**Worlds Beyond Earth**

Natalie Starkey

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| Time code | English | Translation |
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| 1:06 | The Moon was the perfect choice for our first voyage to another world, as it’s our closest neighbor, and the journey takes just a few days. | 月亮是我们首次探索外星世界理所当然的最佳选择。因为作为我们的近邻，抵达月球仅需短短几天的时间。 |
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| 1:26 | The twelve Apollo astronauts who walked across the lunar surface collected rock samples that helped us discover that the Moon formed from Earth itself, during a collision with an object the size of Mars, four-and-a-half billion years ago. | 十二名曾在月球表面行走的阿波罗宇航员收集了许多岩石样本，让我们了解到月球原本起源于地球，而它的形成是来自四十五亿年前地球受到一颗体积与火星相近星体的撞击。 |
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| 2:00 | Looking at the Moon on a clear night, you can see darker patches that are ancient lava flows, telling us the Moon was once volcanically active, just like Earth. | 如果在天朗气清的夜晚赏月，你能够看到月球上有深色的斑块，这是古老的溶岩流，使我们知道月球曾经也像地球一样，有许多活火山。 |
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| 2:13 | But those days are long gone! | 但是，时过境迁。 |
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| 2:17 | The craters littered across the lunar surface are the scars of impacts made by comets and asteroids over billions of years. They show us it’s been a long time since the Moon was a dynamic world. | 数十亿年来，因为彗星和小行星的撞击，月球表面已经布满了密密麻麻的陨石坑。这也就是说，月球上有地质活动已经是很久很久之前的事情了。 |
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| 2:35 | I’m Lupita Nyong’o and today we’re on a mission to explore worlds beyond Earth to find out if Earth is unique in the solar system or if there are other active, thriving…even habitable worlds out there.  | 我是Lupita Nyong’o，今天我们的任务是去探索地球之外的星球，去寻找太阳系中是否还存在和地球一样活跃的、欣欣向荣的，甚至是可居住的星球？  |
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| 3:15 | While humans haven’t physically travelled farther than the Moon, for decades we’ve been launching spacecraft to investigate the giant disk of objects orbiting the Sun.  | 虽然人类亲身去过最远地方的只到月球，但是几十年来，我们从未停止探索围绕太阳系的众多天体，持续发射探测器探索太阳系。  |
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| 3:29 | These robotic explorers are programmed to gather and send data back to Earth, allowing us to experience the wonder of these distant places from the safety of our home.  | 这些机器人探险家经过了编程，能够收集数据并发送回地球，让我们能够足不出户，在安全的家中便能感受这些遥远星球的奇妙。  |
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| 3:44 | The planets closest to the Sun were forged of rock and metal. Mercury, Venus, Earth and Mars. | 距离太阳最近的行星都是由岩石和金属锻造而成。水星、金星、地球和火星。 |
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| 3:59 | The asteroid belt contains millions of rocky remnants from the formation of the planets. Despite their number, if you squeezed all the asteroids into one object, it would have a mass less than our Moon. These asteroids mark the boundary between the inner and outer solar system. | 小行星带中包含了数百万颗行星形成过程中留下的岩石碎片。尽管这些岩石碎片数量巨大，但如果将小行星带的所有物质加在一起，其总质量比月球还小。这些小行星将太阳系分为了内太阳系和外太阳系。 |
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| 4:23 | Our largest worlds sit on the cold side of the asteroid belt. They have no solid surfaces. Jupiter, Saturn, Uranus and Neptune. | 太阳系较大的星球都位于小行星带的外侧。它们的表面不是固态的。木星、土星、天王星和海王星。 |
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| 4:39 | Past the orbits of the planets we enter the Kuiper Belt, home to millions of icy relics from the early solar system. Some will be knocked out of their orbits and become comets as they dive close to the Sun. But the largest among them are frozen worlds, including the dwarf planet Pluto. | 穿过这些行星的轨道，我们将进入柯伊伯带，这里有数百万个早期太阳系遗留下来的冰封物质。某些时候，其中一些冰封物质会受到撞击而离开自己的轨道，而当它们接近太阳时，就会成为彗星。但是这些冰封物质中较大的就是永冻星体，其中包括矮行星冥王星。 |
