

AN ANTHOLOGY OF

Micro Life



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Introduction

The way we humans experience the world relies heavily on our sense of sight. We make sense of the world through the colours, shapes, textures, and patterns that are visible to the naked eye. But many of the most interesting things on our planet happen on a level that we cannot see. In order to learn about them, we need special tools, such as microscopes and lenses.

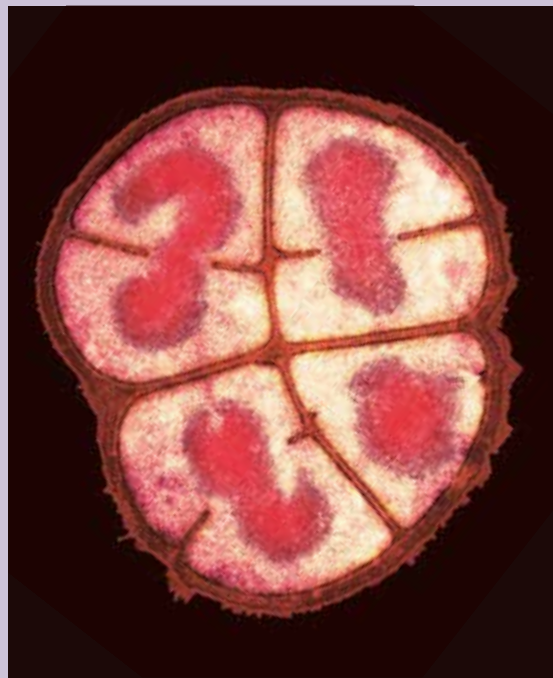
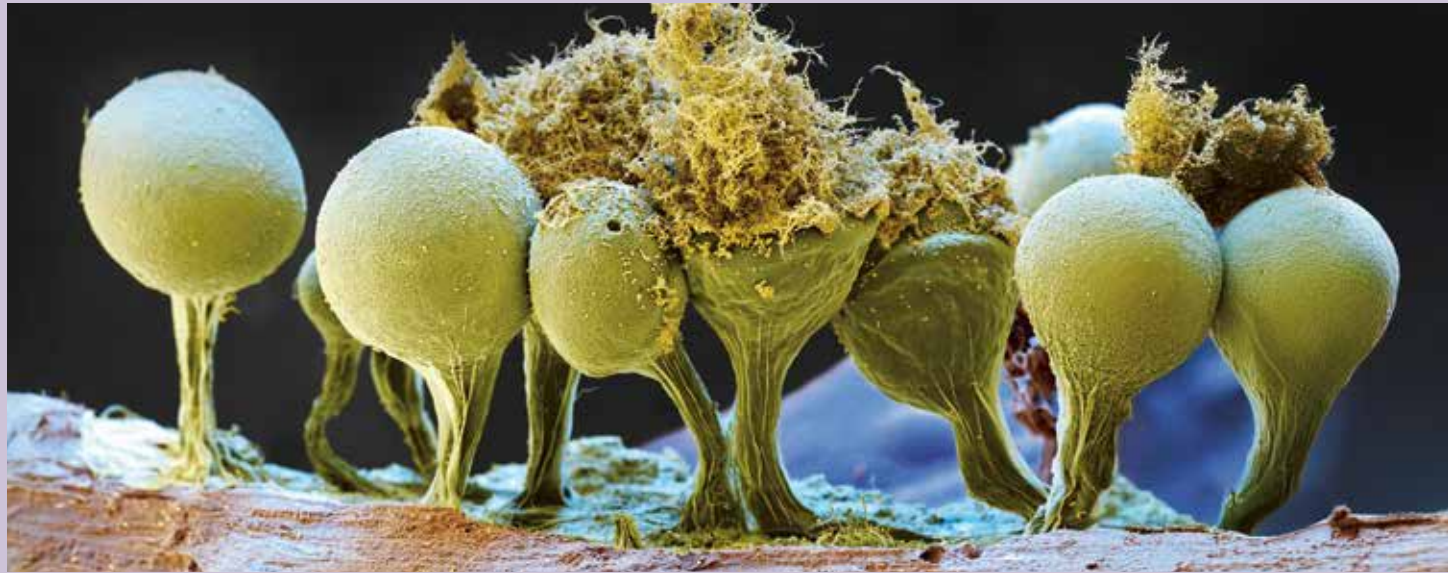
When we magnify the unseen world, we open our eyes and brains to a brand-new landscape of extraordinary natural wonders. Suddenly every grain of soil, drop of water, and inch of skin buzzes with new possibilities. Would you like to learn more about this bustling microscopic universe? Then it's time to zoom in and explore nature as you've never seen it before, as we uncover the miniature details of a planet you thought you already understood. But be prepared – the closer you look, the more there is to see!

