科普英语注释读物

《科学的演进》系列丛书

纬度和磁性的地球

Latitude & the Magnetic Earth

*Stephen Pumfrey*著

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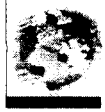
序言

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

Acknowledgements

I want to acknowledge John Schuster, whose inspirational lectures nurtured my interest in Gilbert, the late Charles Schmitt, for showing me the virtues of Renaissance Aristotelianism(s), Duane H. D. Roller, the creator of modern Gilbert studies, and Art Jonkers, from whose thesis I learned much more about magnetic navigation. Thanks also to my colleagues in the Lancaster University Department of History, especially John Brooke, who have made my academic career more enjoyable than William Gilbert's.

I owe deep gratitude to the Icon Books team, especially the patient Simon Flynn, the incisive Jon Turney, and the efficient Alison Foskett, who have made this a better, shorter book. Thanks also to Art Jonkers, Ian Stewart and Richard Cunningham for making time to read a draft. I cannot put any remaining errors down to my instruments. Finally, I want to thank my parents for their support, my wife Dee for her example, and my two little spheres of activity for giving me something other than magnetism to think about. *Latitude & the Magnetic Earth* is therefore dedicated to Niall and Caitriona.

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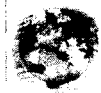

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Introduction: The Magnetic Revolution

Guiding Questions

1 *Who created the magnetic world of ours?*
2 *How did people of 1580s think of the magnetic earth?*
3 *In which sense can we call Gilbert's book a revolutionary one?*

We live in a magnetic world. My refrigerator has magnets in its motors, thermostat[①] and door lock, and decorative magnets on the door. The monitor, disks and drives of the computer on which I'm typing depend on magnets. So do electric switches and valves, every Walkman and telephone, every electric

①thermostat/'θəːməstæt/ *n.* 温度调节装置

motor and loudspeaker, not to mention CAT① scanners and particle accelerators. Over 30 grams of magnets are manufactured every year for every person on Earth, and a rich Westerner will own hundreds. The Earth itself is a giant natural magnet. I can navigate its surface using a magnetic compass. Astrophysicists② have measured the field strength of other planets and even interstellar③ space. As I write, the Sun is reaching the height of the eleven-year cycle of its magnetic sunspots. A solar flare might distort the Earth's magnetic field, rendering my compass unreliable and knocking out communications systems. As the twenty-first century develops, mag-lev④ trains travelling at 800 kph could replace polluting aeroplanes. By then, however, radiation from mobile phones may have fried our brains, for every atom in the universe, including those in human tissue, is basically magnetic. As Dick Tracy's sidekick⑤, Diet Smith, said in the 1960s comics, 'He who controls magnetism controls the world.' The name of the scientist who created the magnetic world, whose

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①CAT = computerized Axial Tomography 计算机控制X射线轴向断层照相术

②astrophysicist/ˌæstrəu'fizisist/*n.* 天体物理学家

③interstellar/ˌintə'stelə/ *adj.* 星际的

④mag-lev/'mæglev/ *n.* 磁力悬浮(火车等)

⑤sidekick/'saidkik/*n.* 伙伴

name once ranked alongside those of Copernicus or Galileo, was the Elizabethan doctor, William Gilbert.

We don't have to go very far back in time to leave our magnetic universe behind. Not much more than 150 years ago, Michael Faraday discovered electromagnetic induction① and, with it, the principles of the electric motors and dynamos② that accelerated the Industrial Revolution. He also developed the concepts of a magnetic field and lines of force. It was only in 1820 that Hans-Christian Oersted announced that the forces of magnetism and electricity were connected. Before that, you could only find magnets in nautical③ compasses, gentlemen's science kits and occasionally in the naturally occurring iron ore called magnetite or lodestone④.

Going back to the eighteenth century, magnetic and electrical apparatus were prized components of the science kits that Europe's gentry bought as fashion items. They were fascinated by the strange, even magical, forces of attraction and repulsion that we experience when we bring two magnets together, or that make a balloon stick on the wall using static electricity. The eigh-

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①induction/in'dʌkʃən/*n.* [电]感应(现象)
②dynamo/'dainəməu/*n.* [尤指直流]发电机
③nautical/'nɔ:tikəl/*adj.* 航海的
④lodestone/'ləudstəun/*n.* 天然磁石

teenth century's scientific hero, Sir Isaac Newton, had declared magnetism to be, like gravity and electricity, one of the fundamental forces of God's creation. What could be a more edifying① leisure activity than to conjure② up the divine spark? People were convinced of the similarities between electrical and magnetic phenomena. Luigi Galvani③ famously 'galvanised'④ a frog's leg into motion by running an electric current through the muscle's nerve. Not long after Galvani's announcement of 'animal electricity', Franz Mesmer⑤ claimed to have discovered and bottled 'animal magnetism'. He briefly made a good living in Paris magnetically curing gentlemen and gentlewomen sufferers (he preferred gentlewomen) of their pain.

