

FOREWORD BY  
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# With a little help from OUR friends

The secret life of seaweed



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# FOREWORD

What if I told you that on our planet there exists an organism that is capable of restoring life in the ocean? An organism that contains essential vitamins and minerals and can provide seafood for billions of people? That can absorb nutrients like nitrogen from ocean 'dead zones' and be used as a material to make plastics and clothing? That can be made into food for cattle to reduce their methane emissions and into a biofuel for renewable energy? An organism that could potentially remove a huge amount of carbon from our atmosphere, then store it for centuries on the ocean floor, which could help us stop the impacts of global warming? I'd imagine you'd probably say, 'This sounds like some kind of miracle!' And I'd say, 'Nah, it's just seaweed.'

I have spent the past 5 years of my life exploring how we can learn from nature to live more sustainably. In particular, I've focused on what would provide the greatest benefits to people and the environment. Seaweed gets the gold star – by a long shot. And right now, it is causing a stir among scientists and engineers around the world.

Contained within the pages of this book is a beautiful love letter to seaweed. Seaweed is the quiet, humble, slightly shaggy person in the corner who at first you don't notice. But with each interaction, something new and exciting is revealed and before you realise, you're sending messages and the entanglement is complete. Seaweed is perhaps the most inappropriately named thing on the planet. It's so much more than a 'weed'. Welcome to your new crush.

