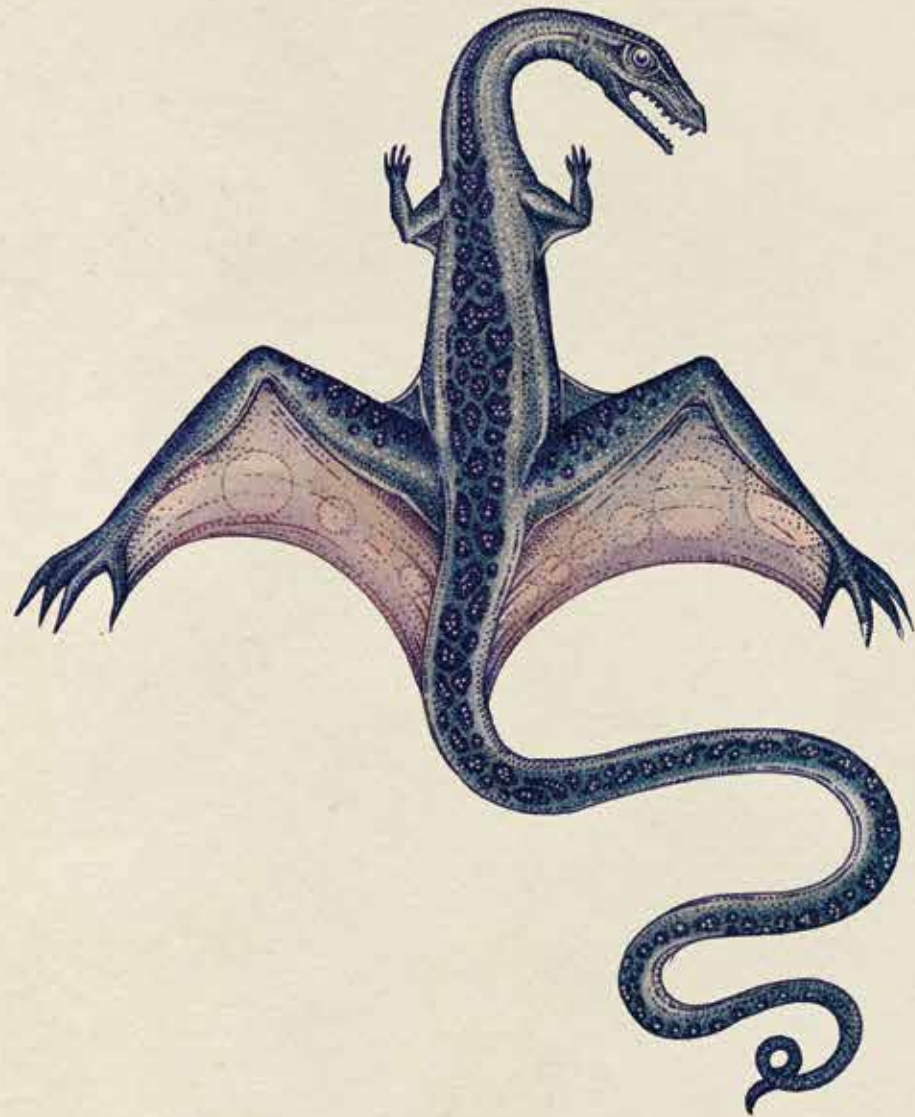


THE STORY OF LIFE

Entrance



Planet Earth was formed about 4.5 billion years ago in a swirl of dust and rocks left over from the Big Bang. It was another 500 million years before the first life forms appeared. In fact, there were no plants or animals on Earth for around 90 per cent of its history.

When Earth first formed it was a hot, rocky planet, with no life at all. Violent volcanic eruptions created the atmosphere and oceans as the Earth gradually cooled. Since then, the planet has changed beyond recognition: continents have shifted; global temperatures have risen and dropped; and over time the right conditions for life have developed.

Life as we know it today is the product of millions of years of evolution. Our human ancestors first appeared around 200,000 years ago. This means that humans have been here for just 0.0004 per cent of the planet's history.

Precambrian Period: First Life

The Precambrian is the name given to the first time period on Earth. During the billions of years of the Precambrian, the Earth formed and cooled. Volcanoes belched out gases, rocks formed from volcanic lava and the oceans condensed from atmospheric vapour. It is thought that life first appeared in these mineral rich waters as simple chemicals spewed through vents in the Earth's crust under the oceans, and reacted with one another to form more complex compounds.

Some of these molecules then combined and developed the ability to copy themselves, using the complex chemicals DNA, RNA and proteins – the building blocks of life. The next step was the protection of these chemicals with a membrane to form the first simple organisms.

The very earliest of these were single-celled organisms called prokaryotes – cells that do not have a nucleus (control centre) or any other subunits. Instead, all of their component chemicals float together, protected by the cell wall. It is thought that all life on Earth evolved from one such single cell, referred to as the Last Universal Common Ancestor (LUCA). This probably lived around 3.8 billion years ago.

