English-Chinese 英汉对照

上海科技教育出版社

戴丹青 胡皖军 编译

读点科学史

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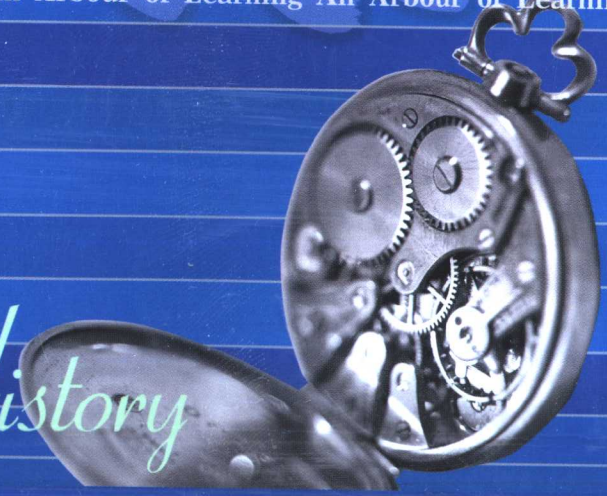

Read a Bit of Science History

An Arbour of Learning 学子书苑系列

英汉对照

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学子书苑系列
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序

我们的时代正飞速发展。科技的突飞猛进、知识的膨胀滋蔓，令许多人不知所措，只觉得未知的领域太多，知识的更新太快。某个领域的专家一旦离开自己的专业，就会感到无所适从。要想在现代社会活得潇洒、自如，多学一点专业以外的知识已迫在眉睫！

我们这套“学子书苑系列”是为那些愿意多品尝几道知识快餐的莘莘学子而精心设计的，涵盖社会科学和自然科学的许多领域与学科。或许在专家眼里，内容是浅显了些；但对于门外汉，对于想多见一点“世面”的知识旅游者来说，透过这里打开的一扇扇小窗户，已足以领略某一学科的基本风貌，为塑造博学多能的人格奠定一个坚实的基础。

丛书以英汉对照的形式出现，是考虑到当今学子大多是英语的学习者，采用双语能收到“一举两得”的学习效果。

这里首期推出《读点哲学》、《读点历史》、《读点文明史》、《读点神话》、《读点科技史》、《读点科幻》、《读点科技》、《读点民俗》和《读点商务》九个分册。如果读者满意，我们还将继续编下去。在“读点××”的题目下，可供开拓的空间是很大很大的……

陈才宇

2001年秋

于浙江大学

Foreword

前言

作为《学子书苑》丛书的一个分册,《读点科技史》展现的是世界科学技术发展历史的基本风貌。两千多年以来,我们人类在数学、物理、化学、天文、航空、航天、医学、农业、生物、计算机等领域取得了许多伟大的成就。那些为社会的进步、科学的发展作出过卓越贡献的科学家和发明家是时代的骄子,人类的精英!历史将永远记住伽利略、牛顿、达尔文、爱迪生、爱因斯坦、玛丽·居里、比尔·盖茨这些十分响亮的名字。

本书选材时充分考虑了科学性、知识性和趣味性。全书内容丰富,深入浅出,有助于普及科技知识。篇目编排大致以年代先后为序。

本书第2、6、8~22等17篇由戴丹青选材,第1、3~5、7等5篇由胡晓军选材。戴丹青编译了第6、8、10、11、

14～16篇，胡晓军编译了第1～5、7、9、12、13、17～22篇。

限于编译者的水平与经验，译文中不妥之处在所难免，恳祈不吝指正。

戴丹青　胡晓军

2001年10月

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Science in Ancient Greece

古希腊的科学

Two famous names from ancient Greece are Homer and Socrates. To Homer, a shadowy figure from around 700 or even 800 BC, is attributed the earliest written literature. Socrates, the famous philosopher who was condemned to death in 399 BC, allegedly for corrupting the young, greatly influenced later Greek philosophers such as Plato and Aristotle. In the century or so before Socrates, the Greeks had virtually created philosophy, theatre and drama, and the writing of history—and had made great innovations in architecture.

Also at this time, around 420 BC, there lived the famous physician, Hippocrates, to whom is attributed a vast body of medical literature and who has given his name to the Hippocratic Oath of the medical profession.