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Units of life

Cells are the smallest units of life. Everything that is alive is made of them. Many living things, like elephants and daffodils, are made up of lots of cells, all working together to support the whole.

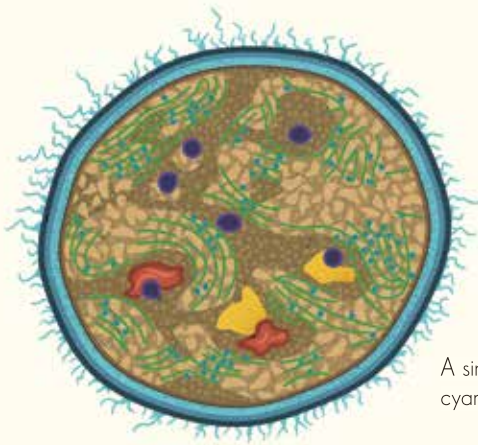
However, there are some cells that live entirely by themselves. They eat, move around, and grow without the support of a team. These are known as single-celled organisms and they are everywhere! You will find them in soil, air, water, ice — even inside the bodies of other animals. Single-celled organisms have been around for a very, very long time. In fact, they were the first things ever to live! Some of those ancient life forms still exist today — and they played a huge role in getting the planet ready for the plants and animals that would follow. In these pages you will meet some of the world's simplest life forms, many of them made of just one cell.

Single-celled organisms are the oldest forms of life — they first appeared on Earth about 3.5 billion years ago.

Clockwise from top: capsules releasing single-celled spores of a slime mould; a type of bacteria that can withstand temperature extremes; yeast cells; dinoflagellate alga cells.

Cyanobacteria

Without cyanobacteria, this book
wouldn't exist, nor would there
be any people to read it!