Key to plate

1: RNA (ribonucleic acid)

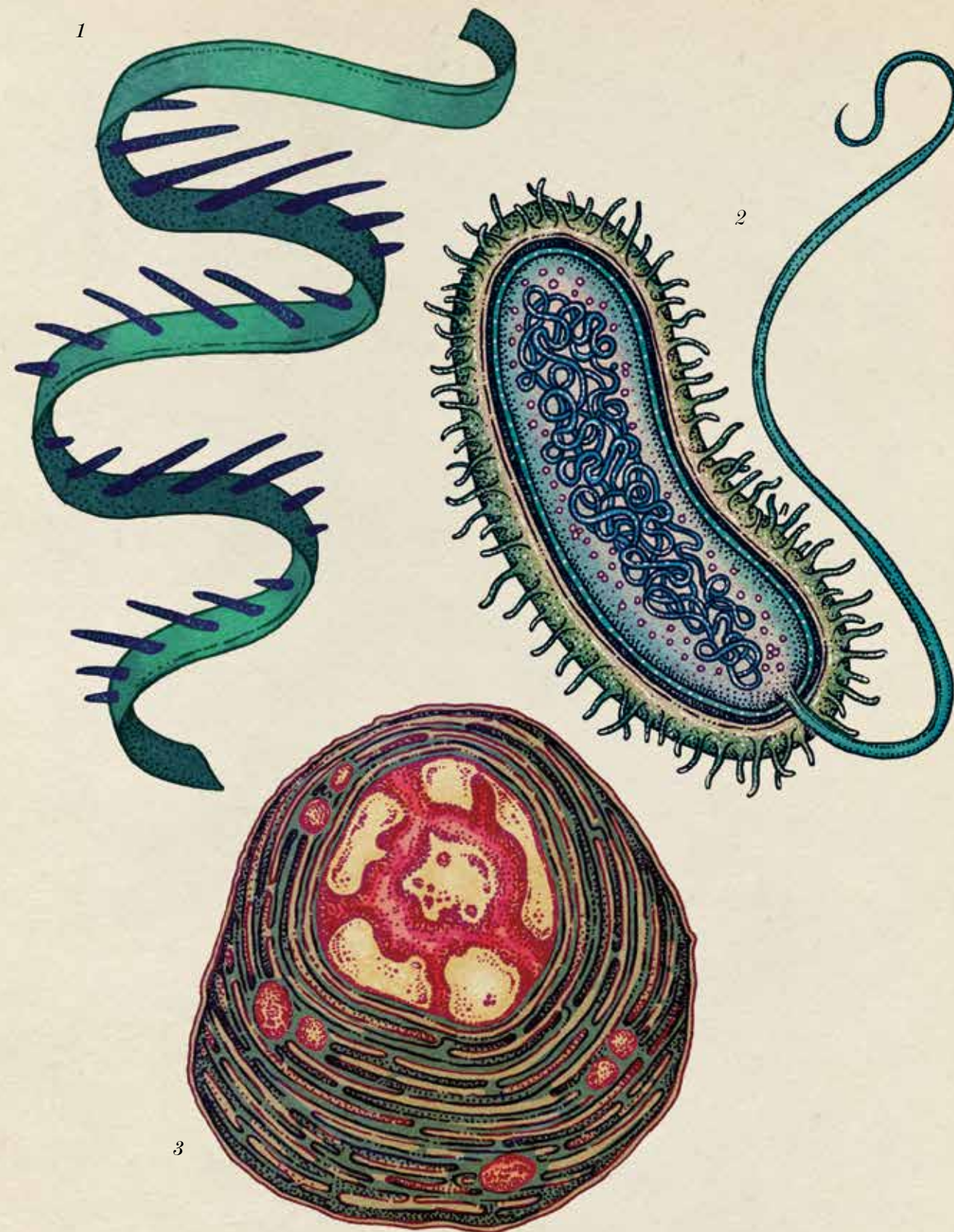
Length: Less than 0.001 micrometres
RNA is present in all living cells and takes the form of a chain of molecules.

2: Prokaryote

Length: 0.1 – 5.0 micrometres
The cell's tail-like flagellum enables it to move. The cell wall is lined with frondlike pili.

3: LUCA

Last Universal Common Ancestor
The cell that links all life on Earth



Devonian Period: the Age of Fish

The Devonian Period is also known as the Age of Fish, as several important species developed at this time. Among the biggest predators were armoured placoderms, such as *Dunkleosteus*, with powerful jaws and bladelike plates that acted as teeth. Some species grew up to 10 metres long and they were the dominant predators of the Devonian seas.

By this time, two other major groups of fish had become established: the bony fish and the cartilaginous fish. The cartilaginous fish had skeletons made of cartilage instead of hard bone. These ancestors of modern sharks and rays included the distinctive *Stethacanthus*, an early shark with an iron-shaped dorsal fin and a cluster of spiky 'scales' on its head. The bony fish were themselves split into two types; the ray-finned fish and the lobe-finned fish. The ray-finned fish, named after the thin bones supporting their fins, gave rise to most modern-day fish. Meanwhile, the lobe-fins, named after the thick, fleshy base to their fins, are thought to be the ancestors of all tetrapods – four-limbed land vertebrates, including dinosaurs, reptiles, amphibians, birds and mammals.

