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EARTH SCIENCE

地球科学

Exploring Space

探索太空

KATE BOEHM NYQUIST （美）著

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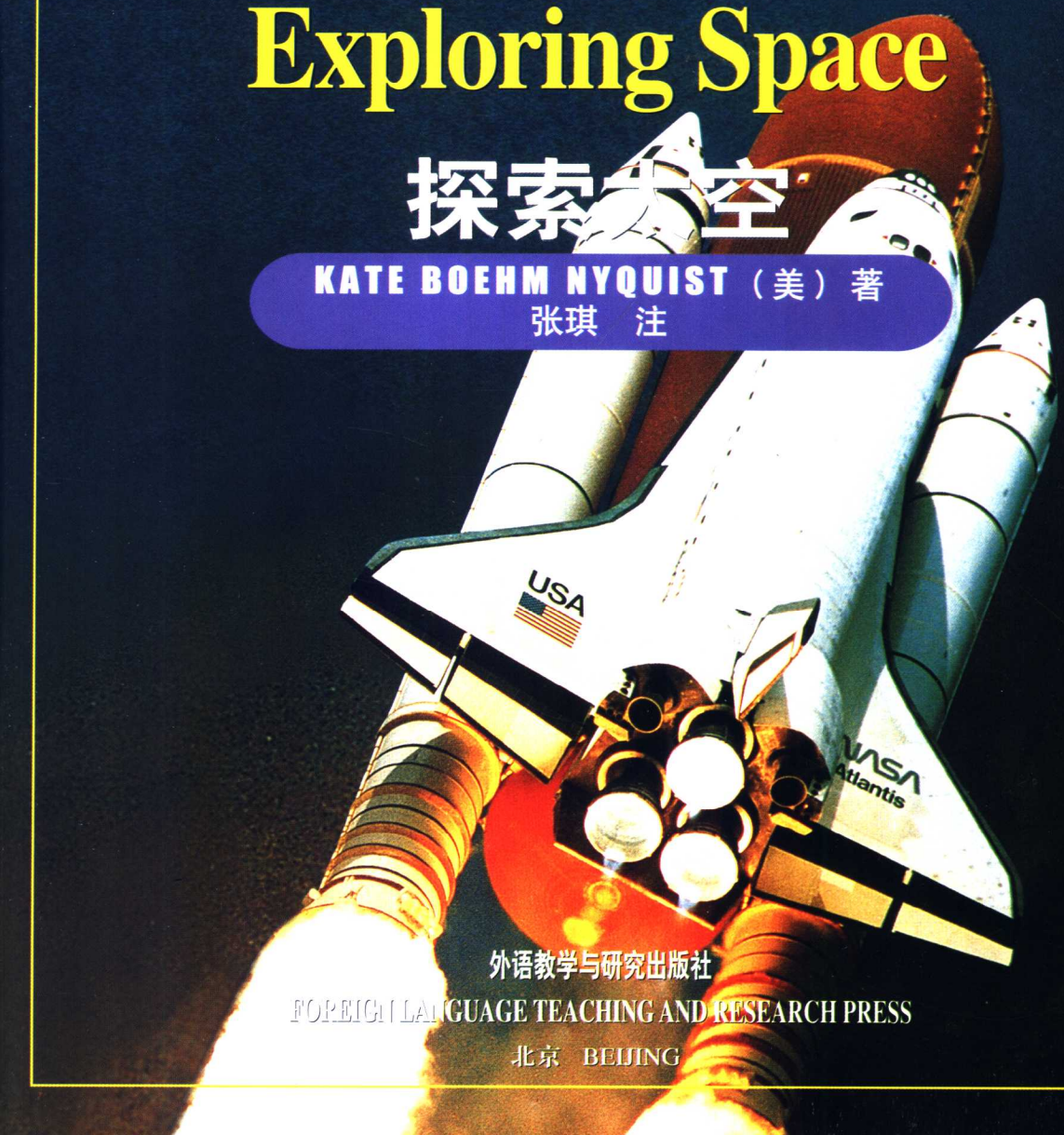

