

## 第一课 科学的态度

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### 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?

5 We all know that science plays an important role in the societies in which we live. Many people believe, however, that our progress depends on 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. 10 New fibres and drugs, faster and safer means of transport,<sup>1</sup> new systems of applied knowledge (psychiatry, operational research, etc.) are some examples of this aspect of science.

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

20 What are these special methods of thinking and acting? First of all, it seems that 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 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 25 conditions, whether of pure or applied knowledge, and enjoys trying to solve the problems which this involves.

30 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.

35 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.

40 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 instruments and that a number of factors tend to disturb impartial and objective investigation (see Unit 8).

45 Lastly, he is highly imaginative since he often has to look for relationships in data which 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.

<sup>1</sup> transportation in U.S.A.

何为科学态度的本质，即研究和运用物理学、生物学、化学、地质学、工程学、医学或任何其它学科的人的态度？

众所周知科学在我们日常生活的社会中扮演着重要角色。可是，许多人相信我们的进步取决于科学的两个不同方面。一方面是，科学家和技术专家研发的机械、产品和实用知识系统的应用。通过技术，科学改进着社会结构，帮助人们加强控制环境。新型纤维和新药物、更快速更安全的交通工具、应用知识系统（精神病学、运筹学等）是科学在这方面的部分实例。

另一方面，从政府官员到普通公民的社会所有成员效仿科学家在工作中的特殊思考方式和行为。

这些特殊思考方式和行为是什么呢？首先，一个成功的科学家会充满好奇心。他总是想方设法探索宇宙是怎样和为什么存在的。他通常会把自己的注意力放在他认为不能圆满解释的问题上；他的好奇心驱使他去寻求那些隐藏的奥秘关系，即使那些现有的数据似乎互不相关。此外，他认为他能改善现有条件，无论纯科学还是应用技术，并乐于试图求解其中所涉及的问题。

他是一个善于观察的人，准确、耐心、客观，并将坚持不懈的逻辑思维运用到他的观察中。他把他观察到的事实发挥到极致。例如，受过培训观察者主要通过对光谱中出现的简单的线条的精确分析而获得大量的有关星球的信息（如距离、质量、速度、大小等）。

他始终持怀疑态度，他不接受那些没有充分证据的陈述；拒绝权威是真理的唯一基础。科学家始终会严谨地进行实验验证陈述。

此外，他不仅批评他人的工作，也批评自己的工作；因为他知道人类是科学仪器中最不可靠的，而且许多因素往往会干扰公正客观的调查（见第八课）。

最后，他富有极大的想象力，因为他通常在不仅复杂而且不完善的数据中寻找关系。而且，如果他想要对事件过程如何进行以及事件如何发生做出假设，他需要想象力。

这些似乎是一个成功的科学家或技术专家思考和行动的方式。