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国家地理科学探索丛书

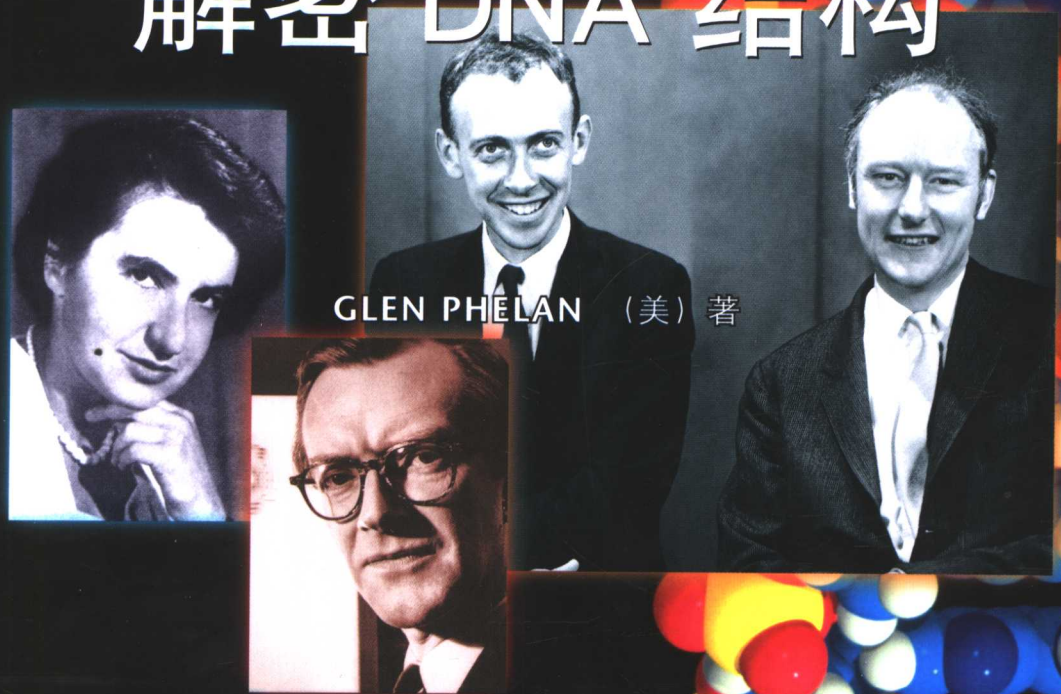
英文注释

SCIENTISTS IN THEIR TIMES

站在时代前沿的科学家

Uncovering the Structure of DNA

解密 DNA 结构



GLEN PHELAN （美）著

外语教学与研究出版社
FOREIGN LANGUAGE TEACHING AND RESEARCH PRESS

京权图字：01－2005－2577

图书在版编目(CIP)数据

解密DNA结构＝Uncovering the Structure of DNA／(美)费伦(Phelan, G.)著. —北京：外语教学与研究出版社，2005.5
(国家地理科学探索丛书：注释版. 站在时代前沿的科学家)
ISBN 7－5600－4855－2

Ⅰ. 解… Ⅱ. 费… Ⅲ. 英语—语言读物 Ⅳ. H319.4

中国版本图书馆CIP数据核字(2005)第046414号

出 版 人：李朋义
责任编辑：咸珊珊 王霖霖
美术编辑：孙莉明
出版发行：外语教学与研究出版社
社　　址：北京市西三环北路19号(100089)
网　　址：http://www.fltrp.com
印　　刷：北京画中画印刷有限公司
开　　本：740×975 1/16
印　　张：2.5
版　　次：2005年6月第1版 2005年6月第1次印刷
书　　号：ISBN 7－5600－4855－2
定　　价：5.90元

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这套丛书秉承《国家地理》杂志图文并茂的特色，在书中配有大量精彩的图片，文字地道易懂、深入浅出，将科学性和趣味性完美结合，称得上是一套精致的小百科全书。特别值得一提的是本套丛书在提高青少年读者英语阅读能力的同时，还注重培养他们的科学探索精神、动手能力、逻辑思维能力和沟通能力。

本套丛书既适合学生自学，又可用于课堂教学。丛书各个系列均配有一本教师用书，内容包括背景知识介绍、技能训练提示、评估测试、多项选择题及答案等详尽的教学指导，是对课堂教学的极好补充。