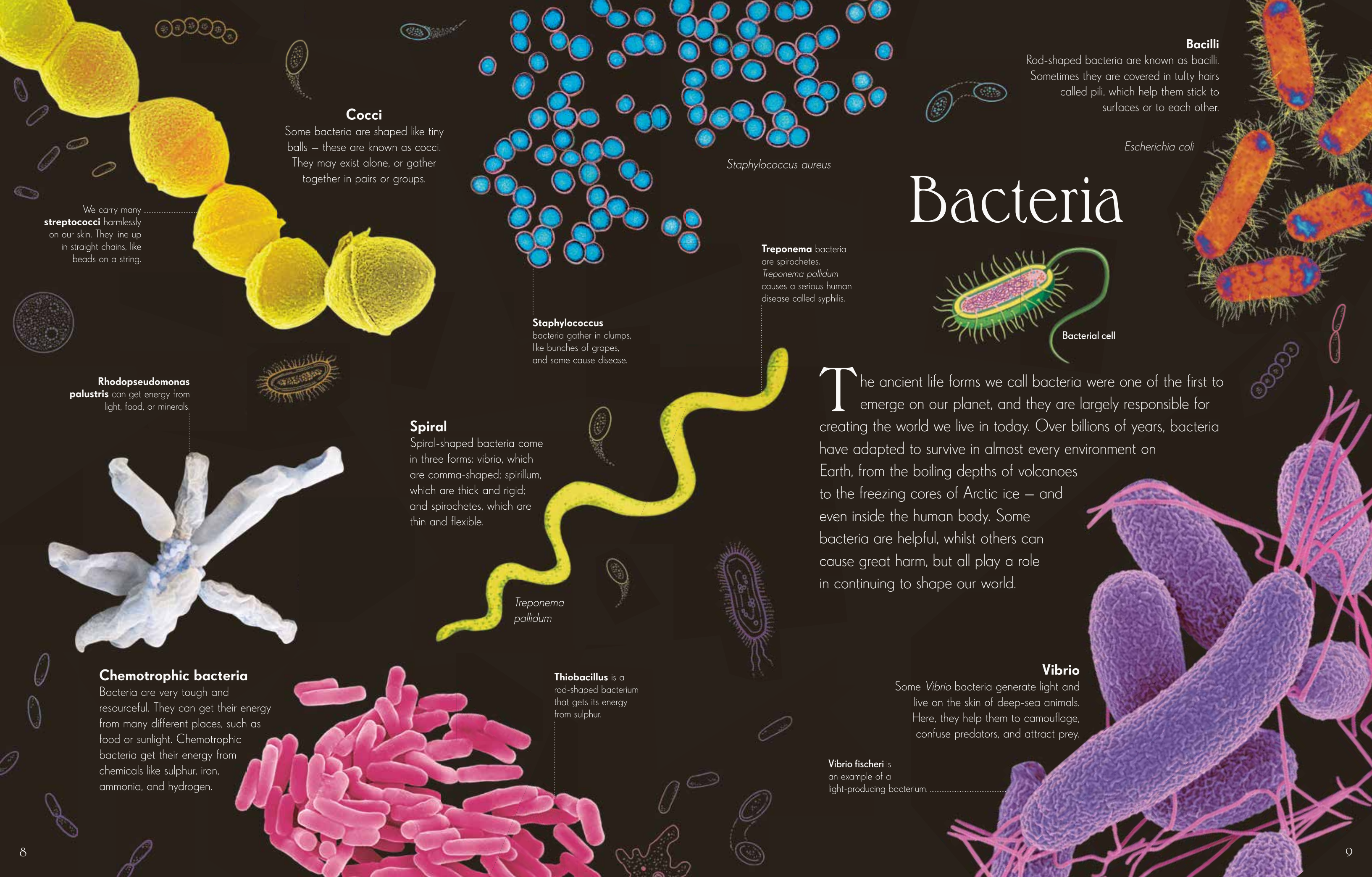


A single
cyanobacterium cell

Oxygen is very important. Almost every animal you can think of needs it to survive. But there was once a time when the atmosphere of the Earth contained very little of this precious gas and the only living things around were microbes, for which oxygen was highly toxic. Back then, there simply wasn't enough oxygen in the air for oxygen-breathing animals to survive.

That all changed when ancient life forms called cyanobacteria came along. They used the energy from sunlight to create food from carbon dioxide and water, producing oxygen as a by-product. Eventually, they filled the world with oxygen, creating an environment that would support all manner of incredible creatures — including us.

Swirling strands of cyanobacteria can
blanket the surface of the sea. They
are also known as blue-green algae
due to their incredible colouring.



Cocci

Some bacteria are shaped like tiny balls – these are known as cocci. They may exist alone, or gather together in pairs or groups.

We carry many **streptococci** harmlessly on our skin. They line up in straight chains, like beads on a string.

Rhodopseudomonas palustris can get energy from light, food, or minerals.

Chemotrophic bacteria

Bacteria are very tough and resourceful. They can get their energy from many different places, such as food or sunlight. Chemotrophic bacteria get their energy from chemicals like sulphur, iron, ammonia, and hydrogen.

Staphylococcus bacteria gather in clumps, like bunches of grapes, and some cause disease.

Staphylococcus aureus

Treponema bacteria are spirochetes. *Treponema pallidum* causes a serious human disease called syphilis.

Treponema pallidum

Spiral

Spiral-shaped bacteria come in three forms: vibrio, which are comma-shaped; spirillum, which are thick and rigid; and spirochetes, which are thin and flexible.

Thiobacillus is a rod-shaped bacterium that gets its energy from sulphur.

Bacilli

Rod-shaped bacteria are known as bacilli. Sometimes they are covered in tufty hairs called pili, which help them stick to surfaces or to each other.

Escherichia coli

Bacteria



Bacterial cell

The ancient life forms we call bacteria were one of the first to emerge on our planet, and they are largely responsible for creating the world we live in today. Over billions of years, bacteria have adapted to survive in almost every environment on Earth, from the boiling depths of volcanoes to the freezing cores of Arctic ice – and even inside the human body. Some bacteria are helpful, whilst others can cause great harm, but all play a role in continuing to shape our world.

Vibrio

Some *Vibrio* bacteria generate light and live on the skin of deep-sea animals. Here, they help them to camouflage, confuse predators, and attract prey.

Vibrio fischeri is an example of a light-producing bacterium.