故事和奇闻轶事

Stories and Curiosities to Tell

Ricardo Moreno, Rosa M. Ros, Beatriz García

International Astronomical Union

Colegio Retamar, Madrid, Spain,

Polytechnic University of Catalonia, Barcelona (Spain),

National Technological University, Mendoza, (Argentina)

故事旨在向学生们讲述……

Stories are presented to tell students about…

- 《星空派对》讲述了恒星演化和赫罗图的故事。

"Star Parties" tells stories about stellar evolution and the HR diagram.

- 《邻近行星》分享了伽利略·伽利莱观测土星的趣闻。

"Neighboring Planets" shares interesting facts about Galileo Galilei's observations of Saturn.

- 《月相》介绍了伽利略对月球的观测，并穿插了不同文化的相关

"Phases of the Moon" introduces Galileo's observations of the Moon and includes stories from different cultures.

- 《全球地球》讲述了人类首次环球航行的故事，以及一个可以作为日晷的全球地球模型。

"Global Earth" tells stories about the first circumnavigation of the globe and a global Earth that acts as a sundial.

- 《猎户座的天空》呈现了关于星座的神话故事。

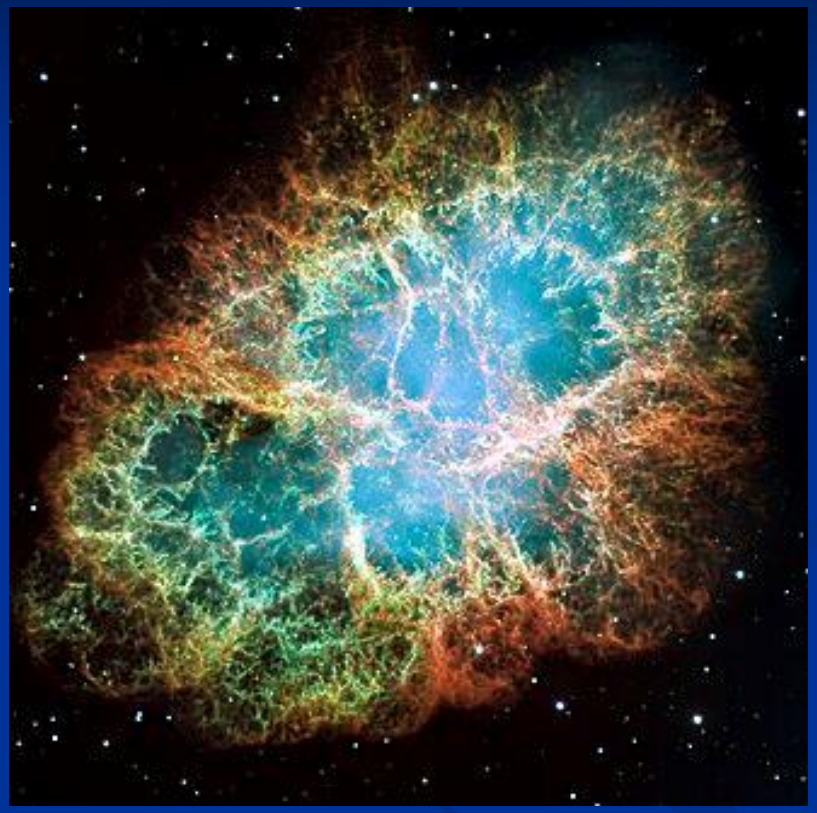
"Orion's Sky" presents mythological stories about constellations.

恒星演化：蟹状星云

Stellar evolution: Crab Nebula

蟹状星云是位于金牛座的一颗超新星的残骸。这颗超新星在白天也能观测到，其峰值亮度约为金星（太阳和月亮之后最亮的天体）的十倍。

The Crab Nebula is the remnant of a supernova located in the constellation Taurus. The supernova was visible in broad daylight, reaching a peak brightness approximately ten times greater than that of Venus (the brightest astronomical object after the Sun and Moon).

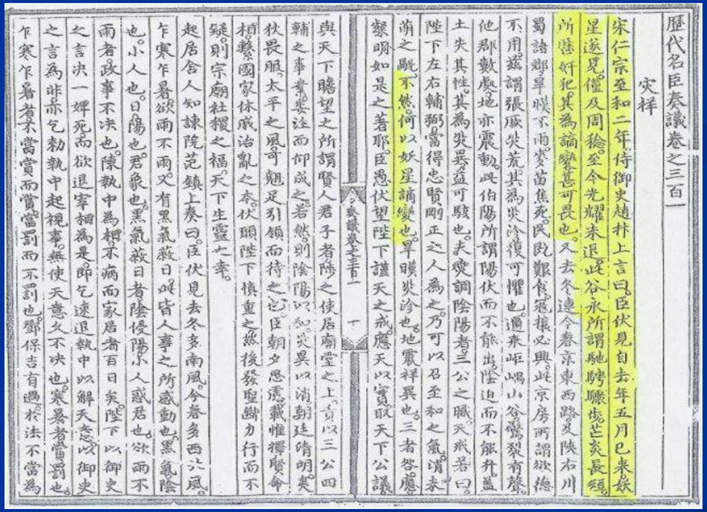


蟹状星云（图片来源：NASA）
(Crab Nebula (Credit: NASA)

恒星演化：蟹状星云
Stellar evolution: Crab Nebula

它是公元1054年7月4日爆发的超新星的残骸。它白天观测了23天，夜晚观测了22个月，并被中国天文学家记录下来。

It is the remnant of a supernova that exploded on July 4th, 1054. It was observed during the day for 23 days and at night for 22 months and was documented by Chinese astronomers.



歷代名臣奏議卷之三百一

災祥

宋仁宗至和二年侍御史趙抃上言曰臣伏見自去年五月已來妖星遂見僅及周稔至今光耀未退此谷永所謂馳騁驂乘芒炎長翹所懸奸犯其為謫變甚可畏也又去冬連今春京東西路及陝右川蜀諸郡旱暵不雨麥苗焦死民既艱食寇攘必興此京房所謂欲德不用茲謂張厥災荒其為災沴復可懼也適來峄嵎山谷驚裂有聲他郡數處地亦震動此伯陽所謂陽伏而不能出陰迫而不能升蓋土失其性其為災異益可駭也夫燮調陰陽者三公之職天戒若曰

证实观测到这颗被认定为1054年超新星的客星的文件。（图片来源：维基百科）

Documents confirming the observation of the guest star identified as the supernova of 1054. (Credit: Wikipedia)

恒星演化：蟹状星云

Stellar evolution: Crab Nebula

在查科峡谷（白岩遗址，普韦布洛文化，新墨西哥州，美国）发现的一幅岩画可能描绘了1054年7月4日的超新星爆发。图中新月代表月亮，左侧的星星代表超新星，而一个真人大小的手印则表明该遗址具有神圣意义。计算表明，当时的月相与图中所示相符，月亮与超新星的夹角为3°，且月牙的朝向与岩画所示一致。

A pictograph found in Chaco Canyon (White Rock ruins, Pueblo culture, New Mexico, USA) may represent the supernova of July 4, 1054. The crescent Moon represents the moon, the star to the left the supernova, and a life-size handprint indicates that the site is sacred. Calculations show the moon was in the phase depicted and was 3° from the supernova, and its crescent was oriented as in the pictograph.

1054年超新星的象形图。（图片来源：Jim O'Donnell）

Pictogram of the 1054 supernova. (Credit: Jim O'Donnell)

恒星演化：蟹状星云

Stellar evolution: Crab Nebula

有记载的第一位欧洲观测者是英国人约翰·贝维斯，时间是1750年。

1758年，法国天文学家查尔斯·梅西耶，一位杰出的彗星观测者，开始编纂弥漫天体目录，以将它们与彗星区分开来。梅西耶目录中的第一个天体是M1，即蟹状星云。

The first documented European observer was the Englishman John Bevis in 1750.

In 1758, the French astronomer Charles Messier, a great observer of comets, began a Catalog of Diffuse Objects to distinguish them from comets. The first object in the Messier Catalog is M1, the Crab Nebula.