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| 5:07 | The outermost region of the solar system is the mysterious Oort cloud, with trillions of icy objects that are barely held by the gravity of the distant sun. | 太阳系最外层的区域是神秘的奥尔特云，它包含了数万亿个冰冻物质，由于距离太远了，几乎不受太阳引力的影响。 |
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| 5:23 | Gravity, which holds our solar system together, also ignited its birth. | 重力不仅将太阳系紧密凝聚在一起，也是太阳系形成的动力。 |
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| 5:34 | Four and a half billion years ago, gravity caused a giant interstellar cloud of gas, ice and dust to collapse in on itself. A star – our Sun -- was forged in the center, surrounded by a swirling disk of debris. Within this disk, a diverse set of objects formed – the planets, moons, comets and asteroids that populate our solar system. | 四十五亿年前，正是重力的作用引起了一场巨大的星际气体、冰和尘埃的自身崩塌。在旋转的碎片盘中央，形成了一颗恒星——就是我们太阳系的中心：太阳。在这个天体形成的盘中，各种各样的物体开始成形：行星、卫星、彗星和小行星。它们成为了我们太阳系的一部分。 |
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| 6:11 | This computer simulation shows how young planets form by gathering up material and carving out their orbits... | 这个电脑模拟画面向我们展示了年轻的行星在形成时如何凝集物质以及形成自己的轨道。 |
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| 6:28 | This theory of how our solar system came to be, is supported by observations of a similar process happening today in the rings that form a disk around Saturn. | 这个关于太阳系形成的理论，得到了我们观察到的土星盘圆环的形成过程的印证。 |
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| 6:43 | Saturn is the second largest planet in our solar system. It’s surrounded by a large family of moons, with even more on the way! | 土星是太阳系中的第二大行星。现在土星的周围已经有大量的卫星，以后还会有更多！ |
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| 7:09 | The Cassini spacecraft spent 13 years diving in and out of the Saturn system, capturing close-up images of its dynamic rings. | 卡西尼号探测器历时13年，持续在土星系中穿梭，捕获了活跃的土星行星环的近景图片。 |
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| 7:31 | This computer simulation based on Cassini’s data, shows moonlets – baby moons the size of houses – acting just like planets forming around a star. Most of these moons will break apart before maturing, but others could develop into unique worlds for future explorers to discover. Like Titan… | 这个电脑模拟画面所用数据均来自卡西尼飞船，我们能够看到许多房子大小的小卫星（小月球），它们与行星围着恒星的形成方式完全一样。大多数小卫星会在成熟前分崩，但是也有一些小卫星能够发展成独立的个体，静候探险者。例如土卫六 |
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| 8:30 | Titan is Saturn’s largest moon, bigger than the planet Mercury. | 土卫六是土星最大的卫星，比水星还要大。 |
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| 8:36 | On its grand tour of the outer solar system, the Voyager 1 spacecraft flew by Titan to discover a much thicker atmosphere than expected; a clue to the existence of an active world below. | 旅行者一号探测器在外太阳系的旅途中飞越了土卫六，发现其大气层的厚度远超预期——这意味着大气层之下可能有一个活跃的星球。 |
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| 8:52 | We were eager to see what lay beneath, so decades later we equipped the Cassini spacecraft with radar vision and the Huygens lander. | 我们对于土卫六充满了好奇，因此数十年后，我们为探索土卫六的卡西尼号探测器配备了雷达视觉和惠更斯号着陆器。 |
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| 9:30 | Titan’s surface was a shocking contrast to our own Moon’s cratered terrain! Huygens beamed home images that virtually transported us to an almost Earth-like world, 1.4 billion kilometers away. | 土卫六的表面十分平坦， 这与我们沟壑密布的月球表面形成了鲜明的对比。惠更斯号传回地球的影像将我们带到了14亿公里之外的这个与地球非常相似的星球。 |