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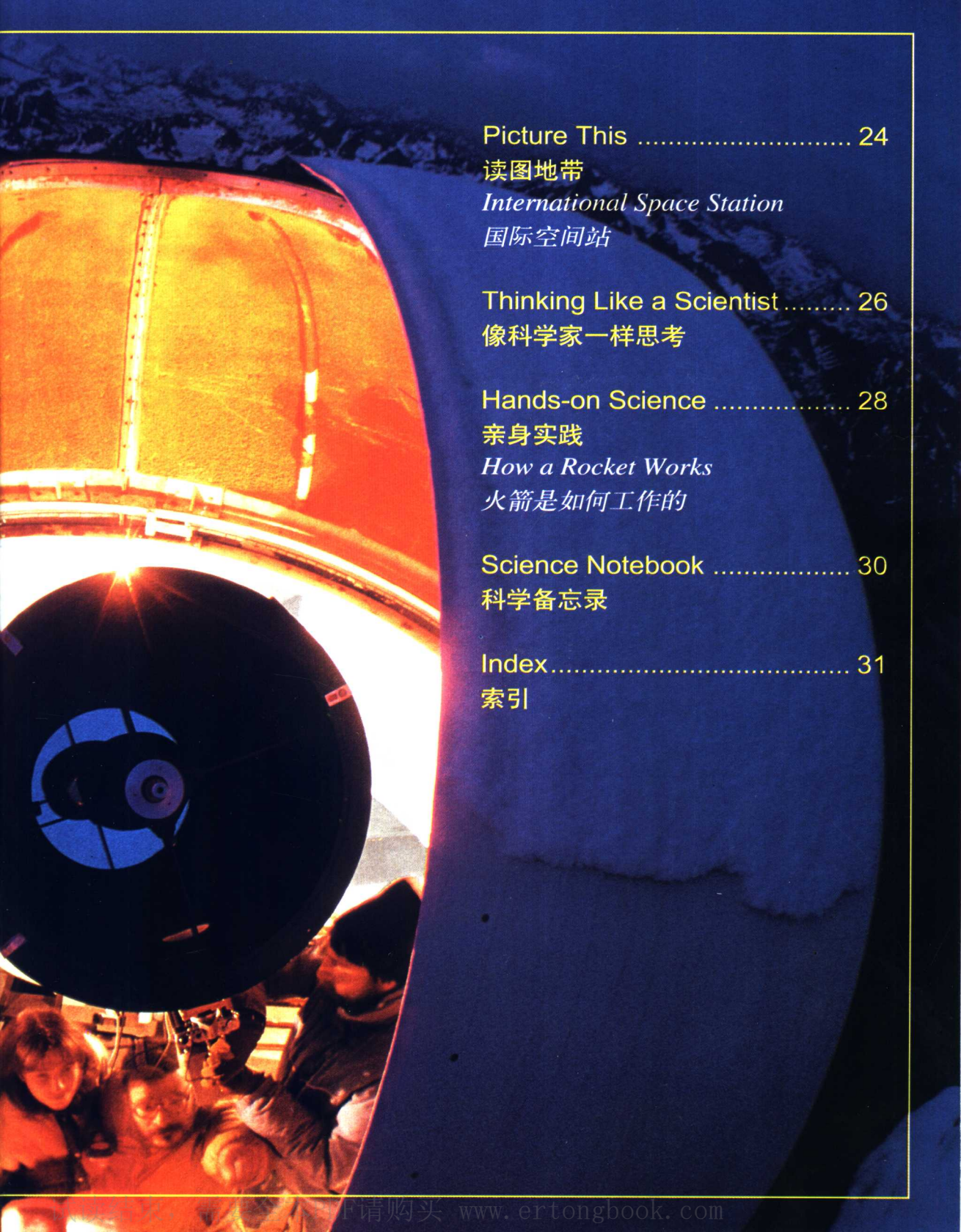


One Small Step
一小步

On July 16, 1969, the Apollo 11 spacecraft[1] blasted off[2] from Earth. Three days later, the spacecraft and its three astronauts[3] entered the orbit[4] of the moon. History was about to be made. Humans were about to walk on the moon.

1. Apollo II spacecraft　阿波罗11号太空船
2. blast off　(太空船)发射升空
3. astronaut　宇航员
4. orbit　轨道

Astronaut Mike Collins stayed in the command module[1] orbiting the moon. Astronauts Neil Armstrong and Edwin "Buzz" Aldrin climbed into a smaller space craft to head down to the moon's surface[2]. As the *Eagle* landing craft[3] got closer to the moon, Armstrong spotted[4] trouble. They had missed the ideal[5] landing site. They were headed for[6] a place covered with boulders[7].

If the *Eagle* were damaged on touchdown[8], the astronauts could be stuck[9] on the moon forever. They had to act quickly. Armstrong turned off the automatic landing system[10]. He would have to pilot[11] the *Eagle* down himself.

Could the astronauts avoid[12] a crash[13]? Tense[14] moments went by. Instruments[15] showed they had less than 30 seconds worth of fuel[16] left. Then Armstrong's voice crackled[17] over the radio. "*Houston*[18] *... Tranquillity Base*[19] *here. The Eagle has landed.*" The announcement[20] made the whole world cheer.

The moon landing is just one example of how technology, skill, and imagination come together every day to help us explore[21] our world and beyond. This is a book about where we are now, where we have been, and where we are going. Pay attention now—you just might be one of the brave astronauts flying a spacecraft in the near future!

