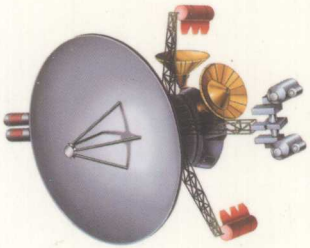
一部包罗万象的知识宝典　　一套营养丰富的文化大餐

◎ 主编／孙静确

BILINGUAL ENCYCLOPEDIA FOR TEENAGER

双语青少年百科

Astronomy 天文卷



“宇宙的年龄 Age of Universe ·地球 The Earth ·宇宙生物 Life in Space ·黑洞深渊 Into the Depths of a Black Hole ·火星上的雪 The Snows of Mars ·黑尔—鲍勃彗星发现的轶闻 The Discovery of Hale Bopp Comet ·恒星 Stars ·土星，光环之王 Saturn, Lord of the Rings

宇宙的结构 Cosmic Structure ·宇宙微波背景 Cosmic Microwave Background (CMB) ·太阳系中发现冰冻“小行星” Icy “Planetoid” Found in Solar System

北方文艺出版社

双语

青少年百科

DOUBLE LANGUAGE

ENCYCLOPEDIA FOR TEENAGER

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□主编 / 孙静确

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作　　者/孙静确
责任编辑/陈颖杰　张远超
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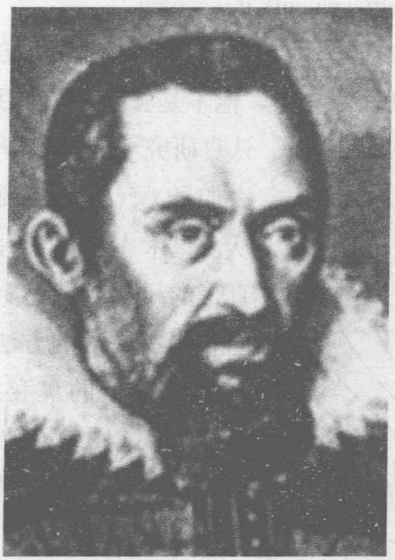
目　录

Johann Kepler

约翰·开普勒

Johann Kepler, German astronomer, Born: Weil der stadt, Württemberg, December 27, 1571, Died: Regensburg, Bavaria, November 15, 1630.

约翰·开普勒是德国天文学家,1571 年 12 月 27 日生于符腾堡州魏尔德施塔特,1630 年 11 月 15 日卒于巴伐利亚州雷根斯堡。



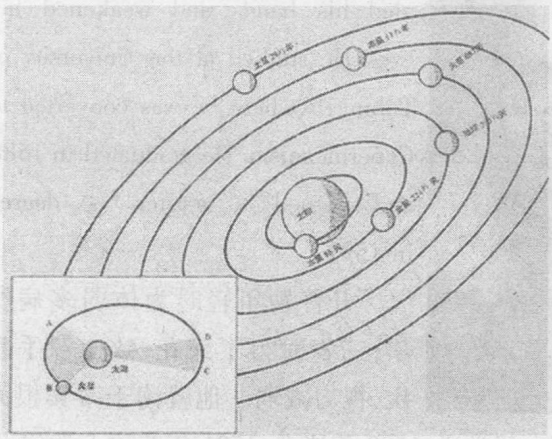
In his youth, Kepler was cursed with a sickly constitution. An attack of smallpox, when he was three, crippled his hands and weakened his eyes. He studied at the University of Tübingen, where he was converted to Copernicanism. He graduated in 1588 and earned a master's degree in 1591.

开普勒年轻时为体弱多病所累,三岁时得了天花,致使双手残疾,视力减弱。他就读于蒂宾根大学,并在那里接受了哥白尼学说;1588 年毕业,1591 年获硕士学位。

There was a strong strain of mysticism in Kepler. An astronomy pro-

fessor in those days was expected to cast horoscopes, and Kepler threw himself into that form of work. He was no faker but studied the Greek astronomers carefully in an attempt to make a real science out of astrology. Kepler attempted to use astrological techniques to solve biblical mysteries. He tried to work out the date of creation, for instance, and found it to be 3992 B. C.. In later life Kepler seemed rather apologetic about his ability as an astrologer, but there is no question that it was more valued by his patrons than his achievements in science.