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| 9:54 | Huygens found an active surface carved by wind and rain. But Titan is far too cold for liquid water, so rain here is made of methane; natural gas condensed to liquid, which evaporates from the surface to form clouds – just like water does on Earth.l | 一个历经风雨的活跃星球便跃然眼前。 但是土卫六的温度太低，水在这里无法保持液态。因此这里所谓的雨其实是甲烷雨；天然气凝结成液态，聚集在地表，而后蒸发到空中形成云，一切都如同地球上的水循环。 |
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| 10:22 | We were surprised to discover a moon so unlike our own. But nearly every mission we’ve launched into space has uncovered something unexpected -- including secrets buried deep inside these alien worlds. | 我们意外地发现了一颗与我们的月球迥然不同的卫星。但是几乎每一次的太空探索任务，我们都会有出乎意料的发现，包括一些深埋在外星世界中的谜团。 |
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| 10:49 | Take Saturn’s neighbor, Jupiter: a planet with a mass greater than all the others combined, with its own large family of moons. | 比如说土星的邻居木星，它是一个质量比另外七颗行星质量加起来还要重的行星，拥有一个庞大的卫星家族。 |
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| 11:01 | Scientists discovered that as these moons orbit Jupiter, they perform a rhythmic gravitational dance, pulling and tugging at one another. The interior of colorful Io is squashed and stretched by these forces, just as the tug of Earth’s Moon causes our ocean tides. | 科学家们发现，在这些卫星绕木星公转时，卫星与卫星之间也会由于引力而产生一些推搡和拉扯，仿佛是在跳舞一般。五彩斑斓的木卫一的内部受到这些引力的影响，被压扁伸展，就像地球的卫星月球引力使得我们有涨潮退潮。 |
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| 11:31 | The result is explosive! Heat from friction melts rocks inside Io, causing eruptions of lava plumes from the frosty surface. Io is the most volcanically active object in the solar system—an amazing world of fire and ice! | 而引力对木卫一的影响是极具爆破性的！摩擦产生的热量将木卫一内部的岩石融化，使得它布满冰霜的地表喷出熔岩柱。木卫一是太阳系形体中火山活动最频繁的星体，简直是冰与火的奇妙世界！ |
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| 11:58 | The effects of an active interior can extend well beyond a world’s surface. The Galileo spacecraft mapped a giant, invisible magnetic field around Jupiter. | 活跃的星体内部的影响力能远远超出星球的表面。伽利略号探测器在木星周围绘制了一个巨大的、看不见的磁场。 |
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| 12:13 | This magnetic field is generated by Jupiter’s hot insides, where liquid, metallic hydrogen churns around the planet's core. | 木星高温的内部产生了这种磁场，源于液态金属氢在木星的核心四周搅动。 |
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| 12:29 | Galileo also detected how the moon Europa distorts this magnetic field, revealing another Jupiter-family secret: a salty, liquid ocean beneath Europa’s icy crust. This alien sea contains more liquid water than in all the oceans on Earth!  | 伽利略号还探测到了木卫二如何改变这个磁场。这是又一次解密土星家族：木卫二冰冷的地壳下方是液态、富盐的海洋。这片外星球的海洋所蕴含的液态水比地球上所有海洋的总和还要多！  |
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| 13:10 | We’ve found many more Earth-like features out here on the cold side of the asteroid belt than most scientists predicted. Now let’s take a look closer to home.  | 出乎大多数科学家的预料，我们在寒冷的小行星带的外侧发现了许多与地球相似的特征。我们再看看离地球更近的地方吧。  |
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| 13:26 | To get there, we’ll have to fly to the warm side of the asteroid belt. Just like comets do when they get diverted out of their distant orbits. | 让我们穿过小行星带，由外侧到达较温暖的里侧。正如彗星从远轨道偏离时的路径。 |
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| 13:46 | The Rosetta spacecraft took 10 years to chase down its target, Comet 67P, a frozen object just a few kilometers in size. | 罗塞塔号探测器花了10年时间追踪其目标彗星67P，一个只有几公里大小的永冻物体。 |
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| 14:01 | As Rosetta closed in, its instruments went to work analyzing the comet, finding not only frozen water and rock dust, but organic matter, including amino acids – the basic building blocks of life! | 罗塞塔号接近67P时，其所载仪器开始分析该彗星，不仅发现有冰冻的水和岩尘，还发现氨基酸等有机物质，这些有机物质都是生命的基本组成部分！ |
