

《英语世界》丛书 英汉对照

伽利略和 实验科学

GALILEO AND
EXPERIMENTAL SCIENCE



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商务印书馆

The-World-of-English Books

Vol. 4

**Galileo
and Experimental Science**

by

Rebecca B. Marcus

Translated by

Gao Zhichong 高志冲

With Notes in Chinese by

Zhu Xiaoming 朱晓明

The Commercial Press

Beijing, 1990

内 容 提 要

伽利略是人们熟知的第一个现代科学家，他一生有许多重要的科学发明，其中包括摆和落体定律、天文发现、比重称和第一个气温计。本书英汉对照，加有注释，详细介绍了这位举世闻名的伟大科学家历尽坎坷的一生。适合科技人员、大中学生、英语学习者和英语爱好者阅读。

《英语世界》丛书

JIA LI LÜÈ HÉ SHÍ YÀN KĒ XUE

伽利略和实验科学

(英汉对照)

丽贝卡·B. 马库斯 著

高志冲 译 朱晓明 注释

责任编辑 周陵生

商 务 印 书 馆 出 版

(北京王府井大街36号)

新华书店北京发行所发行

民 族 印 刷 厂 印 刷

ISBN 7-100-00511-6/H·184

1990年6月第1版

开本 787×1092 1/32

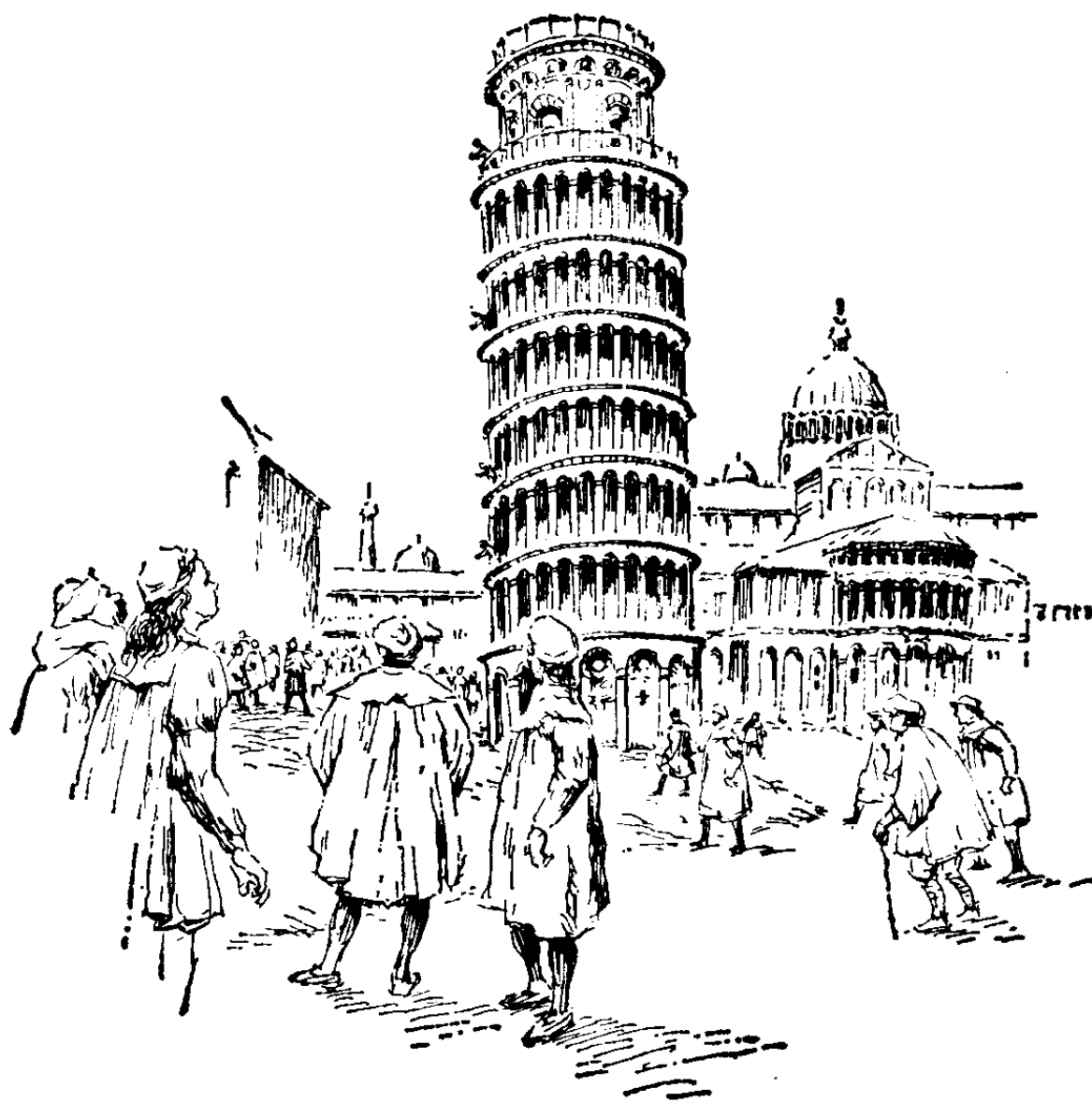
1990年6月北京第1次印刷

字数 176 千

印数 2,200 册

印张 5³/₄

定价: 1.65 元



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Preface

Galileo Galilei is known for many scientific discoveries. Among them are the laws of the pendulum and falling bodies, astronomical discoveries, the hydrostatic¹ balance, and the first air thermometer.

We think of Galileo as the first of the modern scientists, for it was he who² broke away from³ the tradition of ancient Greek science. Often risking his own reputation, Galileo boldly pointed out the errors of these ancient authorities and spoke out for something entirely new — *experimental science*.

Galileo played an outstanding part in⁴ the development of modern science because at the centre of his thought was his insistence on measuring, weighing, and timing things. He first found the facts and from the facts deduced principles.

