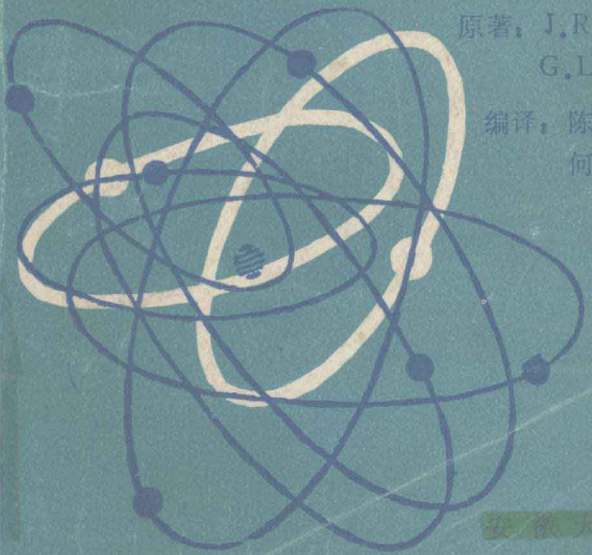
基础科技英語教程

（英汉对照，注释）

A course in basic scientific English



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前　言

J·R·Ewer 和 G·Latorre 合编的A Course in Basic Scientific English是一本精炼的科技英语教材，我校把它作为理科青年教师和高年级学生提高班英语教材。现在把它译出来，主要供校内教学时使用。原书除课文外还有语法和练习，由于时间关系，我们暂且从略。本书既可以作为提高班教材，也适合报考理、工、医、农等学科的研究生阅读，对于希望提高英语水平的各类科技工作者，也极有帮助。

本书有正文12课，文摘18篇。正文的内容及语法自成完整的体系。它不仅是良好的语言教材，而且还有其本身的科学价值。其中提出了许多值得深思的问题以及科技人员思考和处理问题的方法和态度等。文摘中的文体和语言结构十分复杂多样，内容涉及理科中许多领域。原作者声称本书是他审阅了三百多万词汇量的科技著作后精选而成的，所以内容十分丰富，语言现象错综复杂。由于我们的知识面及英语水平均有限，错误之处在所难免。我们诚恳地希望读者，特别是把原书作教材使用的兄弟院校的英语教师和熟悉有关专业的同志们对本书提出批评、指正。

本书在编译过程中，得到我校有关专业教师的帮助；在排印过程中，得到校印刷厂的大力支持，在此我们表示衷心的感谢。

编　译　者

目　录

（括号中第一个数字为英语课文的页码，每课注释在课文之后；第二个数字是译文的页码）

Unit 1

THE SCIENTIFIC ATTITUDE

What is the nature of the scientific attitude, the attitude of the man or woman who studies and applies physics, biology, chemistry, geology, engineering, medicine or any other science? [1]

We all know that science plays an important role in the societies in which we live[2]. Many people believe, however, that our progress depends on[3] two different aspects of science. The first of these is the application of the machines, products and systems of applied knowledge that scientists and technologists develop. Through technology, science improves the structure of society and helps man to gain increasing control over his environment. New fibres and drugs, faster and safer means of transport, new systems of applied knowledge (psychiatry, operational research, etc.) are some examples of this aspect of science.

The second aspect is the application by[4] all members of society, from the government official to the ordinary citizen, of[4] the special methods of thought and action that scientists use in their work.

What are these special methods of thinking and acting? First of all, it seems that[5] a successful scientist is full of curiosity—he wants to find out how and why the universe works. He usually directs his

attention towards problems which he notices have no[6] satisfactory explanation, and his curiosity makes him look for underlying relationships even if the data available seem to be unconnected. Moreover, he thinks he can improve the existing conditions, whether of pure or applied knowledge[7], and enjoys trying to solve the problems which this involves.

He is a good observer, accurate, patient and objective and applies persistent and logical thought to the observations he makes. He utilizes the facts he observes to the fullest extent. For example, trained observers obtain a very large amount of information about a star (e. g. distance, mass, velocity, size, etc.) mainly from the accurate analysis of the simple lines that appear in a spectrum.

He is sceptical—he does not accept statements which are not based on the most complete evidence available—and therefore rejects authority as the sole basis for truth. Scientists always check statements and make experiments carefully and objectively to verify them.

Furthermore, he is not only critical of the work of others, but also of his own, since he knows that man is the least reliable of scientific instuments[8] and that a number of factors tend to disturb impartial and objective investigation (see Unit 8).

