南京航空航天大学『十二五』规划教材·科技英语系列教材

科技英语阅读

A Practical Course of EST Reading

主编 谢小苑

- 凸显技巧实践的结合
- 知识性实用性相结合
- 系统性针对性相结合
- 同类著作中独树一帜

国防工业出版社
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前　言　Preface

随着世界经济全球化、科技一体化、文化多元化进程的加速，国家和社会对非英语专业人才的外语能力提出了新的要求，对大学英语教学提出了新的挑战。为适应新形势，满足新时期国家和社会对人才培养的需求，南京航空航天大学实施了新一轮大学英语教学改革，重点是加强大学英语课程的内涵建设，突出知识构建、能力培养和文化素质的提高，使学生的英语知识、能力、素质得到协调发展，培养具有国际视野、做世界公民和未来开拓者人才，实现新形势下大学英语教学的可持续发展，促进大学英语课程的长远发展。

《科技英语阅读》《科技英语翻译》和《科技英语写作》，是南京航空航天大学新一轮大学英语教学改革探索和专业学术英语教学团队教学实践积累的成果，旨在帮助学生顺利阅读和翻译所学专业的英语文献和资料，并能用英语撰写所学专业的简短报告和论文。我们期待这套教材能为学生知识—能力—素质的协调发展和外语能力的提升提供一个良好的契机和新的生长点。

《科技英语阅读》具有以下特色：

1. 技巧与实践相结合

本书在编排上力求有所创新，突显技巧与实践的紧密结合。本书以“讲座”的形式讲解科技英语的语言特点、科技文献的阅读技巧和方法，以“课文”及“拓展阅读”作为阅读实践内容，介绍由人类发展进程中各个时期的科技发展、科技大发明和大发现、科学家故事连缀成的中外科技史。阅读技巧“讲座”既体现科技文献阅读的技巧和方法，又提供大量的实例和练习，做到讲练结合；“课文”及“拓展阅读”的阅读实践以阅读技巧和方法为指导，做到学用结合。

2. 知识性与实用性相结合

本书的编写注重实用，内容力求做到深入浅出、通俗易懂，目的是帮助学生学会科技文献阅读的技能和方法。本书所选课文、实例和练习内容围绕中外科技史展开，学生在学习阅读技巧与进行阅读实践的同时，还可以了解人类发展进程中科学与技术的发展轨迹，领略每一项发明创造的深远影响，感受科技发展的

内在脉络以及科技发展的传承性，以提高科学文化素养。

3．系统性与针对性相结合

本书编者认为，一本好的科技英语教材应该研究学习者本身的特点和与之关联的工作、社会、未来等需求，应该结合学习者所学专业及相关学科。因此，本书针对高校大学生（尤其是理工科学生）的特点，系统介绍科技英语的语言特点、科技文献的阅读技巧和方法，重点讲解学生在阅读中常碰到的各种问题及解决方法，选择学生未来工作中会经常接触到的文体形式及来源于实际运用中的语言材料，帮助学生尽快了解其感兴趣的领域，以适应实际工作和满足社会的需要。

本书得以付梓，离不开方方面面的支持。首先，本书作为江苏省高等学校外语教学研究会项目“新形势下大学英语教学团队建设研究”、南京航空航天大学“十二五”本科教学建设项目“国际化人才培养视野下的大学英语教学改革”、南京航空航天大学“十二五”第二批规划教材建设立项项目的研究成果之一，我们对各项目的资助表示感谢。其次，感谢南京航空航天大学的各级领导，尤其是教务处及教材科领导的支持，他们在经费和政策上的大力支持为本书的顺利出版提供了有力的保障。再次，感谢参与编写教材的专业学术英语教学团队成员，他们加班加点、含辛茹苦，保质保量完成了教材的编写任务。本书在编写过程中，参考了国内外出版的相关书刊并引用了部分资料，在此向有关作者和单位表示诚挚的感谢。

由于编者水平和经验有限，书中欠妥与谬误之处在所难免，祈请同行专家和广大读者斧正。

编　者

2014 年 8 月于南京航空航天大学

目　录　Contents

Unit 10 Development of Science and Technology in New China

Unit 11 Scientific Discoveries and Inventions

Unit 12 Great Men and Women

Unit 1 Historical Development of Science and Technology

Lecture

了解科技英语的语言特点

Understanding Linguistic Features of EST

随着国际间科技、经济和文化交往的日益扩大，专门用途英语（English for Specific Purposes，简称 ESP）应运而生。专门用途英语是指与某种特定职业或学科相关的英语，是根据学习者特定目的和需要而开设的英语课程，如商务英语、医学英语、科技英语等，其目的是培养学生在一定工作环境中运用英语开展工作的交际能力。科技英语（English for Science and Technology，EST）是专门用途英语中最重要的一个分支。随着世界科技发展的日新月异和我国对外科技交流的日益频繁，科技英语的重要性越来越清楚地显示出来。因此，为了更好地促进科技交流，促进国民经济的发展，同时也为了提高自身的专业素质，保证职业生涯的成功，大学生有必要学习科技英语课程。本单元将分析科技英语及其语言特点。

