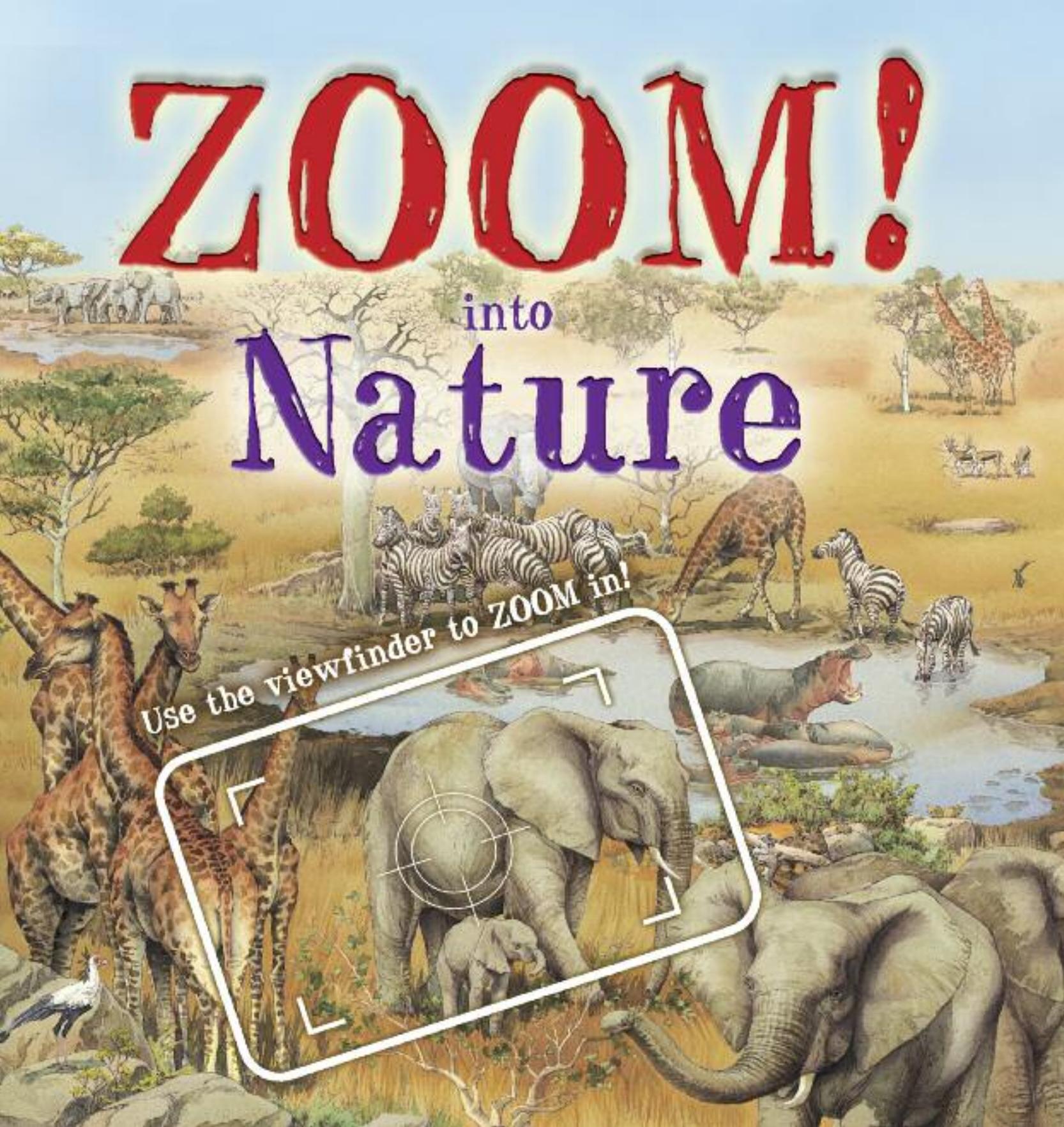


ZOOM!

into

Nature

Use the viewfinder to ZOOM in!



ZOOM!

into

Nature



 Orpheus

Let's zoom!

First published in 2012 by Orpheus Books Ltd.,
6 Church Green, Witney, Oxfordshire, OX28 4AW

Copyright © 2012 Orpheus Books Ltd.

Created and produced by Orpheus Books Ltd.