Here is the life story of this courageous man who was also a truly original thinker.

1. hydrostatic [ˌhaɪdrəʊ'stætɪk] a. 流体静力(学)的。 2. it was he who ...: 强调句式, 相当于汉语“就是他……”。 3. break away from: 原意为: 破除, 挣脱。 4. played an outstanding part in...: 原意是: 在……方面扮演了一个出色的角色。

前 言

伽利略因有许多科学发现而闻名于世，其中有摆和落体定律、天文发现、比重秤和第一个气温计。

我们把伽利略看作是第一个现代科学家，因为是他和古希腊科学的传统决裂。伽利略常常冒着声誉扫地的危险，大胆地指出这些古代权威人士的错误，并为一种崭新的事物——实验科学——而呐喊。

在现代科学的发展中，伽利略发挥了杰出的作用，因为他思想的核心就是坚持不懈地对物体进行测量、称量和记时。他首先找出事实，然后从事实推断出原理。

这里介绍的是这位大无畏的人又是名副其实的有创见的思想家的生平故事。

ONE

THE GREAT AWAKENING

AT the beginning of the fifteenth century, the Western world, like a sleeping giant, had just awakened. It yawned, stretched itself, and began to look around at the civilization which met its eyes.

For many hundreds of years Europe had been living in that period of ignorance and superstition known as the Dark Ages. Few people could read and write. Even the wealthiest lords and ladies seldom took the trouble to¹ learn, but depended upon their scribes to write letters for them. Those of the poorer classes who might have wanted to know what was in books, rarely had the chance to find out. The only schools were in the monasteries where monks lived and worked, but only a very small number could attend these.

Books were for the select few. They were hand-written with pointed goose quills and ink on expensive parchment, each one taking months to complete. Imagine what one of them must have cost! And no wonder not very many were written!