1. 科技英语

科技英语是一种重要的英语语体，是随着科学技术的发展而形成的一种独立的文体形式。科技英语泛指与科学技术有关的书面或口头的英语文献，既涵盖自然科学领域的各种知识和技术，也包括社会科学的各个领域，如用英语撰写的有关自然科学和社会科学的情报资料、学术著作、论文、实验报告、产品和专利的说明书等。为了准确、简洁、明了地叙述自然现象和事实及其发展过程、性质和特征，科技人员常常使用一些典型的句型和大量的专业术语，因而形成科技英语自身的特色。试分析例 1，找出科技英语特征。

例 1

It is nothing else than impurities prenatally inherent in ore that seriously affect

the quality of the latter, which is formed as a result of geological vicissitudes including diastrophic movement, eruption of volcano, sedimentation, glaciation and weathering etc., under the action of which pyrogenic rocks etc., come into being, some of which exist in a stage of symbiosis, the main cause of the absence of pure rocks in nature, wherein lies the reason for the need of separation technology and apparatus, namely, ore-dressing devices and equipment, (which has been) so far impotent to meet the requirements of metallurgical industry (which) the scientists make every endeavor to elevate to a new high by laser separation.

【分析】从例1可以看出,该段具有明显的科技英语特征:(1)逻辑严密,结构紧凑,陈述客观,表达清晰。(2)专业词汇多,如 vicissitudes(变迁)、diastrophic(地壳变迁)、sedimentation(沉积)、glaciations(冰川)、weathering(风化)、pyrogenic rocks(火成岩)、symbiosis(共生现象)等。(3)从句多,如该句主句为 It is... in ore; 从句 that seriously affect... by laser separation; 主语从句中包含的的定语从句有:which is formed..., under the action of which... come into being, wherein(= in which), (which have been) so far impotent to..., metallurgical industry (which) the scientists make every endeavor to...。

根据主从结构和从句之间的关系,这个复杂长句可分成六个小句:

① It is nothing else than impurities prenatally inherent in ore that seriously affect the quality of the latter,

② which is formed as a result of geological vicissitudes including diastrophic movement, eruption of volcano, sedimentation, glaciation and weathering etc.,

③ under the action of which pyrogenic rocks etc., come into being,

④ some of which exist in a stage of symbiosis, the main cause of the absence of pure rocks in nature,

⑤ wherein lies the reason for the need of separation technology and apparatus, namely, ore-dressing devices and equipment,

⑥ (which has been) so far impotent to meet the requirements of metallurgical industry the scientists make every endeavor to elevate to a new high by laser separation.

根据上下文和全句逻辑关系,本句可以这样理解:影响矿石质量的不是别的东西而是矿石中天然固有的杂质。矿石是由地质变化形成的,这些地质变化包括地壳变迁运动、火山爆发、沉积作用、冰川作用和风化作用等。在上述地质变化的作用下,生成了火成岩等。上述这些岩石中,有些处于共生状态——这也

是自然界没有纯净矿石的主要原因。人们之所以需要分离技术与器械，即选矿装置与设备，其原因概出于此。迄今为止，分离技术与器械尚远不能满足冶金工业的需要，科学家们正全力以赴，利用激光分离机把冶金工业提高到一个新的水平。

由例 1 可看出，科技英语在词汇、语法、文体等方面有着不同于普通日常英语的特征。以下我们将在比较科技英语文体与日常英语、文学文体的差异的基础上，了解科技英语的语言特点。

2. 科技英语文体与普通日常英语的比较

与日常英语相比，科技英语讲究严谨和庄重，它和日常英语在措辞、造句、组段、语篇结构等方面存在很大差异。在措辞方面，科技英语表现出专业术语多、名词化结构多、正式庄重的词多、实意动词多和借用词多等特点。在句式方面，科技英语多使用一般现在时、被动语态和长难句。在段落方面，科技英语比较规范；多数情况下有概括段落内容的主题句，而且出现在段首，读者只要阅读第一句就能得知段意。在语篇结构上，科技英语注重逻辑上的连贯，思维上的准确和严密，表达上的清晰与精炼，以客观的风格陈述事实和揭示真理。综上所述，科技英语在文体上的特点可归纳为：逻辑连贯、思维准确、严密、陈述客观、表达清晰、精炼。