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| 14:23 | Months later, as the comet got closer to the Sun, Rosetta saw how 67P’s ice was heated and transformed into gas that streamed off into space, carrying organic matter and dust grains with it. | 几个月后，随着彗星距太阳越来越近，罗塞塔看到了67P彗星上的冰是如何被加热并转化为气体的过程。该气体携带着有机物质和尘粒流向了太空。 |
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| 14:46 | We’ve seen the craters that comets like this one made on the surface of the Moon. Comets have also collided with Earth, and all the other planets, delivering potentially life-giving ingredients to these worlds. | 我们也看到了类似的彗星在月球表面制造了许许多多的彗星陨石坑。彗星也撞击了地球及其他行星，将可能孕育生命的物质传播到这些星球上。 |
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| 15:02 | But for these ingredients to nurture life, they need to be held in the right conditions; somewhere not too hot and not too cold, where liquid water is abundant. We find this environment in the Goldilocks Zone, nestled between Mercury, which is too hot, and the asteroid belt, where temperatures drop too low. It includes Venus, Earth and Mars. | 但是若想孕育生命，这些物质需要有适合的环境：不能太热、不能太冷以保证充足的液态水。我们发现了具有这种环境的“可居住区”，该区位于温度过高的水星和温度过低的小行星带之间。“可居住区”包括金星、地球和火星。 |
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| 15:38 | Our closest planetary neighbor, Venus, is a similar size to Earth and made of the same materials…we could almost call it Earth’s twin. Yet, in many ways, it couldn’t be more different. | 离我们最近的邻居——金星，与地球大小相似，组成材料也相同，几乎可以称为地球的双胞胎兄弟。然而，他们在很多方面又迥然不同的。 |
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| 15:54 | Venus’ slow rotation and the structure of its interior prevents the planet from generating a magnetic field. Without one, Venus is blasted by solar wind, which over billions of years has stripped the planet of its water, allowing carbon dioxide to build up in its atmosphere.  | 金星的转速缓慢，加之其内部结构，导致金星并没有产生自身的磁场。由于缺少磁场，在数十亿年间金星饱受太阳风的危害，导致现在金星上已经没有水分，其大气层中也积累了许多二氧化碳。  |
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| 16:29 | Equipped with radar vision, the Magellan spacecraft peered through Venus’ thick haze. It found a world strewn with volcanoes capable of feeding the atmosphere with water vapor and other gases. But all the carbon dioxide built up in its atmosphere trapped heat from the Sun, turning Venus into a greenhouse world with a surface hot enough to melt lead. | 装配有雷达视觉的麦哲伦号探测器穿过了金星上空的浓雾。麦哲伦号发现金星上火山密布，这些火山源源不断地向大气层中注入水蒸气和其他气体。但是在大气层积累的二氧化碳将金星变成了一个温室，吸收的阳光使其地表温度达到足以融化铅块的高温。 |
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| 17:04 | Going to Venus deepened our understanding of global warming. It showed us that pumping carbon dioxide into our own atmosphere leads to rising temperatures and threatens life on Earth.  | 对金星的认识加深了我们对全球变暖的理解。我们从金星了解到，如果我们向大气层中注入大量二氧化碳气体，就会导致温度升高，并危及地球上的生命。  |
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| 17:28 | Unlike Venus, our other close neighbor is freezing cold. We know a lot about Mars because we’ve sent dozens of orbiters, landers and rovers, to explore its atmosphere and surface.  | 我们的另一个近邻——火星，与金星截然不同，寒冷刺骨。我们对火星的了解更多，因为我们派出了数十架轨道器、着陆器和火星车，来探索火星的大气层和火星表面。  |
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| 17:47 | Mars has the largest volcanoes in the solar system. Long ago, volcanic eruptions generated a thick atmosphere. | 火星上拥有全太阳系最大的火山。在很久以前，由于火山喷发，火星上产生了厚厚的大气层。 |
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| 18:07 | Mars also has the deepest and longest canyons. Layers of sediments within them show us a record of dramatic climate change.  | 火星上还拥有最深、最长的峡谷。峡谷中层层的沉积物记录了火星上曾经经历过的、剧烈的气候变化。  |
