will observe them without harming, without pulling, without breaking.

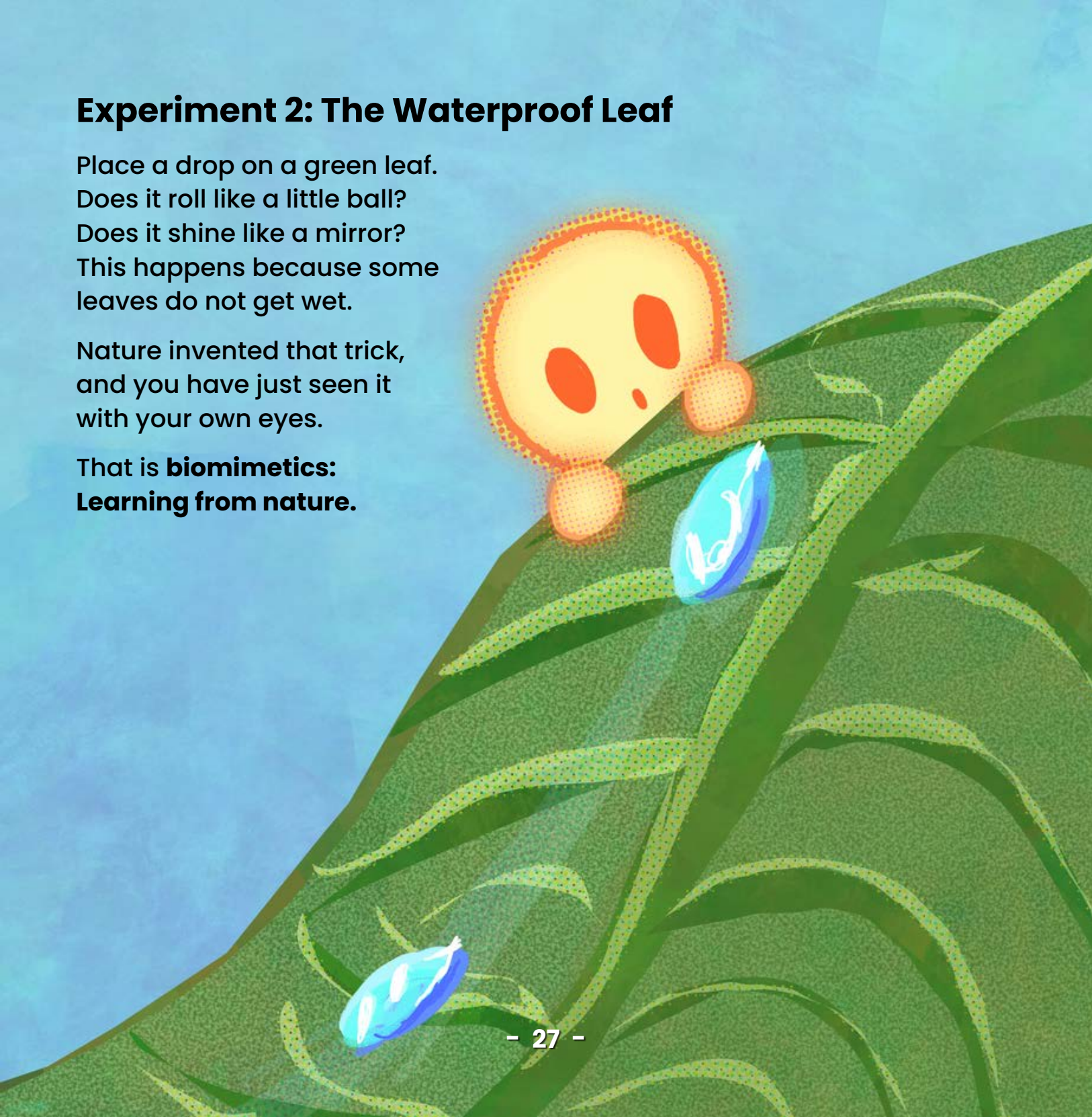
And today, a leaf will show you something unexpected.

Experiment 2: The Waterproof Leaf

Place a drop on a green leaf.
Does it roll like a little ball?
Does it shine like a mirror?
This happens because some leaves do not get wet.

Nature invented that trick, and you have just seen it with your own eyes.

That is **biomimetics: Learning from nature.**



5. The pipette moves little drops.

The pipette does not go in the mouth, and it is not bent. It is a tool for scientists.

When you press its little top and release it inside the water...

