extracts from

100 Things to Know About Science

Written by various contributors

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3 All life on Earth...

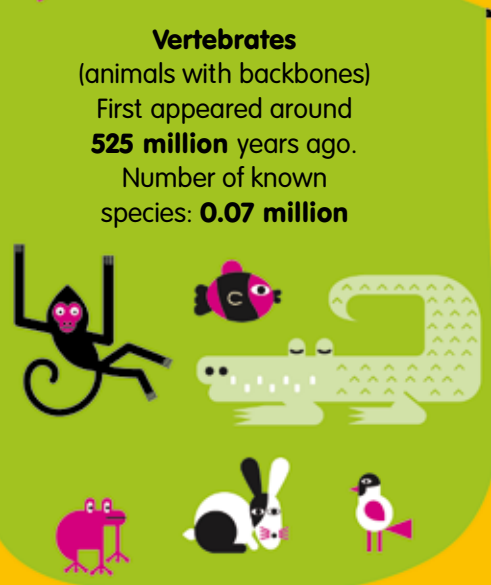
can be traced back to the same starting point.

Scientists classify living things into different groups called **kingdoms**, shown here in capitals. These all evolved from one original kingdom, a group of organisms known as **prokaryotes**.

ANIMALS
First appeared about **580 million** years ago.

Invertebrates
(animals without backbones)
The oldest types of animals.
Number of known species: **1.2 million**

Vertebrates
(animals with backbones)
First appeared around **525 million** years ago.
Number of known species: **0.07 million**



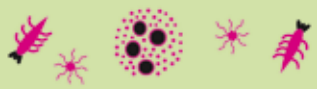
PLANTS
First appeared about **480 million** years ago.

Number of known species: **0.3 million**

FUNGI
First appeared about **1,500 million** years ago.

Number of known species: **0.05 million**

PROTISTA
(very small living things such as algae and plankton)
First appeared about **1.7 billion** years ago.



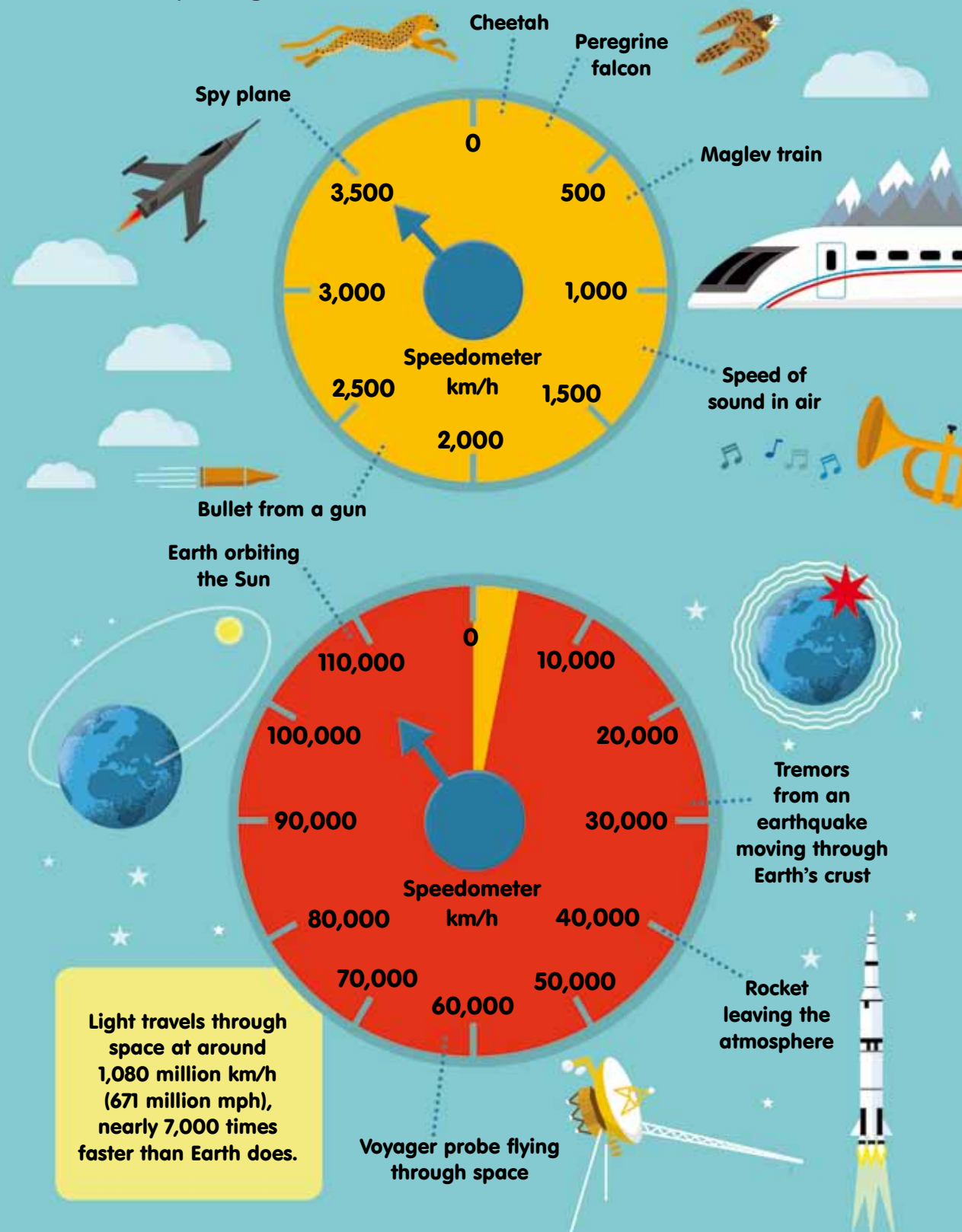
Number of known species: **0.03 million**

PROKARYOTES
(incredibly tiny creatures such as simple bacteria)

Prokaryotes first appeared about **3.8 billion** years ago.
Total number of species: **unknown**

4 The Earth moves faster...

than anything on Earth.