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| 18:30 | Our missions have also shown us that Mars once held underground aquifers of liquid water. Catastrophic flooding occurred when these aquifers collapsed, carving the spectacular landscape we see today.  | 我们的探测还显示，火星曾经拥有地下液态水的含水层。这些含水层的坍塌引起了大洪灾，造就了我们今天所看到的壮观地貌。  |
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| 19:00 | This computer simulation takes us back in time to show us how the once active planet supported seasonal lakes and was able to weather and erode the impact craters left behind by comets and asteroids bombarding it from space.  | 这个电脑模拟画面将我们带回火星活跃的时期，当时火星上还有季节性的湖泊，并且太空中的彗星和小行星撞击留下的陨石坑也受到了风化和侵蚀。  |
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| 19:20 | Mars’ water supply and active volcanoes created the conditions for life, but they didn’t last long. | 火星上的水源和活火山为生命体的诞生创造了有利条件，但是好景不长。 |
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| 19:34 | Mars is about half the size of Earth, so its insides cooled faster. Its volcanoes became inactive and the magnetic field decayed away. Mars lost most of its atmosphere leaving behind a dry, frozen desert – a failed Earth. | 火星的大小约为地球的一半，所以火星内部冷却的速度更快。火星上的火山转为休眠状态，而其磁场也衰减了。火星上的大气层变得十分稀薄，而地表上也只剩下了一片干裂、冰冻的沙漠——就像是演化失败的地球。 |
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| 19:58 | It was around the same time that Mars was giving up, approximately 3.5 billion years ago, that life on Earth was just getting started. | 约35亿年前，就在火星失去生命迹象之时，也正是地球上的生命开始萌发的时候。 |
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| 20:14 | I think it’s about time to head home now, to check out our own planet, with our new perspective.  | 差不多该回我们的地球看看了，在太阳系环游了一圈，我们也有了新的视角。  |
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| 20:35 | Unlike Venus and Mars, Earth *is* surrounded by a magnetic field. It forms a shield that deflects the solar wind, enabling life to flourish. | 与金星和火星不同，地球*是*被磁场环绕的。磁场如同一个保护罩，使太阳风无法侵扰地球，保障地球上的生命能够欣欣向荣。 |
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| 20:51 | It protects our Technosphere, the array of human-made satellites that support our civilization, and continually feed us information about our planet. | 不仅仅是大气层，磁场也保护着我们的技术圈——由人造卫星组成的阵列，它支撑着人类文明，并持续向我们提供地球的信息。 |
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| 21:21 | Earth’s magnetic field is generated by our hot, dynamic insides, where liquid iron churns within our outer core. | 地球磁场的产生是由于地球内部的热能和动能，在看似平静的外地核之下，液态铁在悄然的进行着剧烈搅动。 |
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| 21:41 | Our planet pumps out heat, feeding volcanoes at the surface, helping to sustain an atmosphere containing the perfect blend of molecules for life. | 我们的地球持续发热，使地表的火山生生不息，从而使得大气成分总是保持着利于生命的成分。 |
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| 21:57 | Earth has it all! It is just the right size, located in just the right place, bringing together all the right ingredients – which, over the course of billions of years, led to the evolution of complex life. | 地球真的是一应俱全！地球的大小适中，位置刚好，并汇聚了所有正确的成分：这些天时地利的条件，使得地球能够在数十亿年的发展过程中，孕育出了复杂的生命体。 |
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| 22:27 | Our neighbors have shown us that even if we start out the same, we can grow up to be very different. | 从我们的邻星身上我们能够知道，即使星球的开始并无二致，但是历经多年后却可能会变得迥然不同。 |
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| 22:40 | Earth truly is “a grand oasis in the vastness of space.” Now, it’s up to us to sustain it. | 地球确实是“庞大太空中的广阔绿洲”。现在，维持好地球是我们的责任。 |
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