约翰·贝维斯（1695-1771）
John Bevis (1695-1771)
(Credit: Wikipedia)

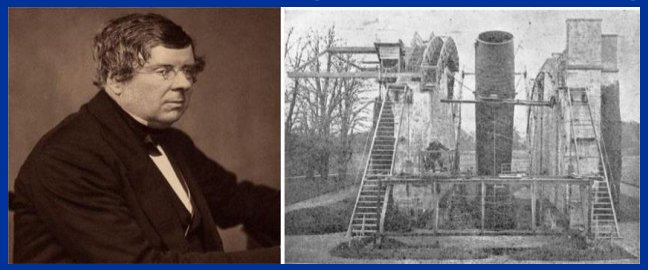
查尔斯·梅西耶（1730-1817）
Charles Messier (1730-1817)
(Credit: Wikipedia)

恒星演化：蟹状星云

Stellar evolution: Crab Nebula

1840年，罗斯伯爵威廉·帕森斯在比尔城堡用望远镜观测了M1，并绘制了第一张详细的素描图，因其外形酷似螃蟹而以自己的名字命名。然而，直到1892年，艾萨克·罗伯茨才拍摄了最早的照片之一（当时的感光底片灵敏度很低）。

In 1840, William Parsons, Earl of Ross, observed M1 with his telescope at Birr Castle and made the first detailed drawing, naming it after himself because it resembled a crab. However, it wasn't until 1892, when Isaac Roberts took one of the first photographs (photographic plates had low sensitivity).



威廉·帕森斯（1800-1867）和他的望远镜
William Parsons (1800-1867) and his telescope
(Credit: Wikipedia)

摄于1892年的照片
Photograph from 1892
(Credit: Isaac Roberts)

恒星演化：小丑星云或爱斯基摩星云

Stellar evolution: Clown or Eskimo Nebula

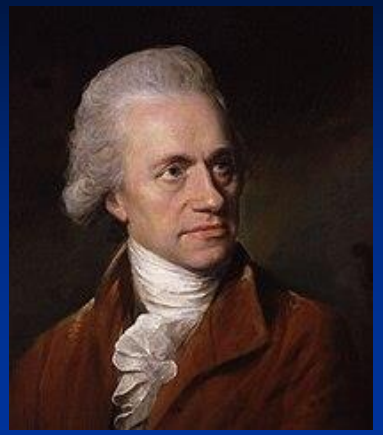
这是一个行星状星云，由威廉·赫歇尔爵士于1787年发现。它被称为小丑星云或爱斯基摩星云，因为它的形状酷似戴着假发或兜帽的人脸。
“头部”是围绕垂死恒星的气体泡，“毛发”是从恒星向外扩散的气体物质。

It is a planetary nebula discovered in 1787 by Sir William Herschel. It is called the Clown Nebula or the Eskimo Nebula because it resembles the face of a person wearing a wig or hood. The "head" is a bubble of gas surrounding the dying star, and the "fur" is gaseous material moving away from the star.

(Credit: Wikipedia)

恒星演化：小丑星云或爱斯基摩星云

Stellar evolution: Clown or Eskimo Nebula



威廉·赫歇尔（1738-1822）
William Herschel (1738-1822)
(Credit: Wikipedia)

卡罗莱纳·赫切尔 (1750-1848)
Carolina Hetrschel (1750-1848)
(Credit: Wikipedia)

弗里德里希·威廉·赫歇尔是一位德国音乐家，19岁时参加过一场战役，之后离开祖国前往英国，并在那里成为一名指挥家。1772年，他22岁的妹妹卡罗琳·赫歇尔搬来与他同住，学习成为一名女高音歌唱家。

Friedrich William Herschel was a German musician who, after fighting in a battle at the age of 19, left his country and went to England where he became a conductor. In 1772, his 22-year-old sister, Caroline Herschel, went to live with him to train as a soprano.

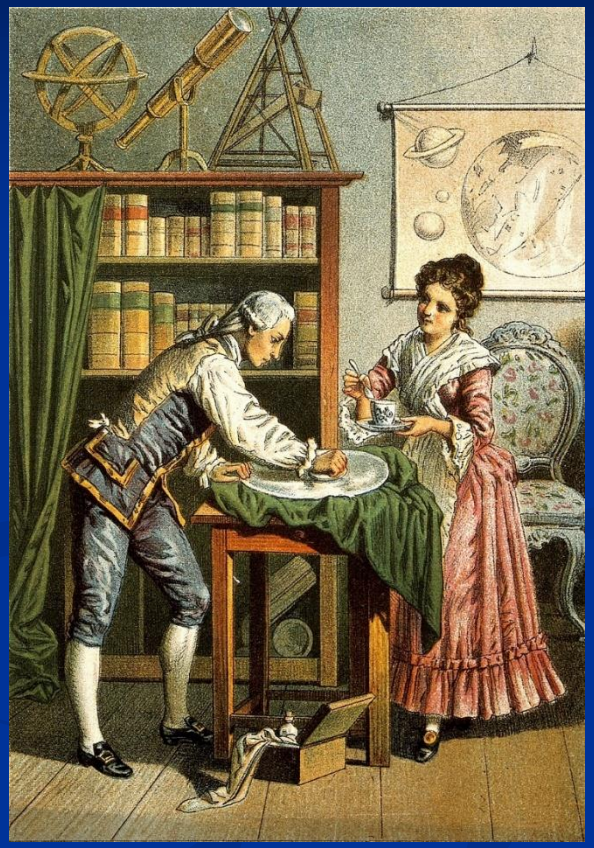
恒星演化：小丑星云或爱斯基摩星云

Stellar evolution: Clown or Eskimo Nebula

几个月后，1773年5月10日，他买了一本书（詹姆斯·弗格森的《天文学》），并深深地被它吸引，决定将余生奉献给天文学。

凭借着精湛的手工技艺，赫歇尔从一开始就自己制造望远镜，并亲自打磨镜片。卡罗琳·赫歇尔也与哥哥一起参与望远镜的观测和制造工作。

A few months later, on May 10, 1773, he bought a book (James Ferguson's "Astronomy") and liked it so much that he decided to dedicate the rest of his life to astronomy. Thanks to his great manual dexterity, Herschel built his own telescopes and polished his own mirrors from the very beginning. Caroline Herschel worked with her brother in the observation and construction of telescopes.



威廉和卡罗琳·赫歇尔

William and Caroline Herschel (Credit: Wikipedia)

恒星演化：小丑星云或爱斯基摩星云

Stellar evolution: Clown or Eskimo Nebula

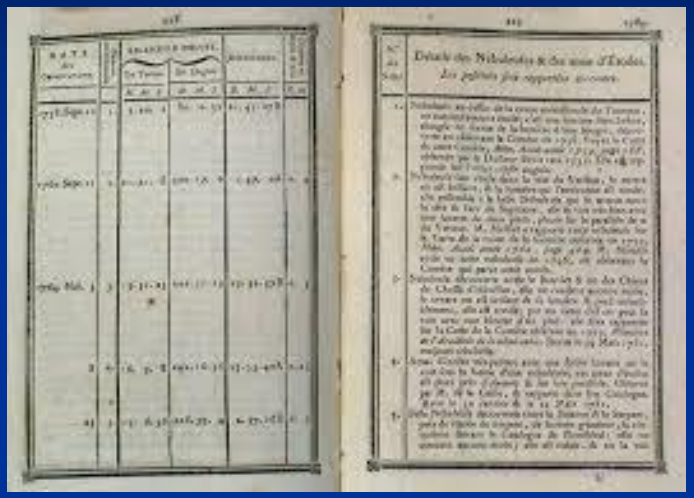
赫歇尔自行制造了望远镜。
1781年，他发现了一颗新行星——天王星。1782年，英国国王乔治三世任命他为皇家天文学家，威廉得以与妹妹一起全身心投入天文学研究。最初，赫歇尔为了纪念国王，将这颗行星命名为“乔治”，但这个名字在英国以外并不受欢迎。最终，它被命名为天王星（土星之父，木星之祖父）。

乔治三世（1760年-1800年）
George III (1760 – 1800)
(Credit: Wikipedia)

Herschel built his own telescopes.
In 1781 he discovered a new planet, Uranus. King George III of England appointed him Astronomer Royal in 1782, and William was able to dedicate himself exclusively to astronomy, along with his sister. Initially, Herschel named it "George" in honor of the king, but that name was not well received outside of his country. Finally it was given the name Uranus (the father of Saturn and grandfather of Jupiter).

恒星演化：小丑星云或爱斯基摩星云

Stellar evolution: Clown or Eskimo Nebula



梅西耶目录
Messier Catalog
(Credit: Wikipedia)

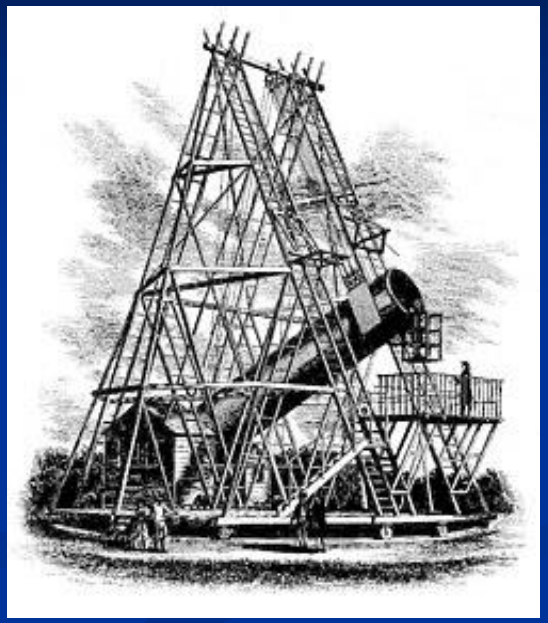
1782年，一位同事给了他一份梅西耶星表，这激发了他用望远镜观测这些天体的兴趣。
一个月后，他开始系统地搜寻天空中的弥散天体。
在1783年至1789年的六年间，他发现了超过2000个天体（球状星团、星云和星系）。

In 1782, a colleague gave him a Messier catalog, which motivated him to observe these objects with his telescopes.
A month later, he began a systematic search for diffuse objects in the sky.
In six years, from 1783 to 1789, he discovered more than 2,000 objects (globular clusters, nebulae, and galaxies).