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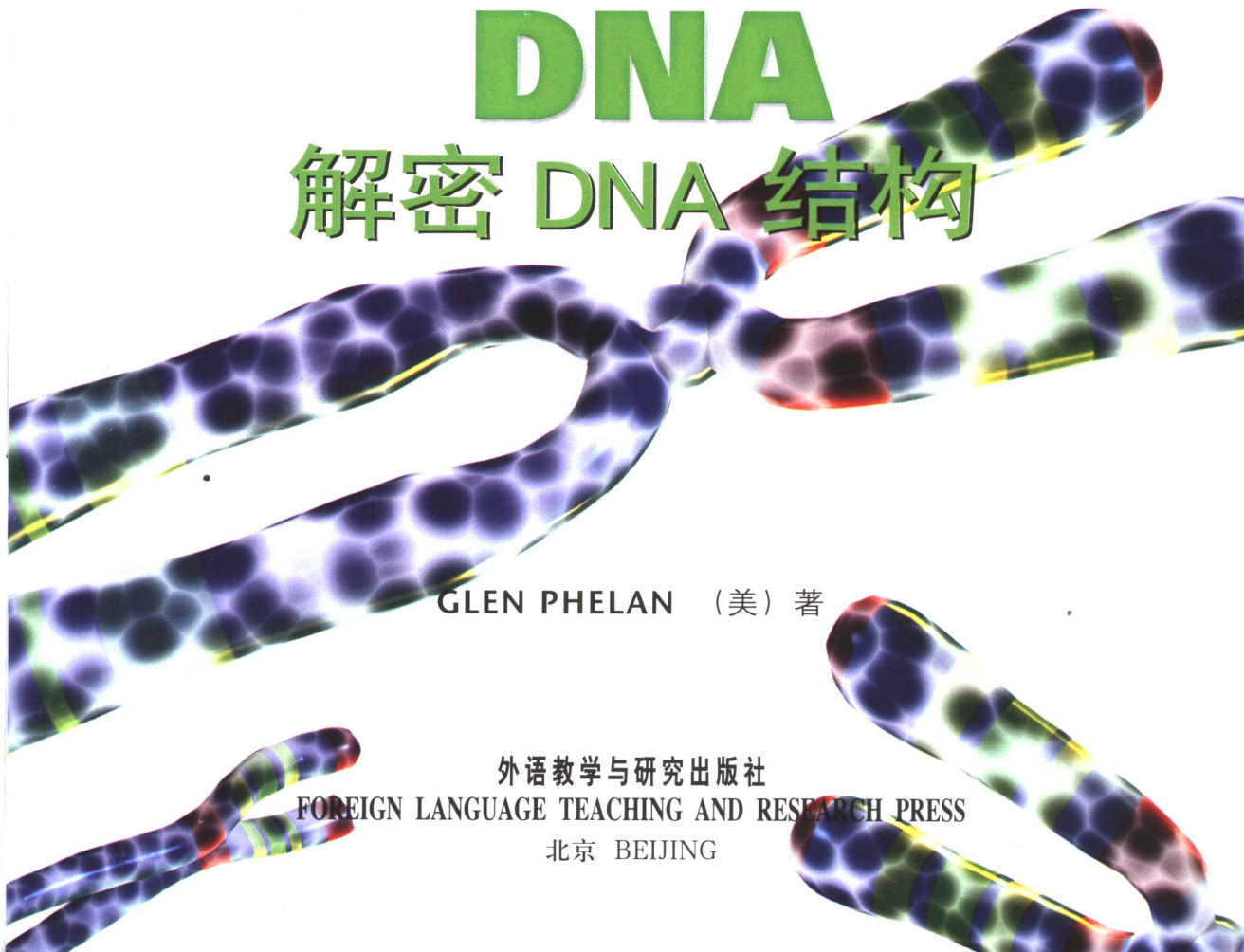

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北京 BEIJING

The science of heredity started with a curious gardener in a pea patch.