阅读下面的文章 *Natural and Synthetic Rubber*（见表 1-1），试从词汇、语法、修辞等方面比较日常英语与科技英语两种文体的区别。

例 2

表 1-1　Natural and Synthetic Rubber（日常英语与科技英语文体）

Natural and Synthetic Rubber	
日常英语	科技英语
People **get** natural rubber from rubber trees as a white, milky liquid, **which is called** latex. They **mix it with** acid, and dry it, **and then they send it** to countries all over the world. As the rubber industry **grew**, people **needed** more and more rubber. They **started** rubber plantations in countries with hot, **wet weather conditions**, but these still could not **give enough** raw rubber to **meet the needs** of growing industry.	Natural rubber **is obtained** from rubber trees as a white, milky liquid **known as** latex. This is **treated with** acid and dried **before being dispatched** to countries all over the world. As the rubber industry **developed**, more and more rubber was **required**. Rubber plantations were **established** in countries with a hot, **humid climate**, but these still could not **supply sufficient** raw rubber **to satisfy the requirements** of developing industry.

（续）

Natural and Synthetic Rubber	
日常英语	科技英语
It was **not satisfactory** for industry to depend on supplies, **which come** from so far away from the industrial areas of Europe. It was always possible that wars or shipping trouble could stop supplies. For many years **people tried to make something to take its place**, but they **could not do it. In the end**, they **found a way** of making **artificial, man-made** rubber which is in many ways **better** than and in some ways **not as good as** natural rubber. They make artificial, man-made rubber in factories by a complicated chemical process. It is usually cheaper than natural rubber. **Today, the world needs so much rubber** that we use both natural and artificial rubber in large **amounts.**	It was **unsatisfactory** for industry to depend on supplies **coming** from so far away from the industrial areas of Europe. It was always possible that supplies could be stopped by wars or shipping trouble. For many years, **attempts were made to produce a substitute**, but they **were unsuccessful**. **Finally, a method was discovered** of producing **synthetic** rubber which is in many ways **superior** and in some ways **inferior to** natural rubber. Synthetic rubber is produced in factories by a complicated chemical process. It is usually cheaper than natural rubber. **At present, the world requirements for rubber are so great** that both natural and synthetic rubber is used in **quantities**.

比较两种文体后可知：

（1）措辞上，与日常英语相比，科技英语文体显得更正规、庄重，见表 1-2。

表 1-2　日常英语与科技英语在措辞上的比较

日常英语	科技英语
send	dispatch
take its place	substitute
better	superior
not as good as	inferior to
amounts	quantities
wet weather conditions	humid climate
artificial, man-made rubber	synthetic rubber

（2）句式上，与日常英语相比，科技英语文体更多使用被动句式，见表 1-3。

表 1-3　日常英语与科技英语在句式上的比较

日常英语	科技英语
People get natural rubber from rubber trees...	Natural rubber is obtained from rubber trees...
They mix it with acid, and dry it, and then they send it to...	This is treated with acid and dried before being dispatched to...
... people needed more and more rubber.	... more and more rubber was required.
They started rubber plantations in...	Rubber plantations were established in ...
... people tried to make something to...	... attempts were made to ...
... they found a way of...	... a method was discovered of ...
which is called	known as(更常使用非限定动词,尤其是分词)
which come from	coming from

(3) 文体方面,与日常英语相比,科技英语文体结构更紧凑,逻辑性更强。

3. 科技英语文体与文学文体的比较

科技文献揭示的是物质世界,是反映客观事实和规律的信息。为了客观准确地描述客观世界的实情、传递科技信息,科技英语文体在语言使用上更规范地道,在语言形式上更简明准确,在语义理解上更直接明了。而像小说、诗歌之类的文学作品表现的主要是人类的精神世界,是人们对物质世界的感受而抒发出来的感情、思想。文学英语文体用于建构鲜明的文学形象,是反映主观世界的媒介,常常通过音韵和节奏、语调和句式、思想和情感的表达方式,来建立独特的人物、环境和情节,在语言使用上比较洒脱自如,因而常常违背常规的语法定式,超脱语言的表述形式,以突显语言的风格化和人物的鲜活性。科技英语文体与文学英语文体在文字运用上各有独特之处。科技文献追求的是形式与逻辑的结合,而文学作品追求的是形式与意境的统一。在修辞方面,科技文献以交际修辞为主,文风质朴,描述准确,而文学作品富于美学修辞手段和艺术色彩。科技文献的语言表现出逻辑的连贯性和内容的统一性,突显出科技文体语言简洁、事理明了的特征。

