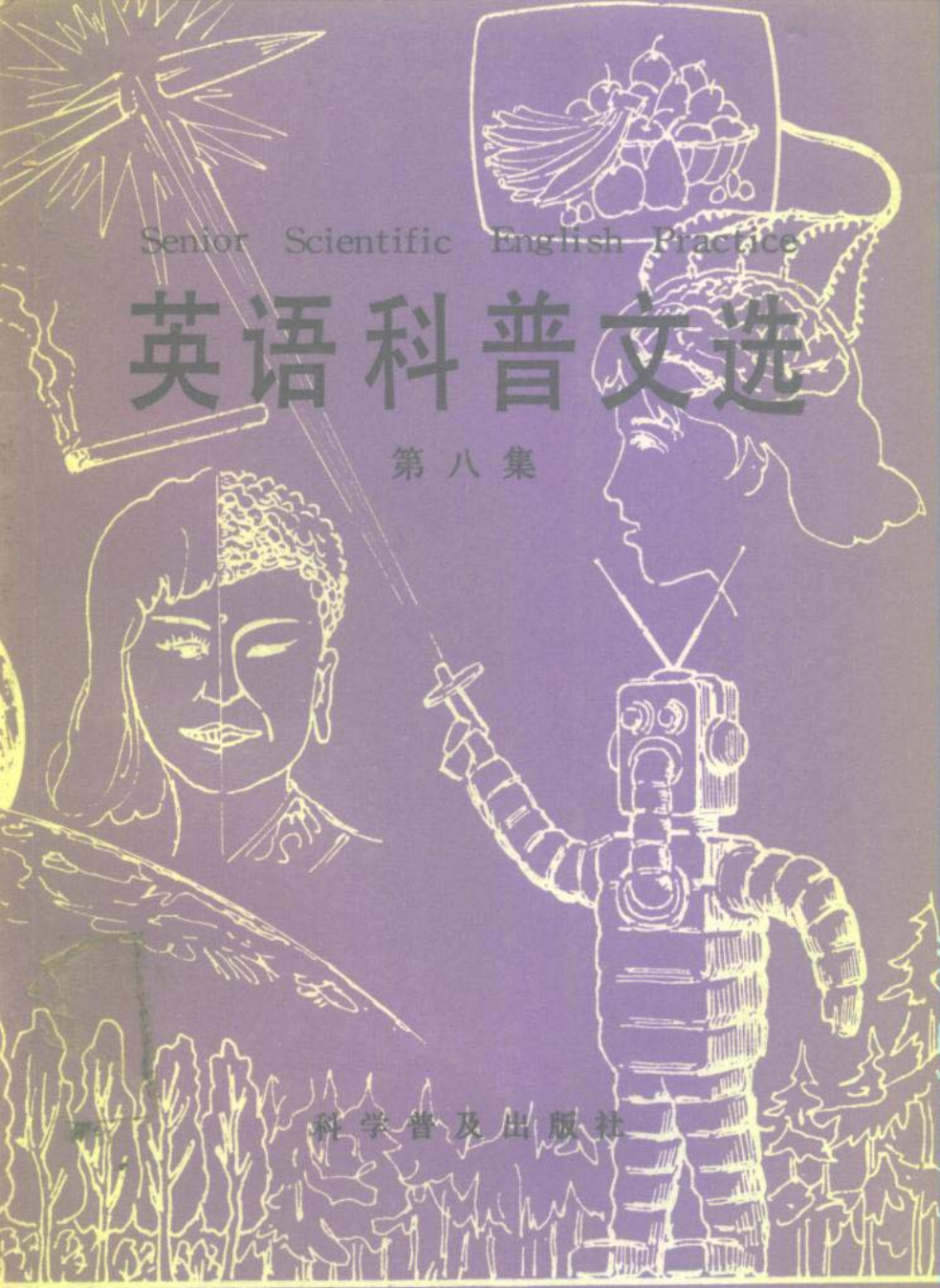

Senior Scientific English Practice

英语科普文选

第八集

科学普及出版社

SENIOR SCIENTIFIC ENGLISH PRACTICE

英 汉 对 照

英语科普文选

（第八集）

北京大学英语系教研室编译

科学普及出版社

内 容 提 要

《英语科普文》选共10集，本书为第8集。这里共收英语科普文章27篇，全部选自英美近期报刊杂志，经删改、注释和翻译，编作英汉对照读物。本集内容广泛，大都属于新技术革命潮流中涌现的最新发现，提醒并批判了某些伪科学，在语言现象上属高级英语层次。读者在学过前七集的基础上，通过对本集的学习，将进入能独立阅读英语报刊科普文章的阶段。