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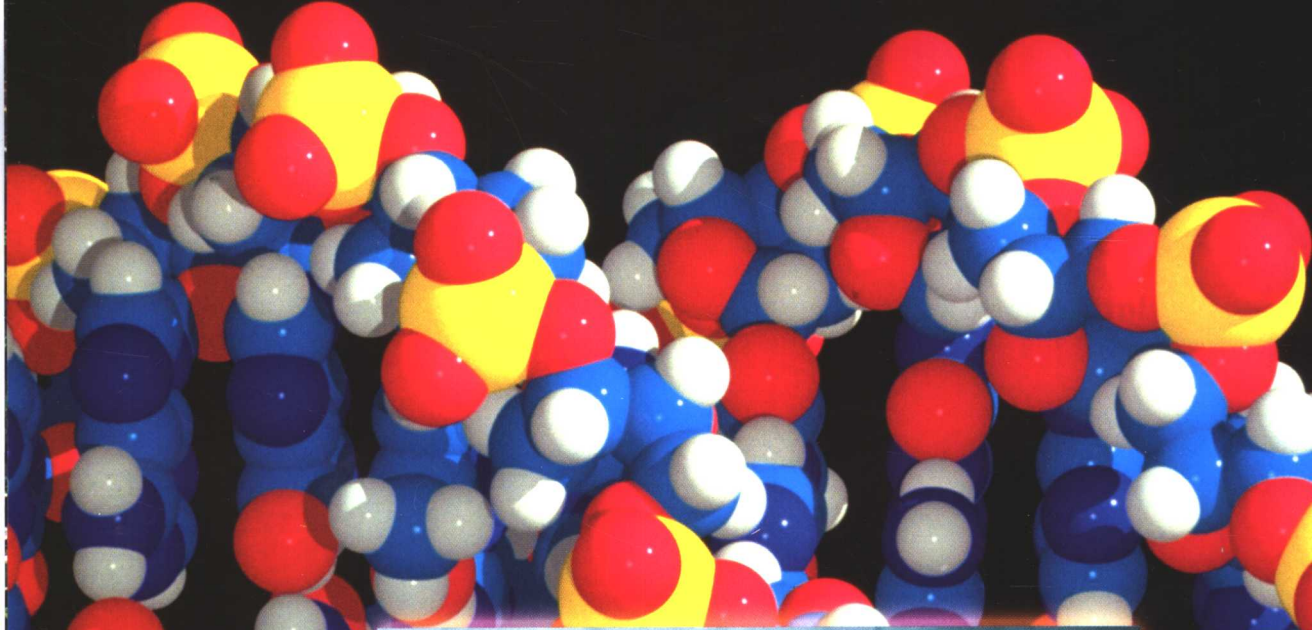
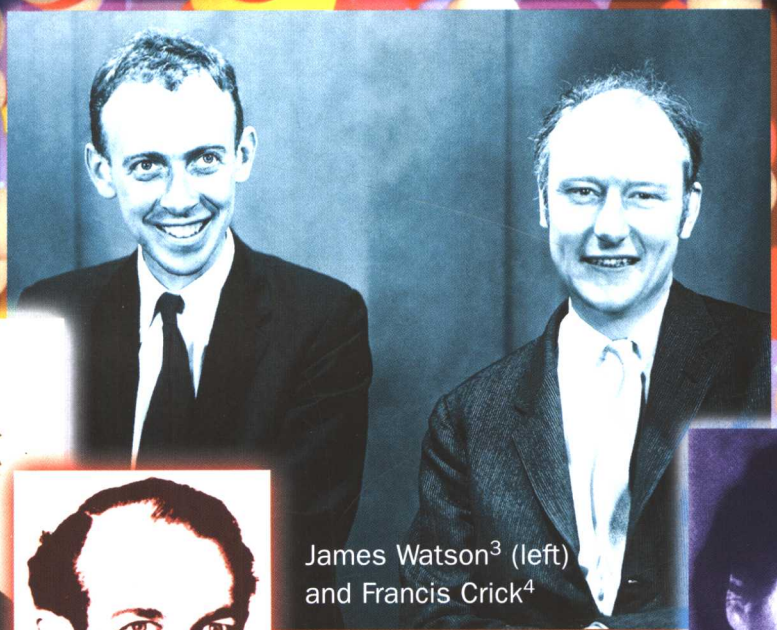
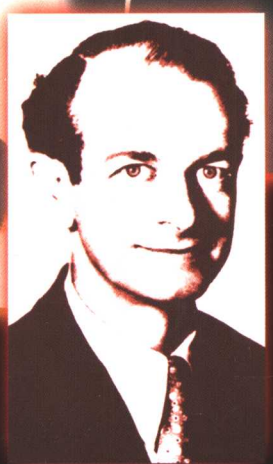