Much of mathematics, too, was created in ancient Greece, both in the theory of numbers and in geometry. Pythagoras, who is remembered for his theorem about the sides of a right-angled triangle, lived around 540 BC, while Euclid, the best known geometer of the ancient world, lived around 300 BC. Euclid's books on geometry, with their formal axioms and rigorous methods of proof, shaped mathematical thinking for more than 2000 years. The word "geometry" literally means "earth-measuring" and the Greek Eratosthenes, who lived around 230 BC, applied geometrical ideas in devising one of the earliest estimates of the radius of the earth. This example illustrates the use of mathe-

荷马[①]和苏格拉底[②]是古希腊时期的两位著名人物。生活在公元前700年或800年左右的荷马身份至今尚不太确定，但他被认为写了最早的书面文学。著名哲学家苏格拉底在公元前399年因为被指控犯有腐蚀年轻人之罪被处死，他对后来的希腊哲学家如柏拉图和亚里士多德等人产生了重大的影响。大约在苏格拉底前一个世纪中，希腊人创造了哲学、剧院和戏剧以及史书编写，另外在建筑艺术上也有巨大变革。

在公元前420年左右，希腊还出了一位著名的医生希波克拉底[③]，他编写了大量的医学著作，而且医学领域中还有以他的名字命名的"希波克拉底誓言[④]"。

此外，在数学方面，无论是数字理论还是几何，古希腊都取得了较大的成就。生活在公元前540年左右的毕达哥拉斯[⑤]，便提出了闻名于世的关于直角三角形各边的勾股定理。古代最知名的几何学家欧几里得[⑥]生活在公元前300年左右。他关于几何方面的书籍，以其形式公理和严格论证方法影响世界数学思想达2000多年之久。"几何"一词的字面意思是"地球的测量"。生活在公元前230年左右的埃拉托色尼[⑦]运用几何原理，成为最早测出地球周长的人之一。这表明数学当时已

① 荷马（约公元前9～8世纪），古希腊吟游盲诗人。著史诗《伊利亚特》和《奥德塞》。

② 苏格拉底（公元前469～公元前399年），古希腊哲学家。认为哲学在于认识自我，美德即知识，提出探求真理的助产术和辩证法。

③ 希波克拉底[公元前460～公元前377（?）年]，被称为"医学之父"。

④ 医生执行医务前保证遵守医生道德守则的誓言，守则相传出自希波克拉底之手。

⑤ 毕达哥拉斯，古希腊哲学家、数学家，毕达哥拉斯教团的创始人。认为数是万物的本原，促进了数学和西方理性哲学的发展。

⑥ 欧几里得，著有《几何原本》13卷，一直流传至今，关于光学和天文学也有著述。

⑦ 埃拉托色尼[公元前276（?）～公元前194（?）年]，古希腊天文学家、数

matics in what we would call scientific work, and this emphasis on mathematics was central to much of Greek science.

For example, the Pythagoreans, the followers of Pythagoras, discovered that simple numerical relationships existed between the lengths of vibrating strings and the harmony of the musical notes they emitted. This led them to try to explain all things in terms of simple mathematical laws and musical harmonies. The Pythagoreans also devised a musical scale which was based on very simple numerical ratios.

The Greeks also tried to apply mathematical methods in devising models of the universe and one of them—Aristarchus of Samos, who lived around 280 BC—even proposed a sun-centred model similar to that of Copernicus. However, it was not this model but a different and much more plausible model of the universe which was most common in the ancient world. This was the ancient Two-Sphere Universe with one sphere, the earth, at the centre and a second vast sphere surrounding it in which all the stars were embedded.

The two-sphere model arises from some very simple observations of the stars which anyone can make. The stars are largely the same night after night. The same groups of stars, or constellations, continually reappear in the same relative positions. For example, the constellation we call the Great Bear reappears every night and rotates around the pole star through 60° every four hours—that is, through 360°,

经被应用于我们所称的科学工作之中，而且许多希腊的科学工作都是围绕着数学而展开的。

比如，毕达哥拉斯的信徒，即毕达哥拉斯的追随者们发现，在震动弦的长度和弦所发出的和声之间存在着简单的数的关系，于是他们尽力运用简单的数学法则和音乐的和谐来解释一切事物。而且，他们还根据非常简单的数率设计出了一种音阶。

古希腊人还尽力利用数学方法来设计宇宙模型，他们中的一个人——生活在公元前280年左右的阿里斯塔克斯⑧，甚至提出了一个与哥白尼学说相似的日心说。然而，在古代最流行的还是一种与此不同的、似乎更为真实的宇宙学说，即以处于中心的地球为一个球面，以围绕地球旋转的其他星系为另一个球面的双球面学说。

这种双球面学说是根据任何人都能做到的对星星的简单观察而提出的。天上的星星日复一日地几乎没有什么变化，同样的星群或者星座会不断地出现在同样的相对位置。比如，我们所谓的大熊星座每天晚上都会出现，并且围绕极星每4小时旋转60°，也就是说，每24小时公转一

学家和诗人。首次测量出地球周长和交角，并编制了一本星表。

⑧ 阿里斯塔克斯（公元前310～公元前230年），古希腊大文学家。首创日心说，并测算日、月的大小和距离。

or one complete revolution, every twenty-four hours.