本书由北京大学英语系教学研究室[illegible]负责选编和注译，参加这一工作的有石春祯、黄昌纬、钱军、莎露茜和张庆新五位教师。

* * *

SENIOR SCIENTIFIC ENGLISH PRACTICE

英语科普文选

（第八集）

北京大学英语系教研室编译

责任编辑：阿 朗

封面设计：王序德

科学普及出版社出版（北京海淀区魏公村白石桥路32号）

新华书店北京发行所发行 各地新华书店经售

精华印刷新技术公司激光照排

北京市顺义县李史山印刷厂印刷

*

开本：787×1092毫米1/32 印张：8.75 字数：195 千字

1990年9月第1版 1990年9月第1次印刷

印数：1— 3,000册 定价：4.80元

ISBN 7— 110— 01512— 2/H·78

CONTENTS
目　录

1 Everyone's Genealogical Mother

If family trees were charted indefinitely backward, they would eventually converge on a small group of ancients who were ancestors of us all. Now biologists suggest in a report to NATURE[1] that a single female living between 140,000 and 280,000 years ago in Africa was an ancestor of everyone on the earth today. Inevitably and to the probable delight of creationsts[2] many scientists are calling her "Eve."

The authors point out that the hypothetical Eve[3], unlike the biblical one, was in no sense[4] the one ancestral mother of all humans. There were other females reproducing at the time who have modern descendants. But Eve is the only one who appears in everyone's genealogy, a conclusion the biologists reached by studying mitochondrial DNA (mtDNA).

Most of the DNA in human cells is in the cell nucleus, in the form of chromosomes. Since chromosomes come from both parents, this nuclear DNA is reshuffled with each generation, confusing the line of inheritance. But there is also DNA outside the nucleus, in mitochondria, substructures within each cell that are responsible for producing energy the cell needs. Since the sperm's mitochondria do not survive fertilization intact, mtDNA is inherited solely through the mother. The only way it can change over the generations is through mutation. And that mutation, evidence suggests, proceeds at a steady, known rate. To calculate how much time has elapsed since the mutations that gave rise to[5]

today's variations began[6], the scientists need merely determine how much change has taken place.

To measure this change, the biologists examined mtDNA from 147 individuals representing five broad geographic regions. The scientists analyzed the samples by mixing them with restriction enzymes, proteins that cut strands of DNA at specific sites. After compating the resulting fragments, the scientists used a computer to analyze the differences between the mtDNA samples and construct a "family" tree. Those differences were so small that they could be explained by assuming the existence of one ancestral mtDNA. Then the biologists extrapolated backward to calculate when that mtDNA existed in other words, when Eve lived.

The facts that mtDNA is maternally inherited and that Eve's along has survived mean that she was the only one among her female contemporaries whose descendants included some females in all succeeding generations. Descendants of the other females alive during Eve's time eventually included generations that produced no children or only males, thus halting propagation of their mtDNA.

By considering the geographic origins of the 147 people, the biologists were even able to determine where Eve lived; samples from those of sub Saharan African descent showed the most intragroup differences, implying that their mtDNA had had more time to change and thus that their ancestors arose earliest. This finding plus the structure of the family tree indicated sub Saharan origin, a conclusion that agrees with[7] current archaeological and anthropological theory.

The researchers concede some uncertainties; about the mutation rate, for example, and whether it is constant. Still, they

say: "the evidence shows mtDNA is a good molecule for tracing relationships between populations in general. It is a way of welding molecular biology and anthropology. Sometimes fossils are misleading. We're trying to build better pictutes of how humans evolved."

Explanation of words: 词解:

ancestor ['ænsəstə] a person, esp one living a long time ago, from whom another is descended 祖先

anthropological [ænθrəpə'lɔdʒikə] of the scientific study of the nature of man, including the development of his body, mind, and society 人类学的

archaeological [ɑ:kə'lɔdʒikəl] of the study of the buried remains of ancient times 考古学的

assume [ə'sju:m] to take as a fact or as true without proof 假设

biblical ['biblikəl] of or abont Bible 《圣经》的,出于《圣经》的

biologist [bai'ɔlədʒist] a person who studies living organisms and vital process 生物学家

chromosome ['krouməsəum] one of the linear or sometimes circular basophilic bodies of viruses, bacteria, blue-green algae, and the cell nucleus of all other unicellular or multicellular organisms that contain most of all of the DNA or RNA comprising the genes of the individual 染色体

concede [kən'si:d] to admit as true 承认

converge [kən'və:dʒ] to come together to a common point 会聚,集中

creationist [kri'eiʃənist] a person who believes in the theory that

matter, the various forms of life, and the world were created by God out of nothing 特创论者

descendant [di'səndənt] a person or other liveng thing that has another as grandfather or grandmother, great grandfather, etc. 后代