恒星演化：小丑星云或爱斯基摩星云

Stellar evolution: Clown or Eskimo Nebula

1789年，他完成了他最大的望远镜的建造，这架望远镜因其镜筒长度而被称作“40英尺望远镜”。这架望远镜直径1.2米，当他第一次将它指向天空时，仅仅几分钟就发现了天王星的一颗卫星，并在接下来的几天里又发现了其他几颗卫星。



40英尺望远镜
40-foot telescope
(Credit: Wikipedia)

In 1789 he finished building his largest telescope, the so-called "40-foot telescope" because of the length of its tube. With a diameter of 1.2 meters, when he first pointed it at the sky, he discovered a satellite of Uranus in just a few minutes, and in the following days he discovered several more.

恒星演化：小丑星云或爱斯基摩星云

Stellar evolution: Clown or Eskimo Nebula

卡罗琳·赫歇尔是第一位发现彗星的女性。从1786年到1847年，她发现了八颗彗星。她是第一位因科学工作获得正式薪水的女性，也是第一位职业天文学家。

卡罗琳娜·赫歇尔（1750-1848）
Carolina Herschel (1750-1848)
(Credit Wikipedia)

Caroline Herschel was the first woman to discover a comet. Between 1786 and 1847, she discovered eight comets. She was the first woman to receive an official salary for her scientific work, the first professional astronomer.

恒星演化：小丑星云或爱斯基摩星云

Stellar evolution: Clown or Eskimo Nebula

1880年，根据威廉·赫歇尔及其子约翰·赫歇尔的观测数据，著名的NGC（新总星表）被编纂完成。

该星表收录了超过7000个天体；例如，小丑星云（又称爱斯基摩星云）的星表编号为NGC 2382。

约翰·赫歇尔（1792-1871）
John Herschel (1792-1871)
(Credit Wikipedia)

In 1880, using the observations of William Herschel and his son John Herschel, the famous NGC (New General Catalogue) was compiled. It contains more than 7,000 objects; for example, the Clown Nebula, also known as the Eskimo Nebula, is NGC 2382.

恒星演化：猎户座星云

Stellar evolution: Orion Nebula

在猎户座星云中，超过3000颗恒星正在从一团气体和尘埃中形成。10万年后，它将形成一个明亮的疏散星团，由年轻的恒星组成，周围环绕着气体和尘埃（就像现在的昴星团一样）。

猎户座星云
Orion Nebula
(Credit: NASA/ESA)

In the Orion Nebula, more than 3,000 stars are forming from a cloud of gas and dust. In 100,000 years, it will form a bright open cluster of young stars surrounded by gas and dust (like the Pleiades are now).

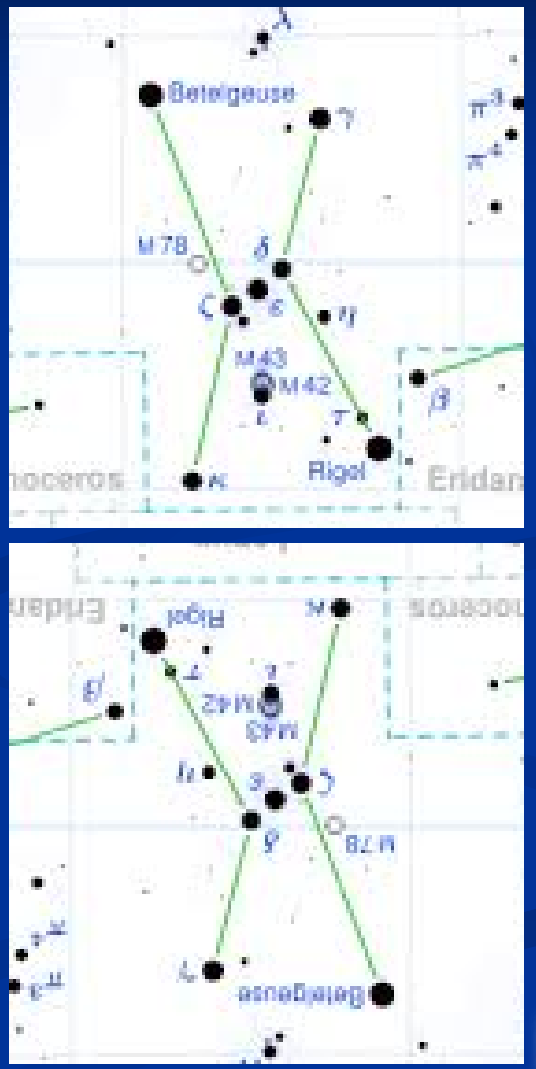
恒星演化：猎户座星云

Stellar evolution: Orion Nebula

The Orion Nebula (M42) is one of the few nebulae visible to the naked eye.

It is located in the center of the Hunter's Sword, which hangs from Orion's Belt (in the Northern Hemisphere).

It is located in the center of the Hunter's Sword, which is above Orion's Belt (in the Southern Hemisphere).



(Credit Wikipedia)

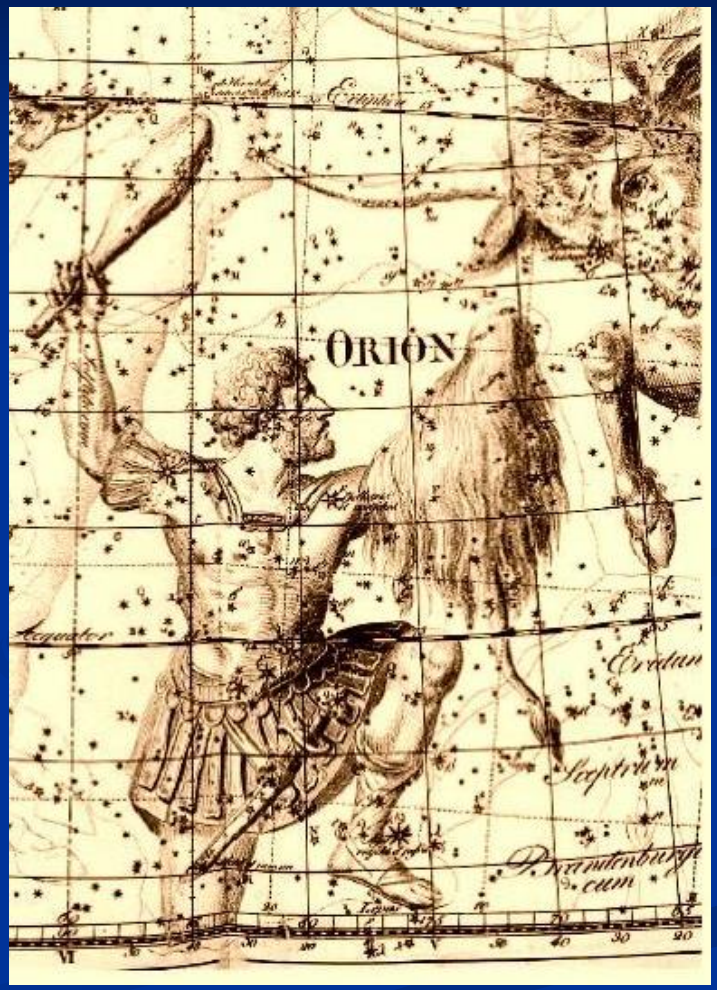
恒星演化：猎户座星云

Stellar evolution: Orion Nebula

The Orion Nebula is currently visible to the naked eye as a diffuse patch. But ancient astronomers (like Ptolemy) considered it only a faint star.

It is believed that the nebula's brightness may have increased as very luminous stars have formed within it.

It is surprising that Galileo, although he was observing the stars in the area, does not mention the nebula.