开普勒身上具有强烈的神秘主义气质。在他那个时代，天文学教授常被要求占星算命，开普勒亦热衷于此道。他不是骗子，而是想认真研究希腊天文学家们的观点，以期冀从占星术中得出某种真正的科学。他还企图利用占星术的方法来解开圣经的奥秘。例如，他试图算出创世的日期，并得出那是在公元前 3992 年。开普勒在后半生似乎对于将才能用于占星而颇为抱愧，但是毫无疑问，他的庇护人对此的



评价却比对其科学成就的评价更高。

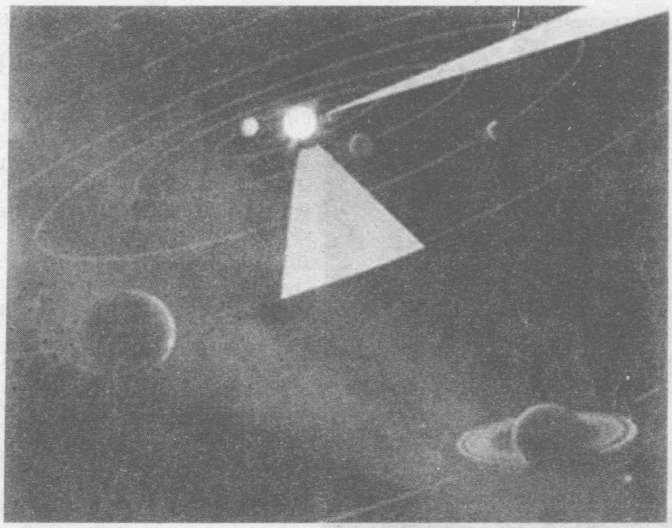
In 1598, he accepted a position at Prague with the aged Tycho Brahe. On Tycho's death in 1601 Kepler inherited the invaluable data that the older man had collected over the years, including his careful observations of the apparent motion of the Planet Mars. Kepler set about trying to devise a system of the heavens based on these observations.

1598 年,他在布拉格任职,与上了年纪的第谷·布拉赫在一起。1601 年第谷去世,开普勒继承了这位老人多年收集起来的无比宝贵的资料,包括他对火星的表面运动的仔细观测记录。开普勒开始尝试以这些观测为基础,设计的一种天空体系。

Kepler found that the positions of Mars, as observed by Tycho, fitted into an elliptical orbit with a high degree of accuracy. It wasn't a very flattened ellipse, but it was most definitely not a circle. Furthermore, the sun was located at one focus of the ellipse. Kepler found that the orbits of the other Planets could also be drawn as ellipses with the sun always at one of the foci. He announced this in *Astronomia Nova*, a book published in 1609, and this is now known as Kepler's first law. The book also contained his second law, "A line connecting the planet and the sun will sweep over equal areas in equal times as the planet moves about its orbit." Kepler's scheme of the solar system has been followed by astronomers ever since, without singifi-

cant modification.

开普勒发现,第谷观测的火星位置与一个椭圆轨道相符,且符合的精度很高。它不是一个很扁的椭圆,但它决不是一个圆。而且,太阳位于该椭圆的一个焦点上。他发现其他行星的轨道亦可画成椭圆,太阳总是处于椭圆两焦点中的一个上。他在1609年出版的《新天文学》一书中宣布了这一结果,如今它被称为开普勒第一定律。该书还包含了他的第二定律:“当行星在轨道上运行时,连接该行星与太阳的直线在相等的时间内总是扫过相等的面积。”开普勒的太阳系图景从此为天文学家们所信奉,而无重大的修改。