DNA: desoxyribonucleic acid 脱氧核糖核酸

enzyme ['enzaim] a chemical substance produced by certain living cells, which can cause or hasten chemical change in plant or animal witheut itself being changed 酶

extrapolate [ik'stræpəleit] to guess from facts already 推断

fertilization [fə:tilai'zeiən] the act of starting the development of young by sexual or other means 受精

fragment ['frægmənt] a small piece broken off 碎片

genealogy [dʒi:ni'ælədʒi:] the study of the history of the members of a family from the past to the present 家谱

geographic [dʒi'ɔgrəfik] belonging to or characteristic of a particular region 地理的

halt [hɔ:lt] to stop 停止

hypothetical [haipə'θətikəl] supposed to be so; not yet proved to be true or known to have happened 假设的

inevitably [i'nevitəbli] cannot be prevented from happening 必然地,不可避免地

inheritance [in'həritəns] the act of receiving (quality of mind or body) from one's parents, grandmother or grandfather, etc. 遗传

intact [in'tækt] whole because no part has been touched or spoit 完整的,未受损的

intragroup [intrə'gru:p] within group 组中

mitrochondrial [maitə'kəndriəl] 线粒体的

mitrochondria [maitə'kəndriə] pl. 线粒体

mutation [mju:'teiʃən] the action of change in the cells of a living thing producing a new quality in the material or parts of the body 变异，变种

protein ['prəuti:n] any of many substances (present in such foods as meat and eggs) that help to build up the body and keep it healthy 蛋白质

propogation [prɔpə'geiʃən] the act of living things to increase in number by producing young 繁殖

reshuffle [ri:'ʃʌfəl] to move to different positions again 重新改组

sperm [spə:m] a cell produced by the sex of a male animal, which swims in a liquid and is able to unite with the female egg to produce new life 精子

survive [sə'vaiv] to continue to live 生存下去

Comprehension Exereise: 理解练习:

1. Who was an ancestor of everyone on the earth according to the research of the biologists?
2. How did the biologists reach this conclusion?
3. How is mtDNA inherited? Why is mtDNA called a good molecule?
4. How did the biologists calculate when Eve lived?
5. Why were the biologists able to determine where Eve lived?

Notes：　注释：

1. "NATURE"　　美国出版的《自然》杂志.
2. to the probable delight of creationists = perhaps it makes creationists pleased
3. Eve　　夏娃，亚当(Adam)之妻，《圣经》中所说的世界最初的女人.
4. in no sense = in no way　　决不
5. gave rise to = led to　　引起
6. To calculate how much time has elapsed since the mutations that gave rise to today's variations begam，…　　是目的状语，其中 that gave rise to today's variations　　是定语从句，修饰 mutations
7. to agree with = to be in accordance with.　　与…相符合

Translation：　译文：

人类的祖母

如果把所有人的家谱都无限地往回追朔上去，最终就会集中到几个古代人身上，他们就是我们所有人的祖先。最近，生物学家在给《自然》杂志的一份报告中指出，今天地球上所有人的祖先是一个妇女，她生活在 140,000 至 280,000 年以前的非洲。很自然地，也为了使特创论者们高兴，科学家们称她为"夏娃"。

他们指出，不象《圣经》里的夏娃，假设的夏娃并不是所有人祖先的母亲。和她同时代的其他妇女也生儿育女，她们的后代也生活在今天，但是夏娃是唯一出现在所有家谱中的人。生

物学家是通过研究线粒体脱氧核糖核酸 mtDNA 得出这个结论的。

大多数在人细胞中的 DNA 是在细胞核中，是以染色体的形式出现的。由于染色体是从父母双方遗传下来的，因此细胞核 DNA 就随着每一代重新组合，这就使遗传分支不那么清楚了。但在细胞核外也有 DNA，它是在线粒体中，每个细胞的这种结构是用以产生细胞所需要的能量。由于精子的线粒体在受精过程被破坏，因此 mtDNA 只通过母亲遗传下来，而一代又一代唯一使它改变的是突变。事实证明突变是以一个稳定的已知的速度进行着，要想计算出导致今天的变种的突变是什么时候开始的，科学家只需判定发生了多大的变化就可以了。

为了测定到底发生了多大的变化，一些生物学家对代表五大地理区域的 147 个人的 mtDNA 进行了检验，取了样品。科学家把样品和在特定点割断 DNA 丝的蛋白质、酶混在一起来分析样品。科学家在比较了所得到的断片后，用计算机分析 mtDNA 样品之间的差别，并建了一个家谱。这些样品之间的差别非常微小，因此我们可假设有一个原始的 mtDNA 存在于什么时候，也就是夏娃生活在什么时候。

mtDNA 是母亲遗传和只有夏娃的 mtDNA 保留下来的事实说明她是同时代妇女中唯一一个在每辈后代中都有女姓的人。而与夏娃同代的其他妇女，她们的后代或者没有孩子或者只有男孩，这样就中断了她们的 mtDNA 的繁殖。