(Credit Wikipedia)

恒星演化：猎户座星云

Stellar evolution: Orion Nebula

1610 年，尼古拉斯-克劳德·法布里·德·佩雷斯克发现了猎户座星云，但他并没有公开此事，只是在他的野外笔记中记录了下来，直到 1916 年，纪尧姆·德·比古尔丹才将其公之于众。

In 1610 Nicolas-Claude Fabri de Peiresc discovered the Orion Nebula, although he did not make it public and only noted it in his field notebook, and it was not until 1916 that Guillaume de Bigourdan made it known.

猎户座星云
Orion Nebula
(Credit: NASA/ESA)

恒星演化：猎户座星云

Stellar evolution: Orion Nebula

Nicolas-Claude Fabri de Peiresc was a lawyer, a member of Parliament, as well as an astronomer, botanist, numismatist, collector of antiquities, archaeologist, Egyptologist, and scientific scholar. He dedicated himself to physiology, conducting experiments on human and cat cadavers. He was truly peculiar.

Nicolas-Claude Fabri de Peiresc
(Credit: Wikipedia)

恒星演化：猎户座星云

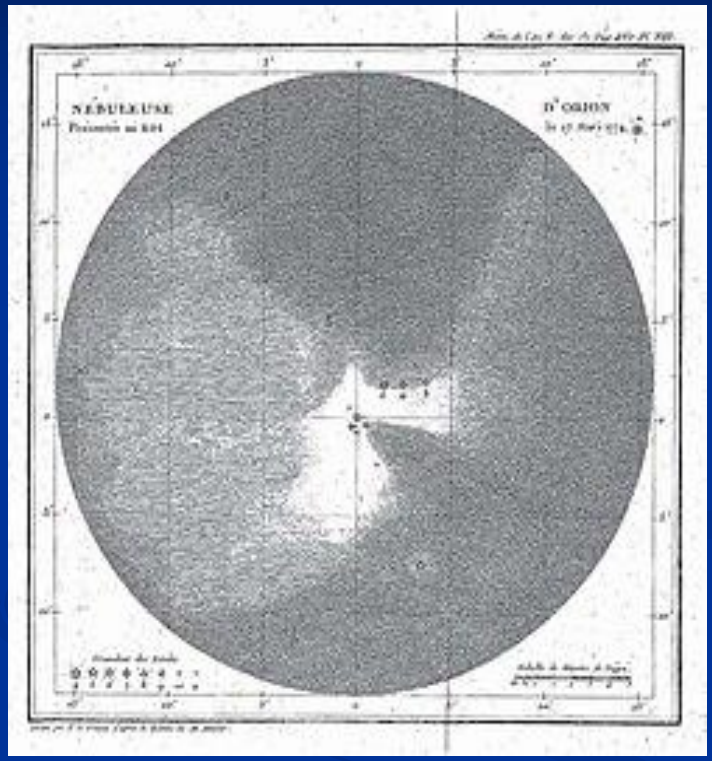
Stellar evolution: Orion Nebula

查尔斯·梅西耶于1769年观测了猎户座大星云，后来将其收录到他的星表中，编号为M42。

1774年，赫歇尔用他的望远镜观测了该星云，后来将其收录到新总星表中，编号为NGC 1976。

Charles Messier observed the Orion Nebula in 1769 and later included it in his catalog as M42.

In 1774, Herschel observed it with one of his telescopes, and it was later included in the New General Catalogue as NGC 1976.



梅西耶于1771年绘制的猎户座星云图

Drawing of the Orion Nebula made by Messier in 1771

恒星演化：赫罗图

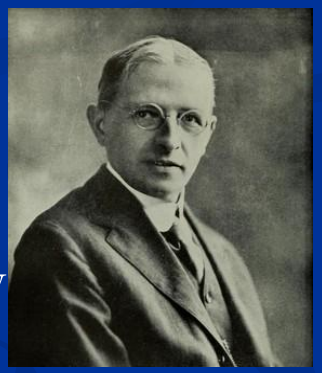
Stellar evolution: HR diagram

丹麦人赫茨普龙是一位化学工程师，曾在哥本哈根大学天文台从事天文摄影技术的研究。
1909年，他提出了他的第一个星图，该星图将恒星排列并分类在两个坐标轴上。由于赫茨普龙当时名不见经传，他的这项“发明”并未引起太多关注。
与此同时，在北美，一位著名的天文学家罗素教授在与赫茨普龙没有任何联系的情况下，也开始设计类似的星图，对恒星进行分类。

埃纳尔·赫茨普龙
Ejnar Hertzprung
(1873-1967)
(Credit: Wikipedia)

The Dane Hertzsprung was a chemical engineer who worked at the University of Copenhagen Observatory on astronomical photography techniques.

In 1909, he suggested his first diagram, which organized and classified the stars on two axes. Since Hertzsprung was unknown, his "invention" went largely unnoticed. Meanwhile, in North America, a renowned astronomer, Professor Russell, without any contact with Hertzsprung, began to design a similar diagram, organizing the stars.



亨利·N·罗素
Henry N. Russell
(1877-1957)
(Credit: Wikipedia)

太阳系：望远镜

Solar System: telescope

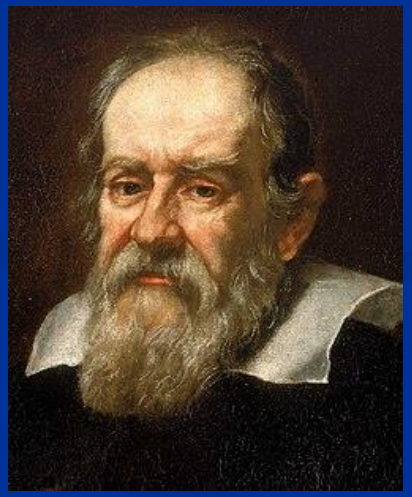
望远镜的发明者至今仍是个谜。多年来，人们一直认为望远镜是荷兰人汉斯·利珀泰（汉斯·利珀泰）发明的，因为他在1608年向荷兰王子拿骚的莫里斯赠送了一架望远镜，但他并没有申请专利，因为当时也有许多人在制造望远镜。根据20世纪后期的研究，胡安·罗杰（Joan Roget）大约在1590年发明了望远镜。罗杰兄弟是法国人，他们定居在西班牙，并在那里制造远视望远镜。巴塞罗那一些商人的遗嘱中都提到了这些望远镜。例如，1593年的一份遗嘱中提到了一架“黄铜包裹的远视望远镜”，长20厘米。

It is not known who invented the telescope. For many years it was believed to be the Dutchman Hans Lipperthey because he presented a telescope in 1608 to the Dutch prince Maurice of Nassau, but he did not patent it because many others were also building them. According to research from the late 20th century, Joan Roget was the inventor around 1590. The Roget brothers, of French origin, settled in Spain where they manufactured long-sighted telescopes. Several wills from Barcelona merchants bequeath these instruments. For example, in 1593 [illegible] bequeathed a "long-sighted telescope covered in brass" measuring 20 cm in length.

太阳系：大耳朵土星

Solar System: Big-eared Saturn

到了16世纪末，眼镜在欧洲作为一种娱乐方式开始销售。伽利略并非眼镜的发明者，但他对其进行了多项改进。



伽利略·伽利莱（1564-1642）和他的望远镜

Galileo Galilei (1564-1642) and his telescope (Credit: Wikipedia)

1609年，伽利略将他的望远镜呈献给威尼斯大公，希望将其用于军事用途，但这一计划最终失败。于是，他决定将望远镜用于观测星空。

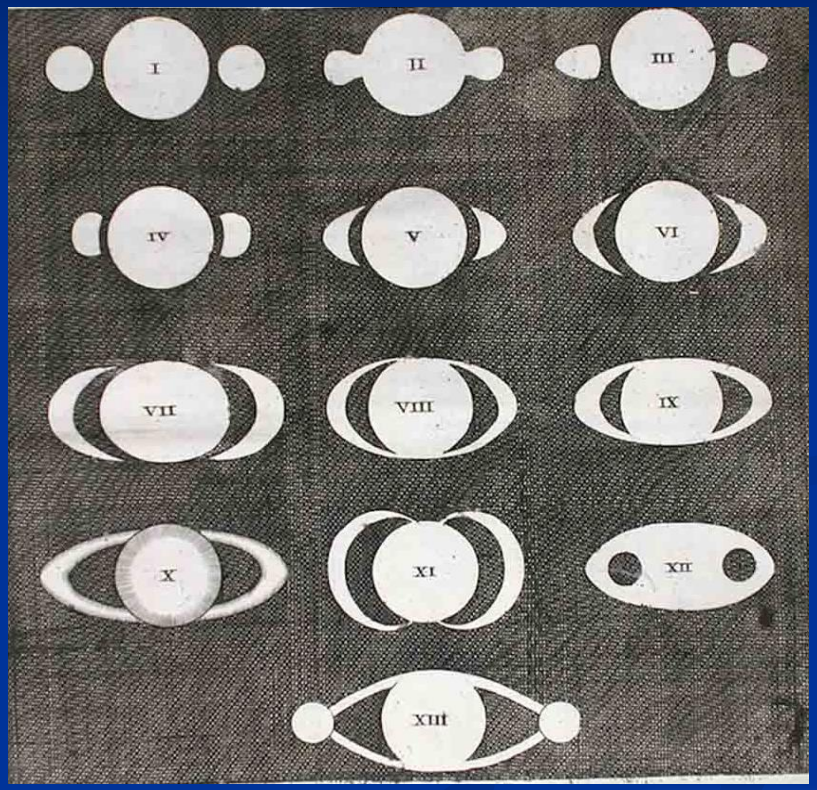
By the late 1500s, eyeglasses were being sold in Europe as a form of entertainment. Galileo didn't invent them, but he introduced several improvements. In 1609, Galileo presented his telescope to the Grand Duke of Venice for its potential military applications, but when this proved unsuccessful, he decided to focus it on the sky.