Astronomy and Culture

天文和文化

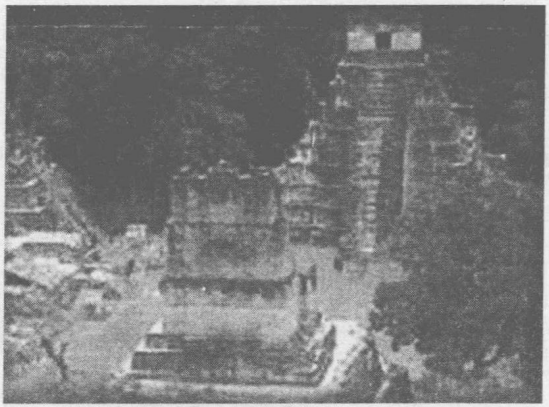
Mayan Pyramids were built in the heart of Latin American jungle. These were intended primarily for astronomical observations, although at times also used for the tombs of Mayan Kings, and for holding ceremonies and celebrations on major occasions. The elites spent their whole lives on the Pyramids' top floor, to record their observations of the sun and planets. Probably due to a long period of drought, the whole population moved out of the jungle without any indication of whereabouts. They, however, during their stay, created hieroglyphic characters. Scholars revealed that Mayan Calendars had two features.

玛雅人在中南美洲丛林中建造了许多金字塔,除了用作帝王坟墓及节日祭坛外,大部分时间用以观测天文。高级神职人员终生居住在金字塔上层,记录太阳和行星的运行情况。后来可能因为长期旱

灾,所有的人迁移不知去向,留下了独特的象形文字和神奇的玛雅历法。经研究解读,学者们发现其历法有两个特征:

The first feature was a number system advanced a digit by counting up to twenty. In their calendar called Haab, a month (urinal) had 20 days (kin); a year (tun) had 18 months; with 5 leap days (uayeb) added up to make a Mayan Year of 365 days. Mayan Year is quite the same as our own calendar year.

第一,该历法是以20进位的数字系统。下邑历以20记元(即20太阳日)的周期为一月元,18月元为一年(即360日),再加上5闰日作为玛雅历的一年。玛雅历法的年和我们的历法年颇为一致。

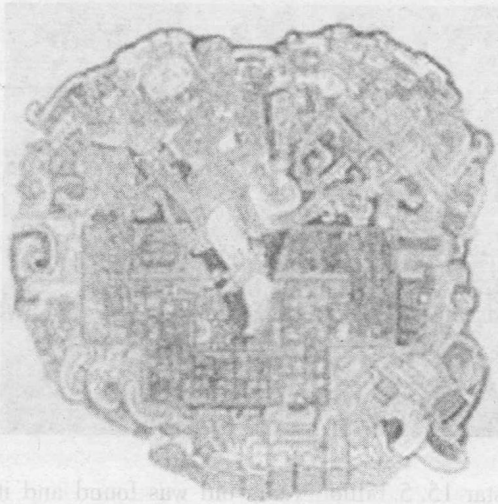


Secondly, Mayan calendar had a 1,366,560 day period, or a 3740 year period. This is rather unintelligible. Does that mean another unknown planet exists whose revolution takes 3740 earthly years? Did the Mayans come to the Earth in 3114 BC and return to that planet in 626 AD?

第二,玛雅历法中有一个为期1,366,560天(合3740地球年)的周期,这令人相当费解。难道说还有个行星,其公转期为3740年,玛雅人在公元前3114年从那颗行星上降临到地球上来,又在公元626年左右返回那颗行星了?

Cuneiform of more than 2000 years ago unearthed in the Middle East, recorded a big star revolving in its long elliptical orbit around the

sun, for a revolution period of 3600 earthly years (named a SHAR). The record documented that visitors from that planet had arrived on the Earth many times, landing in the Mesopotamia area, building towns with stone blocks and teaching earthly residents many useful things. Finally the visitors left. They built in early history the First Egyptian Pyramid around 8500 BC, Angkor Wat in Cambodia in 5000 BC, Tower of Babel in Babylon, etc., and the First Egyptian Kingdom was established at about 1500 BC. The Mayan Calendar started on the date of 3114 BC, a time coincided with the time of the Yellow Emperor of China teaching the Chinese people to make dress and bronze wares, and the three kings telling the Chinese to work on agriculture and build stone houses.