James Watson[3] (left) and Francis Crick[4]

Gregor Mendel[1]



Linus Pauling[2]

Rosalind Franklin[5]

1. Gregor Mendel 格雷戈尔·孟德尔（奥地利遗传学家）
2. Linus Pauling 莱纳斯·泡令（美国化学家）
3. James Watson 詹姆斯·沃森（美国生物学家）
4. Francis Crick 费朗西斯·克里克（英国生物物理学家）
5. Rosalind Franklin 罗莎琳德·富兰克林（英国科学家）

Introduction
引言

On February 28, 1953, Francis Crick walked into a pub[1] in Cambridge, England, and made a startling[2] announcement[3]. He and his colleague[4], James Watson, had just discovered "the secret of life." He wasn't kidding[5]! Earlier that day, Crick and Watson had figured out[6] the structure of a mysterious[7] substance[8] called DNA.

What is DNA? It's the substance in your cells[9] that carries information about all of your inherited characteristics[10], or traits[11]. Half of your DNA comes from your mother. The other half comes from your father. In fact, every living thing—from a pig to a potato plant—has its own DNA that passes from parent to offspring[12].

Today scientists study DNA to find cures[13] for diseases, to develop new sources[14] of food, and even to identify[15] criminals[16]. Yet 50 years ago, most people had never even heard of DNA.

In the 1950s, the work of many scientists was beginning to come together. Then Watson and Crick discovered the structure of DNA. It was a huge breakthrough[17]. Why? Until scientists understood the structure of DNA, they couldn't really tell how genetic[18] information was passed on.

Let's begin our story by taking a closer look at those exciting years of the early 1950s. What was going on in Watson and Crick's world when their discovery was taking shape?

Maurice Wilkins[19]

1. pub	*n.*	酒吧
2. startling	*adj.*	惊人的
3. announcement	*n.*	宣布
4. colleague	*n.*	同事
5. kid	*v.*	开玩笑
6. figure out		演算出
7. mysterious	*adj.*	神秘的
8. substance	*n.*	物质
9. cell	*n.*	细胞
10. inherited characteristic		遗传特性
11. trait	*n.*	特征
12. offspring	*n.*	后代
13. cure	*n.*	疗法
14. source	*n.*	来源
15. identify	*v.*	识别；鉴定
16. criminal	*n.*	罪犯
17. breakthrough	*n.*	重大成就
18. genetic	*adj.*	基因的
19. Maurice Wilkins		莫里斯·威尔金斯（生于新西兰的英国生物物理学家）