太阳系：大耳朵土星

Solar System: Big-eared Saturn

1610 年，伽利略第一次观测到土星时，他并没有把土星理解为一颗被薄环包围的行星，而是把它解释为一颗有三个天体的恒星（一颗长着耳朵的恒星）。

When Galileo first observed Saturn in 1610, he did not understand the object as a planet surrounded by a thin ring, but interpreted it as a star with three bodies (a star with ears).



伽利略·伽利莱的土星
Saturn by Galileo Galilei
(Credit: Wikipedia)

太阳系：大耳朵土星
Solar System: Big-eared Saturn

多年来，人们对土星的结构存在误解。

For years the structure of Saturn was misinterpreted.

(Credit: Wikipedia)

例如，在鲁本斯于 1636 年至 1638 年间创作的一幅画作中，他画了三颗星来象征根据伽利略的最新发现而形成的土星。

For example, in the painting that Rubens made between 1636-1638, he painted three stars to symbolize Saturn according to Galileo's recent discovery.

太阳系：大耳朵土星

Solar System: Big-eared Saturn

1655年，克里斯蒂安·惠更斯提出土星的“耳朵”实际上是位于赤道平面上的一个扁平的薄盘状物质。根据土星和地球在其轨道上的相对位置，从地球上看，这个圆盘有时呈现为一条细线，有时呈现为一个宽椭圆。

（土星环的周期与土星的公转周期一样，均为29年。）

克里斯蒂安·惠更斯 (1629-1695)
Christiaan Huygens (1629-1695)
(Credit: Wikipedia)

In 1655, Christiaan Huygens suggested that Saturn's "ears" were a thin, flat disk of matter located in the equatorial plane. Depending on the relative positions of Saturn and Earth in their orbits, this disk appears from Earth as either a thin line or a wide ellipse. (The ring cycle, like Saturn's orbit, lasted 29 years).

太阳系：大耳朵土星

Solar System: Big-eared Saturn

目前已知土星拥有七个环，环与环之间有缝隙。这些环由水冰块和冰覆岩石组成，大小从房屋大小到沙粒大小不等。此外，土星还有24颗球形卫星和一百多颗形状不规则的卫星，其中一些卫星的直径达数公里。

(Credit: NASA)

It is currently known that Saturn has a system of seven rings separated by gaps. The rings are composed of blocks of water ice and ice-covered rocks, ranging in size from that of a house to grains of sand. In addition, Saturn has 24 spherical moons and more than a hundred irregularly shaped moons, some several kilometers in size.

太阳系：提丢斯-波德定律

Solar System: Titius-Bode Law

1771 年，德国天文学家约翰·波德参考了另一位德国天文学家约翰·提丢斯的研究成果，提出了著名的提丢斯-波德定律，该定律描述了太阳到已知行星的距离，并预测了其他行星的存在。

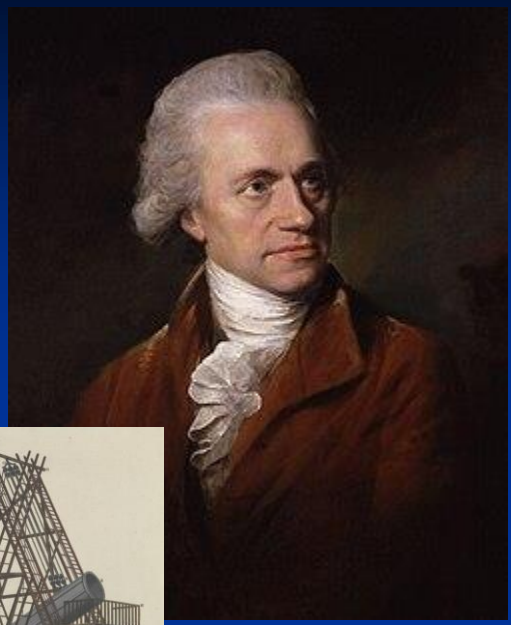
In 1771, the German astronomer Johann Bode, considering the work of another German astronomer, Johann Titius, formulated the well-known Titius-Bode law on the distances from the Sun to the known planets, which predicted the existence of others.

约翰·丹尼尔·提丢斯
Johann Daniel Titius
(1729-1796)
(Credit: Wikipedia)

约翰·埃勒特·博德
Johann Elert Bode
(1747-1826)
(Credit: Wikipedia)

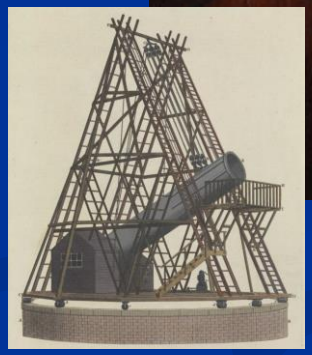
太阳系：提丢斯-波德定律

Solar System: Titius-Bode Law



1781 年，威廉·赫谢尔 描述了乌拉诺 的情况，并确认了提丢斯-博德 的位置。

赫歇尔曾试图以他的国王乔治三世的名字命名这颗行星，称之为 或“乔治行星”。这个名字在英国以外的地方并不受欢迎，最终约翰·波德提议将其命名为天王星（希腊神话中土星的父亲）。



威廉·赫歇尔（1738-1822）以及他的望远镜
William Hershel (1738-1822) and his telescope, (Credit: Wikipedia)

En 1781 William Hershel descubrió Urano situado a la distancia predicha por la ley de Titius-Bode y pareció confirmarse.

Herschel attempted to name the planet after his king, George III, calling it "Georgium Sidus" or "Planet **George**." This name was not well received outside of Great Britain, and Johann Bode eventually proposed naming it **Uranus** (the father of Saturn in Greek mythology).

太阳系：提丢斯-波德定律

Solar System: Titius-Bode Law

1796年，在哥达天文大会上，天文学家划分了黄道带，并从1800年开始寻找火星和木星之间的新行星。这些观测者被称为“天体警察”，他们发现了几颗小行星，但未能找到提图斯-波德所说的缺失的行星。

In 1796 at the Gotha Astronomical Congress, astronomers divided up the zodiac zone and began the search for a new planet between Mars and Jupiter from 1800 onwards. These observers were called the "celestial police" and discovered several asteroids but failed to find the planet that Titus-Bode said was missing.

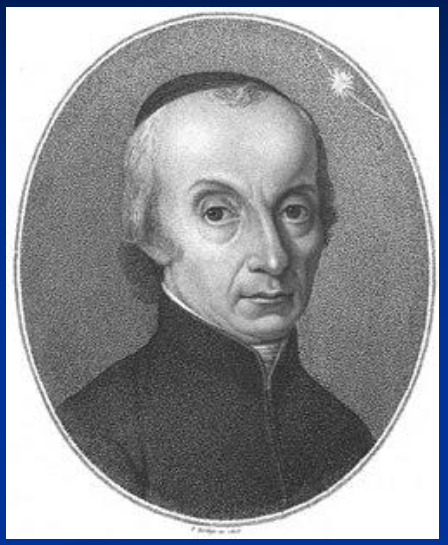
(Credit: Wikipedia)

太阳系：提丢斯-波德定律

Solar System: Titius-Bode Law

天主教神父朱塞佩·皮亚齐当时还没有被邀请参与搜寻，但他在 1801 年发现了谷神星，这与提丢斯-波德定律非常吻合。

The Catholic priest Giuseppe Piazzi, who had not yet been invited to participate in the search, discovered Ceres in 1801, which fit well with the Titius-Bode law.



朱塞佩·皮亚齐 (1746 – 1826)
Giuseppe Piazzi (1746 – 1826)
(Credit: Wikipedia)

因此，1801 年太阳系由以下行星组成：水星、金星、地球、火星、谷神星、木星、土星、天王星和海王星。

Therefore, in 1801 the solar system consisted of the planets: Mercury, Venus, Earth, Mars, Ceres, Jupiter, Saturn, Uranus and Neptune.