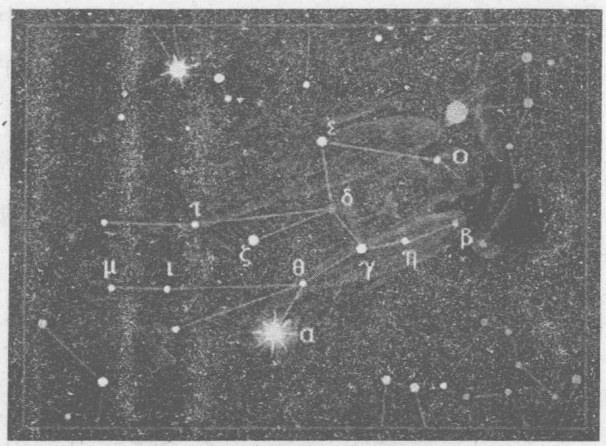


中东出土的二千多年前的古泥方也记载了一个按长椭圆形轨道绕太阳运行的大星，周期为3600地球年（称为“一韶华”）。大星居民来过地球多次，降落在两河流域并用石头建造城池，教会地球人很多东西，然后离去。他们约在公元前8500年左右建造了埃及第一个金字塔，在公元前5000年建造了柬埔寨的吴哥窟，以及巴比伦的巴别塔等等，而埃及的第一个王国直到公元前1500年左右才得建立。玛雅历开始的日期是公元前3114，这个时间和黄帝教授华夏人民做衣服、制造青铜器以及三皇五帝在华夏传授农业、建筑技艺的时间颇为相近。

Age of the Universe

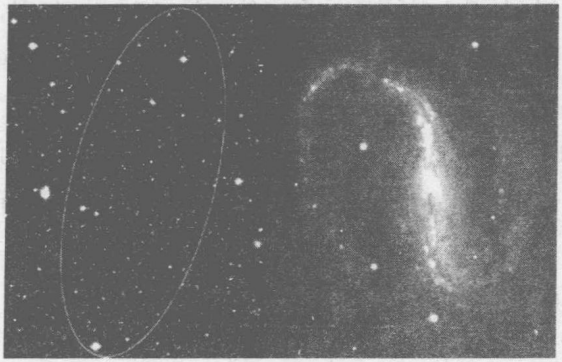
宇宙的年龄

Edwin Powell Hubble has discovered that the farther a star from Virgo is, the faster it retreats and the bigger the Red Shift is. The relation between the retreating speed and the distance is measured as 80 ± 17km/sec/Megaparsec, where a parsec represents a 3.26 light-year distance. The age of our universe is therefore estimated to be 13.7 billion years. Some galaxies had an age older than the Bang, e.g., a star 15.5 billion years old was found and its year of birth should be recorded as − 1.8 billion years, with a negative value of time.



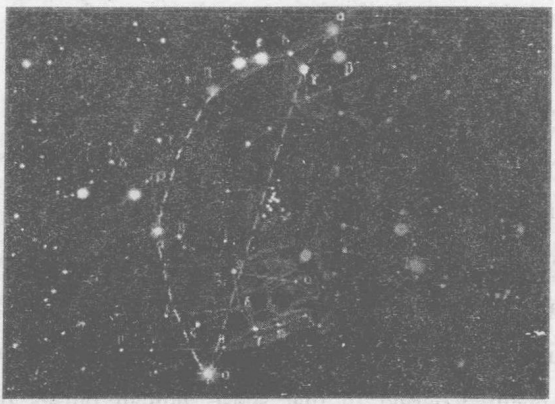
美国人哈勃发现,离室女座中心越远的星体,向后退的速度(即光谱红移)越大。星体距离和后退速度之间的关系是(80 ± 17)公里/秒/兆巴秒(1 巴秒代表 3.26 光年的距离)。由此估算出银河系年