通过对 147 人所在地理区域的研究，生物学家甚至能推断出夏娃生活在何处。从亚撒哈拉非洲人后代身上取的样品之间的差别最大，这表明他们的 mtDNA 变化的时间最长，这也说明了他们的祖先起源最早。这个发现再加上家族系的结构表明了人类起源于亚撒哈拉，这个结论与当代考古学和人

类学的理论是一致的。

研究者们也承认有一些不能确定的事情，比如突变的速率和它是否是常量。但是他们说："这些证据表明 mtDNA 是一个很有用的分子，用它可以找出人之间的关系，而且它还能把分子生物学与人类学结合起来，因为有时化石把人引入岐途。我们正努力研究以便更好地解释人类是如何进化的。"

2 The Universe in Depth

The image shown here, which resembles nothing so much as a blackboard spattered with paint, is in fact one of the deepest views of the universe ever obtained. It encompasses a patch of sky barely 1% the size of the full moon. Yet virtually every point of light in it is a galaxy. Moreover the faintest galaxies are 27th magnitude[1]—about a billion times fainter than can be seen with the naked eye—and are more than 10 billion light-years away.

This particular view is one of a series of 12 such images produced over the past 3 years by J. Anthony Tyson of Bell Laboratories and Patrick Seitzer of the National Optical Astronomy Observatories. Tyson discussed it in some detail at a recent workshop on galaxies.

To minimize the number of foreground stars, he explained, he and Seitzer pointed the telescope at the South Galactic Pole, which lies in the southern constellation of Sculptor; their line of sight was thus perpendicular to the plane of the Milky Way. To maximize the depth of the search, they exposed the image for a total of 6 hours, using a very sensitive charge-coupled device[2] (CCD) detector to collect the light. And to get color information they repeated the process using filters for three different wavelength bands.

The resulting image is remarkable for several reasons, not the least of which[3] is the sheer number of galaxies it contains. "If you look at the faintest galaxies you can see that the sky is filling

in[4]," explained Tyson. In this image the coverage is already approaching 30%; moreover, the coverage will only increase as longer exposures probe even deeper. But a sky coverage that approaches 100% is a recipe disaster[5], as first pointed out by Johannes Kepler in 1610: if stars (or galaxies) were scattered at random in an infinite universe, then an observer's line of sight would eventually intersect a star no matter where he looked. The night sky would be as bright as the surface of the sun. (This argument was rediscovered in 1823 by the German astronomer Heinrich Olbers; it is now known as Olbers' paradox.)

Obviously, said Tyson, the night sky is a good deal darker than the sun. And the reason is that we do not live in an infinite universe—at least, not of the kind envisioned by Kepler and Olbers. In the real universe we not only look outward in space but backward in time, toward the Big Bang[6]. Beyond a certain point, the galaxies have to thin out[7] because they are still in the process of forming. The significance of the image shown here is that magnitude 27 may be very close to that point.

To see why, said Tyson, consider that the light from all the galaxies in the universe blends into a diffuse background light on the sky, in much the same way that the sound of individual raindrops blends into the diffuse sound of a rainstorm. Astronomers have even been able to set upper limits on that background: it is roughly equivalent to the light of a single tenth magnitude star spread over a square degree of sky. And yet the integrated light of all the galaxies in the 27th magnitude image is already some 70% to 80% of that limit. "In a sense, we've almost gotten to Olbers' paradox already." said Tyson.

Another intriguing hint comes from looking at the very faintest galaxies in the image: on the average one might expect them to be quite a bit smaller than the not-so-faint galaxies, said Tyson, since they are presumably farther away. But in fact they are not much smaller. Moreover, this is a real effect, since the galaxy images are several times bigger than the blurring caused by atmospheric turbulence. "What this tells us is that we really are in a non-Euclidean universe[8]," explained Tyson. Beyond a certain point, it turns out that Einsteinian curvature actually causes images to get larger with distance. The 27th magnitude galaxies seem to be near that point.

Still another intriguing feature of the 27th magnitude image is the color of the faint galaxies, said Tyson: they are very, very blue compared to the brighter galaxies, despite the fact that they are presumably further away and have a larger redshift. "Since the effect is competing with redshift," he said, "these galaxies must have an enormous ultraviolet enhancement." This suggests in turn that the galaxies are producing hot, massive young stars at a very high rate — exactly as one would expect in galaxies that are themselves quite young.

"If you take the number counts and colors, and fold them in with models of galactic evolution," said Tyson, "you find that you need to start the galaxies at a redshift of 6 to 10 in order to get the colors we see." That is , the faintest galaxies in this image are roughly 1 billion to 2 billion years old, which in cosmic terms is practically newborn. Tyson is the first to admit that such conclusions need a lot of refinement before they are reliable. Nonetheless, it is clear that with deep images such as this one , as-