太阳系：提丢斯-波德定律

Solar System: Titius-Bode Law

天文学家在火星和木星之间的第一小行星带中发现了各种小行星。19世纪50年代，谷神星与其他小行星一起被编入小行星目录：尽管它是其中最大的，但它不再被认为是行星。

Astronomers discovered various asteroids in the first asteroid belt between Mars and Jupiter. In the 1850s, Ceres was cataloged as an asteroid along with the others: although it was the largest of them all, it was no longer considered a planet.

太阳系：提丢斯-波德定律

Solar System: Titius-Bode Law

天王星和海王星运动中的各种异常现象只能用一颗新行星的存在来解释。许多人开始寻找这颗新行星，但直到1930年，美国天文学家汤博才通过对比星空照片发现了它。它被命名为冥王星，取自罗马冥王哈迪斯的名字。

克莱德·汤博（1906-1997）
Clyde Tombaugh (1906 -1997)
(Credit: Wikipedia)

Various irregularities in the movements of Uranus and Neptune could only be explained by the existence of a new planet. Many embarked on a search for this new planet, but it wasn't until 1930 that the American astronomer Tombaugh detected it by comparing photographs of the sky. It was named Pluto, after the Roman god of the underworld.

太阳系：提丢斯-波德定律

Solar System: Titius-Bode Law

冥王星非常有名，以至于沃尔特·迪士尼在创作米老鼠的伙伴狗时，将其命名为冥王星。1941 年，新发现的化学元素被命名为钚。

(Credit: Wikipedia)

Pluto became so famous that Walt Disney, when creating the dog that accompanies Mickey Mouse, gave it the name Pluto, and in 1941 the new chemical element discovered was named Plutonium.

所以，在 1930 年，我们拥有一个包含以下行星的太阳系：水星、金星、地球、火星、木星、土星、天王星、海王星和冥王星。

So in 1930 we have a solar system with the planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune and Pluto.

太阳系：提丢斯-波德定律

Solar System: Titius-Bode Law

随着科技进步，人们发现了更多冥王星以外的天体。例如，2005年发现的阋神星比冥王星还要大，一度有人考虑将其列为第十大行星。然而，类似天体的新发现促使国际天文学联合会（IAU）得出结论：行星的概念需要明确定义。

在2006年于布拉格举行的国际天文学联合会大会上，最终确定了行星的定义，将太阳系行星数量减少到八大，不包括冥王星。

With technological advances, more bodies beyond Pluto were discovered. For example, Eris, discovered in 2005, was larger than Pluto, and its inclusion as a tenth planet was considered. However, new discoveries of similar objects led the IAU to conclude that the concept of a planet needed to be clearly defined.

At the IAU General Assembly in Prague in 2006, a definition of a planet w
established that reduced the solar system to only eight planets, excluding

太阳系：提丢斯-波德定律
Solar System: Titius-Bode Law

国际天文学联合会将行星定义为：
a) 具有足够的质量，使其自身引力能够克服刚体的作用力，从而达到近乎球形的形状；
b) 围绕恒星运行；
c) 还必须清除其轨道上的其他天体。

The IAU defined a planet as a celestial body that:

a) has sufficient mass for its own gravity to overcome the forces of rigid bodies so that it achieves a nearly spherical shape,

b) is in orbit around a star, and

c) must also clear its orbit of other bodies.

2006年布拉格国际天文学联合会冥王星投票IAU Pluto vote in Prague 2006
(Credit: IAU)

太阳系：提丢斯-波德定律

Solar System: Titius-Bode Law

符合前两个标准但体积不足以清空轨道的星体被定义为矮行星。因此，冥王星在76年后不再被视为行星，并与谷神星、阋神星和其他一些星体一起被归类为矮行星。自2014年以来，人们探测到了新的轨道异常，天文学家正在寻找遥远宇宙中可能存在的新行星……

Bodies that meet the first two criteria but are not large enough to clear their orbits are defined as dwarf planets. Consequently, Pluto, after 76 years, ceased to be a planet and was grouped with Ceres, Eris, and other bodies in the dwarf planet category. Since 2014, new orbital anomalies have been detected, and astronomers are searching for the possible existence of a new planet far beyond…

自 2006 年以来，太阳系包括以下行星：水星、金星、地球、火星、木星、土星、天王星和海王星。

Since 2006 the solar system includes the planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.

太阳系
Solar System

1801年，太阳系包含9颗行星：水星、金星、地球、火星、谷神星、木星、土星、天王星和海王星。

In 1801 the solar system included 9 planets: Mercury, Venus, Earth, Mars, Ceres, Jupiter, Saturn, Uranus and Neptune.

1930年，太阳系包含9颗行星：水星、金星、地球、火星、木星、土星、天王星、海王星和冥王星。

In 1930 the solar system included 9 planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune and Pluto.

截至 2006 年，太阳系共有 8 颗行星：水星、金星、地球、火星、木星、土星、天王星和海王星。

As of 2006, the solar system includes 8 planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune.

月球上的山脉
Mountains on the Moon

1609年11月30日，伽利略首次用小型望远镜观测了月球。当时人们认为月球是一个光滑完美的球体，但伽利略发现月球上有山脉、陨石坑和山谷。
月球表面在晨昏线（划分明暗面的分界线）处呈现出不规则的纹理，伽利略甚至根据山脉的阴影计算出了它们的高度。
伽利略还观察到一些比月球表面其他区域颜色更深的平原，并将其称为月海。

(Credit: Wikipedia)

On November 30, 1609, Galileo observed the Moon for the first time with a small telescope. At the time, it was believed that the Moon was a smooth, perfect sphere, but Galileo discovered that the Moon had mountains, craters, and valleys.

The lunar surface showed irregularities at the terminator (the line dividing the illuminated and dark sides), and Galileo even calculated the height of its mountains from their shadows.

Galileo saw plains that were darker than the rest of the lunar surface and called them seas.

月球上的山脉
Mountains on the Moon

国际天文学联合会（IAU）目前认可的陨石坑有9137个，并以科学家和探险家的名字命名。
陨石坑是陨石或小行星撞击的结果，人们认为月海（月海）是由巨大的撞击形成的。
由于月球上没有水、大气层或板块构造，侵蚀作用非常轻微，一些陨石坑的年龄超过20亿年。

(Credit: Wikipedia)

The IAU currently recognizes 9,137 craters, which it names after scientists and explorers.

Craters are the result of meteorite or asteroid impacts, and it is believed that the lunar mare (seae) were formed by giant impacts.

Since there is no water, atmosphere, or tectonic plates on the Moon, there is very little erosion, and some craters are over two billion years old.

月亮上的兔子
A Rabbit on the Moon

在某些文化中，人们认为月亮表面由深色斑点构成了一只兔子。

In some cultures, a rabbit is seen on the face of the Moon, formed by dark spots.

(Credit: Wikipedia)

月亮上的兔子
A Rabbit on the Moon

In East Asia, a rabbit (or a hare) is seen pounding the elixir of life, medicines, or cakes with a mortar and pestle (depending on whether the observer is Chinese, Japanese, Korean, or Vietnamese).

(Credit: Xiahpop)

月亮上的兔子

A Rabbit on the Moon

根据佛教传说：一只猴子、一只水獭、一只豺狼和一只兔子决定在满月之日行善布施。一位老人向它们讨要食物；猴子给了他树上的果子，水獭给了他鱼，豺狼给了他蜥蜴，而只会采草的兔子，却毅然投身于老人点燃的火堆中。兔子没有被烧伤，而老人——也就是释迦牟尼神——被兔子的善行所感动，便将兔子的形象画在了月亮上，供世人瞻仰。

According to a Buddhist tale: a monkey, an otter, a jackal, and a rabbit decided to practice charity on the day of the full moon. An old man asked them for food; the monkey gave him fruit from the trees, the otter fish, the jackal a lizard, but the rabbit, who only knew how to gather grass, offered his body by throwing himself into the fire the man had lit. The rabbit was not burned, and the old man, who was the god Shakra, moved by the rabbit's virtue, drew his image on the moon for all to see.

月见是指在秋季的第一天观赏月亮，因为根据神话传说，在这一天可以看到兔子在月亮上奔跑。

Tsukimi consists of contemplating the Moon on the first day of autumn because according to mythology, on that day rabbits can be seen running around on the Moon.