从以上分析可知,科技英语和文学英语在语言、文字运用和修辞上存在较大的区别。阅读例 3 和例 4,试比较科技英语文体与文学英语文体的区别。

例 3

George stood out in fair sight, on the top of the rock, as he made his declaration of independence; the glow of dawn gave a flush to his swarthy cheek, and bitter indignation and despair, gave fire to his dark eye; and, as if appealing from man to the jus-

tice of God, he raised his hand to heaven as he spoke.

【分析】本段摘自《汤姆叔叔的小屋》。本段的文学文体明显，用了明喻一则：as if appealing from man to the justice of God。此外，文学作品有时需要用一些夸张的手法来表述人的主观思想和情感，三个词 indignation、despair、appealing 充分地显示出了文学上描述的特点，是为了给读者一种强大的冲击力和感召力。这种冲击力量越大，就越能震撼读者。

例 4

People sometimes ask "why waste time studying fossils?"

Studying fossils is far from being a waste of time, because many useful facts can be learned from them. Generally speaking, fossils are especially important because they are the only clues to the existence and appearance of life on the earth millions of years ago. When arranged in proper geological order, fossils reveal how life steadily developed from lowly-organized primeval creatures to the complex animals of today. Such knowledge helps us better to comprehend the origins and evolution of life, and this in turn helps us to understand a little of what we ourselves are.

Since different fossil types are found in different strata, certain distinctive fossils can be used to identify different kinds of sedimentary rocks, including those below ground level of separated by miles of ocean. Even rocks at very great depths, when bored by the drills of engineers, can be identified by their fossil contents. Fossils are therefore valuable aids to mining and petroleum engineers.

【分析】本篇为科普文章，其科技文体特征明显，全文除了一个 we 作主语外，没有再用任何人称代词，也没有用任何明喻或暗喻；文章被动语态较多，显示其客观性强；语法规范，更易于读者接受信息。阅读科技文体，就能体验到文章朴实无华的特质。

4. 科技英语文体的特点

科技英语文体包括科普文章、科技论文、科技报道、实验指示与实验报告以及科技发展的历史等。科技英语文体种类不同，因此具有各自的特点，主要差异表现在内容、措辞、句式、修辞、结构等方面。如科普作品以语言生动、形式活泼为特色；科技论文和各种学术文献说理充分，理论鲜明，论述缜密，极具严谨典雅的风格；实验指导书则是结构简单，句子短小精悍；产品说明书的风格通俗易懂，朴实简明；专利文献内容专深，措辞周密，说明详细，句式固定，结构规范。尽管如此，科技文体仍具有一些共同点，即条理分明，层次清楚，语言简练，合乎逻辑。

因此，在阅读科技文章时，首先要注意文章的逻辑关系，准确把握该文体的结构特征和文章的语言逻辑。其次要注意文章的语篇衔接连贯。语篇衔接通过词汇或语法手段使文脉相通，形成语篇的有形网络。语篇连贯以信息发出者和接受者双方共同了解的情景为基础，通过推理来达到语义的连贯，这是语篇的无形网络。充分利用语篇的叙事次序（时间顺序、空间顺序等）和逻辑连接词有助于对文章的整体把握，做到传意达旨。

试分析以下科技英语文体的特点。

例 5

Food quickly spoils and decomposes if ***it*** is not stored correctly. Heat and moisture encourage the multiplication of microorganisms, and sunlight can destroy the vitamins in such foods as milk. Therefore, most foods should be stored in a cool, dark, dry place which is also clean and well ventilated.

Foods that decompose quickly, such as meat, eggs, and milk should be stored in a temperature of 5℃ – 10℃. In ***this*** temperature range, the activity of microorganisms is considerably reduced. In warm climates, this temperature can be maintained only in a refrigerator or in the underground basement of a house. In Britain, for six months of the year at least, ***this*** temperature range will be maintained in an unheated room that faces the north or the east. Such a room will be ideal for food storage during the winter months provided that ***it*** is well ventilated.