1.	command module		(航天器中载人及主要控制器的)指挥舱
2.	surface	*n.*	表面
3.	*Eagle* landing craft		鹰号登月艇
4.	spot	*v.*	发现
5.	ideal	*adj.*	理想的
6.	head for		(使)朝……行进
7.	boulder	*n.*	巨砾
8.	touchdown	*n.*	(飞机或宇宙飞船着陆过程中的)触地；着地
9.	stick	*v.*	使停留
10.	automatic landing system		自动登陆系统
11.	pilot	*v.*	驾驶
12.	avoid	*v.*	避免
13.	crash	*n.*	坠毁
14.	tense	*adj.*	紧张的
15.	instrument	*n.*	仪器
16.	fuel	*adj.*	燃料
17.	crackle	*v.*	发出尖锐急促而轻微的声音
18.	Houston		休斯顿
19.	Tranquillity Base		宁静海基地
20.	announcement	*v.*	宣言，宣告
21.	explore	*v.*	探索，探究

Edwin Aldrin and the *Eagle*

Chapter 1
第一章

The Solar System:

Satellites of the Sun

太阳系：太阳的卫星

Do you know where you are? Chances are, you can easily name your street, town, state, and country. But what about the position[1] of your planet[2]? Do you know your place in space?

1. position *n.* 位置
2. planet *n.* 行星(此处指地球)

Day after day, year after year, Earth revolves[1] around the sun. The sun is the center of our solar system and, in a way, it is our anchor[2]. With the strong pull of its gravity[3], the sun keeps Earth in orbit. The sun also is our major source[4] of energy[5]. Without the sun's light and heat, life on Earth would not exist[6].

Earth's Neighbors

Earth isn't the only planet that circles the sun. In fact, our solar system is made up of the sun and everything that revolves around it. This includes planets and their moons as well as asteroids[7], comets[8], and other objects.

Since ancient[9] times humans have studied the skies. The ancient Greeks[10] made up stories about the stars. Native Americans[11] celebrated[12] the phases of the moon[13] in special ceremonies[14]. Today, advances[15] in technology[16] have improved[17] our understanding of what's out there. We now know, for example, a lot more about the nine planets in our solar system.

What tools do you know about that have helped us learn about our solar system?

Native American sun god mask

1.	revolve	v.	绕转；(天体)公转	10.	Greek	n.	希腊人
2.	anchor	n.	锚	11.	Native American		印第安人
3.	gravity	n.	重力；(万有)引力	12.	celebrate	v.	庆祝
4.	source	n.	来源	13.	phase of the moon		月相
5.	energy	n.	能量；能源	14.	ceremony	n.	典礼；仪式
6.	exist	v.	存在	15.	advance	n.	前进；进展
7.	asteroid	n.	小行星	16.	technology	n.	技术
8.	comet	n.	彗星	17.	improve	v.	提高
9.	ancient	adj.	古代的				

The Inner Planets[1]

The four planets closest to the sun are called the inner planets. The inner planets are made up of solid, rocky materials[2].

Mercury[3] is the planet closest to the sun. Mercury's very thin atmosphere[4] leads to huge changes in temperature[5]. During the day the sun's rays make this planet very hot. At night the thin atmosphere can't keep in heat, and it gets very cold on Mercury.

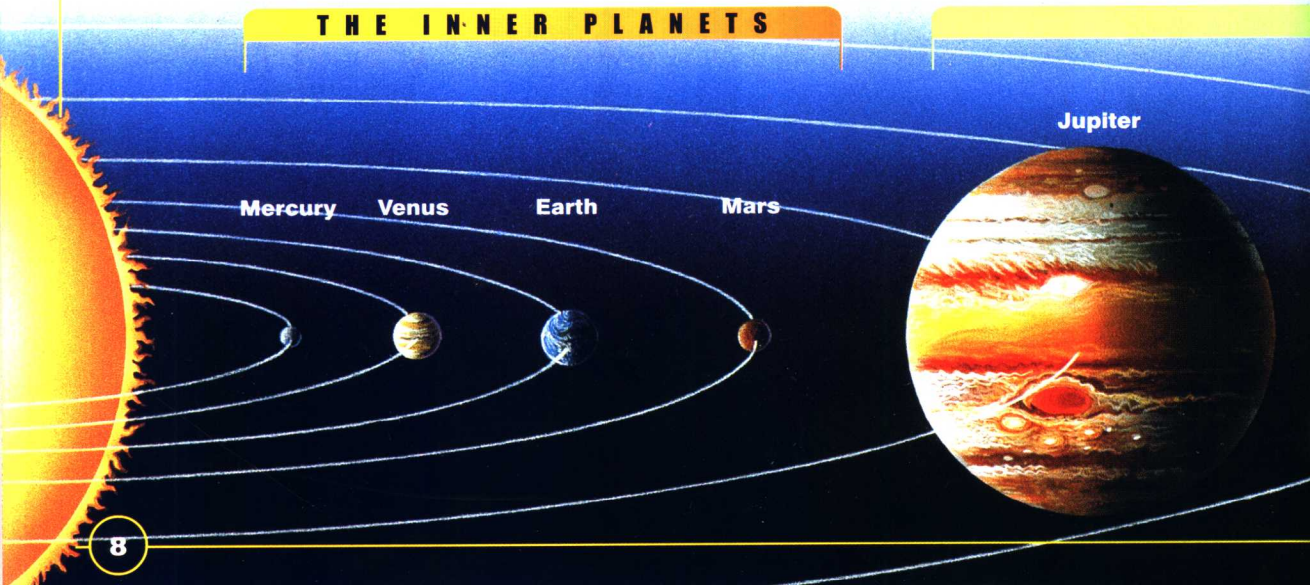
Venus[6] is next in orbit around the sun. Thick, swirling[7] clouds surround Venus. These clouds trap[8] the sun's energy and make the surface of the planet very hot—more than 450°C (842°F).