Text Nicholas Harris

Consultant Steve Parker, Scientific Fellow of the Zoological Society

Illustrated by Studio Inklink, Firenze

All rights reserved. No part of this book may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of the copyright owner.

ISBN 978 1 7418 3798 7

A CIP record for this book is available from the British Library

Printed and bound in Singapore



IMAGINE you are out in space looking down on Earth. Through your viewfinder you can see the whole globe. Now — zoom in. What can you see now? Seas, mountains, plains, deserts, forests, lakes... Train your viewfinder on a particularly spectacular part of the Earth's surface, The Great Rift Valley of East Africa, and

zoom in some more. You'll find yourself looking at an ancient volcanic landscape, set amid grassy plains. Keep zooming, and you will begin to see some of the inhabitants of this wild savannah landscape: elephants, giraffes, zebras, lions and many others.



Look for the viewfinder on each illustration. Then turn the page to see what you've zoomed in on next. It's like a grand tour of the living world, beginning

with planet Earth itself, then the habitats into which it is divided, the animal community, the plants on which the animals and insects ultimately depend for their food, the micro-organisms that play such a vital role in nature, and finally the chemical basis of life itself.





Earth

Our planet is one of eight major planets in the Solar System. Because of its position relative to the Sun, it is neither too hot nor too cold for the existence of liquid water, essential to life.

Earth's atmosphere consists mostly of nitrogen and oxygen. It is thin enough to let through sunlight but thick enough to block most of the harmful radiation from the Sun and to shield Earth from bombardment by meteorites, large, rocky objects from space. The atmosphere also acts like a blanket, keeping the planet at an almost even temperature.

Earth's crust, its rigid surface layer, is made of several slabs, called tectonic plates which fit together like the pieces of a jigsaw puzzle. The plates are always on the move, although only very gradually. Where they collide or rub together they cause earthquakes. Where they move apart, molten rock (magma) from the mantle, the layer beneath the crust, rises to the surface through volcanoes.

Earth is sometimes compared to a giant spaceship. It travels through space and everything that lives on it must depend on its resources for survival. Essentials, such as water and nutrients, are recycled in nature, for the benefit of all Earth's living things.

Great Rift Valley

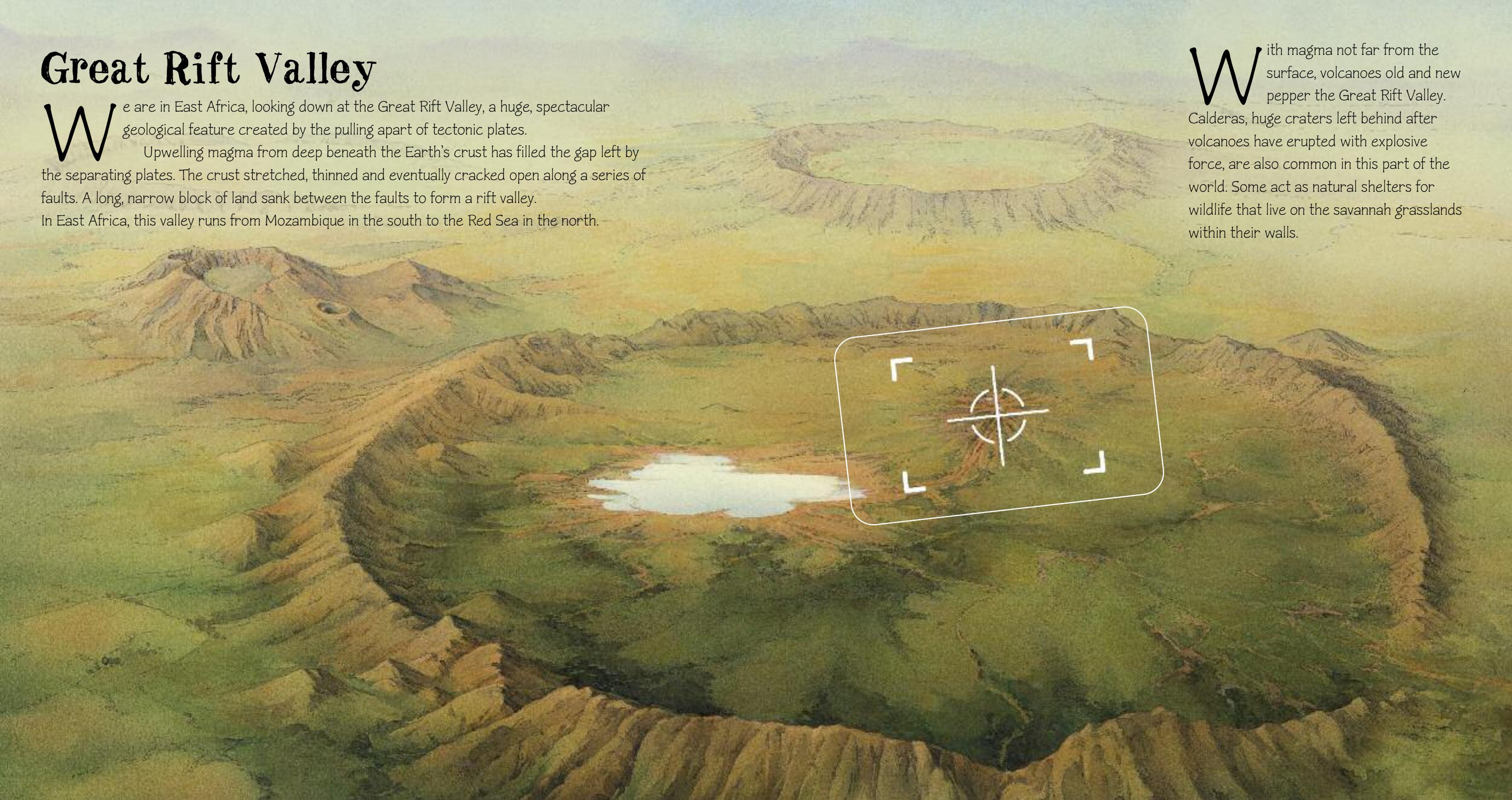
We are in East Africa, looking down at the Great Rift Valley, a huge, spectacular geological feature created by the pulling apart of tectonic plates.