Lastly, he is highly imaginative since he often

has to look for relationships in data which[9] are not only complex but also frequently incomplete. Furthermore, he needs imagination if he wants to make hypotheses of how processes work and how events take place.

These seem to be some of the ways in which a successful scientist or technologist thinks and acts.

注释：

1. the scientific attitude, the attitude of the man … who studies and applies physics, … 后一个 the attitude 是前一个的同位语。who studies and applies physics, …是限制性定语从句，修饰 the man or woman。
2. science plays an important role in the societies in which we live. to play … role in 在 … 中起 … 作用。which 代表 societies.
3. to depend on 依靠，取决于。
4. The second aspect is the application by all members…, of the special methods … by 和 of 所引起的两个介词短语均修饰 the application, 起定语作用。
5. First of all, it seems that a successful scientist … first of all 作状语。seems 后的 that 引出主语从句，it 是先行词。
6. towards problems which he notices have no…

which have no satisfactory explanation 为限制性定语从句，he notices 为插入语，在句中作独立成分。

7. whether of pure or applied knowledge = whether they (the existing conditions) are of pure or applied knowledge.

8. man is the least realiable of scientific instruments = man is the least realiable scientific instrument of scientific instruments.

9. relationships in data which are not only…but also…which 引起限制性定语从句，修饰 data。in data 为介词短语，作定语修饰 relationships。

Unit 2

NUMBERS AND MATHEMATICS

It is said[1] that mathematics is the base of all other sciences, and that arithmetic, the science of numbers,[2] is the base of mathematics. Numbers consist of whole numbers (integers) which are formed by the digits o, 1, 2, 3, 4, 5, 6, 7, 8 and 9 and by combinations of them. For example, 247—two hundred and forty seven—is a number formed by three digits. Parts of numbers smaller than 1 are sometimes expressed in terms of[3] fractions, but in scientific usage they are given as decimals. This is because it is easier to perform[4] the various mathematical operations if decimals are used instead of fractions. The main operations are: to add, subtract, multiply and divide; to square, cube or raise to any other power; to take a square, cube or any other root and to find a ratio or proportion between pairs of numbers or a series of numbers. Thus, the decimal, or ten-scale, system is used for scientific purposes throughout the world, even in countries whose national systems of weights and measurements are based upon other scales. The other scale in general use nowadays is the binary, or two-scale, in which numbers are expressed by combinations of only two digits, o and 1. Thus, in the binary scale, 2 is expressed as 101, 3 is giv-

en as 011, 4 is represented as 100, etc. This scale is perfectly adapted to the 'off-on' pulses of electricity, so it is widely used in electronic computers; because of its simplicity it is often called 'the lazy schoolboy's dream'!

Other branches of mathematics such as algebra and geometry are also extensively used in many sciences and even in some areas of philosophy. More specialized extensions, such as probability theory and group theory, are now applied to an increasing range of activities, from economics and the design of experiments to war and politics. Finally, a knowledge of statistics is required by every type of scientist for the analysis of data. Moreover, even an elementary knowledge of this branch of mathematics is sufficient to enable the journalist to avoid misleading[5] his readers, or the ordinary citizen to detect the attempts which are constantly made to deceive him.

注释：

1. It is said 人们说，据说。
2. the science of numbers 是 arithmetic 的同位语。
3. in terms of 介词短语，以…的方式。
4. …it is easier to perform the various mathematical operations. adj + to + 原形动词结构。perform operations 进行运算。
5. to avoid misleading his readers. avoid 后要跟动名词。

Unit 3

SCIENTIFIC METHOD AND THE METHODS OF SCIENCE

It is sometimes said that there is no such thing as the so-called 'scientific method'; there are only the methods used in science. Nevertheless, it seems clear that there is often a special sequence of procedures which is involved in[1] the establishment of the working principles of science. This sequence is as follows[2]: (1) a problem is recognized, and as much information as appears to be relevant[3] is collected; (2) a solution (i.e. a hypothesis) is proposed and the consequences arising out of this solution[4] are deduced; (3) these deductions are tested by experiment, and as a result[5] the hypothesis is accepted, modified or discarded.

As an illustration of this we can consider the discovery of air-pressure.[6] Over two thousand years ago, men discovered a method of raising water from one level to another by means of the vacuum pump. When, however, this machine passed into general use in the fifteenth and sixteenth centuries, it was discovered that, no matter how perfect the pump was, it was not possible to raise water vertically more than about 35 feet. Why? Galileo, amongst others, recognized the problem, but failed to solve it.