It fills up as if by magic.

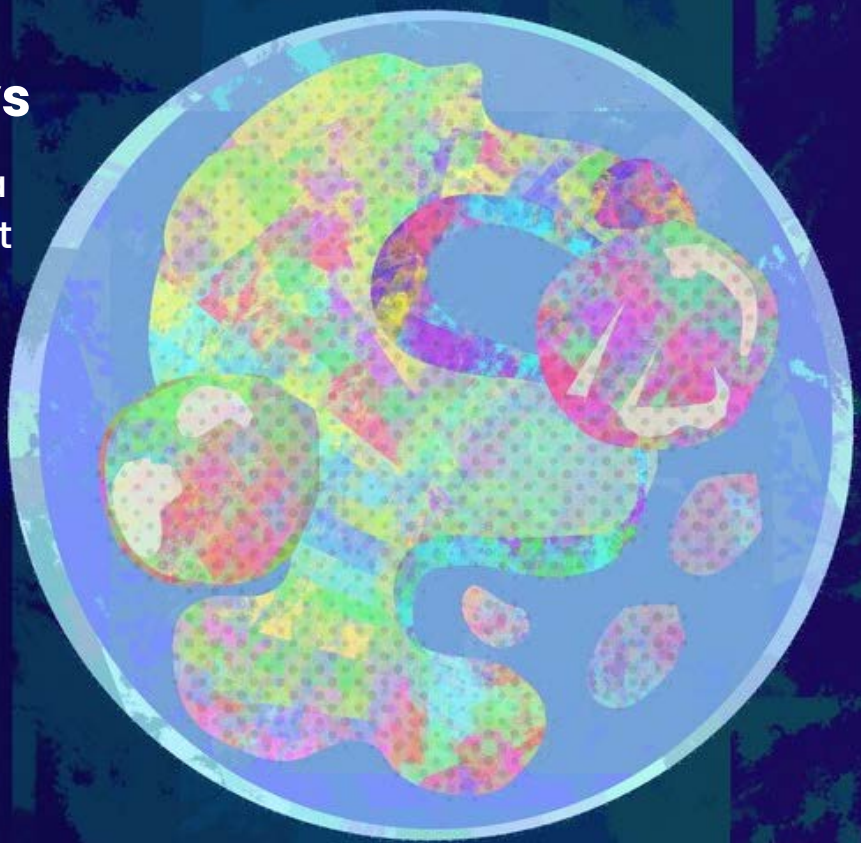
Today you will learn to use it with **calm, precision** and **accuracy.**

Three words from real scientists.

6. The Petri dish is for observing.
Your Petri dish is like a small window.
There you will see drops, colors, sparkles, shadows.
Everything that is too small to see outside!

And inside this little window, you will see another experiment...

Experiment 3: Color Pathways



Fill your beaker with a little water and pour it into the Petri dish.

Touch the surface with a cotton swab dipped in food coloring.

Look...
The color walks.

It travels through the water without you pushing it. It moves gently and freely.

That movement is called diffusion, but you can call it:
“The color that strolls”.

7. The beaker is only for science.

It is not for drinking.

Here you mix, observe, and test.

Each mixture teaches you something.

8. The cotton swab moves color.

Only one. Only for experimenting.
Afterwards, you throw it away.

Today you used it to see how color travels.

You are a water explorer.