Upwelling magma from deep beneath the Earth's crust has filled the gap left by the separating plates. The crust stretched, thinned and eventually cracked open along a series of faults. A long, narrow block of land sank between the faults to form a rift valley.

In East Africa, this valley runs from Mozambique in the south to the Red Sea in the north.

With magma not far from the surface, volcanoes old and new pepper the Great Rift Valley.

Calderas, huge craters left behind after volcanoes have erupted with explosive force, are also common in this part of the world. Some act as natural shelters for wildlife that live on the savannah grasslands within their walls.

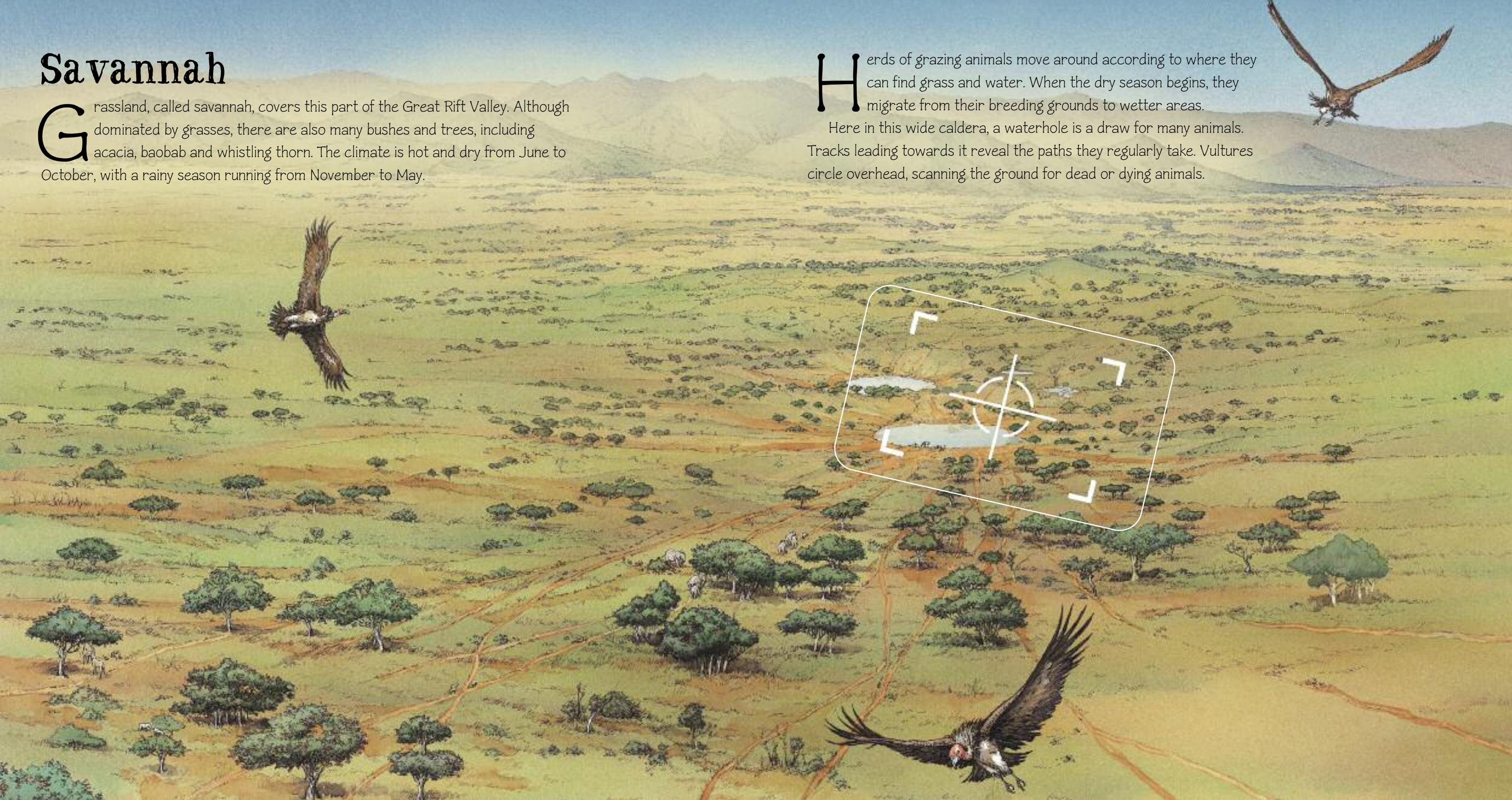


Savannah

Grassland, called savannah, covers this part of the Great Rift Valley. Although dominated by grasses, there are also many bushes and trees, including acacia, baobab and whistling thorn. The climate is hot and dry from June to October, with a rainy season running from November to May.

Herds of grazing animals move around according to where they can find grass and water. When the dry season begins, they migrate from their breeding grounds to wetter areas.

Here in this wide caldera, a waterhole is a draw for many animals. Tracks leading towards it reveal the paths they regularly take. Vultures circle overhead, scanning the ground for dead or dying animals.





Lion

Marabou stork

Giraffe

Rhinoceros

Zebra

Hippopotamus

Elephant

Animals

The savannah grasslands of East Africa are home to a wide range of plant-eating animals. The grazers — those animals that feed on grass — include zebras, who eat the coarse tops, and gazelles, who crop the shoots close to the ground. Among the leaf-eaters are giraffes, who feed from the tops of trees, and elephants who take leaves (and bark) from lower down. Rhinoceroses feed on small shrubs and plants.