Earth's orbit comes next. (Third rock from the sun!) Our planet is largely covered with water. Earth is the only planet in our solar system with enough oxygen[9] in its atmosphere to support life as we know it.

Mars[10] is the fourth inner planet from the sun. Mars is known as the red planet because of its dusty[11] red surface. Scientists think Mars once had a lot of water on it. Some believe there is still ice and even liquid water under its surface.

How do you think the outer planets differ from[12] *the inner planets?*

1.	inner planet		内行星(指比较靠近太阳的水星、金星、地球或火星)
2.	material	*n.*	材料
3.	Mercury	*n.*	水星
4.	atmosphere	*n.*	大气层
5.	temperature	*n.*	温度
6.	Venus	*n.*	金星
7.	swirling	*adj.*	旋转的
8.	trap	*v.*	捕捉
9.	oxygen	*n.*	氧气
10.	Mars	*n.*	火星
11.	dusty	*adj.*	多尘的，灰尘覆盖的
12.	differ from		相异，不同



The Outer Planets[1]

The outer planets are farthest from the sun and are much colder than the inner planets. Except for Pluto[2], the outer planets are made up mostly of gases. Pluto is probably made mostly of icy matter.

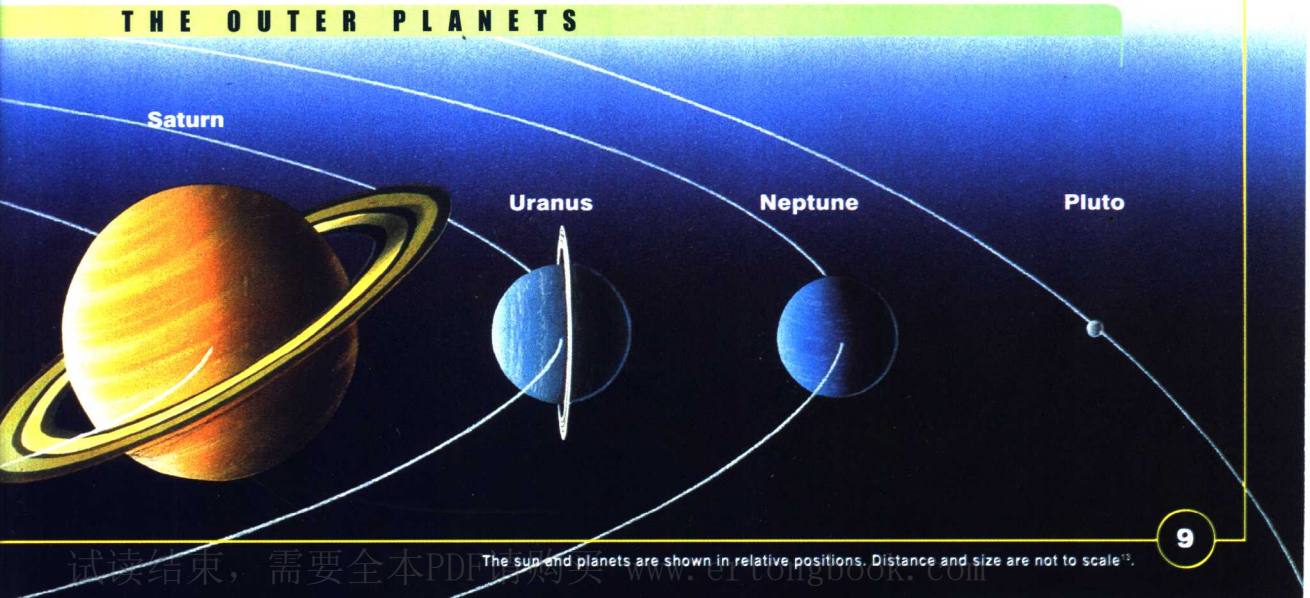
Jupiter[3] is the largest of all the planets — more than ten times wider than Earth. Jupiter is mostly gases, but it probably has a solid core[4]. At least 16 moons orbit this huge planet.

