科普英语注释读物

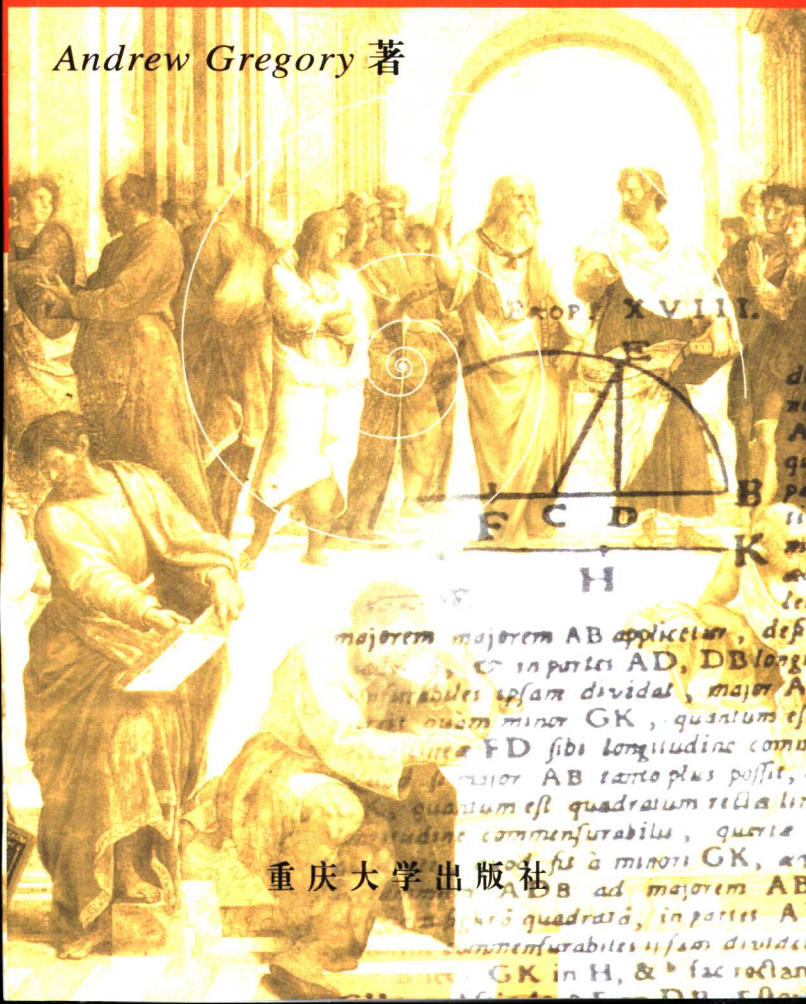
《科学的演进》系列丛书

找到了！

—科学的诞生

Eureka!—The Birth of Science

Andrew Gregory 著



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卢　敏　导读

向朝红　审定

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安德鲁·葛列格里，伦敦大学学院科学史讲师，曾先后获得哲学学士，历史及科学哲学博士学位；在电视台和电台主持有关科学史的专题讨论。

找到了！
—科学的诞生

EUreka!—The Birth of Science

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内容简介：

人类不断地在设法用科学的态度来对待自然，这是人类思想中的奇迹。这种科学态度是在何时、何地开始的？

《找到了！科学的诞生》向我们展示，科学是从古希腊开始的。在摆脱了学识和宗教信条的束缚后，古希腊人不再用神话和任性的神来解释世界，来区别自然与超自然；正是古希腊人最早发现了自然。随着新理论的提出和证实，知识变得越来越复杂。最后，人们认识到科学不同于技术。

本书作者对西方文明的起源和人类追求理性宇宙体系的愿望进行了有趣的探索，阐明了科学的起源。

《科学的演进》系列丛书简介

本系列丛书是以大学生和研究生为主要对象的科普英语读物。原书由在英国和新西兰著名大学讲授科学史的教师撰写，英国ICON公司2002年出版。参照我国大学生的英语水平，本丛书为生词作了注释，并对有关的文化背景和语法难点作了简短的说明；在每一章前用英文提问，促使读者有目的地阅读；在每一章后用中文给出内容摘要，帮助读者准确理解。

本系列丛书从历史的角度，分析探讨了有关学科的发展进程，可以帮助读者以史为鉴，了解科学演进中的有关情况和问题，懂得科学的发展总是充满了矛盾和斗争，从而学习科学研究的方法，增强克服困难的信心和勇气。本丛书还有助于大学英语专业和其他人文学科的学生扩展科技知识，提高阅读科技文章的能力；帮助理工学科的学生扩展知识面，提高英语阅读水平；对英语水平较高的高中学生和广大英语爱好者也是难得的课外阅读材料。

