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时间背后的故事

伊丽莎白·劳姆

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THE STORY BEHIND
TIME

时间背后的故事

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时间的起点

The beginning of time

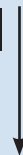


▲ 这位地质学家通过测量阿根廷安第斯山脉高端恐龙的足迹，来了解地球过去。

This geologist learns about Earth's past by measuring dinosaur footprints high in the Andes Mountains of Argentina.

137000亿年前

“时间的开端”出现。The “dawn of time” occurs.



14,000 BILLION YEARS AGO (BYA)

时间是衡量过去、现在和未来的一种方式。我们可以区分白天与黑夜，冬天与夏天，年轻与年老。大部分人都知道自己的确切年龄，但是我们怎样知道地球的年龄呢？

Time is a way to measure the past, the present, and the future. We can tell day from night, winter from summer, and young from old. Most people know their exact age. But how do we know the age of Earth itself?

地球有多大年纪了

地质学家把地球的历史划分为不同的“代”和“纪”（见第七页的图表），他们是通过研究岩石和动植物化石做出这样的划分的。最早的时代称为前寒武纪，这是一个非常久远的时代，那时地球上几乎没有任何植物或动物。

How old is Earth

Scientists, called geologists, have divided Earth's history into time periods called eras (see chart on page seven). These scientists made their decisions by studying rocks and the fossils (remains) of plants and animals. The earliest era is called the Precambrian Era. This was a long time ago. During almost all of this era there were no plants or animals living on Earth.

45000亿年前—5.44亿年前

前寒武纪的开始与
结束。 The Precambrian Era
begins and ends.

4,000 BYA

观念转变 Ideas change



17世纪，人们认为地球诞生于公元前4004年，那样的话地球大约就是5600岁。18世纪初，一位法国科学家认为地球至少有75000岁。今天，地质学家通过研究岩石和化石获知地球已经有好几百亿岁了。

In the 1600s, people believed that Earth was created in 4004 BCE. That would have made it about 5,600 years old at the time. In the 1700s, a French scientist believed that Earth was at least 75,000 years old. Today, geologists study rocks and fossils to learn Earth's age. Scientists now know that Earth is billions of years old.

地质学家们认为地球上最早的和植物出现在古生代。那时，水里生活着各种各样的鱼，陆地上生长着参天大树等各种植物。中生代是恐龙的时代，鳄鱼、鸟类、蛇类以及早期的哺乳动物也生活在那个时代。直到新生代，许多今天常见的动物和植物才开始出现在地球上。现在，科学家认为人类已经在地球上生活了180万年。

Geologists believe that the earliest animal and plant life began on Earth during the Paleozoic Era. Fish of various kinds lived in the water. Plants, including large trees, grew on land. The Mesozoic Era was the time of dinosaurs. Crocodiles, birds, snakes, and early mammals also lived at that time. It was not until the Cenozoic Era that many of the plants and animals common today began to appear on Earth. Scientists now believe that humans have lived on Earth for about 1.8 million years.

▶ 这张图表显示了地质时间的历史（BYA的意思是“十亿年以前”，MYA意思是“百万年以前”。）

This chart shows the history of geologic time. (bya means “billion years ago”. mya means “million years ago”).

5.44亿年前—2.45亿年前

古生代的开始和结束。
The Paleozoic Era begins and ends.

2.45亿年前—6500万年前

中生代的开始和结束。
The Mesozoic Era begins and ends.

代 Era	特征 Characteristics
时间的开端 (137000亿年前) Dawn of time (13,700 BYA)	宇宙形成 The universe is formed.
前寒武纪 (45000亿年前—5.44亿年前) Precambrian (4,500 BYA–544 MYA)	地球形成。大气层（地球周围的气体）含有有毒气体，气候（天气状况）非常寒冷，遍布冰川（巨大的冰），仅有非常原始的植物和动物形式。 Earth is formed. There are poisonous gases in the atmosphere (the air surrounding Earth) There is a cold climate (weather conditions) with glaciers (large masses of ice). The first, very simple plants and animals form.
古生代 (5.44亿年前—2.45亿年前) Paleozoic (544-245 BYA)	无颌鱼类、被称为三叶虫的硬壳生物、第一批陆地植物、早期的蜘蛛，以及有骨头的鱼开始出现。同时还有第一批鲨鱼、爬行动物和昆虫（有些是有翅膀的）活动的迹象，针叶树也出现在这时。 There are jawless fish, hard-shelled creatures called trilobites, the first land plants, early spiders, and fish with bones. There are the first signs of sharks, reptiles, and insects (some with wings). There are cone-bearing trees.
中生代 (2.45亿年前—6500万年前) Mesozoic (245-65 BYA)	恐龙、鳄鱼、海生爬行类、海龟、哺乳动物、鸟类、螃蟹、蛙类和蜥蜴都生活在这个时代。 There are dinosaurs, crocodiles, marine reptiles, turtles, mammals, birds, crabs, frogs, and salamanders.
新生代 (6500万年前—现在) Cenozoic (65mya–today)	恐龙消失。开花植物、小型哺乳动物、树、第一批草、骆驼、猫、狗、马以及啮齿目动物出现。智人（现代人）出现。 Dinosaurs disappear. There is an increase in types of flowering plants, small mammals, trees, first grasses, camels, cats, dogs, horses, and rodents. Homo sapiens (modern humans) appear.