All the constellations revolve in this way and so there arose the simple picture of a fixed sphere of stars rotating once a day about a spherical stationary earth. However, not all the heavenly bodies behave as simply as the stars, the major exceptions being the sun, the moon and the planets. The sun moves through the fixed stars on a path called the ecliptic, taking a year to return to its original position. It is the constellations traversed by the sun in its wanderings—Aries, Gemini, Taurus, and so on—that give rise to the astrological divisions of the calendar year.

The moon and the planets also move about amongst the fixed stars — indeed, the Greek word *planetos* means the wanderer — but they are always found on or very near the ecliptic.

By the 4th century BC, just before Aristotle, this model was widely accepted. Other models were proposed, including one from around 350 BC in which Mercury and Venus go round the sun, which in turn circles the earth. But such models were not common.

The field was held by the modified two-sphere universe which was taken over by Aristotle and integrated into his complex synthesis of ideas covering cosmology, the natural world and philosophy. It is not possible even to outline all of Aristotle's work. His writings were an enormous attempt to synthesise the whole of the existing human knowledge and experience into one coherent system. They covered philosophy, logic, cosmology, physics, the natural

周360°。

所有的星座都是这样旋转的，因此，简单看来就好像其他星星构成的球面在围绕地球这个静止的球面而旋转。然而，并不是所有的天体都这样简单运行，其中太阳、月亮和行星例外。太阳穿过一些固定的恒星在一条被称为黄道的轨道上运行，经过一年的时间才回到原来的位置。正是这些太阳穿过的星座——白羊座、双子座、金牛座等，才导致占星术上日历年的划分。

月球和行星也穿梭于一些固定星系之间——实际上，希腊单词"planetos"的意思就是漫游者——只是它们通常出现在黄道上或黄道附近。

到公元前4世纪，正好在亚里士多德以前，这种双球面学说得到了广泛的认同。其他一些宇宙模式假说也曾出现，其中之一大约出现在公元前350年，认为水星和金星围绕太阳旋转，太阳反过来围着地球旋转。然而，这些假说都不流行。

亚里士多德继承了修改过的双球面学说并将其融合到他的涉及宇宙、自然界和哲学的复杂的综合理论中。实际上，我们甚至不可能概括亚里士多德的所有著作。他企图将当时存在的所有人类知识和经验都综合成一个连贯的体系纳入自己的著作中，内容涉及哲学、逻辑学、宇宙学、物理学、自然界、心理学、伦理学、政治

world, psychology, ethics, politics, and literary criticism. Aristotle also made major contributions to the classification of animals and plants and to the study of social and political questions. However, we do need to describe Aristotle's basic ideas concerning cosmology, matter and motion.

Aristotle divided the universe into two regions—the heavenly region, which was everything from the moon outwards, and the earthly region, which was everything beneath the moon, or the sub-lunary sphere, as it was called.

These two regions were, for Aristotle, totally distinct and totally different. In the heavens everything was perfect, incorruptible and unchanging. The heavenly bodies were perfect spheres, and they were made of a different, more perfect kind of matter, the ether, which was, to quote Aristotle, "more divine" and "more precious" than ordinary terrestrial matter. Since it was perfect, this heavenly matter had the property, when it moved, of moving naturally in the most perfect of all figures, the circle. Uniform motion in a circle was at once changing and yet changeless, since it endlessly repeated itself. According to Aristotle, no explanation was needed to explain this uniform circular motion of the heavenly bodies. It was in their nature to move thus. They could do nothing else.

In the sub-lunary sphere, everything was different. Things there were corruptible and subject to change and decay. Aristotle talks of "the corrupting power of matter" and now he means ordinary matter as it exists

学以及文学批评等方面。而且他对动植物的分类以及社会问题和政治问题的研究也作出了重大贡献。然而，我们的确有必要描述一下他关于宇宙论、物质和运动的基本思想。

亚里士多德将宇宙分为两个区域——天国区和地球区。天国区是指月球以外的太空，而地球区则是指月球以下的世界，或者按照人们所称呼的那样即月下世界。

在亚里士多德看来，这两个区域完全独立，截然不同。在天国，一切都是完美不朽、永不改变的。天国的物体是完美的球体，由一种不同的、更完美的物质“以太”构成；用亚里士多德的话来说，以太比普通的地球物质“更神圣、更珍贵”。既然以太是完美的，因此当它运动时，它自然就具有以所有图形中最完美的形式——圆形移动的特性。始终如一的圆周运动既在变化又没有变化，因为它只是在不断地重复自己。亚里士多德认为，没有必要去解释天国物体的这种圆周运动。它们的本性决定只能这样运动。

在月下世界中，一切都不一样。那儿的东西容易腐烂、变质。亚里士多德谈到“物质的腐蚀能力”就是指地球上的普通