

科普英语注释读物
《科学的演进》系列丛书

哈维的心脏

— 血液循环的发现

Harvey's Heart

— The Discovery of Blood Circulation

Andrew Gregory 著

Subclavian Vein

Subclavian Artery

Superior Vena Cava

Axillary Artery

Pulmonary Vein

Pulmonary Artery

Axillary Vein

Cephalic Vein

Basile Vein

重庆大学出版社

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范定洪
向朝红

导读
审定

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内容简介：

在17世纪，担任过詹姆斯一世和查理一世的医生的威廉·哈维，做出了解剖学领域最伟大的发现之一，使我们对人体的认识发生了革命性的转变。他发现血管是一个封闭的系统，由心脏提供的血液在人体内做快速的循环运动。他的发现推翻了1,500年以来被人们毫不怀疑地接受的观点，即认为血液是由肝脏生成，然后慢慢地被全身消耗的观点。作者叙述了哈维在文艺复兴时期的艺术和科学背景下所取得的重要成就，以及哈维为了倡导自己的发现所进行的艰苦卓绝的斗争。

《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。

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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

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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Introduction

Guiding Questions

1. *What was the remarkable discovery William Harvey made at some time around 1618?*
2. *Why was Harvey's discovery so remarkable and so momentous?*
3. *Who are the three ancient Greeks Harvey most admired?*
4. *How should we look at the vivisection and the use of animals in research in the seventeenth century?*

STORY TIME

At some time around 1618, William Harvey^①, an English physician, made a remarkable discovery that was to revolutionise thinking about the human body. He found that the blood circulated around the body, and did so rapidly. He also discovered a great deal about the motion and function of the heart, believing it to pump blood around the body. Today, we take these to be basic and evident facts. So why were these discoveries so remarkable

①William Harvey 哈维(1578—1657,英国医师、生理学家,实验生理学创始人之一,阐明血液循环原理及心脏作用,提出胚胎组织“渐成说”)



and so momentous?

In the era of open-heart^① surgery, arterial bypasses^② and blood transfusions^③, we believe we understand the motion of the heart and the blood very well. Doctors are familiar with the sight and feel of the human heart pumping away, and TV documentaries^④ bring these images into our homes. Such easy access to the human heart has not always been available, however. Prior to anaesthetics^⑤, blood transfusions and antiseptics^⑥, to open the chest and expose the heart meant certain death for the patient. Knowledge came only through animal vivisection^⑦ and human post-mortem^⑧ dissection^⑨, and both methods had significant drawbacks. One can discern the structure of the heart relatively easily from dissection, but not its motion and function. Vivisection was no great help, as the motion of the heart is swift and in a distressed subject^⑩ likely to be either rapid or dis-

①open-heart surgery 体外循环心脏手术

②arterial bypass 动脉旁路术

③blood transfusion 输血; 输血法

④documentary/dɒkju'mentəri/n. 纪实性影片, 纪实节目, 记录片

⑤anaesthetic/ˌænis'tetɪk/n. 麻醉剂

⑥antiseptic/ænti'septɪk/n. 防腐剂; 抗菌剂

⑦vivisection/ˌvɪvɪ'sekʃən/n. 活体解剖

⑧post-mortem/ˌpəʊst'mɔ:təm/adj. 死后的; 验尸的

⑨dissection/di'sekʃən/n. 解剖

⑩subject/'sʌbdʒɪkt/n. 解剖用的活体

organised^①. So too, as soon as one opens a living heart to see its internal workings^②, the subject is likely to die. The motion of the heart is also complex. How many of us could say with certainty exactly how the heart beats? Where does the contraction^③ of the heart begin and where does it finish, or does it all contract at once? What function do the heart valves^④ perform, and when do they open and shut? The heart rises and falls in the chest as it beats. Which of these is muscular contraction and which relaxation^⑤? At which point does the heart have its largest and smallest volume? The next time you see a documentary showing open-heart surgery, try discerning the basic motion of the heart yourself. Initially, it is by no means easy, even if you know what you are looking for. For those who know a good deal about the motion of the heart, remember it is one thing to look when you know what you are looking for, quite another to work out what is happening with no prior information, or even worse, in Harvey's case, with incorrect prior information. The heartbeat has a considerable cultural significance as a sign of life,

①disorganised/dis'ɔ:gənaɪzd/*adj.* 杂乱无章的;凌乱的;无系统的

②workings/'wɜ:kɪŋz/*n.* 运转,运行;活动

③contraction/kən'trækʃən/*n.* 收缩

④heart valve 心脏瓣膜

⑤relaxation/ˌrɪ:læk'seɪʃən/*n.* 松弛,舒张

both now and in the seventeenth century. But how, exactly, does the heart beat and what is its purpose? That was a key question that Harvey hoped to solve.