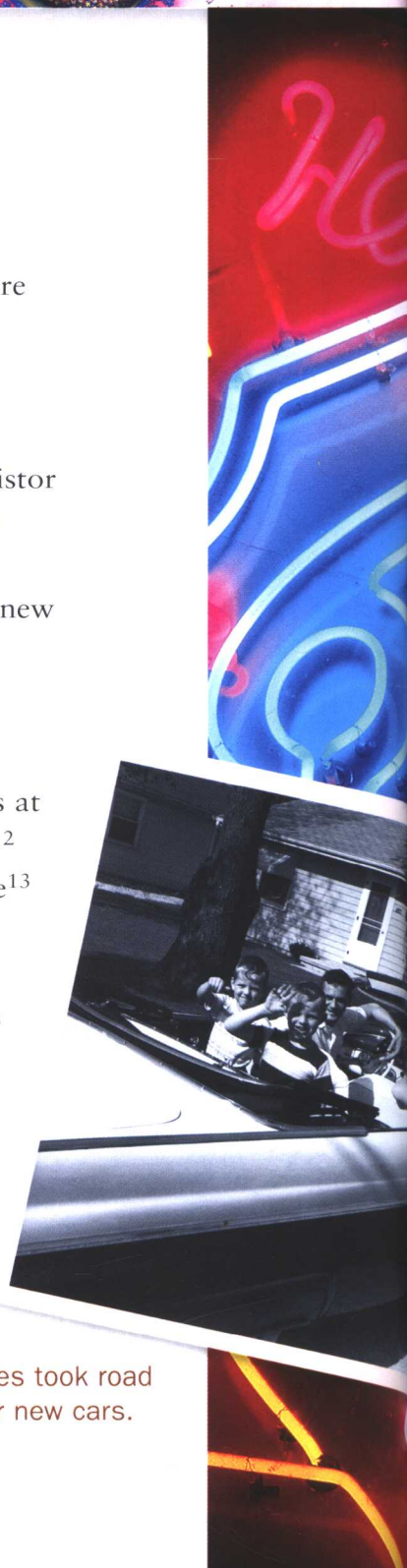
Life in the 1950s

The 1950s were a time of booms[1]—baby booms, buying booms, building booms, and booms in technology. What brought all of this about? The hard times of the Great Depression[2] and World War II were over. More people were going to college and getting good jobs. They were moving into new homes in the suburbs[3] and raising large families.

People wanted to have fun—and there were plenty of products[4] to please them. Buyers gobbled up[5] small transistor radios[6], TVs, and big, new cars. But life in the 1950s was more than just gadgets[7] and gizmos[8]. Breakthroughs were being made in the life sciences. Scientists were developing new medicines to fight diseases such as influenza[9] (the flu) and polio[10]. And many physicists and chemists were getting interested in the life sciences, especially genetics.

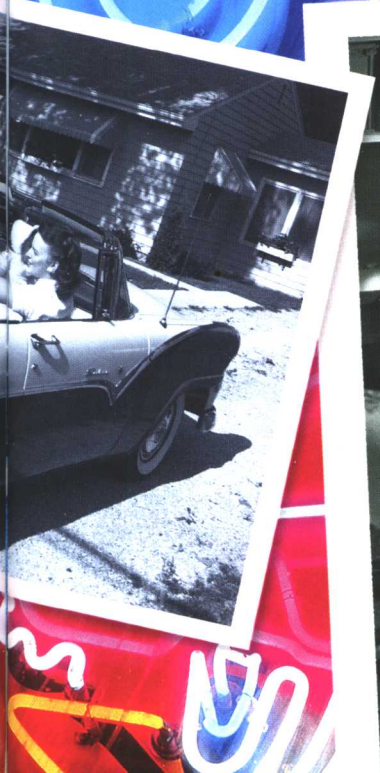
Many of these scientists didn't know much about genetics at first. But they did know the story of an Austrian[11] monk[12] named Gregor Mendel. So let's leave the hustle and bustle[13] of the 20th century for a moment and jump back about 100 years. The scene[14] is a pleasant Austrian town. Up ahead is an old garden wall. On the other side, a monk is busy tending[15] plants.

1. boom	*n.*	繁荣；迅速发展	9. influenza	*n.*	流行性感冒
2. Great Depression		大萧条	10. polio	*n.*	小儿麻痹症
3. suburb	*n.*	郊区	11. Austrian	*adj.*	奥地利的
4. product	*n.*	产品	12. monk	*n.*	修道士
5. gobble up		抢购	13. hustle and bustle		熙熙攘攘，忙乱
6. transistor radio		晶体管收音机	14. scene	*n.*	（戏剧、故事等的）发生地点
7. gadget	*n.*	小巧的机械			
8. gizmo	*n.*	小玩意儿	15. tend	*v.*	照料