Saturn[5] is the sixth planet from the sun. Saturn is famous for the rings of dust and ice that spin[6] around it. People on Earth spotted Saturn's rings back in the 1600s. At that time telescopes[7] weren't very powerful so it wasn't clear how many rings there were. We now know Saturn has seven major rings.

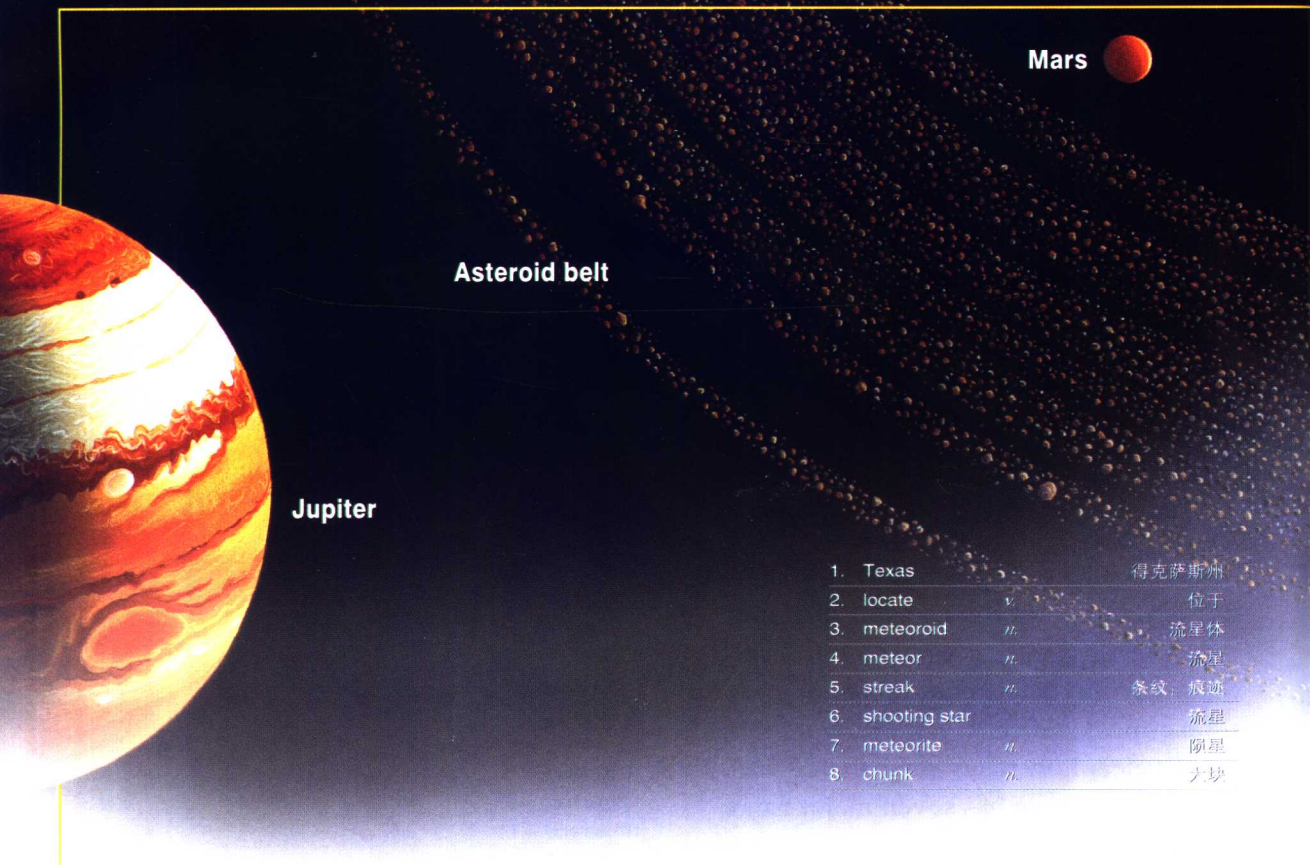
Uranus[8] also has rings surrounding it. These rings weren't discovered until 1977. When viewed from Earth, Uranus appears to rotate[9], or spin, on its side.

The last two outer planets, **Neptune**[10] and **Pluto**, have orbits that overlap[11]. Most of the time Pluto is farthest from the sun. But sometimes Pluto's orbit brings it closer to the sun, and Neptune becomes the most distant[12] planet.

1. outer planet		带外行星
2. Pluto	*n.*	冥王星
3. Jupiter	*n.*	木星
4. core	*n.*	核心
5. Saturn	*n.*	土星
6. spin	*v.*	快速旋转
7. telescope	*n.*	望远镜
8. Uranus	*n.*	天王星
9. rotate	*v.*	旋转；转动
10. Neptune	*n.*	海王星
11. overlap	*v.*	重叠
12. distant	*adj.*	遥远的
13. to scale		按比例



The sun and planets are shown in relative positions. Distance and size are not to scale[13].