龄约为137亿年。有些不在银河系的星体的年龄竟达155亿年，也就是说它们在大爆炸前已经存在。我们用负值来表示它们诞生的时间，即负18亿年之前。



Human history uses BC and AD to denote the years of events. However, 0B. C. and 0A. D. does not exist! The archaeologists like to denote the time of a piece of artifact in BP, meaning before present. To avoid unnecessary confusion, it was proposed to record history in *absolute time scale*. That means measurement is taken from the year 10000 B. C. as a New Year ZERO, because in that year the ice on earth melted, the last (fourth) Ice Age ended, and the human civilization began.

人类用“公元前”及“公元后”来表示年代，却没有公元前0年或公元0年，不够科学。考古学家喜用“距今”表示文物的年代是离现在多少年，于是算法不同，产生混乱。有人倡议使用绝对历史纪年，认为零年可以设在公元前10000年，因为公元前10000年是冰河纪末期，人类文化方才开始。

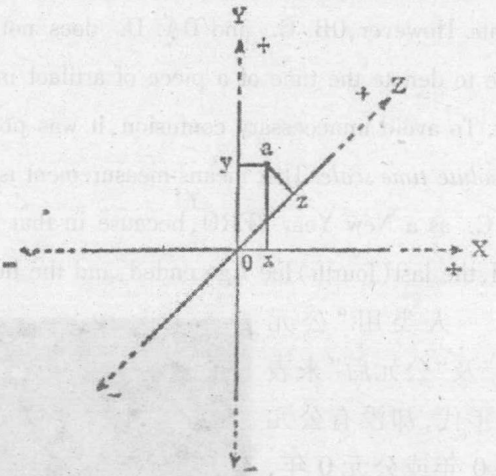


The Big Bang of our galaxy occurred in *virgo*, a constellation 56 mil-

lion light years away from the Sun. Shall we take this location and the moment of the Bang as an ideal origin of Space-time Coordinate, i. e. , $t=0$, $x=0, y=0, z=0$, and the absolute cosmic time and distance could be measured from that point? Is that reasonable?

我们的银河系大爆炸的中心在室女星座，它是距离太阳 5600 万光年的一个星团。这个地点在爆炸时的一刹那，是银河系时空坐标的理想原点，即 $t=0, x=0, y=0, z=0$，宇宙时间和距离不妨从这一点算起。但是这样做是不是合理呢？

What is TIME? You may think that time is the positions of the two hands on a clock or a watch, or the Earth's position in the orbit around the Sun, or the pulse rate indicating your biological clock. However, the whole universe is in motion and all stars are shifting. Said ideal origins of time and space may not be meaningful at all. A permanent space coordinate system never exists, nor does the time origin. A relative time lapse indicates a number of events happening in a specified period. In that sense, human pulses represent just the heartbeats. Hands on a clock are in reality only representative of the condition of the running gears. The angular speed of the orbiting Earth is not constant since it revolved much faster a billion years ago. One YEAR merely



tells us that the Earth has completed one revolution around the Sun. Then the real meaning of TIME should be understood as the count of perceivable events within a space domain.

时间是什么？是钟表齿轮带动指针所转的角度吗？还是地球公转的位置呢？还是脉搏跳动的生理时钟呢？整个宇宙都在运动，上面提到的理想原点便没有永恒的意义了。没有绝对的空间坐标，也没有绝对的时间坐标。只有相对的时间，可以用现实空间发生的事情来表示。所以脉搏只表示个人心跳的次数；钟表只表示齿轮转了某个角度。地球公转的角速度也不是恒定的，它比 10 亿年前慢了不少，所以“年”只表示它绕太阳的次数。时间的本质，只是空间中可感知事件的计量。