



THINGS NOT SEEN BY THE NAKED EYE Pavla Hanáčková • Adela Režná



THINGS NOT SEEN BY THE NAKED EYE



↓ MITES

Mites are smaller than a dot, which is at the end of this sentence. The most of them are harmless. However, there are also kinds that cause **allergies** — those can be often found in dust or blankets.



↓ VIRUSES

People began to be interested in viruses for their ability to cause diseases. They cause cold, flu, smallpox as well as other diseases. It is therefore important to ensure hygiene to prevent further virus spread.



Attention – infection!
Virus particles travel in the air as far as 3 meters and they can infect other people.

THINGS TOO SMALL

Everywhere around us are things we cannot see with the naked eye. Some of them are too small – the smallest things that human eye can capture are about 0.1 mm big. As thick as a human hair!

↻ BACTERIA

For a long time, people considered bacteria to be harmful, which is not entirely true. Some of them are beneficial to humans! They are cleaners of the planet – **bacteria** can decompose live substances. Life would not exist without them! Harmful ones cause diseases, such as tonsillitis.



Hello, it will be my pleasure to help you!

I am looking forward to enjoy you!

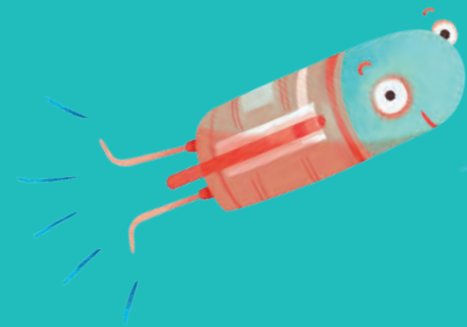


Welcome to the microworld!

↻ EVERYWHERE AROUND US

Everything around us is composed of particles. There are more microbes on one person's hand than there are people on the planet. Tiny particles are suspended even in the air — insect pieces, animal hair and cosmic dust! Actually, we are giants surrounded by a **tiny world that we cannot see**.

Once again I forgot to take a waterproof hat!



↑ NANOBOTS

In the future, they plan to use the tiny robots in medicine — **nanobots** — which would be released into the bloodstream and they would thus make it easier to control when a drug is active in a body.

↵ TINY OBJECTS

Teeny-tiny objects are called **microscopic** — they are visible only through microscope or other magnifying apparatus. These devices magnify a tiny thing for our eye through special lenses.



What is this monster? Try to guess!
It is an ordinary caterpillar, only magnified.

↵ NANOTECHNOLOGY

The word '**nano**' means a '**dwarf**'. Lotus leaves have the ability to repel water — that is why scientists conducted a thorough investigation, to be able to create them artificially. They also make the astronaut's space suit that does not catch cosmic dust.



You didn't clean up your plate again!

It is micro-organisms' fault!

➡ UNEXPLAINED PHENOMENA

In the old days some phenomena racked scientists' brains. How do grapes become wine? Why does food go bad? Today we know **micro-organisms** are the cause of it.



A **VIRUSES**

Do you see that withered flower? It looks ill, doesn't it? It in fact is ill, as it is infected with viruses that weaken it. Infected plants show spots, blisters, or bumps. Most disease-causing viruses are carried and transmitted naturally by insects, especially sap-sucking insects. They bite into the plant and cause damage to it. Such wound creates an entry point for the virus.



B BACTERIA

Even though there are no bacteria pictured on this poster, they are in fact there, hiding in panda's belly. They are panda's little helpers that live in its stomach. These bacteria help pandas digest bamboo, which is pandas' only source of food. Bamboo is really tough, therefore hard to digest without any help.



Teeny tiny particles are everywhere around us. Even in your classroom, you are surrounded by various tiny particles. Where can they be hiding? Look around this class.

You cannot see the particles themselves (as they are too small for us to see), but there are hints to help you determine where you can find these minuscule things.

© NANOTECHNOLOGY

This incredible field of science takes some of the smallest particles (i.e. molecules and atoms), that make up things and uses them as building blocks of nature, rearranging them in interesting new ways. This way, scientists can build all kinds of amazing materials and things whose improved properties are immensely useful for people. This T-shirt, for example, is made of nanofibers that repel water!



D VIRUSES

When we sneeze or cough, we expel tiny particles with viruses to the air that spread further. Hand, handkerchief, or elbow over your mouth! Always remember to wash your hands as well. There might be some particles stuck to it. Many people wear facemasks to keep other people safe. If we follow these simple measures, we help to minimize the spread of diseases such as the flu or COVID-19.

F DUST MITES

Dust mites are our permanent roommates. These teeny, tiny bugs like to reside in warm and moist places, such as our beds, pillows and sofas ... Dust mites are harmless to most people as they don't carry diseases. But people with allergies are allergic to the debris left behind by dust mites. We can't get rid of them completely, but we can certainly reduce their numbers by cleaning!



E PROBIOTICS

Just like bacteria in panda's stomach, there are 'good' or 'helpful' bacteria living in yogurts. Such bacteria are good for our digestive system and we call them probiotics. Simply put, they keep our guts healthy. You can find these probiotics in yummy foods like yogurt, kefir, sauerkraut or kimchi.