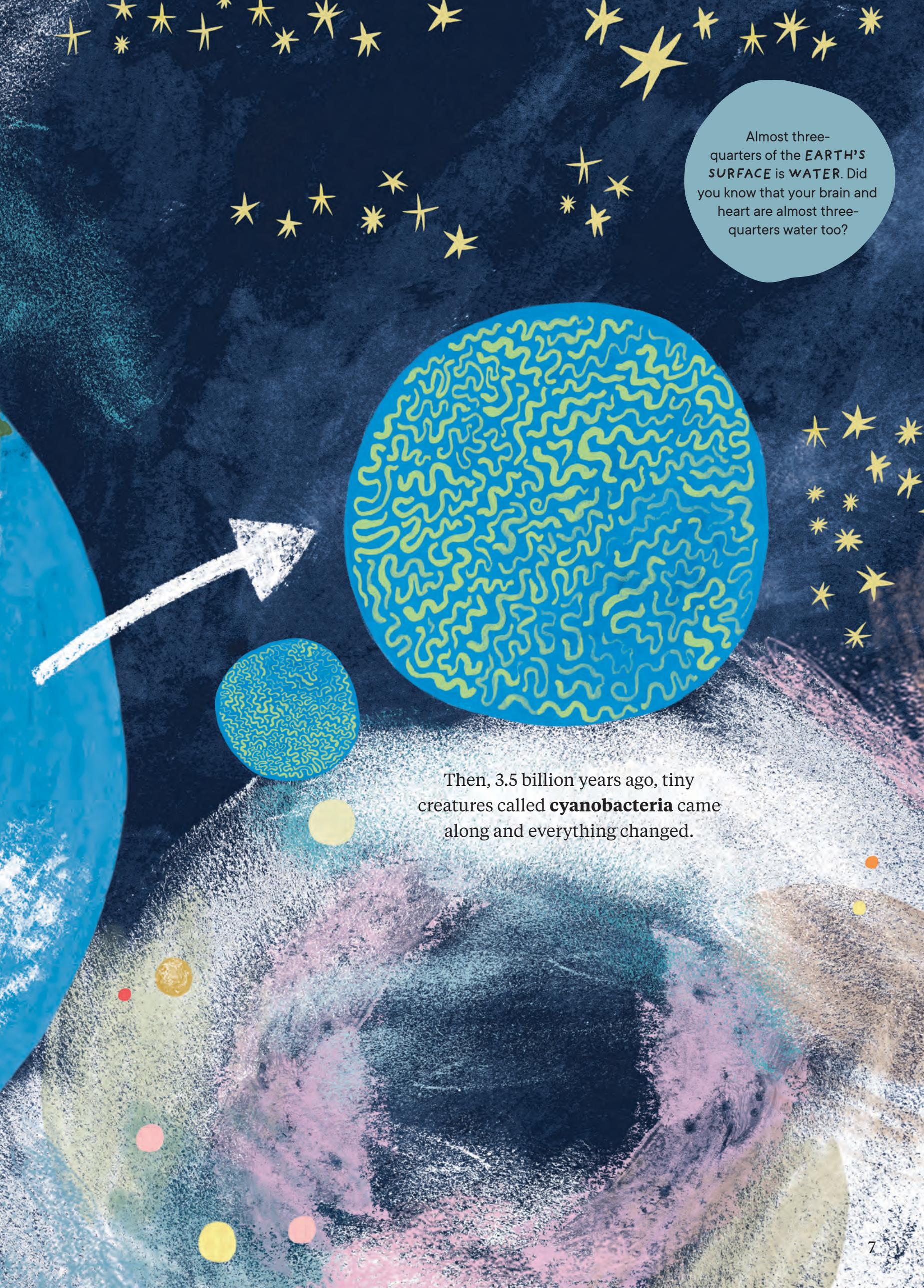
DAMON GAMEAU



# IN THE BEGINNING

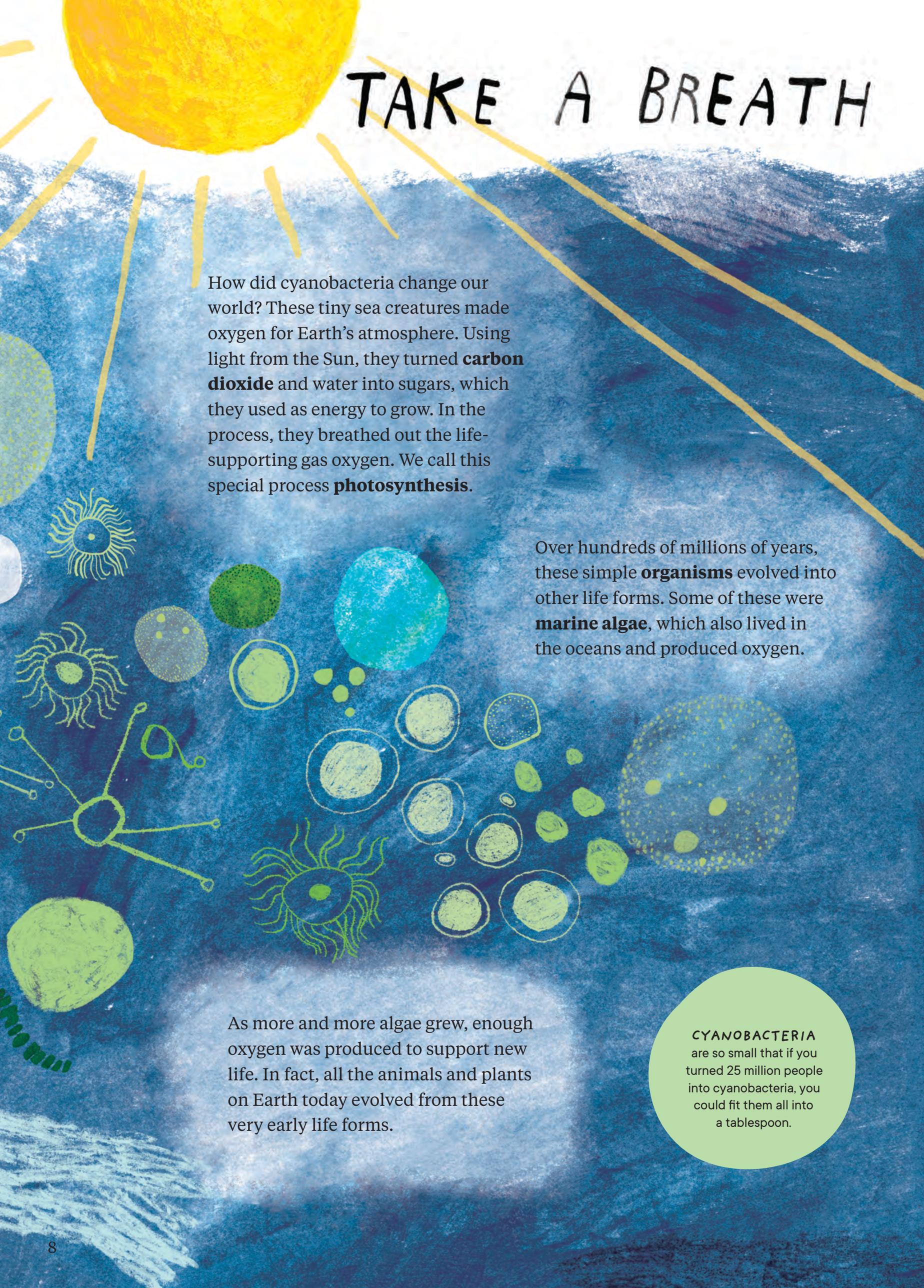
The story of life on Earth starts in the water. Without our oceans, life as we know it would not exist. For the first billion years, there was almost no life on Earth.