9. Laser light is used with an adult.

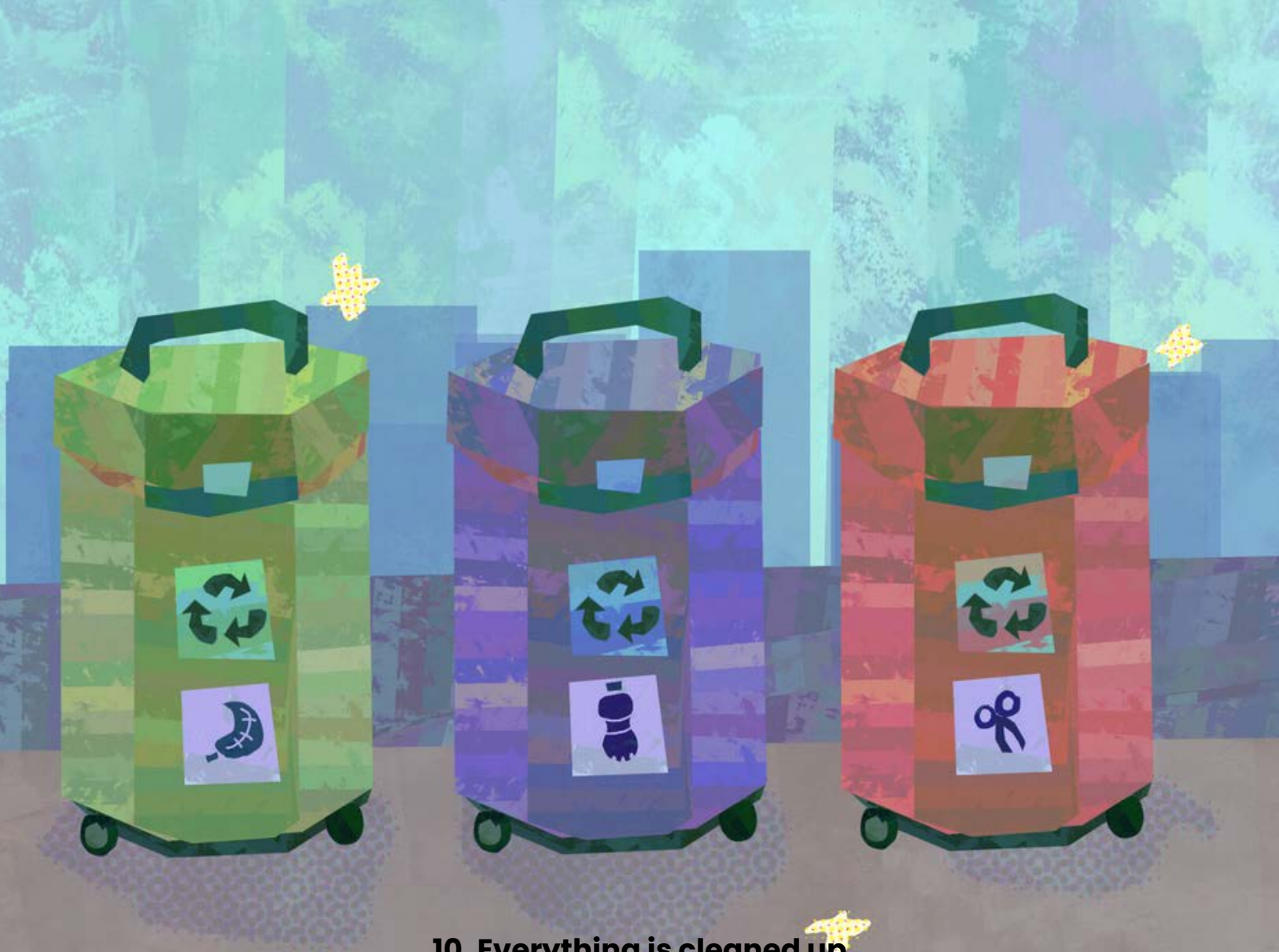
Someday in this collection, you will see how Fotón is born, a spark of light that talks with you.

But for now, just look at the light with respect and from a distance.

Light is powerful and you are learning how to take care of it.

If the laser points at the eye, the light is so strong that it can burn the retina and the little eye can get hurt.

The laser does not go to the eyes, it is only for experimenting and learning, like real scientists, always with care, and only an adult can help you turn on the laser.



10. Everything is cleaned up.

What you use, you wash.
What gets wet, you dry.

Science is also order.

11. We use a little so we don't make trash.

If you don't have a pipette, you use a straw.
If you don't have a Petri dish, you use a lid.

Science is done with creativity...

And with love for the planet.

12. Science is done with calm.

No running.
No rushing.

The best ideas arrive slowly.

When you finish doing experiments:

- Put away your laboratory.
- Dry your materials.
- Store them inside your Box of Light (dodecahedron).

That way, they will be ready for the next journey.

Your Little Box of Light is ready.

You now know drops that hug...
Colors that stroll...
Leaves that do not get wet...