The savannah's meat-eating animals prey on the plant-eaters. Lions catch their victims usually by hunting together. They make short bursts from the cover of long grass or bushes. Scavengers, including storks, vultures and hyenas (who also make their own kills) feed on the carcasses left behind by lions and others.

Small animals

The savannah is home to many smaller creatures as well as the well-known large animals. Banded mongooses, about 50 cm long, hunt lizards, mice, insects and other small prey. Mongoose packs may travel many kilometres a day in search of food during the dry season.

Other small savannah mammals include the rock hyrax, a distant relative of the elephant. It feeds mainly on grass. Male hyraxes leave their family groups to seek a mate. They may have to travel several kilometres over the plains, where they are vulnerable to attack from hungry eagles, leopards, lions, hyenas, jackals and snakes.



Banded mongoose

Rock hyrax

Rainbow lizards



The colourful flower petals, strong scent and presence of a sugary liquid called nectar all attract butterflies and bees to the plants. As they feed, they pick up sticky pollen grains which brush off at the next flower they visit, so enabling the plants to reproduce.

Plants and flowers

Growing among the savannah grasses are certain other plants and flowers that are exactly suited to a climate where it is dry for half the year. They grow well in the rich soil, made fertile by the weathering of volcanic rock found everywhere in the Great Rift Valley.