46 Honey bees...

help feed the planet.

Bees transfer pollen from flower to flower as they gather nectar. This is called **pollination**.

This enables plants to reproduce by making **seeds** and **fruit**.

The work done by bees every year is worth **hundreds of billions** of dollars.

One bee colony (40,000-60,000 bees) can pollinate up to **300 million** flowers per day.

As much as 25% of all the food we eat depends on pollination by honey bees.

Global honey bee populations have fallen rapidly in recent years. Nobody knows exactly why...

Honey bees pollinate more than 100 different food crops.

40 kinds of vegetable

50 kinds of fruit

15 kinds of nuts and seeds

Honey bees also pollinate coffee and cotton plants.

47 The deepest ocean is deeper...

than the highest mountain is high.

Sunlight Zone 0-200m (650ft)

Twilight Zone 200-1,000m (650-3,300ft)

US Navy diver
Deepest diving human
610m (2,000ft)

Midnight Zone
1,000-4,000m (3,300-13,000ft)

Emperor penguin
Deepest diving bird
565m (1,850ft)

Cuvier's beaked whale
Deepest diving mammal
2,900m (9,500ft)

Abyssal Zone
4,000-6,000m (13,000-19,700ft)

Mount Everest, the highest mountain, is **8,848m (29,029ft)** above sea level. If it was turned upside down, it wouldn't reach the very bottom of the ocean.

Hadal Zone
Below 6,000m (19,700ft)

Dumbo octopus
Deepest living octopus
7,000m (23,000ft)

Snailfish
Deepest known fish
7,700m (25,000ft)

Pressure at the deepest point:
1,000kg per cm² (14,200lbs per inch²)

Challenger Deep, Pacific Ocean
Deepest place on Earth
10,994m (36,069ft)

86 A Victorian scientist...

designed a mechanical, steam-powered computer.

The first-ever programmable computer, called the Analytical Engine, was designed by English scientist Charles Babbage in the 19th century. Sadly, it was never completed.

The plans for the Analytical Engine called for tens of thousands of metal cogs, wheels, nuts and bolts, combining to make a machine over **4m (13ft) tall** and **6m (20ft) long**.

The Engine would have been able to solve complex mathematical equations. Like modern computers, it had separate **processing** and **memory** units, and ways of entering **data** and printing results.

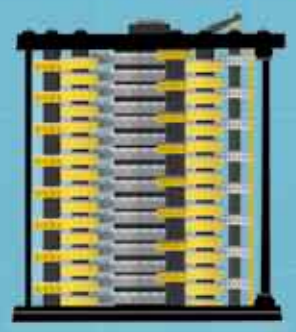
What was it for?

Astronomers, **navigators** and **engineers** relied on books of mathematical tables. But the tables were calculated by hand, and were full of errors. The Analytical Engine would have made these calculations more quickly and accurately.

Babbage only built part of the Engine during his lifetime. He was still perfecting the design when he died.

This illustration shows part of the plan of the Analytical Engine, as seen from above.

Seen from the side, the Analytical Engine might have looked something like this.



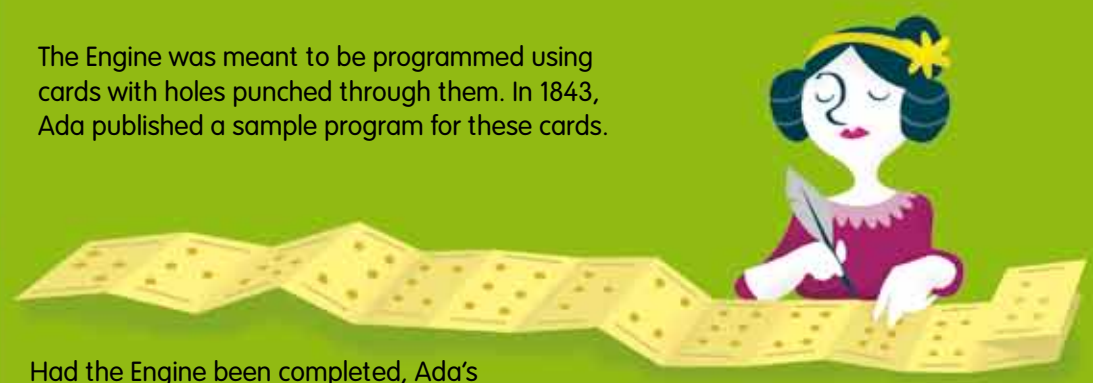
A **steam engine** would have been used to turn the machine's heavy columns of interlocking gears and wheels.

87 The first computer programmer...

was an English countess.

Augusta Ada King, Countess of Lovelace, was a keen amateur scientist. She quickly grasped the potential of the Analytical Engine.

The Engine was meant to be programmed using cards with holes punched through them. In 1843, Ada published a sample program for these cards.



Had the Engine been completed, Ada's program would have enabled it to calculate a famously complex series of numbers known as the **Bernoulli numbers**.

This is widely considered to be the first ever computer program.