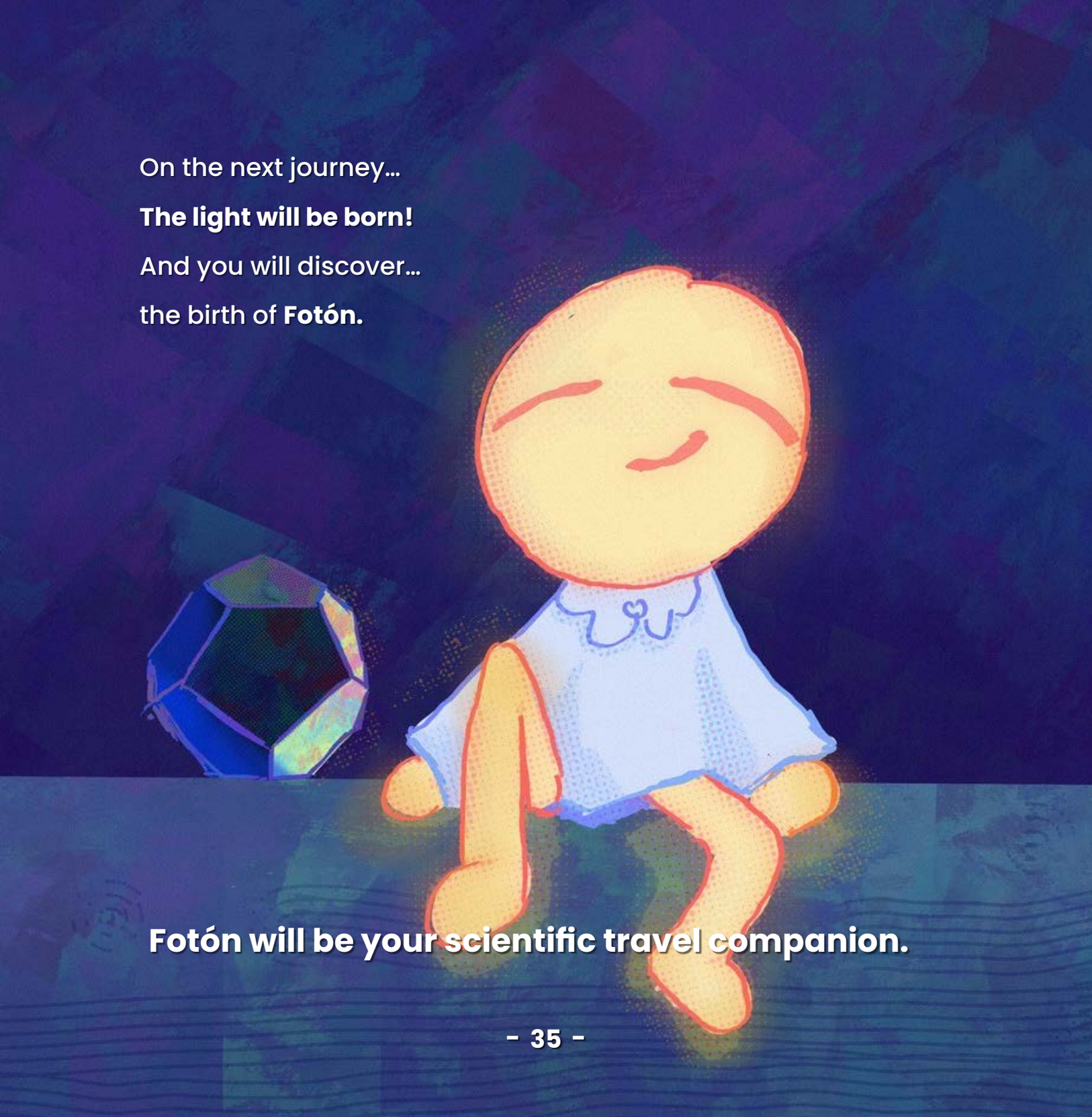
You have cared for the planet,
observed nature, and done **science.**

On the next journey...

The light will be born!

And you will discover...

the birth of **Fotón.**



Fotón will be your scientific travel companion.

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Fotón Explores is a children's collection that brings girls and boys closer to science through stories, safe experiments, and a sensitive narrative. Throughout the saga, Fotón—a curious spark of light—travels through different worlds where it discovers physics, chemistry, biology, nanosciences, and biomimetics, understanding that natural phenomena do not occur in isolation, but are interconnected and form living systems.

The collection encourages, from early childhood, observation, care for life, and scientific thinking from a systemic perspective, showing that when something changes in the environment, other things are also affected. In this way, science not only explains the world, but also helps us understand it as a set of relationships that must remain in balance to protect life.

Fotón Explores invites children to recognize and promote responsibility, empathy toward living beings, and the construction of a sustainable future. Fotón Explores is an adventure to discover light, living beings, and the worlds around us, and to learn that with every action—no matter how small—we illuminate the entire system to which we belong.

Studying light with Fotón will be a journey to learn how to care for the world we share!

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Consulta y descarga

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