Insects

Insects are important members of the savannah community. Butterflies and bees help spread pollen, allowing plants to reproduce. Other insects play their part in decomposing dead plants and animals and recycling nutrients for other living things to take up. Termites carry dead plant matter into their nests, where they grow fungus on it to eat. Dung beetles remove animal waste and use it both for food and for laying their eggs in.

Ants are social insects: they live in large groups, known as "colonies" in which each individual plays a part to benefit the rest. Worker ants are females. Among their tasks are tending to the eggs and larvae, and foraging for food to pass on to the other ants.



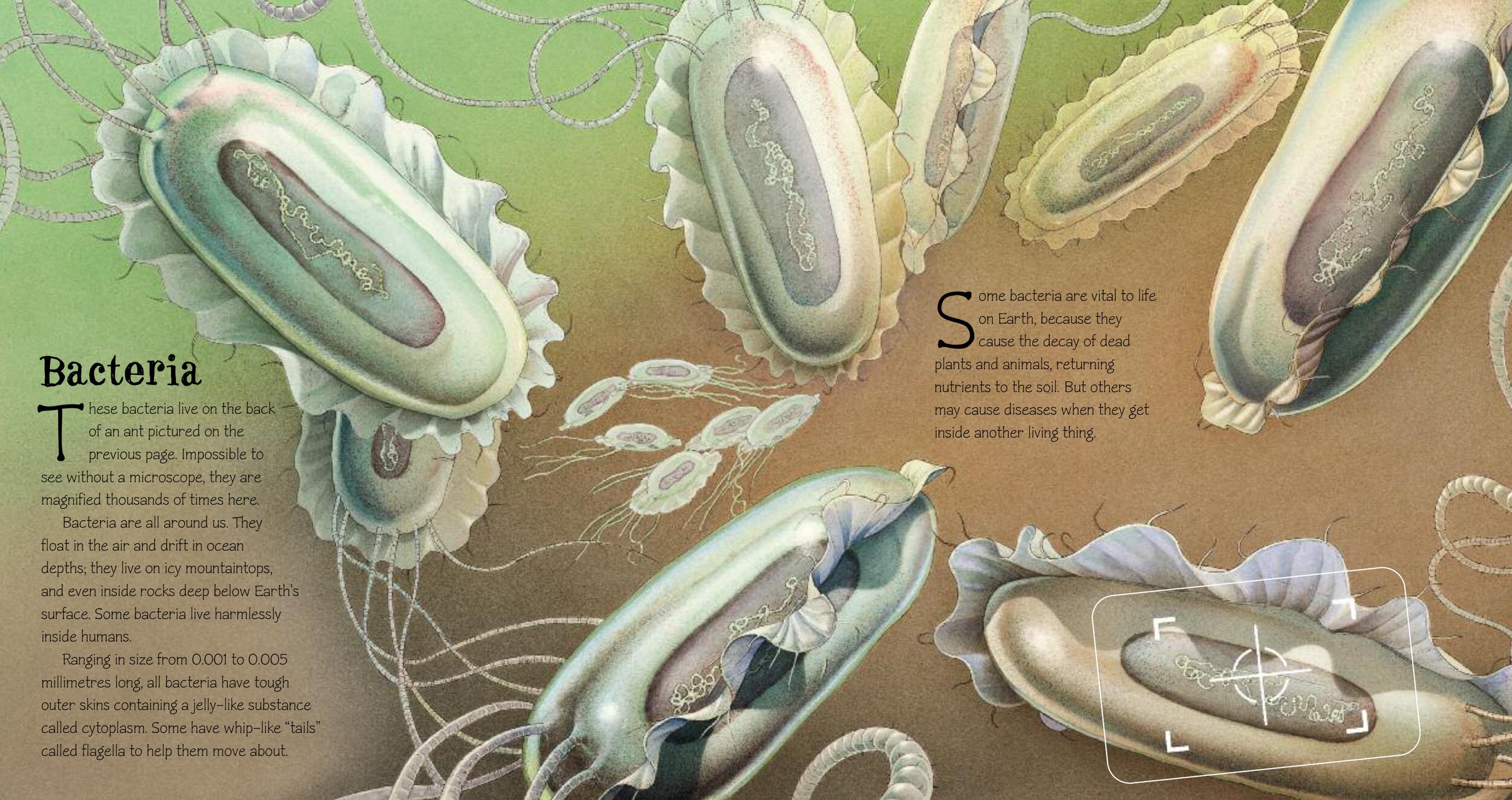
Bacteria

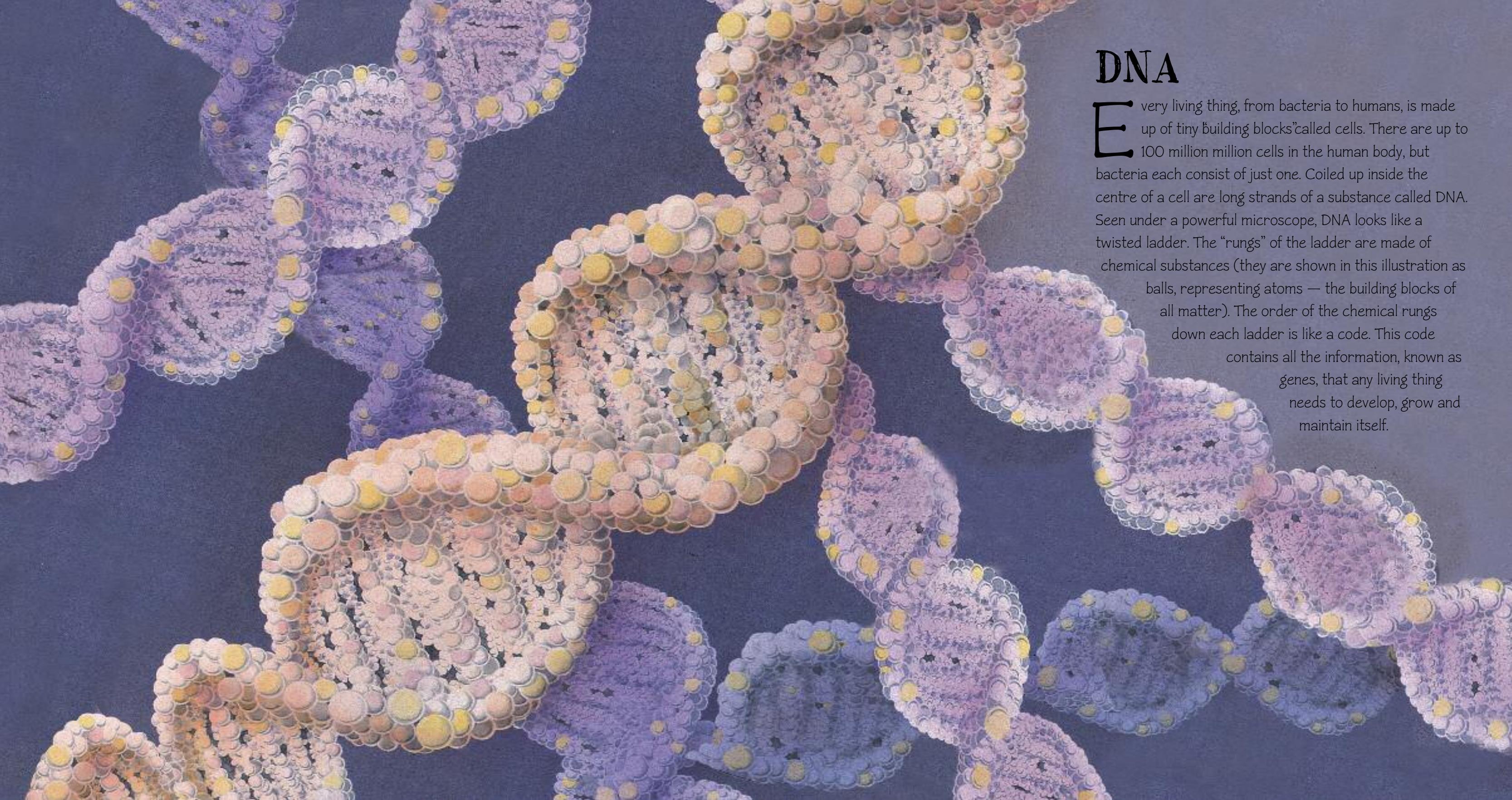
These bacteria live on the back of an ant pictured on the previous page. Impossible to see without a microscope, they are magnified thousands of times here.

Bacteria are all around us. They float in the air and drift in ocean depths; they live on icy mountaintops, and even inside rocks deep below Earth's surface. Some bacteria live harmlessly inside humans.

Ranging in size from 0.001 to 0.005 millimetres long, all bacteria have tough outer skins containing a jelly-like substance called cytoplasm. Some have whip-like "tails" called flagella to help them move about.