【分析】这是一篇科普文章，科普文章是普及科学知识的读物，它包罗万象，涉及天文、地理、物理、化学、生物、医学等方面知识，其形式也多样化，有科学小丛书、百科全书、科普文摘、科学史、科学家传记等。科普文章内容上着重常识性、知识性和趣味性，语言上通俗易懂，深入浅出，语句简短，多用普通词汇。

从文章的逻辑关系来看，这篇文章组织严密，逻辑性强。文章的层次清楚，第一段第一句话概括了该段的中心思想，第二段具体说明了如何才能保证保存食物的要求。文章中还使用了词汇手段“词语的复现关系”，如 food, decompose, store (storage) 都出现两次以上；以意义相同或相近的词组的形式出现，如文章前面用 spoil, decompose，后面扩展为 the multiplication of microorganisms, the activity of microorganisms, destroy the vitamin 等；前面用 cool，后面用各种方式表达同一概念，in a temperature of 5℃ – 10℃, in a refrigerator, in the underground basement of a house, in an unheated room that faces the north or the east, during the winter months。通过词汇在意义上的衔接把全篇文章的各部分紧紧地联系在一起，使文章结构紧凑，前后呼应。从文章的语篇衔接连贯角度来看，在衔接方面，使用语法手段的“照应”，第一段代词 it 指代 food，第二段 it 指代 room，第二段中

this 指代温度范围。

通过以上内容，我们对科技英语文体在内容、措辞、句式、修辞、结构等方面的特点有了一个比较全面的了解，但真正要理解科技文章还需进行大量的实践。

Quiz

Analyze the features of the following passages.

I

First, a long glass tube was taken. The tube was closed at the top and was then completely filled with water. Next it was placed vertically in a large barrel half-full of water. When the bottom of the tube was opened, the water level in the tube fell to a height of approximately 10 meters above the water level in the barrel. As a result, a vacuum was left in the upper part of the tube. The water in the tube was supported by the atmospheric pressure. The height of the column of water could therefore be used to measure atmospheric pressure.

II

Many parts of this machine are made of flammable plastic. Never place hot or burning objects on or near the washing machine.

When disconnecting the power cord from the power outlet, always take hold of the plug, and not the wire, and pull free. Never connect or disconnect the power plug with wet hands since you may receive an electric shock.

For really dirty clothing use hot water 40℃.

For removal of blood stains use cold water only.

STAIN REMOVAL AND BLEACHING

- Add 1/2 cap per liter of water.
- Soak laundry well in solution for at least 20-30 minutes and wash.
- Rinse thoroughly.

Power source: 220V/50Hz

Power consumption: 400W

Washing capacity: 3kg

Spin capacity: 3kg

Water supply pressure: 0.3kg/cm^2-10kg/cm^2

Net weight: 30kg

Dimension: 500 × 500 × 850mm

Text

Technological Evolution of Humankind

This article is about the topic of technology in human history. Technology is the making, modification, usage, and knowledge of tools, machines, techniques, crafts, systems, methods of organization, in order to solve a problem, improve a preexisting solution to a problem, achieve a goal or perform a specific function. It can also refer to the collection of such tools, machinery, modifications, arrangements and procedures. Technology significantly affect humanity' ability to control and adapt to their natural environments. Its evolution has experienced a long history...

Paleolithic[1] (2.5 million-10,000 BC)

The use of tools by early humans was partly a process of discovery, partly of evolution. Early humans evolved from a species of foraging hominids which were already bipedal, with a brain mass approximately one third that of modern humans. Tool use remained relatively unchanged for most of early human history, but approximately 50,000 years ago, a complex set of behaviors and tool use emerged, believed by many archaeologists to be connected to the emergence of fully modern language.

Human ancestors have been using stone and other tools since long before the emergence of Homo sapiens approximately 200,000 years ago. The earliest methods of stone tool making, known as the Oldowan[2] "industry", date back to at least 2.3 million years ago, with the earliest direct evidence of tool usage found in Ethiopia within the Great Rift Valley, dating back to 2.5 million years ago. This era of stone tool use is called the Paleolithic, or "Old stone age", and spans all of human history up to the development of agriculture approximately 12,000 years ago.

To make a stone tool, a "core" of hard stone with specific flaking properties was struck with a hammerstone. This flaking produced a sharp edge on the core stone as well as on the flakes, either of which could be used as tools, primarily in the form of choppers or scrapers. These tools greatly aided the early humans in their hunter-gatherer lifestyle to perform a variety of tasks including butchering carcasses (and breaking bones to get at the marrow); chopping wood; cracking open nuts; skinning an animal for its hide; and even forming other tools out of softer materials such as bone and wood.