序言

美国政府在普及文化知识的过程中，曾实施了 RIF（Reading Is Fundamental），即“阅读是最基本的”计划。阅读不仅让我们获得各种各样的知识，也是培养、巩固和提高语言技能，特别是阅读理解能力的重要手段。

在外语学习中，阅读也受到普遍的重视。著名应用语言学家克拉申（Krashen）曾提出输入假设（Input Hypothesis）：认为第二语言的习得必须有可理解的输入（Comprehensible Input）；同时，语言输入还需要达到足够的量（Adequate Exposure）。在我国，阅读已成为绝大多数英语学习者学习英语的主要方式，教材是接触英语的主要媒介。众所周知，英语语言浩如烟海，要想把英语学好，光靠阅读教材是远远不够的，必须有足够的课外读物作为补充。目前，我国市场上的英语课外读物虽然琳琅满目，但科普读物较少，面向大学生和研究生的科普读物则更加匮乏，难以满足需求。《科学的演进》系列丛书正是在这种背景下引进的。

本系列丛书由在英国和新西兰著名大学讲授科学史的教师撰写，英国 ICON 公司 2002 年出版，共 13 册，内容涉及天文、地理、数学、计算机、医学、生物学、哲学

和历史学等领域。作者们通过讲述科学发展的历史，在让读者领略科学研究的乐趣、矛盾和斗争，增强人们战胜困难的信心和勇气的同时，也让读者学到了地道而实用的现代英语。

在保持原著原文不变的前提下，为帮助读者阅读和理解，本丛书以导读和注释的形式增添了三个部分内容：即 Guiding Questions（引导性问题），Footnotes（脚注）和 Reflection（反思）。Guiding Questions 置于一章之前，以调动读者的思维，激活读者大脑的认知图式（Cognitive Schemata），使读者在阅读过程中处于积极认知的状态；参照我国大学生的英语水平，Footnotes 为同页的生词注释了国际音标、词性和词义，并对相关的文化背景和语法难点作了简短的解释；章末的 Reflection 是对该章内容的小结，也是对 Guiding Questions 中部分问题的回答。读者可根据自己的需要，决定 Guiding Questions 和 Reflection 的阅读顺序。本系列丛书可作为大学生及研究生的英语课外读物，也是广大英语爱好者自学英语的理想材料。

最后需要说明的是，本丛书的内容仅仅是一家之言，如读者能由此而激起阅读的热情和对科学的兴趣，那就是我们最大的欣慰。另外，由于导读者水平有限，如有不妥之处，敬请批评、指正。

向朝红

2002 年 8 月

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I would like to thank the editors, Jon Turney and Simon Flynn, for their patience and efficiency and for their comments on the manuscript. I would also like to thank Ms. Sheelagh Doherty RGN, RSCN, RM for her support, her comments and for checking the manuscript for medical accuracy. Without their help this would have been a less interesting and less accurate book.

Dedication

For Sheelagh, *with love*

Contents

The Creation of Science

Science has done much to shape both the world we live in and the way in which we think about that world. But what are the origins of science? What came before science, and how and why was that transformed into a new and progressive way of thinking about and investigating our world? Who were the people who effected this transformation? When and where did science begin?

Prior to science, there was technology. People knew how to do many useful things, without understanding quite why they happened, or why natural phenomena occurred. When they attempted to explain their world, it was in terms of myths and anthropomorphic① gods. So thunder, lightning, earthquakes and disease were all due to the actions of the gods, while the origins of the world and human beings were a matter of myth. These myths often involved the sexual coupling of the gods—such as those of sea and sky to create earth—since procreation② was one of the few models for the production of something new that the ancients possessed. These gods were supposed to have many

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①anthropomorphic/ˌænθrəpəuˈmɔːfik/*adj.* 神、人同形同性论的

②procreation/ˌprəukriˈeiʃn/*n.* 生产，生殖

human fallibilities①. They sometimes acted in anger, jealousy or spite, and their actions were often unpredictable to humans.

A good example here is the daily passage② of the sun across the sky. What do we see, and how do we explain it? To a pre-scientific society, the sun might well be a god driving his chariot③ across the heavens. Many primitive cosmologies④ supposed the universe to be hemispherical⑤. There was a flat earth with a hemispherical bowl of the heavens above it. So the sun would disappear in the evening and reappear each morning, but what happened in between was a mystery—the subject of myth. Many ancient societies could accurately predict the time that the sun would rise, and at what point on the horizon. Any sort of scientific explanation of the sun or its motions, though, was beyond them.