How the heart is connected to the major blood vessels^① that bring blood to it and take blood from it is also reasonably evident from dissection. It is not in the least bit evident, however, how those vessels and their tributaries^② relate to each other in parts of the body remote from the heart. Do they form open-ended^③ systems, as was commonly thought prior to Harvey? Or are there several closed^④ systems? Or do they join in one closed system? In an age when the capillaries^⑤, the fine blood vessels that join the arteries^⑥ to the veins^⑦, were unobserved because of their minuteness^⑧, this was not an easy question. Nor was it clear how quickly the blood flowed. Opening blood vessels is no great help here. Certainly we bleed quickly if cut in certain places, but if you make a hole in a water pipe when water is not flowing, it will still

①blood vessel 血管

②tributary/'tribjutəri/n. 支流

③open-ended/'əʊpən'endɪd/adj. 开口的; 两端开口的

④closed/kləʊzd/adj. 封闭的, 闭合的

⑤capillary/kə'piləri/n. 毛细管

⑥artery/'ɑ:təri/n. 动脉

⑦vein/veɪn/n. 静脉

⑧minuteness/mai'nju:tnɪs/n. 微小, 微细

leak rapidly. Harvey's discovery of the rapid circulation of the blood and the proper motion and function of the heart was remarkable relative to the knowledge, technology and methods available in the seventeenth century. Harvey's discoveries had to be inferred, not merely observed. He had to create a good number of ingenious^① experiments and well-argued inferences^② without ever having seen the internal workings of human beings.

Harvey's discoveries were also quite contrary to accepted opinion, which had stood for some 1,500 years. Everyone but Harvey thought blood was generated^③ in the liver^④ and was gradually consumed by the body, giving it nutrition^⑤. Blood flowed very slowly away from the liver to the other parts of the body, but not back to the liver. This was the view of Galen^⑥, greatest of the ancient anatomists^⑦, and accepted without question down to Harvey's time. Although Galen's views may seem odd to the modern eye, in the context of their

①ingenious/in'dʒi:njəs/adj. 灵敏的,精巧的

②inference/'infərəns/n. 推断结果;结论

③generate/'dʒenəreɪt/v. 产生,生成

④liver/lɪvə/n. 肝脏

⑤nutrition/nju:'trɪʃən/n. 营养

⑥Galen/'geɪlən/ 盖伦(130—200AD,古希腊医师、生理学家和哲学家,从动物解剖推论人体构造,用亚里士多德目的论阐述其功能)

⑦anatomist/ə'nætəməst/n. 解剖学家

time, they offered a plausible^① and comprehensive account of the human body. Galen's account of the heart and arteries was attuned^② to a very slow flow of the blood. He could easily explain rapid bleeding without a rapid circulation^③. Galen's views were well entrenched^④, and were defended vigorously by intelligent, experienced men. Anatomists in sixteenth-century Italy began to examine the human body with the aim of improving on Galen, but no one suspected that he was radically wrong regarding both the motion of the heart and the blood. Harvey had two significant obstacles to overcome. There was the difficulty of conceiving not only of the circulation of the blood, but also of an account of the heart and arteries that would suit a rapid circulation theory, against 1,500 years of tradition. Harvey had to amass sufficient evidence and arguments in favour of his new ideas to win over some highly sceptical^⑤ Galenic^⑥ opponents, and that, as we shall see, was no easy matter.

Their doubts were increased because Harvey's

①plausible/'plɔ:zəbl/adj. (论点等)貌似有理的;(说法等)貌似真实的

②attune/ə'tju:n/v. 使合拍,使协调

③circulation/,sə:kju'leɪʃn/n. (血液)循环

④entrench/in'trentʃ/v. 使处于牢固地位

⑤sceptical/'skeptɪkl/a. 倾向于怀疑的;表示怀疑的

⑥Galenic/gə'lenɪk/a. 盖伦的;盖伦派医学的

ideas affected our whole conception of how the body works. If Harvey was right about the cardiovascular^① system, then Galen was wrong, not merely about the heart and blood, but also about digestion^②, nutrition, respiration^③ and aspects of organ function. Galen's physiology^④ depended to a large extent on principles of attraction^⑤. Parts of the body (including the heart and the arteries) were thought to attract what they required to themselves. Harvey's work showed this was quite wrong for the heart and blood, as the heart forces blood around the body. This prompted a complete re-evaluation of the attraction principle. A significant part of medical therapy^⑥ in Galen's system was based on blood letting^⑦. Blood was drawn from specific parts of the body, determined by Galen's conception of the blood system and the position of the organ thought to be affected, in order to treat a disease. If Galen was wrong on the blood system, however, this entire mode of treatment needed to

①cardiovascular/ˌkɑːdiəʊˈvæskjələ/n. 心血管的

②digestion/diˈdʒestʃən/n. 消化(作用); 消化力

③respiration/respəˈreɪʃn/n. 呼吸; 呼吸作用

④physiology/ˌfɪziˈɒlədʒi/n. 生理学

⑤attraction/əˈtrækʃn/n. 吸引 (“吸引”这个概念在盖仑的生理学中起着关键作用。它是指血液和营养是被人体的各个部位吸引过去的,而不是被灌入或输入的。)

⑥therapy/ˈθerəpi/n. 治疗

⑦blood letting 放血