Key to plate

1: *Dunkleosteus*
Length: 10m
A placoderm

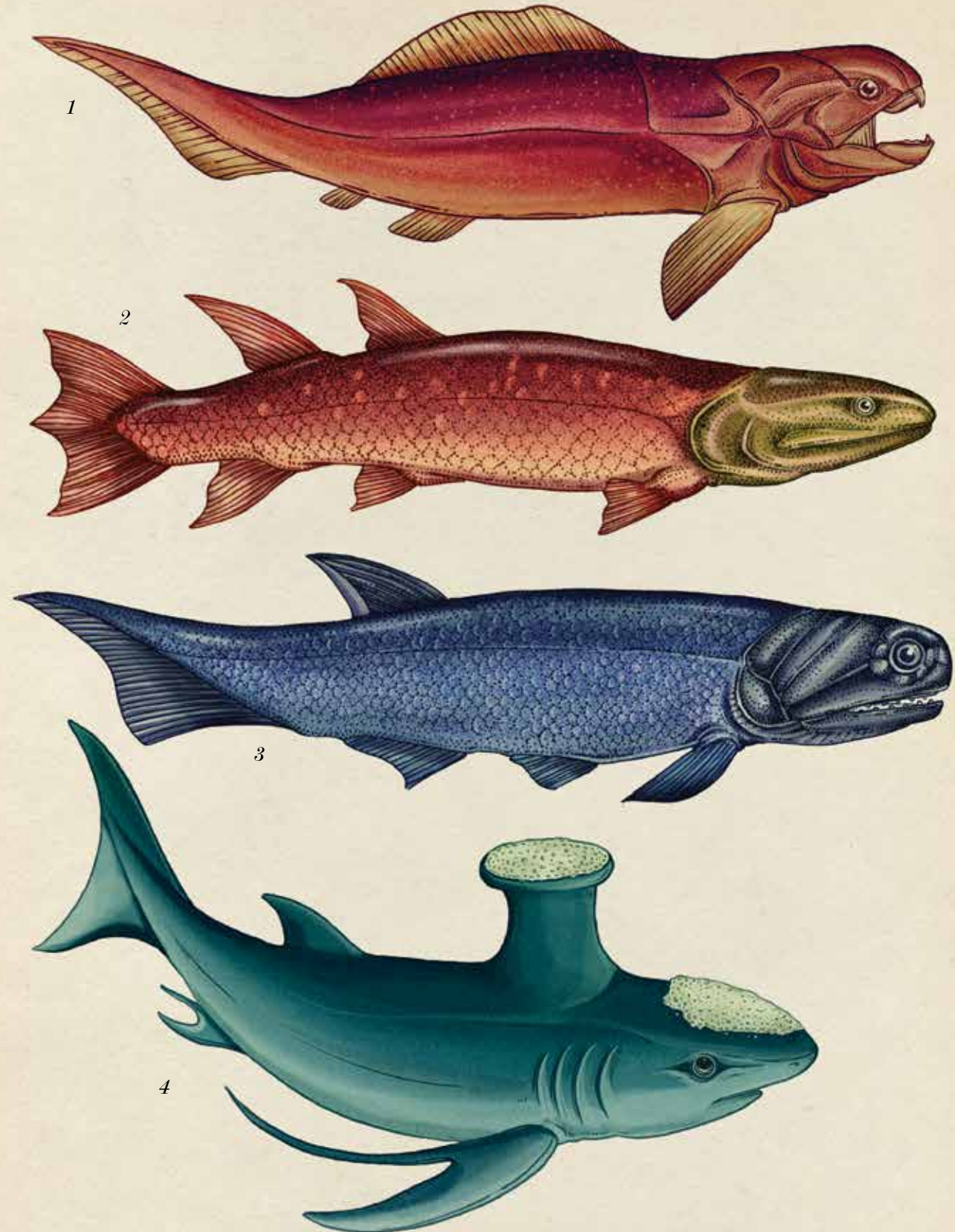
2: *Eusthenopteron*
Length: 1.8m

Lobe-finned fish and
close to the ancestor
of land animals

3: *Cheirolepis*
Length: Up to 50cm

Primitive ray-finned fish

4: *Stethacanthus*
Length: 70cm
An early shark with an iron-
shaped dorsal fin



CRETACEOUS
145 mya – 65 mya

Tyrannosaurus rex

Tyrannosaurus rex belonged to a group of dinosaurs called the theropods, which was almost entirely made up of meat-eaters. Some theropods reached enormous sizes during the Cretaceous, and *Tyrannosaurus rex* was one of the largest ever to walk the Earth.

This huge predator had long legs, a powerful tail and two small arms. Its strong jaws and long serrated teeth were perfect for slicing through flesh. Like modern-day predators, *Tyrannosaurus rex* had forward-facing eyes, which would have given it excellent depth perception.

Key to plate

1: *Tyrannosaurus rex*
Length: 12m
Late Cretaceous predator

Tyrannosaurus rex whose name means 'tyrant lizard king' was one of the largest theropods, but was still smaller than the enormous meat-eaters *Giganotosaurus* or *Spinosaurus*.