At some point, a new and more critical attitude came about. People began to reject myths and explanations in terms of the gods as arbitrary and fanciful. Instead, they began to use theories for which they could gather evidence and debate the

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①fallibility/ˌfæliˈbiliti/*n.* 易错,易误

②passage/ˈpæsidʒ/*n.* 通过,经过

③chariot/ˈtʃæriət/*n.* 战车

④cosmology/kɔzˈmɔlədʒi/*n.* 宇宙哲学,宇宙论

⑤hemispherical/ˈhemisˌfiərikəl/*adj.* 半球的,半球状的

merits. They considered their world to be a natural place, in the sense that it was free from supernatural intervention, and so in need of *natural* explanations. Thunder and lightning were to be explained in terms of storm clouds, and not the anger of the gods. The world was now seen as a place where events happened in a regular and predictable manner, and were not dependent on the whims of the gods.

In many ways, it is remarkable that science came about at all. Science is not a 'natural' activity in the sense that it comes easily or instinctively to humans. Technology, the ability to manipulate① our environment to our benefit, may come relatively easily; but science, involving understanding and explaining our world, does not. Nor is science a 'natural' way of thinking, as we can see from the fact that the first societies were dominated by myth and anthropomorphic deities. One might also consider the prevalence② of non-scientific thought in the world today. Nor is science merely applied common sense. Many of the ideas of science, even at its very outset, have been quite contrary to common sense. Nor, one must say, was science a productive activity in the sense that it would reap

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①manipulate/mə'nipjuleit/*v.* 利用,操纵

②prevalence/'prevələns/*n.* 流行

immediate material benefits. So why, and how, did the transition to scientific thinking occur? Who was responsible for it? These are the questions that this book will investigate.

When and where this transformation occurred is relatively easy to pin down. The first steps towards scientific explanation were taken in ancient Greece around 600 BC. Prior to that, the Babylonians and the Egyptians had evolved advanced technologies, but had not progressed beyond mythological explanations. The Greeks drew deeply on these technologies, especially in astronomy, geometry and medicine, and began to produce the first crude theories of how the world might work in an entirely natural manner. This book will follow the Greeks on their adventure in this new type of thinking, looking at the ideas and approaches that they created, and the increasing sophistication of their theories. It will also look at the social background that allowed them to initiate and develop a radically new way of looking at the world.

This book is not a comprehensive① treatment of Greek science. That would require a work many times longer than this. Rather, it attempts to capture the essence② and the spirit of the Greek

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①comprehensive/ˌkɔmpri'hensiv/*adj.* 全面的,广泛的

②essence/'esns/*n.*【哲】本质

achievement, and something of the excitement of the debate between the Greek thinkers. It attempts to convey what the Greeks thought their world was like, and how they went about investigating it. The Greek picture of the world is of great relevance for several reasons:

i) It was formative for virtually all Western thought down to the scientific revolution of the seventeenth century, not merely in science but in philosophy and religion as well. The dominant mode of thought—and most of the alternatives to it—was a combination of Greek science, Greek philosophy and Christian theology① (which in turn was deeply influenced by Greek philosophy and theology). To understand the nature of the scientific revolution, one needs to understand Greek science and its strengths and weaknesses.

ii) The influence of Greek ideas did not come to an end with the scientific revolution. Many of their ideas, such as atomism, are still alive and well, and many of the principles laid down by the Greeks for understanding and investigating the universe are still valid today.

iii) Greek science displays fascinating differences from modern science. The spirit of investigation

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①theology/θi'ɔlədʒi/*n.* 神学

may have remained the same, but the content of science has changed radically. The Greeks had many wonderful ideas, but some look somewhat strange to the modern eye, and some are wrong. That is no great surprise, since we are talking of the pioneers of science, and a time gap of over two millennia①. What I shall try to explain is why, given the resources available to the Greeks, intelligent people would have found these ideas attractive. Often the Greeks had very good reasons for their odder beliefs.

The project begun by the ancient Greeks is one that has deeply affected every aspect of thinking in the modern world, and every aspect of our lives. Our conception of the natural world traces its ancestry to the ancient Greeks, and our science has its roots there. This book is the story of the origins of a great quest to understand the world we live in, a quest that continues today and that still owes a great deal to its originators.

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①millennia/mi'leniə/*n.* millennium（一千年）的复数