Superstition lurked² everywhere in peoples' minds. Witches could put an evil sign on a person; a black cat was a sign of bad luck. Someone would die if another person far away stuck pins into an image of the victim. Many people wore charms against disease. If they fell ill in spite of the charm, magic words and spells were often tried as a cure. Certain crops had to be planted in the dark of the moon, or in the full moon. These were only some of the many superstitious beliefs strongly held throughout Europe.

1. took the trouble to ...; 不辞辛劳地……, ...trouble: 麻烦, 困苦。

1 伟大的觉醒

15 世纪初，西方世界好比一个酣睡初醒的巨人。它打着哈欠，伸着懒腰，开始环顾闯入它眼帘的文明。

千百年来，欧洲一直生活在被称为黑暗时代的愚昧和迷信之中。能读会写的人寥寥无几。即使最富有的贵族男女也很少不辞劳苦去学习，而是依赖他们的缮写员代笔写信。那些出身贫寒，也许想要知道书中内容的人，却很少有这种机会。仅有的几所学堂设在僧侣居住和工作的寺院，但是只有极少数人能进这些学堂。

书只供给少数经过严格挑选的人。这些书都是用削尖了的鹅毛管蘸着墨水在价格昂贵的羊皮纸上手写而成的，每本书都需若干个月才能完成。可想而知一本书得值多少钱！难怪写成的书少得可怜！

人们的头脑里充满了迷信。巫婆可以在任何人身上贴一个邪恶的标记；黑猫是倒霉的象征。如果远方的一个人在某人的形象上插进几根针，相信此人就会成为受害者死去。很多人随身佩带着护符以避疾病。如果佩带了护符还生病，便常试用魔语和符咒来治疗。某些作物只能在没有月亮或是在满月的时候种植。在整个欧洲，这些只是人们坚信的许许多多迷信活动的例子而已。

如：He often takes the trouble to help others. 他常常不辞辛苦地帮助别人。
2. lurk [lɜ:k] vi. 潜藏；潜在。

People were afraid of strangers, afraid of new ideas, afraid of anything different or not understood. If a person thought for himself or questioned some of these old beliefs, he did not dare to voice his doubts because he might be punished, or even put to death.

Scholars were so busy thinking and arguing about¹ the next world after death, they had no time left for thinking much about the one they lived in. They would even spend days arguing about how many angels could stand on the point of a pin!

Now, at the start of the 1400's, so many new ideas were blossoming forth as people began to examine the world around them, that it seemed as if knowledge were being born again.² Indeed, the period from the 1400's to the 1700's has been called the *Renaissance*,³ a French word meaning rebirth.

Europe indeed was ripe for change, and the Crusades⁴ helped prepare the ground. In 1095, the Pope called for the first of these holy wars against the Moslems. The Crusaders were to recapture the city of Jerusalem⁵ from them. Many thousands, fired by religious zeal, "carried the Cross" — became Crusaders — and began marching to the East. Nobles, peasants, craftsmen, merchants, even women and children joined the march.

For two hundred years Crusaders moved across Europe into Turkey and the Holy Land.⁶ They failed to capture Jerusalem, but they won another war — the war against darkness and ignorance. What they saw opened their eyes to different ways of life and they were eager to introduce some of these new ways to replace the old ones.

1. Scholars were so busy thinking and arguing about ...: be busy (in) doing something 是固定搭配,意思是:忙于做某事,书中采用时省去了 in。 2. it seemed as if knowledge were being born again: 知识似乎正在被再生出来。as if 后面是虚拟语气的句子,因此动词用了 were 而没有用 was,此句用的是被动语态进行时。 3. Renaissance [rə'neɪsəns] 文艺复兴,作为专用名词一般都用大写字母开头。 4. Crusade [kru:'seɪd].