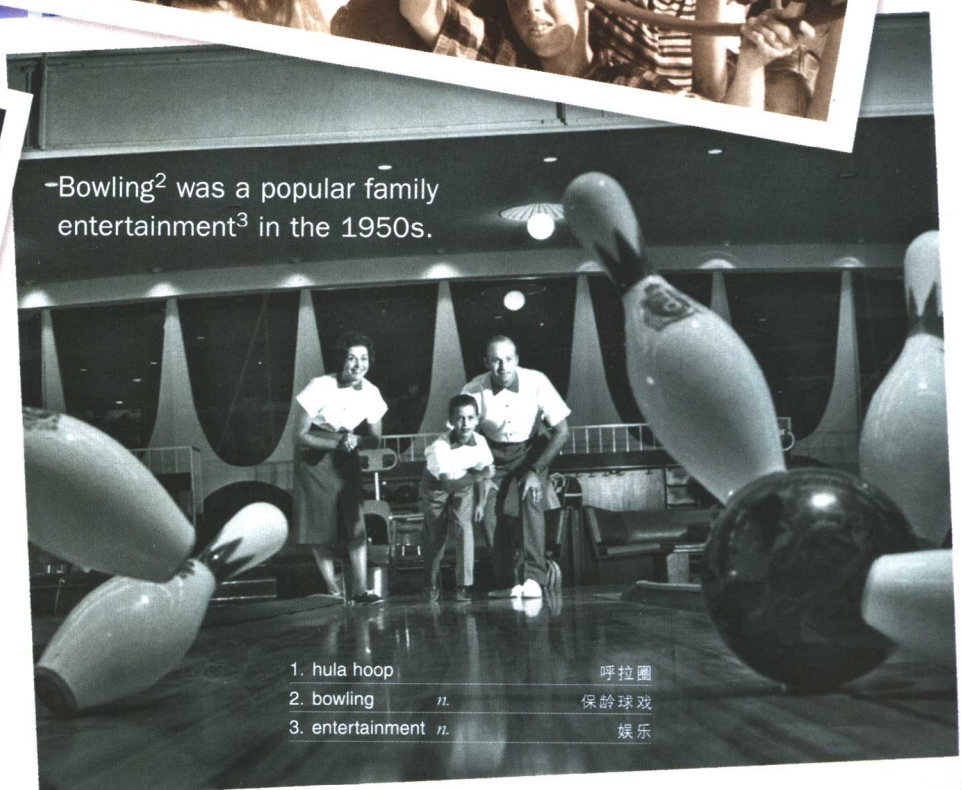


Many families took road trips in their new cars.

Kids everywhere had hula hoops[1] in the 1950s.



Bowling[2] was a popular family entertainment[3] in the 1950s.



1. hula hoop 呼拉圈
2. bowling *n.* 保龄球戏
3. entertainment *n.* 娱乐

Chapter 1 第一章

Science in a Pea Patch
豆苗圃里的科学

On this beautiful spring day in 1856, Gregor Mendel is starting an experiment. It will be unlike any other experiment. It will take several years, and Mendel's not sure he can do it. But he wants to find answers to his questions. So he bends[1] over and plants his seeds[2]. He has no idea that his work in the garden will lead to a whole new field of study.

In the garden of this monastery[3] in Brno[4], in what is now the Czech Republic[5], Mendel experimented on pea plants.

1. bend v. 俯身
2. seed n. 种子
3. monastery n. 寺院
4. Brno 布尔诺
5. Czech Republic 捷克共和国

Growing Up to Teach

Gregor Mendel knew a lot about growing things. As a boy, he helped his father take care of the gardens that fed the family. He loved making things grow.

When Mendel was old enough, he joined the monastery in his town to become a monk. The monks worked as teachers. Mendel himself had not gone to school regularly[1] as a boy. So, as a young adult[2], he was not prepared to take the exams to become a teacher. In fact, he failed the tests two times. But the abbot[3], or leader of the monastery, knew that Mendel was bright. So the abbot sent him to college to learn math and science. Soon Mendel became a teacher.

Garden Experiments

Mendel liked teaching. But mostly he loved taking care of the gardens in the monastery. He was very curious about what he saw growing there. For example, he wondered why some pea plants had green seeds and some had yellow seeds. Some pea plants had flowers only at the top, and some had flowers only along the sides. Yet these were all the same kinds of plants. Why did they look so different and have such different traits? Mendel simply had to find out.

Mendel set aside a plot[4] of land in the monastery gardens. For the next seven years, he grew pea plants and observed[5] them carefully. He crossbred[6] some plants. That's a process[7] of taking the pollen[8] from one plant and using it to fertilize[9] another plant. Mendel kept careful records. And before long, he began to recognize[10] some patterns[11].