The problem was then attacked by Torricelli. Analogizing from the recently-discovered phenomenon of water-pressure (hydrostatic pressure), he postulated that a deep 'sea of air' surrounded the earth; it was, he thought, the pressure of this sea of air which pushed on the surface[7] of the water and caused it to rise in the vaccum tube of a pump. A hypothesis, then, was formed. The next step was to deduce the consequences of the hypothesis. Torricelli reasoned that this 'air pressure' would be unable to push a liquid heavier than water as high as 35 feet, and that a column of mercury, for example, which weighed about 14 times more than water, would rise to only a fourteenth of the height of water, i.e. approximately 2.5 feet. He then tested this deduction by means of the experiment we all know, and found hat the mercury column measured the height predicted. The experiment therefore supported the hypothesis. A further inference was drawn by Pascal, who reasoned that if this 'sea of air' existed, its pressure at the bottom (i.e. sea-level) would be greater than its pressure further up, and that therefore the height of the mercury column would decrease in proportion to[9] the height above sea-level. He then carried the mercury tube to the top of a mountain and observed that the column fell steadily as the height increased, while another mercury column at

the bottom of the mountain remained steady (an example of another of the methods of science, the controlled experiment[10]). This further proof not only established Torricelli's hypothesis more securely, but also demonstrated that, in some aspects, air behaved like water; this, of course, stimulated further enquiry.

注释：

1. be involved in 涉及。
2. as follows 如下，例 she wrote as follows 她所写如下。
3. and as much information as appears to be relevant 那么多…可能有关的资料 as much…as… 如…一般多。例：(a) As much steel as is in the storehouse has been made use of. 仓库里那么多的钢材都已经充分利用起来了。(b) He has as many books on mathematics as I have 他有的数学书和我的一样多。
4. arising out of this solution 从这个解决办法引起的。
5. as a result 结果，最后。
   As an illustration of this we can consider the discovery of air-pressure. = We can consider the discovery of air-pressure as an illustraton of this. As…短语提前放在句首是为了表示强调。

另外，短语中的this代表课文一开始提到的a special sequence。

7. It was…the pressure…which pushed on the surface…. It was…which为强调句型。例如It was a key which I found in his pocket. 我在他口袋里找到的是一把钥匙。句中的he thought为插入语。

8. Galileo伽里略（1564—1647）意大利物理学家和天文学家。

Torricelli 托里拆里（1608—1647）意大利数学家和物理学家。

Pascal 巴斯加（1623—1662）法国哲学家和物理学家。

9. in proportion to…与…成比例。

10. the controlled experiment 对照实验，控制实验。

Unit 4

PURE AND APPLIED SCIENCE

As students of science you are probably sometimes puzzled by the terms 'pure' and 'applied' science. Are these two totally different activities, having[1] little or no interconnection, as is often implied?[2] Let us begin by examining what is done by each.

Pure science is primarily concerned with[3] the development of theories (or, as they are frequently called, models) establishing relationships between the phenomena of the universe. When they are sufficiently validated, these theories (hypotheses, models) become the working laws or principles of science. In carrying out this work, the pure scientist usually disregards its application to practical affairs, confining his attention to[4] explanations of how and why events occur. Hence, in physics, the equations describing the behaviour of fundamental particles, or in biology, the establishment of the life cycle[5] of a particular species of insect living in a Polar environment, are said to be examples of pure science (basic research), having[6] no apparent connection (for the moment) with technology, i.e. applied science.

Applied science, on the other hand, is directly concerned with the application of the working laws of pure science to the practical affairs of life, and

to increasing man's control over his environment, thus leading to the development of new techniques, processes and machines. Such activities as investigating the strength and uses of materials, extending the findings of pure mathematics to improve the sampling procedures used in agriculture or the social sciences, and developing the potentialities of atomic energy, are all examples of the work of the applied scientist or technologist.

It is evident that many branches of applied science are practical extensions of purely theoretical or experimental work. Thus the study of radioactivity began as a piece of pure research, but its results are now applied in a great number of different ways—in cancer treatment in medicine, the development of fertilizers in agriculture, the study of metal-fatigue in engineering, in methods of estimating the ages of objects in anthropology and geology, etc. Conversely,[8] work in applied science and technology frequently acts as a direct stimulus to the development of pure science. Such an interaction occurs, for example, when the technologist, in applying a particular concept of pure science to a practical problem, reveals a gap or limitation in the theoretical model, thus pointing the way for further basic research. Often a further interaction occurs, since the pure scientist is unable to undertake this further research until an-