➡ FIELD IMAGES

At first glance, it is an ordinary field, but you fly higher up and voila! You can see hidden images before your eyes. Those on paddy fields in China or Japan create people by planting different kinds of rice. Who is responsible for the mysterious crop circles? Some patterns are the work of man; others are shrouded in mystery...



One would think that the bigger something is the better we can see it. But don't be fooled! There are things so big and so far away we cannot see. Luckily we have devices to explore the huge universe.

THINGS TOO BIG



⬆️ THE BIRD'S EYE VIEW

To birds flying across the sky big cities must seem small and people must look like real shrimps. However, one thing cannot be denied — birds have an outlook. People also figured out how to get a bird's eye view — they invented **airplanes**!

⬇️ FARSIGHTED EYE

Curiosity of people was big, so they kept coming up with more sophisticated and better devices. That is also how **binoculars** were born! With their help, they could not see as far as outer space, but they were getting close.



Hubble telescope flies through space since 1990 and it captured millions of images. Like this one, for instance!

⬆️ TELESCOPE

The discovery of the **telescope** changed our perception of the universe. Suddenly we could see what was outside our planet! With ever more powerful devices we can see farther and farther. Let's explore the universe a little more!

➡ THE WORLD AROUND US

We found out our planet is part of solar system. Still, there is a lot we do not know, therefore scientists gather data to tell us more about them. Maybe somewhere in the universe could be found a planet with equally suitable conditions as Earth!



⬅️ TRIP TO SPACE

However, it was not enough for people to look at these amazing things — they had to explore it themselves! Then came the day the first human travelled into space and to the moon. And again and again. People have been in space many times since, nevertheless we still have a lot to discover.



When we look at a night sky with a naked eye, we see the Moon, stars, their constellations, satellites, even some of the planets or comets if we're really lucky! But what is in fact hiding deeper in the universe? If you want to join us and look farther into the space, just look through the telescope!

black hole

comets

solar system

Sun

spacecraft

Hubble telescope

planets

rover

International Space Station

WARNING!

The picture does not show all of the planets in the solar system in relative size - they would not get into the picture. Only Jupiter alone is 11 times larger than Earth.

➔ A COMPLETELY NEW VIEW

A regular X-ray image is stationary, but there are devices that can capture skeletal movement of a human or an animal during **activity**. Or when eating and drinking! That way we have a better understanding of how our bodies work.



Egg inside
a quail's body

Milk and
second tooth

broken bone

There are things of different shapes, sizes and colours around us. Some of them, for example, water and glass are transparent and we can see inside them. However, there are many more things that we cannot see into. Perhaps the human body.



➔ ULTRASOUND

Ultrasound provides another alternative for imaging the inside of the body. It is about **a reflection of the wave**, which is then displayed on a doctor's computer. To expecting mom, it can show the baby in her belly. Ultrasound also makes it possible to see how the heart works.



⬇️ AN INSIDE VIEW

Passengers' luggage is checked at airports to make sure they do not transport any dangerous items. A suitcase is put on a conveyor belt and a special machines show airport staff its contents.



THINGS HIDDEN INSIDE

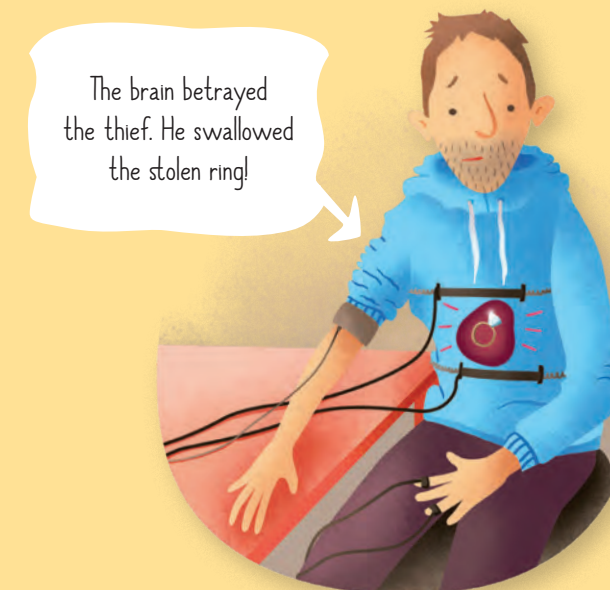


⬆️ SMILE, PLEASE!

How does X-ray actually work? When radiation hits the light-sensitive photographic material (film or paper), the material turns black. If there is some object between the radiation and the film, such as bone, the sensitive layer underneath it turns black and the object itself appears lighter. Such a clever thing! Just imagine, X-ray was invented by accident.

⬆️ LIAR, LIAR, LIAR

If doctors scan a liar's **brain** during an interrogation, they can easily reveal his lie, because lying is very strenuous and stressful for the brain. The brain is then markedly coloured on the screen.



⬇️ WOW! I CAN SEE INSIDE YOUR TUMMY

With today's technology, it is quite possible that **virtual reality** will be connected with learning and children will be able to see some things with their own eyes. They will only need a special T-shirt and app on their mobile phones ... and voila! That's how organs work!





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Come with us to discover things that are too small, too large, too slow or too fast to be seen by the naked eye. We'll take a close look, too, at the inside of things and what is hiding in darkness. What are all the things that are alive in your body? Do you know what's in outer space? And what invisible things are all around us? When you read through this book, you'll see immediately that things around us aren't as they seem.