There were no trees, no birds, no insects and no fish because there wasn't enough **oxygen** in the **atmosphere**.

A chalkboard-style illustration of space. The background is dark blue with numerous yellow stars of various sizes and shapes. In the center, a large blue circle is filled with a yellow, wavy, brain-like pattern. To its left, a white arrow points from a smaller blue circle with the same pattern towards the larger one. The bottom of the page features a colorful, abstract landscape with pink, purple, and blue hues, and several small colored circles (yellow, orange, red, pink) scattered across it.

Almost three-quarters of the **EARTH'S SURFACE** is **WATER**. Did you know that your brain and heart are almost three-quarters water too?

Then, 3.5 billion years ago, tiny creatures called **cyanobacteria** came along and everything changed.



# TAKE A BREATH

How did cyanobacteria change our world? These tiny sea creatures made oxygen for Earth's atmosphere. Using light from the Sun, they turned **carbon dioxide** and water into sugars, which they used as energy to grow. In the process, they breathed out the life-supporting gas oxygen. We call this special process **photosynthesis**.

Over hundreds of millions of years, these simple **organisms** evolved into other life forms. Some of these were **marine algae**, which also lived in the oceans and produced oxygen.

As more and more algae grew, enough oxygen was produced to support new life. In fact, all the animals and plants on Earth today evolved from these very early life forms.

**CYANOBACTERIA** are so small that if you turned 25 million people into cyanobacteria, you could fit them all into a tablespoon.



Take a deep breath in. Most of the oxygen in that breath comes from land-based plants. Take another deep breath. The oxygen in every second breath comes from marine algae. Not only do they produce half of the world's oxygen, marine algae make up four-fifths of the organic living matter on Earth.

So, there's a lot of them.

Some algae are so small you need a microscope to see them, but other kinds of algae are very large.

Now we're ready to meet the largest of all the marine algae. Can you guess what they are commonly known as?

**SEAWEED!**

# THE COLOUR OF SEAWEED



There are around 10,000 different types of seaweed. To tell them apart, we can group them into three main colours: green, brown and red.

The colour of seaweed relates to the light it **absorbs** and **reflects**, and how deep it grows. Most seaweeds are found in less than 30 metres of water, where there is a lot of light. But the deeper you go underwater, the less light there is.



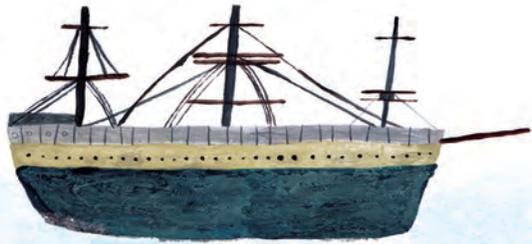
## TRAVELLING LIGHT

Light travels in waves, and each wavelength of light has a colour. Different wavelengths of light **penetrate** further into water than others.

Seaweeds absorb some wavelengths of light and reflect the rest. The colour you see when you look at seaweed is actually the colour of the light being reflected.



The record for the **DEEPEST SEAWEED** is a red seaweed that was growing 295 metres underwater. That's almost the length of six Olympic swimming pools (300 metres)!



Seaweeds that grow in shallow water absorb red light and reflect green light. These are the green seaweeds.

Seaweeds that can grow to around 30 metres underwater absorb blue and green light, and reflect yellow and red light. These are the brown seaweeds.

Blue wavelengths of light can travel much further through water than other wavelengths, such as red. Seaweeds that grow in deep water absorb blue light, some green light and reflect red light. These are the red seaweeds.