1.	Texas		得克萨斯州
2.	locate	v.	位于
3.	meteoroid	n.	流星体
4.	meteor	n.	流星
5.	streak	n.	条纹，痕迹
6.	shooting star		流星
7.	meteorite	n.	陨星
8.	chunk	n.	大块

Asteroids

Other objects orbit the sun along with big planets and their moons. An asteroid is a rock that can be about as small as a house or as large as the state of Texas[1]. Most asteroids revolve around the sun in an asteroid belt located[2] between the orbits of Mars and Jupiter.

Meteoroids[3]

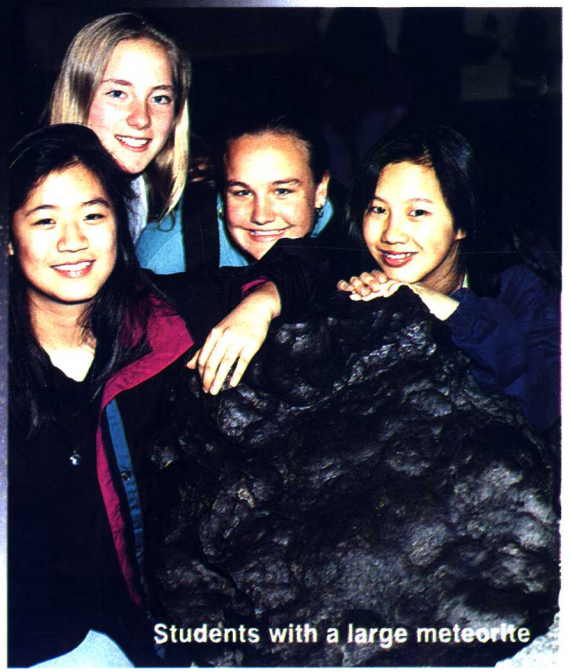
Sometimes small pieces of dust and rock come close enough to Earth to be pulled by gravity into Earth's atmosphere. As the piece of rock or dust, called a meteoroid, travels through the air at high speed, it becomes hot and starts to burn. Then it's called a meteor[4].

Have you ever seen streaks[5] of light in a clear night sky? These "shooting stars[6]" are meteors.

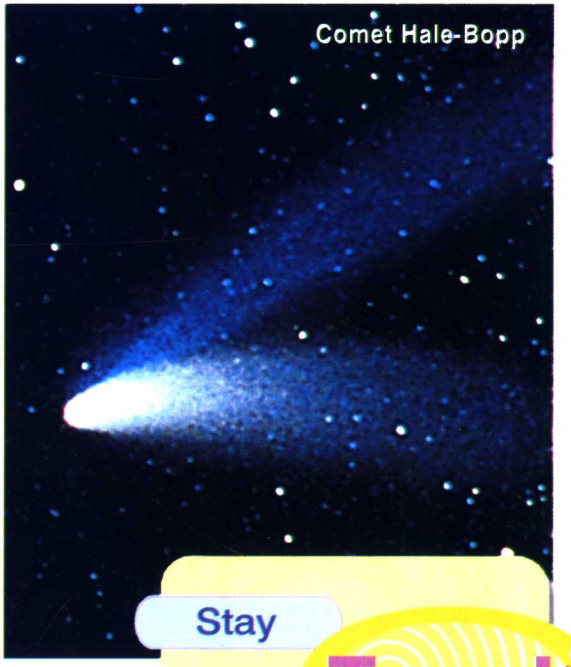
Although most meteors burn up before they reach the ground, some are large enough so that part of the meteor reaches Earth. If a piece of rock does hit, it's called a meteorite[7]. Scientists collect and study meteorites to learn more about where they come from.

Comets

Often described as "dirty snowballs," comets are large chunks[8] of ice, dust, and gas that orbit the sun. Sometimes their orbits take



Students with a large meteorite



Comet Hale-Bopp

them far away from the sun. When comets get closer to the sun, more of their ice becomes gas. This gas gets pushed out from the comet—so it looks like the comet has a tail. A comet's tail can be millions of kilometers long.

In 1997 the comet Hale-Bopp[1] passed close enough to Earth to be seen. Probably more people saw this comet than any other one in history.

1. Hale-Bopp 海尔 波普彗星
2. argue v. 争论，辩论
3. consider v. 认为
4. debate n. 争论
5. sighting n. 看到
6. Halley's comet 哈雷彗星

Stay Tuned!

Pluto the Comet?

Some scientists argue[2] that Pluto should not be called a planet at all. They say it's too small—smaller than our own moon—and mostly made of ice like a comet. But Pluto has been considered[3] a planet since its discovery in 1930. The debate[4] continues.

This boy had his face painted to celebrate the sighting[5] of Halley's comet[6] in 1986. He will be 81 when this famous comet returns.