Newton published his masterwork, *Philosophiae Naturalis Principia Mathematica* [*The Mathematical Principles of Natural Philosophy*], in London a century earlier in 1687. If we go back in London's history an-

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①edifying/'edifaiiŋ/*adj.* 启发的

②conjure/'kʌndʒə/*v.* 变戏法

③Luigi Galvani/lu:'i:dʒi gɑ:l'vɑ:ni/伽伐尼(1737 - 1798),意大利科学家、医师,研究比较解剖学和电能,做青蛙解剖时发现生物电现象,为电生理学研究开辟了道路,许多电学术语来源于他的名字。

④galvanise/'gælvənaiz/*vt.*〈主英〉(= galvanize)通电流于,激起,引起;使感到震惊

⑤Franz Mesmer/'frɑ:nts 'mesmə/梅斯梅尔(1734 - 1815),奥地利医师,创始催眠术,用以治病,但其"治愈例"为一专门委员会的调查报告所否定。

other 100 years, the idea that the Earth itself was a magnet had yet to be heard. Yet London in 1587 was in the middle of its first boom in magnet making – for nautical compasses. The port of London was home to England's expanding mercantile and naval fleets. Elizabethan England was a fast developing nation. It was transforming from Europe's economic and cultural backwater① into a minor imperial power that could compete with Spain and France. The Spanish Armada② of 1588 was expected, as was its defeat. England's new strength and self-confidence owed much to its sailors and their expertise. In particular, their compasses had recently become as good as any in the world. But if the new heroic English navigators like Francis Drake could tell magnetic north from south, they had no better idea than did Spanish experts how the compass worked. In 1587 no one had even a suspicion that the magnetic compass worked by aligning③ itself with the magnetic force of planet Earth. That deceptively simple theory, so familiar to us, was almost unthinkable. But, some time in the 1580s, the unknown Dr Gilbert began to think the unthinkable, and to invent the magnetic universe.

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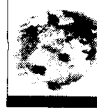
①backwater/'bækwɔ:tə/*n.* 死水,停滞不进的状态或地方
②the Spanish Armada/ɑ:'mɑ:də/*n.* 西班牙无敌舰队
③align/ə'lain/*vt.* 匹配,调准



Gilbert blazed into the scientific world like a comet. Before 1600, the year he published his only book, *De Magnete, or On the Lodestone*, few people outside his London medical circle had heard of him. But *De Magnete* was a sensational work that turned him into the first modern English scientist of international repute. Its impact was not just due to Gilbert's extraordinary new theory and its applications. There was also the novel way that he used and described 'experiments that appeal plainly to the senses' to prove it. Then, as now, scientists were expected to show how their work built on respected, published conclusions. Gilbert, with a revolutionary's lack of respect and caution, declared in his preface to *De Magnete* that the world was already:

> [full] *of books of the more stupid sort whereby the common herd ... are led to profess themselves philosophers, physicians, mathematicians, and astrologers, the while ignoring and contemning*① *men of learning ... why should I submit this noble and (as comprising many things before unheard of) this new and inadmissible philosophy to the judgement of men*

①contemn/kən'tem/*vt.* 侮辱,蔑视

*who have taken oath*① *to follow the opinions of others, to the most senseless corrupters of the arts, to lettered clowns, grammatists, sophists, spouters*②, *and the wrong-headed rabble*③, *to be denounced, torn to tatters*④ *and heaped with contumely*⑤. *To you alone, true philosophers, ingenuous minds, who not only in books but in things themselves look for knowledge, have I dedicated these foundations of magnetic science – a new style of philosophizing.*

This new style meant that, for an unknown physician from Colchester whose debut⑥ discussed an obscure, puzzling mineral in a print run of a few hundred copies, Gilbert's star began to burn brightly. In Venice in 1602, Galileo was excited, and his friend Giovanni Sagredo wrote to Gilbert of their enthusiasm. By 1603, the German astronomer Johann Kepler wished that he 'had wings, that I might fly to England to talk with Gilbert'. Kepler's mission to Europe's

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①oath/ˈəuθ/*n.* 誓言,宣誓
②spouter/ˈspautə/*n.* 说话滔滔不绝的人
③rabble/ˈræbl/*n.* 乌合之众
④tatter/ˈtætə/*n.* 碎布,碎片
⑤contumely/ˈkɔntjuːmli/*n.* 傲慢,侮慢,侮辱行为
⑥debut/ˈdeibjuː/*n.* 初次登场,开张