(Credit: Wikipedia)

月亮上的兔子
A Rabbit on the Moon

根据阿兹特克和玛雅的传说，羽蛇神奎策尔科亚特尔长途跋涉后饥肠辘辘，缺水少粮，以为自己必死无疑。这时，一只在附近吃草的兔子献身，救了他的命。奎策尔科亚特尔被兔子的慷慨奉献所感动，将它举向月亮，说道："你的身影在月光中显现，为了所有的人，为了永远。"

(Credit: Wikipedia)

According to an Aztec and Mayan legend, the god Quetzalcoatl (the feathered serpent), hungry after a journey, without food or water, thought he would die. Then, a rabbit grazing nearby offered itself as food to save his life. Quetzalcoatl, moved by the rabbit's noble offering, raised it to the moon, saying, "There is your image in the light, for all peoples and forever."

月亮上的兔子
A Rabbit on the Moon

墨西哥人认为月亮是他们的女神科约尔绍基，她被安置在一个容器中，根据月亮在容器中的位置，以不同的方式照亮地球。

根据另一个中美洲传说，谦逊的纳纳瓦特辛 (Nanahuatzin) 为了成为新的太阳而自焚，而富有的神特西斯特卡特尔（Tecciztecatl）在点燃自己成为月亮之前犹豫了四次。由于他的怯懦，众神认为月亮不应该像太阳那样明亮，其中一位神便向月亮脸上扔了一只兔子，以减弱它的光芒。

The Mexica believed that the Moon was their goddess Coyolxauhqui inside a vessel, which illuminated the Earth in varying ways depending on its position inside the vessel. According to another Mesoamerican legend, the humble Nanahuatzin sacrificed himself in the fire to become the new sun, but the wealthy god Tecciztecatl hesitated four times before setting himself ablaze and becoming the moon. Because of his cowardice, the gods believed the moon should not be as bright as the sun, and one of them threw a rabbit at its face to dim its light.

月亮上的兔子

A Rabbit on the Moon

(Credit: Wikipedia)

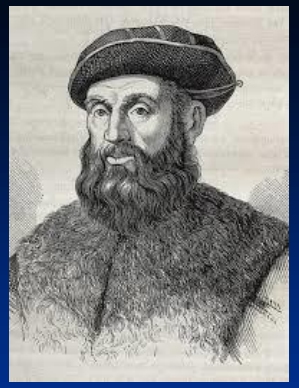
加拿大和美国流传着一个传说，讲述一只渴望登上月亮的小兔子。一只鹤答应带它去。旅途中，兔子紧紧抓住鹤伸展开来的双腿，就像今天鹤的腿一样。到达月亮后，兔子用沾满鲜血的爪子触碰了鹤的头部，留下了一道红色的印记。传说中，在晴朗的夜晚，人们仍然可以看到兔子在月亮上遨游。

A legend in Canada and the United States tells of a young rabbit who longed to ride the Moon. A crane offered to take him there. During the journey, the rabbit clung tightly to the crane's legs, which stretched out, just as cranes' legs appear today. Upon reaching the moon, the rabbit touched the crane's head with a bloody paw, leaving a red mark. According to the legend, on clear nights, the rabbit can still be seen riding on the Moon.

环游世界
Around the World

公元前3世纪，埃拉托色尼就已经计算出了地球的半径，但直到麦哲伦和埃尔卡诺首次环球航行，这一计算结果才最终得到证实。从1519年9月20日至1522年9月8日，这次航行极其复杂，因为当时世界这一地区没有海图，他们只能依靠天文知识。

In the 3rd century BC, Eratosthenes had already calculated the radius of the Earth, but it wasn't until Magellan and Elcano's first circumnavigation of the globe that it was conclusively proven. From September 20th, 1519, to September 8th, 1522, the voyage was extremely complicated, as there were no nautical charts of that part of the world at the time, and they had to rely on their astronomical knowledge.



费迪南·麦哲伦
Fernando de Magallanes
(1480-1521)
(Credit: Wikipedia)

胡安·塞巴斯蒂安·埃尔卡
Juan Sebastián Elcano
(1486-1526)
(Credit: Wikipedia)

环游世界

Around the World

费迪南·麦哲伦在1505年受葡萄牙国王赞助的航行中，就已经将该星座命名为南十字座（用于定位南天极，因为没有恒星直接指向南极）。

麦哲伦在西班牙国王卡洛斯一世赞助的航行中观测到了大麦哲伦星云，并将其介绍给了欧洲。中东地区早已知晓这两片麦哲伦星云。964年，波斯天文学家阿卜杜勒·拉赫曼·苏菲将其命名为“白牛”（al-Baker）。但它们在欧洲仍然不为人知，也难以观测到。

大麦哲伦星云 Large Magellanic Cloud (Credit Wkipedia)

Ferdinand Magellan, on a previous voyage under the auspices of the King of Portugal in 1505, had already named the constellation the Southern Cross (used to locate the South Celestial Pole, since there is no star that points to the South Pole).

Magellan made the Large Magellanic Cloud known in Europe, which he observed during his voyage under the auspices of King Charles I of Spain. Both Magellanic Clouds were known in the Middle East. In 964, the Persian astronomer Abd al-Rahman al-Sufi named them al-Baker (White Ox). But they remained invisible and unknown in Europe.

环游世界
Around the World

麦哲伦向西班牙国王卡洛斯一世提议进行“香料远征”，以此作为保存食物的一种方式（这一提议遭到了葡萄牙国王曼努埃尔一世的拒绝）。1518年，卡洛斯一世决定资助这次远征，并决定向西航行，而不是像之前那样向东航行，当时他只有18岁。

Magellan proposed the "Spice Expedition" to King Carlos I of Spain as a means of preserving food (a proposal rejected by Manuel I, King of Portugal). When, in 1518, Carlos I decided to finance this expedition, sailing west instead of east as had been the practice until then, he was only 18 years old.

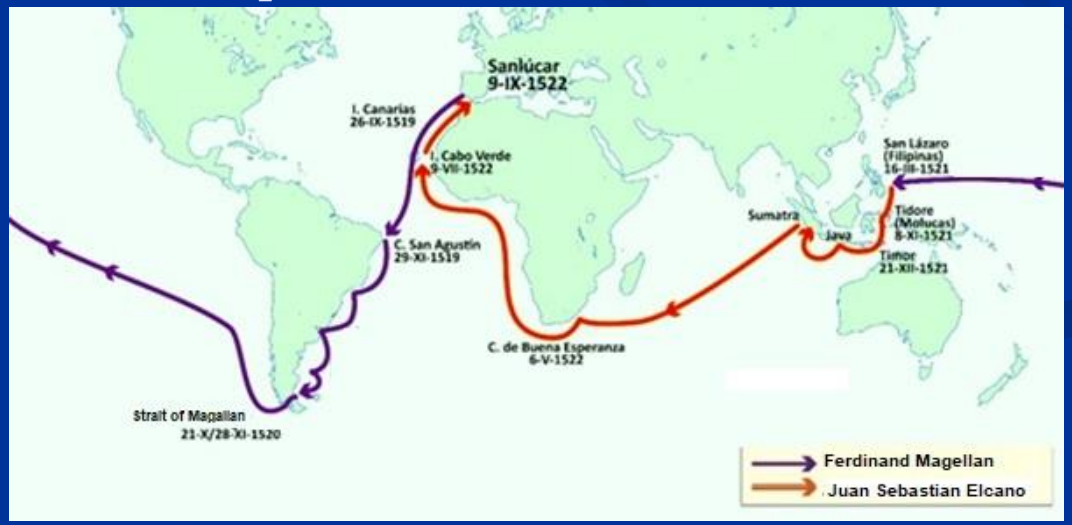
卡洛斯一世（1500-1558），17岁
Carlos I, (1500-1558), aged 17
(Credit: Bernard van Orley)

环游世界

Around the World

卡洛斯一世资助了五艘由费迪南德·麦哲伦指挥的船只，这些船只于1519年从塞维利亚出发，共有239名水手。最终只有17名幸存者在胡安·塞巴斯蒂安·埃尔卡诺的指挥下，乘坐“维多利亚号”返回。麦哲伦于1521年4月在菲律宾去世，西班牙人埃尔卡诺接管了指挥权。

Carlos I financed five ships under the command of Ferdinand Magellan, which departed from Seville in 1519 with a total of 239 sailors. Only 17 survivors returned, under the command of Juan Sebastián Elcano, in a single ship, the Victoria. Magellan died in the Philippines in April 1521, and the Spaniard Elcano took command.