Eye[1] on the Universe[2]: Gathering[3] Space Data[4]

Scientists have been collecting information about space for hundreds of years. Astonishing[5] discoveries have been made in the last decade[6] with data collected from the Hubble Space Telescope[7]. Collecting vast amounts of data about space, the Hubble is our most powerful eye on the universe.

The Hubble Space Telescope is about as long as a school bus.

1.	eye	*n.*	观察
2.	universe	*n.*	宇宙
3.	gather	*v.*	收集
4.	data	*n.*	数据
5.	astonishing	*adj.*	令人吃惊的
6.	decade	*n.*	十年
7.	Hubble Space Telescope		哈勃太空望远镜
8.	interpret	*v.*	解释，阐明
9.	identify	*v.*	鉴定
10.	pattern	*n.*	类型，样本
11.	measure	*v.*	测量
12.	astronomical unit		天文单位
13.	relationship	*n.*	关系
14.	hint	*n.*	提示

Thinking Like a Scientist: Interpreting[8] Data

When scientists interpret data, they identify[9] patterns[10] and answer questions with the new information. Scientists have collected data about distances in space. Space is so big that distances are measured[11] in Astronomical Units[12] (AU). One AU is 149.6 million kilometers—the average distance between Earth and the sun. Use the data in the table to answer the questions below.

Planets and Their Orbits

Planet	Average distance from the sun *(astronomical units)*	Time it takes to orbit the sun *(in Earth years)*
Mercury	0.4 AU	88 days
Venus	0.7 AU	7.4 months
Earth	1.0 AU	1 year
Mars	1.5 AU	1.9 years
Jupiter	5.2 AU	12 years
Saturn	9.5 AU	29.5 years
Uranus	19.2 AU	84 years
Neptune	30.1 AU	165 years
Pluto	39.5 AU	248 years

Which planet takes the longest time to orbit the sun? The shortest time?

What relationship[13] can you see between AU and orbiting times?
HINT[14]: Find the distance from the sun to each planet. Then look at the amount of time it takes the planet to orbit the sun.

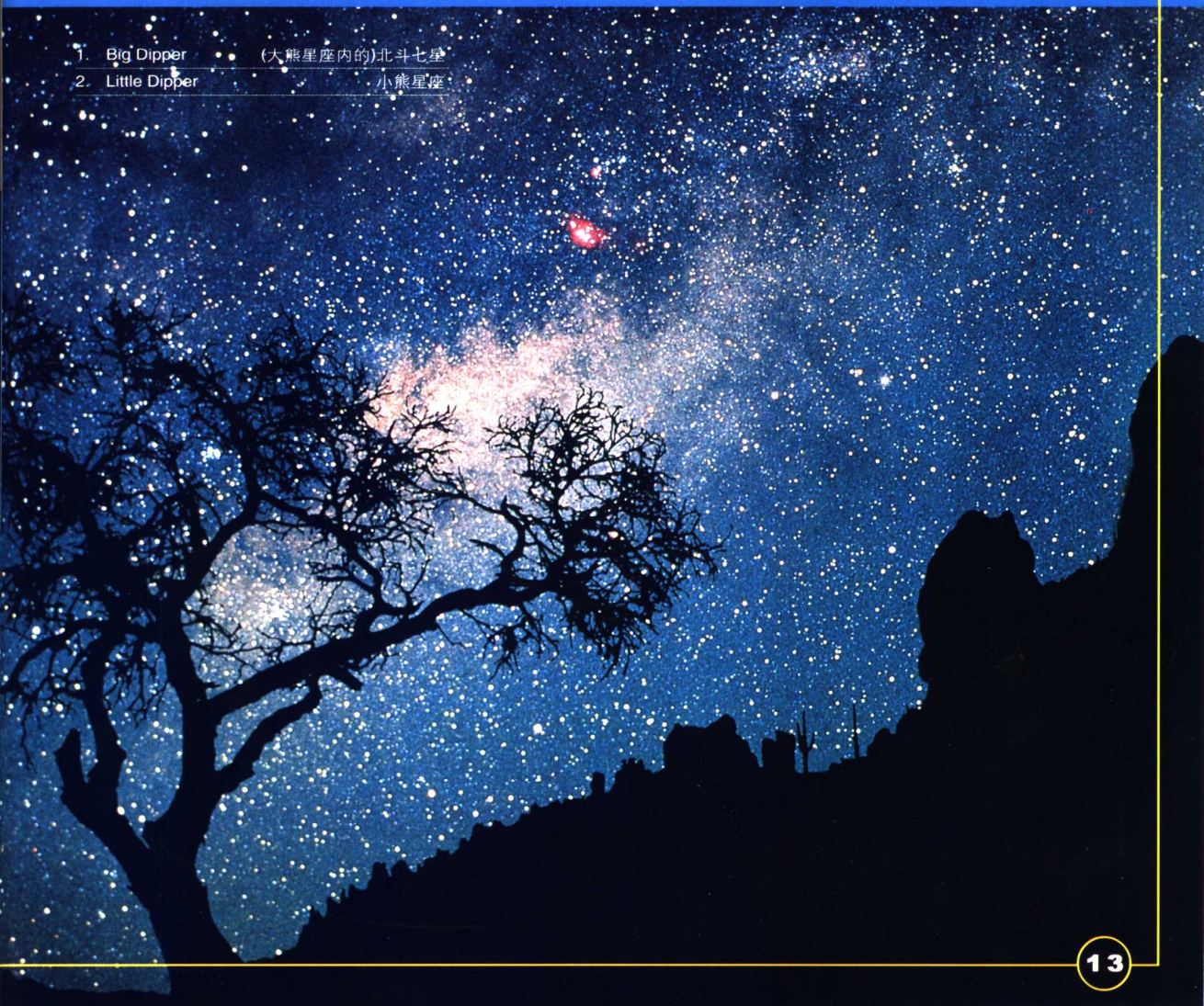
Beyond the Solar System:

Shooting for the Stars

超越太阳系：探索星座

Have you ever looked at the Big Dipper[1] and Little Dipper[2] in the night sky? If you have, you've looked at the very same stars the ancient Greeks saw thousands of years ago.

1. Big Dipper (大熊星座内的)北斗七星
2. Little Dipper 小熊星座



The Big Dipper is part of the Ursa Major[15] (Big Bear) constellation. Ursa Minor[16] (Little Bear) is the Little Dipper.

People have always looked to the sky and wondered about what they saw. The ancient Greeks made imaginary connect-the-dot[1] pictures to explain patterns of stars in the sky. Some of these pictures, called constellations[2], were based on stories about the superhuman[3] Greek gods. One myth[4] goes like this.

The Story of Big Bear and Little Bear

The king of the gods, Zeus[5], had a wife named Hera[6]. Queen Hera became jealous[7] of a pretty woman named Callisto[8]. One day Queen Hera decided to get rid of Callisto by changing her into a bear.

Callisto was upset[9]. She went home for help. On the way, she ran into her son. He did not recognize[10] her as a bear. He aimed his arrow at[11] her. Just before the arrow flew, Zeus swept down[12] from the sky and turned Callisto's son into a bear too. Then Zeus grabbed[13] both bears by the tail and tossed[14] them up into the sky. That's how the Little Bear and Big Bear constellations came to be.

Imaginary stories about constellations may not seem useful to us now. But ancient people had few tools available to them. As technology advanced, so did our understanding of our solar system.

1.	connect-the-dot		将点连起来的
2.	constellation	*n.*	星座
3.	superhuman	*adj.*	超人的；神的
4.	myth	*n.*	神话
5.	Zeus		宙斯(希腊神话中的主神)
6.	Hera		赫拉(希腊神话中的天后)
7.	jealous	*adj.*	妒忌的
8.	Callisto		卡利斯托(希腊神话中宙斯所爱的一个仙女)
9.	upset		苦恼的；心烦的
10.	recognize	*v.*	认出
11.	aim at		瞄准
12.	sweep down		猛然降临
13.	grab	*v.*	抓住
14.	toss	*v.*	扔；抛
15.	Ursa Major		大熊星座
16.	Urse Minor		小熊星座

Galileo Galilei[1]: Father of Modern Science

In the early 1600s, an Italian scientist named Galileo Galilei used a telescope to study objects in the sky. Galileo used a simple telescope that allowed him to see things at magnifications[2] 20 times greater than with the naked eye[3]. This may not seem very powerful today, but the telescope allowed Galileo to describe great things. He saw that the moon had craters[4]. He saw that the planet Venus goes through phases just like our moon. He also saw four moons circling[5] Jupiter.

Galileo's discoveries caused him many problems. At the time he lived, people believed that Earth—not the sun—was the center of the solar system. When Galileo interpreted his new data, he began to think differently. He realized that the sun was the center of the solar system. Religious leaders[6] disagreed with this way of thinking. They told him to stop discussing the idea. Galileo chose to give in[7] to the authorities[8] to save his life. But the evidence[9] was there for anyone to see. Eventually[10], people realized Galileo was right. The sun is the center of our solar system.

How did Galileo's interpretation of data change how people thought about the universe?

1.	Galileo Galilei		伽利略·加利莱伊(意大利数学家、天文学家和物理学家)
2.	magnification	*n.*	放大
3.	naked eye		肉眼
4.	crater	*n.*	(月球表面上的)环形山
5.	circle	*v.*	环绕
6.	religious leader		宗教领袖
7.	give in		屈服
8.	authority	*n.*	当权者
9.	evidence	*n.*	证据
10.	eventually	*adv.*	最后；最终

Galileo's drawings of our moon

Galileo used this small, handheld telescope to study the universe.