Some bacteria are vital to life on Earth, because they cause the decay of dead plants and animals, returning nutrients to the soil. But others may cause diseases when they get inside another living thing.





DNA

Every living thing, from bacteria to humans, is made up of tiny "building blocks" called cells. There are up to 100 million million cells in the human body, but bacteria each consist of just one. Coiled up inside the centre of a cell are long strands of a substance called DNA. Seen under a powerful microscope, DNA looks like a twisted ladder. The "rungs" of the ladder are made of chemical substances (they are shown in this illustration as balls, representing atoms — the building blocks of all matter). The order of the chemical rungs down each ladder is like a code. This code contains all the information, known as genes, that any living thing needs to develop, grow and maintain itself.

Glossary

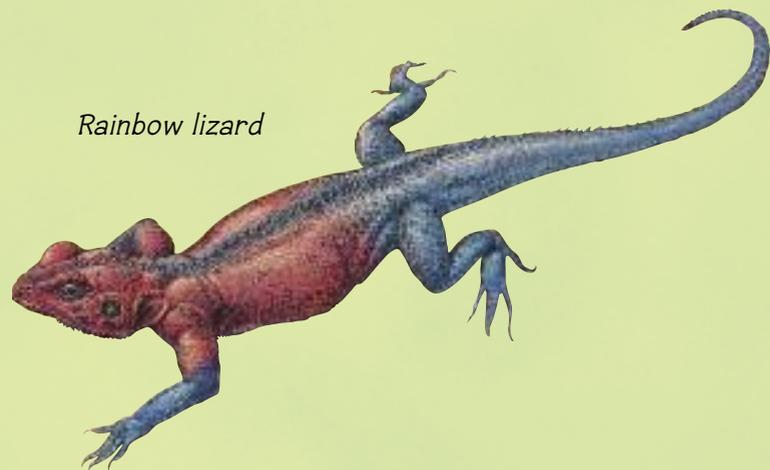
Adaptation The process whereby living things change their bodies or behaviour, the better to suit their environment.

Algae Plants without true stems, roots and leaves, found in water or moist ground. They include tiny, often single-celled plants known as phytoplankton.

Arthropods Animals with hard external skeletons and pairs of jointed legs. They include insects, crustaceans, spiders and millipedes.

Atmosphere The envelope of gases that surrounds a planet, moon or star.

Bacteria Tiny organisms made up of only one cell. Some live inside other organisms. Some types cause disease. Bacteria play a vital role in recycling nutrients in the soil.



Rainbow lizard



Swallowtail butterfly

Biome A large group of habitats that are generally similar to one another.

Biosphere The living world.

Caldera A round basin formed after a violent volcanic eruption during which the volcano collapses in upon itself.

Cell A tiny building block which makes up all the tissues in all living things.

Climate The pattern of weather in a particular region of the world over a long period of time.

Conservation The management and care of the biosphere, to avoid imbalances caused by habitat destruction and extinction.

Crust The thin, rocky outer layer of the Earth.

Food chain The sequence in which a plant is eaten by an animal, which is then eaten by another animal, and so on. Because animals eat more than one kind of food, food chains are part of more complex food webs.

Fungi Living things, such as mushrooms, that feed on rotting plant and animal material and reproduce by shedding spores.

Habitat The type of surroundings in which a plant or animal lives.

Invertebrates Animals without backbones.

Magma Hot melted, or molten, rock, that is formed beneath the Earth's crust.

Mantle The layer of the Earth that lies beneath the crust and the core, its innermost portion.

Migration The movement of a population of animals from one place to another at a certain time of year to feed or breed.

Nutrients Substances needed to maintain an organism's bodily activity and new growth.

Organism Any living thing.



Aardvark

Photosynthesis The process by which plants use sunlight as an energy source to turn carbon dioxide and water into the sugars they need for food.

Pollen Microscopic grains that are produced in the male part of a flower and transferred to the female part of another (or the same) flower during pollination.

Protist An organism that is made up of a single cell containing a nucleus.



Mandrill

Rift valley A valley formed by the sinking of land between parallel faults.

Savannah Tropical grasslands with scattered trees and bushes.

Tectonic plates The large slabs into which Earth's surface is divided. The plates move relative to one another.

Weathering The action of rain, wind, heat or frost on decaying or disintegrating rocks.

Vertebrates Animals with backbones.