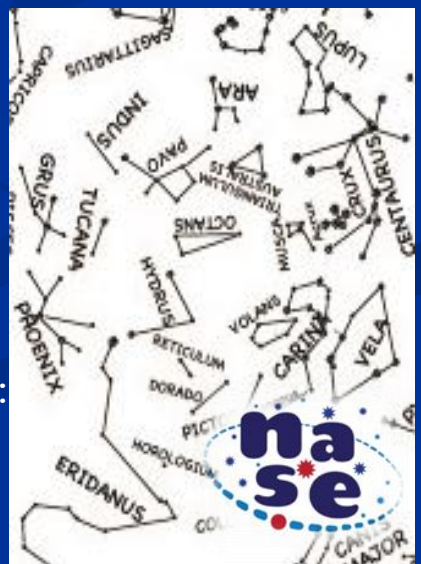


环游世界

Around the World

前往南半球后，人们开始定义新的星座，这些星座的命名往往取自当时使用的仪器和机器，或是美洲特有的动物。
16至17世纪发现的星座有：南三角座、水龙座、苍蝇座、孔雀座、凤凰座、杜鹃座、鹿豹座、天猫座、六分仪座、钟座、显微镜座、南极座、船尾座、望远镜座和船帆座。
古代星座的名称通常源于希腊神话，例如：狮子座、天蝎座、金牛座、水瓶座、白羊座、御夫座、巨蟹座、大犬座、小犬座、摩羯座、双子座、天秤座、猎户座、双鱼座、射手座、处女座。

Upon traveling to the Southern Hemisphere, new constellations began to be defined, named after instruments and machines used at the time or after animals native to the Americas.
The constellations discovered during the 16th and 17th centuries are Triangulum Australe, Hydrus, Musca, Pavo, Phoenix, Tucana, Camelopardalis, Lynx, Sextans, Horologium, Microscopium, Octans, Puppis, Telescopium, and Vela.
Ancient constellations often have a name based on Greek mythology, such as: Scorpius, Taurus, Aquarius, Aries, Auriga, Cancer, Canis Major, Canis Minor, Capricornus, Gemini, Libra, Orion, Pisces, Sagittarius, Virgo.



1884 年的全球地球

Global Earth of 1884

1888年，城堡公园举办了巴塞罗那世界博览会。这是一座集科学与文化于一体的公园，旨在展示19世纪的科学成就。公园内设有遮阳棚、温室、植物园、地质博物馆、动物博物馆和动物园。此外，公园内还建有一座气象公园，始建于1884年，园内设有一座气象柱，配备温度计、气压计和湿度计，但其机械装置已遗失。

The Ciutadella Park in 1888, hosted the Barcelona Universal Exposition. It was a science and cultural park, designed to showcase the scientific advances achieved in the 19th century. The park included an Umbracle, a Greenhouse, a botanical garden, and museums of Geology and Zoology and the Zoo. Stood a meteorological park, designed in 1884, which included a meteorological column with a thermometer, a barometer, a hygrometer but the mechanisms have been lost

(Credit: G. Ribera)

1884 年的全球地球
Global Earth of 1884

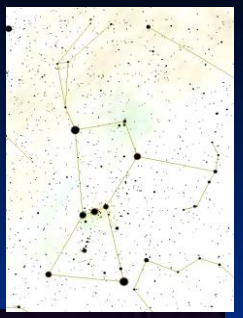
这根柱子指向四个基本方位，支撑着一个定向的球形日晷（实际上是一个定向的平行地球模型），球体上被照亮的区域指示时间。球体赤道周围环绕着一圈罗马数字。它确实运转正常。

The column was oriented to the four cardinal points and supporting the oriented spherical sundial (which is actually an oriented parallel Earth) where the illuminated area of the sphere indicated the time. Sphere surrounded by a band of Roman numerals along its equator. It actually works correctly.

(Credit: G. Ribera)

猎户座神话

Orion Mythology



猎户座是来自波俄提亚（希腊）的巨人，拥有绝世的美貌和强大的力量。他身材高大，甚至能在海底行走，头露出水面。他酷爱狩猎，使用一根青铜棒。猎户座死于蝎子的蜇刺，因此众神将猎户座和蝎子分别置于天空的两端，一个在冬季可见，另一个在夏季可见。

(Credit: Ricardo Moreno)

Orion was a giant from Boeotia (Greece), of great beauty and physical strength. He was so tall that he could walk along the seabed with his head above water. He loved hunting and did so with a bronze club. Orion died as a result of a scorpion's sting, so the gods placed Orion and the scorpion at opposite ends of the sky, one visible in winter and the other in summer.

猎户座地区的神话

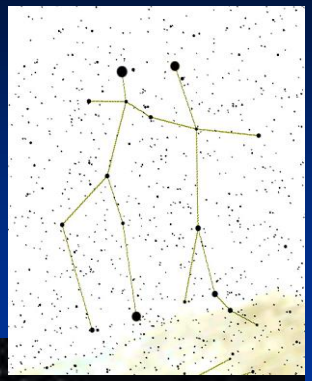
Mythology of the Orion region

(Credit: Wikipedia)

猎户座有两条狗：一条名叫天狼星的老狗，一条名叫玛伊拉的小狗。玛伊拉离开猎户座后，又被另一个主人收养。新主人去世后，玛伊拉开始呜咽哭泣，直到双眼肿胀，她便一直守在坟墓旁，不吃不喝，直到死去。为了表彰她的忠诚，人们将她升入天空。最亮的恒星南河三（Procyon）被阿拉伯人称为阿尔戈迈萨（Algomaisa），意为“哭泣的眼睛”。

Orion had two dogs: an older dog named Sirius, and a younger dog named Maira. After being with Orion, Maira had another owner. When that owner died, his dog began to moan and cry until her eyes swelled up, and she stayed on the grave, without eating or drinking, until she died. As a reward for her loyalty, she was placed in the sky. The brightest star, Procyon, was called Algomaisa by the Arab meaning "she of the weeping eyes."

双子座神话
Gemini Mythology



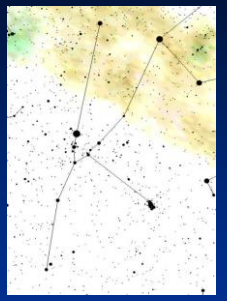
宙斯爱上了斯巴达王后勒达，于是化作天鹅，送给她两枚蛋。一枚蛋孵出了波吕克斯，另一枚蛋孵出了卡斯托耳。他们手牵着手被放在天空中，象征着兄弟情谊和友谊。

Zeus fell in love with Leda, queen of Sparta, and disguised as a swan, gave her two eggs. From one hatched Pollux, and from the other, Castor. They were placed in the sky holding hands, a symbol of brotherhood and friendship.

(Credit: Ricardo Moreno)

金牛座神话

Mythology of Taurus



腓尼基国王的女儿欧罗巴正在采花，突然看到一头毛色油亮柔顺的公牛——金牛座——正在悠闲地吃草。原来这是宙斯化身，因为他爱上了欧罗巴。欧罗巴走近金牛座，抚摸它的鬃毛。金牛座随即坐了下来。突然，它站了起来，带着这位年轻女子扬帆远航，最终抵达了克里特岛。

(Credit: Ricardo Moreno)

在天空中，金牛座的头颅被许阿得斯八位仙女环绕，她们曾抚养过酒神狄俄尼索斯。狄俄尼索斯为了奖赏她们，将她们安置在了天空。

Europa, daughter of the king of Phoenicia, was picking flowers when she saw a bull with a glossy, soft coat, Taurus, grazing peacefully. It was Zeus disguised, for he was in love with Europa. She approached him and stroked his hair. The animal sat down on the ground. Suddenly, he rose and, with the young woman, sailed until they reached Crete.

In the sky, the head of Taurus is surrounded by the Hyades, eight nymphs who raised the god Dionysus. This god placed them in the sky as a reward.

金牛座地区的神话

Mythology of the Taurus region

昴星团由七姐妹组成（玛亚、塔伊格忒、厄勒克特拉、阿尔库俄涅、刻莱诺、斯忒洛珀和墨洛珀）。猎户座追赶她们五年之久。她们恳求宙斯的帮助，宙斯便将她们安置在天空中。

在古希腊，人们用这个星座来测试弓箭手的视力：如果能看到全部七颗星，说明他们的视力很好；如果只能看到六颗，则说明视力不太好。

(Credit: Wikipedia)

The Pleiades were seven sisters (Maia, Taygete, Electra, Alcyone, Celaeno, Sterope, and Merope). Orion pursued them for five years. They begged Zeus for help, and he placed them in the sky.

In ancient Greece, this constellation were used to test the visual acuity of archers: if all seven stars could be seen, their eyesight was good; if only six could be seen, it was not so good.

御夫座的神话

Mythology of the Auriga

御夫座代表雅典国王，他发明了由四匹马拉的战车，称为四马战车。太阳神是第一个驾驶四马战车的神。

在罗马，战车驾驶员参加马戏比赛。他们通常出身卑微，但也有一些人最终变得富有。

The Auriga represents the king of Athens, invented the chariot drawn by four horses, called a quadriga. The Sun was the first god to drive a quadriga.

Among the Romans, charioteers competed in circus races. They usually came from humble backgrounds, although some became wealthy.

(Credit: Ricardo Moreno)

非常感谢您的关注！

Thank you very much for your attention!