人们害怕陌生人,害怕新思想,害怕任何不同的或不理解的事物。如果有人独自思考或怀疑一些旧信念,他也不敢说出怀疑之处,因为他会受到惩罚,或甚至被处死。

学者们忙于思考和争论人死后的来世该是什么样子,他们无暇去多想他们生活在其中的那个世界。他们甚至会为一个大头针的尖上能站立多少仙女的问题而整天价争论不休。

15 世纪初,人们开始考察周围世界,与此同时,新思想层出不穷,仿佛知识得到了再生。确实,15 至 18 世纪被称为“复兴”时期,“复兴”是法文,即再生的意思。

欧洲的确已到了变革的成熟时期,而十字军东征则有助于奠定变革的基础。1095 年,教皇发起了第一个讨伐伊斯兰教徒的圣战。十字军战士要从他们手中重新夺取耶路撒冷城。成千上万的人受到宗教热情的激发,“扛着十字架”,加入了十字军的行列,开始向东进军。贵族、农民、手工业者、商人、甚至妇女和儿童都参加了进军。

在 200 年中,十字军战士越过欧洲进入土耳其和圣地。他们未能攻克耶路撒冷,但是他们赢得了另一场战争——反对黑暗和愚昧的战争。他们所见到的不同的生活方式开阔了他们的眼界,他们急切地想引进一些新的生活方式来代替旧的生活方式。

5. Jerusalem [dʒə'ru:sələm].

6. Holy Land: 指耶稣的故乡巴勒斯坦。

The great Italian cities were the first to awaken. This was not an accident, for they were the main centres of trade. Florence, Genoa, and Venice¹ lay in the path of the trade routes from the East. Ships and caravans from Cathay² and India brought their eagerly sought goods into these cities, where they would be sent on to the rest of Europe.

Small wonder, then, that as these strange cargoes were unloaded, people began to ask questions about the lands that produced them. Merchants returning from these lands told spell-binding³ tales of beautiful, clean cities, richly-dressed men and women, great works of art, and new foods. The Crusaders had started an interest in different things; other travellers fed that interest.

In the minds of many people, distrust of new ideas was giving way to⁴ a curiosity about what was still unknown. They were ready for new inventions.

The first great invention of the Renaissance was the printing press about the year 1450 in Germany. Now, if a scholar or scientist wrote a book, it no longer had to be written out word by word, one book at a time, taking months to complete. Many copies could be printed in one day. Books became cheaper and less difficult to get, and new ideas spread more easily.

Wealthy princes in the Italian cities vied with each other to see who could assemble the finest works of art and who could surround himself with the greatest poets, artists, and scientists. It became fashionable to make a handsome allowance to these creative people so that they would dedicate their works to their patron. A patron was generally a wealthy man who supported an artist so that the artist could devote full time to his work. Among the wealthiest, most generous patrons were the princes of Florence.

There were, of course, many who feared the new ways. What

1. Florence ['flɒrəns]; Genoa ['dʒenəʊə, dʒə'nəʊə]; Venice ['venɪs].
2. Cathay [kæ'θei] *n.* 中国, 古语、诗词用语。 3. spell-binding: 迷

意大利的大城市首先觉醒。这并不是偶然的，因为它们是主要的贸易中心。佛罗伦萨、热那亚和威尼斯等城市都地处与东方贸易的要冲。来自中国和印度的船只和商队把人们翘首以待的货物运到这些城市，然后再由此转运至欧洲其他地方。

不足为奇的是，当这些罕见的货物卸下时人们开始打听出产这些东西的地方。从那些地方回来的商人谈起漂亮干净的城市，衣着华丽的男男女女，伟大的艺术品和新型食物等等令人入迷的故事。十字军战士对不同的事物开始产生了兴趣；其他旅行者则助长了那种兴趣。

在许多人的头脑里，对新思想的怀疑逐渐被一种对未知事物的好奇心所代替。他们乐于接受新发明。

文艺复兴时期的第一大发明便是大约于 1450 年在德国问世的印刷机。现在如果哪位学者和科学家要写书的话，不必再一个字一个字地写，一次只写一本，花几个月才能写完了。很多本书可以一天印成。书便宜了，也不再那么难以得到，新思想的传播容易多了。