6500万年前

新生代开始，并持续到现在。

The Cenozoic Era begins. It continues to the present day.

180万年前

人类出现。 Human beings appear.

200 MYA

100 MYA

0 MYA

生物钟

Biological clocks





一些工作需要夜间进行，适应新的时间表是很困难的。
Some jobs require people to work at night. It is difficult to adjust to a new schedule.

从地球上开始计时起，人类就有了辨别时间的特殊方法。人体内具有生物钟，它会告诉人们什么时候睡觉、什么时候吃饭。科学家发现，人的大脑中有一小群细胞会告诉肌体什么时候该做什么事，这些细胞辅助控制呼吸、体温，它们告诉心脏如何按正常的节奏和方式搏动。人的脖子或手腕的脉搏就是一种生物钟。

From the beginning of their time on Earth, humans have had special ways of telling time. These built-in clocks are called biological clocks. They tell humans when to sleep and when to eat. Scientists have discovered a tiny clump of cells in the human brain that tells the body what to do when. These cells help control breathing, temperature, and other things. They tell the heart to beat in a regular rhythm or pattern. The pulse at a person's neck or wrist is a body clock.

人的一天 A human day



人的一生大约有三分之一的时间在睡觉。美国马萨诸塞州哈佛大学的科学家们研究人类的体温发现，人类体温的升高或降低存在一个规律性的模式，这个模式每24小时11分钟重复一次，科学家们把这个模式称为一天。不管人们睡觉还是清醒，这个模式一直这样进行着。

Humans spend about one-third of their lives sleeping. Scientists at Harvard University in Massachusetts, USA, studied people's body temperature. People's body temperature rose and fell over time in a regular pattern. The pattern repeated itself every 24 hours and 11 minutes. Scientists called this pattern a day. This happened no matter when people went to bed or woke up.

▼ 即使人们有着健康的饮食、良好的锻炼，他们仍然会变老。
Even if people eat well and exercise, they will still grow old.





有关体温的一些事

人的体温在早晨五点左右最低。起床时，体温就升高了，胃开始准备消化我们很快就要吃的早餐。然后，体温会继续升高，直到午饭后才慢慢降下来。到了晚上七八点左右，它又会再次升高。

科学家们持续研究人类大脑，以获得更多有关生物钟的知识。他们希望找到改善健康状况和保障安全的方式。

Temperature matters

Human body temperature is lowest around 5 o'clock in the morning. As people wake up, their temperature rises. The stomach prepares to digest the food that will soon be eaten at breakfast. Body temperature continues to rise until just after lunch. Then it drops slightly. It rises again until about 7 or 8 o'clock at night.

Scientists continue to study the human brain to learn more about the biological clock. They hope to discover ways to improve health and safety.

◀ 夜间睡眠不足的孩子在学校时可能会睡觉，或者太累而无法集中精力学习。

Children who do not get enough sleep at night may fall asleep in school or be too tired to learn.

失眠

超过半数的成年人说，他们每周至少有几个晚上会有睡眠问题，小学生偶尔也会有类似的问题。有些孩子每天晚上需要睡眠10小时，甚至有些还需要更多。睡眠不足会使学习变得更加困难，也会导致小学生的行为变坏。

Losing sleep

Over half of all adults say they have trouble sleeping at least a few nights a week. Primary school pupils may have problems, too. Some children need a full 10 hours of sleep each night. Others need even more. Lack of sleep makes learning more difficult. It can also cause pupils' behaviour to worsen.

睡眠需求 Sleep needs



充足的睡眠对身体健康十分重要。随着人逐渐变老，睡眠需求随着年龄增长会有所改变。另外，有些人的睡眠时间比其他人要少一些。

Getting enough sleep is important for good health. Sleep needs change as a person gets older. Also, some people need less sleep than others.

年龄 Age	睡眠需求 Sleep needs
新生婴儿 Newborn babies	每天16—18小时 16–18 hours a day
学前儿童 Preschool children	每天10—12小时 10–12 hours a day
学生和青少年 School children and teens	每天9—10小时 9–10 hours a day
成年人 Adults	每天7—8小时 7–8 hours a day



你是怎么样的

医生指出，喝含有咖啡因（咖啡因是一种化学物质）的饮料会导致孩子睡眠减少。许多研究小孩看太多的电视会导致睡眠问题。大约一半的青少年有电视机，这是个好现象吗？你认为喝饮料或看电视会导致睡眠出现问题吗？

What about you?

Doctors suggest that drinking fizzy drinks with caffeine may cause some children to sleep less. (Caffeine is a chemical that keeps people awake.) Many sleep experts also believe that children who watch too much television may have trouble sleeping. About half of all school-aged children have a television in their bedroom. Is that a good idea? Do you think that drinking fizzy drinks or watching television causes sleep problems for you?

► 研究睡眠的科学家们正在给这个年轻女子做测试。传感器连着她的头，以便测量她的心率、眼动和脑波。

Scientists who study sleep are performing tests on this young woman. Sensors attached to her head measure her heart rate, eye movements, and brain waves.