意大利城市中富有的王子互相竞赛，看谁能收集到艺术珍品，谁能在自己的周围聚集最伟大的诗人、艺术家和科学家。向这些富于创造性的人提供大量的补助，然后由他们向各自的施主贡献作品的做法变得时髦起来。这种施主一般是资助某一艺术家的富翁，以便艺术家能将全部时间用于工作。这些富人中最慷慨的施主是佛罗伦萨的王子们。

当然，也有很多人害怕新的生活方式。他们争辩说，凡是他们父辈人的，用符咒镇住的；现在分词用作形容词，动词原形是 spell-bind。 4. was giving way to: 让位于；让步；屈服。

had been good enough for their fathers, they argued, was good enough for them. If ideas and theories had lasted for so long, they must be correct. In the universities and monasteries scholars studied, almost without change, the scientific notions first taught by the Greek philosopher, Aristotle, over seventeen hundred years earlier. His theories were considered the accepted truth, and were not to be questioned.

The first mighty blow against Aristotle's science was destined to be dealt by Galileo Galilei, born in Pisa, Italy, not far from Florence, on February 15, 1564.

Vincenzo and Giulia Galilei named their first-born Galileo, after a famous ancestor who was still remembered in Florence as a great doctor. Perhaps in doing so they hoped their son would follow his example and become a great physician, who would bring fame and fortune once more to his family.

For the Galilei family was of the nobility — at one time wealthy, but now become poor. For all his accomplishments as a lute player and composer, Vincenzo could not make a living from music. And though he was a skilled mathematician, nobody at that time could see enough use for mathematics to pay him enough to support himself and his family. Even the great University of Pisa did not have a single professor of mathematics among its teachers!

In despair, shortly after Galileo's birth, Vincenzo moved his family to nearby Florence. There he set up shop as a wool merchant.

The city of Florence was alive with great artists, fine musicians, and talented writers. Learning of a high quality was in the very air.¹ But Vincenzo could spare little time for any of it. He was tied to his wool shop. He was determined, however, that his son should profit from this environment. Perhaps if Galileo

1. in the very air: 随处可见。in the air 在流传中, very 起加

认为够好的东西，对他们来说则也是够好的。倘若思想和理论已经延续了这么长时间，那么它们必定是正确的。在大学和寺院里，学者们几乎是一成不变地研究、学习 1700 多年前由希腊哲学家亚里士多德首先讲授过的科学概念。他的理论被视为公认的真理，不容置疑。

对亚里士多德的科学首先发起有力冲击的人注定是伽利略。他于 1564 年 2 月 15 日出生于意大利境内离佛罗伦萨不远的比萨。

文岑卓和裘丽亚·伽利莱给他们的长子取名伽利略，用的是他们赫赫有名的祖先、佛罗伦萨人在当时还记得的一位名医的名字。也许他们这样做是希望儿子会学习先辈的榜样，成为一名伟大的内科医生，再一次为他们的家族带来荣誉和钱财。

伽利莱家族原是贵族门第，一度曾很阔绰，不过现在已破落。文岑卓作为琵琶演奏者和作曲家尽管颇有建树，却不能以音乐为生。他虽然是个高明的数学家，可是在当时没有人能看到数学的广泛用途而付给他足够的报酬供他养家活口。甚至在堂堂比萨大学的教员中也没有一个数学教授。

在伽利略出生之后不久，走头无路的文岑卓带着全家搬到了不远的佛罗伦萨。他在那里开了一个小店，经营羊毛。

优秀的艺术家、音乐家和才华横溢的文学家在佛罗伦萨城里十分活跃。高深的学识处处可寻。然而文岑卓却没有时间去学这些东西，羊毛商店使他脱不开身。不过，他决定让儿子从这个环境里有所得益。

强语气的作用。