Mendel at work in his garden

1. regularly	*adv.*	定时地	7. process	*n.*	过程
2. adult	*n.*	成年人	8. pollen	*n.*	花粉
3. abbot	*n.*	男修道院院长	9. fertilize	*v.*	使受精
4. plot	*n.*	小块土地	10. recognize	*v.*	认出；识别
5. observe	*v.*	观察	11. pattern	*n.*	模式
6. crossbreed	*v.*	（使）杂交繁育			

Curious Patterns

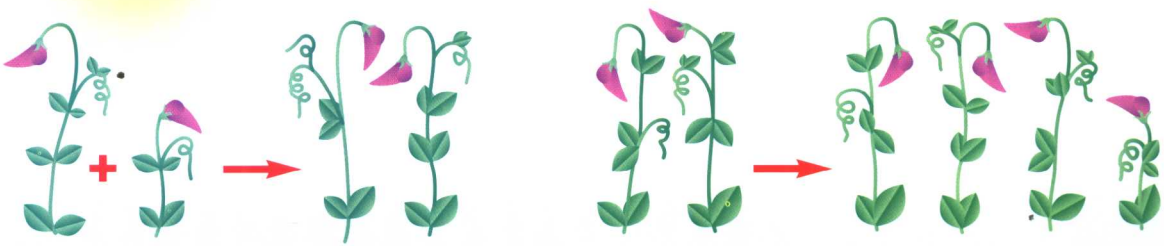
In one experiment, Mendel crossbred a tall pea plant with a short pea plant. The resulting[1] seeds all grew into tall pea plants. What had happened to the trait of shortness? Mendel thought it must be hidden there in the plants. When he planted the seeds from these tall plants, he got another surprise. About three-fourths of the plants were tall, and one-fourth were short. The shortness trait had reappeared[2]!

Mendel also experimented with several other traits. Each time he found the same pattern. What did this all mean?

He thought that each trait was controlled by tiny "factors[3]." (Today, we call Mendel's factors genes[4].) One factor for a trait comes from the male[5] parent, and the other factor comes from the female[6] parent.

Mendel also thought that some factors were more powerful[7] than others. He called these more powerful factors dominant[8] and the less powerful ones recessive[9]. A recessive factor produced its trait only if it paired up with another recessive factor. Mendel's experiments showed that tallness in pea plants is dominant, and shortness is recessive.

1. resulting	*adj.*	从而产生的	6. female	*adj.*	雌性的
2. reappear	*v.*	再出现	7. powerful	*adj.*	效力大的
3. factor	*n.*	因素	8. dominant	*adj.*	显性的
4. gene	*n.*	基因	9. recessive	*adj.*	隐性的
5. male	*adj.*	雄性的			



A tall plant is crossbred with a short plant.

All the seeds grow into tall plants.

In the next generation, seeds from the same tall plants. . .

. . .grow into one short plant for every three tall plants.

Forgotten Ideas

Gregor Mendel's work was unique[1]. No one else had ever taken the time and the care to study living things in this way. (Imagine doing a school science project[2] that lasts for seven years!)

Other scientists at the time did not appreciate[3] Mendel's work. When he read a report about his results at a scientific meeting, there was silence. No questions. No comments[4]. No congratulations[5]. He was practically[6] ignored[7]. His report was published, but no one paid much attention. His ideas seemed too simple. Also, since he lived in a monastery, Mendel was isolated[8], off in a world of his own. There was no exchange[9] of ideas as there was at universities, where most scientific work was done.

So Mendel's work was forgotten for about 35 years. But other scientists who had never heard of Mendel started similar experiments of their own. In 1900, several scientists came to the same conclusions[10] Mendel had. When they learned about Mendel's work, they gave him credit[11]. They said that their experiments confirmed[12] what he had done. In the 20th century, Gregor Mendel became known as the Father of Genetics.

1. unique	*adj.*	独一无二的
2. project	*n.*	科研项目
3. appreciate	*v.*	重视
4. comment	*n.*	评论
5. congratulation	*n.*	祝贺
6. practically	*adv.*	实际上
7. ignore	*v.*	忽视
8. isolated	*adj.*	与世隔绝的
9. exchange	*n.*	交流
10. conclusion	*n.*	结论
11. credit	*n.*	赞扬，荣誉
12. confirm	*v.*	进一步确定
13. Dutch	*adj.*	荷兰的
14. botanist	*n.*	植物学家
15. Hugo de Vries		雨果·德弗里斯（荷兰植物学家）

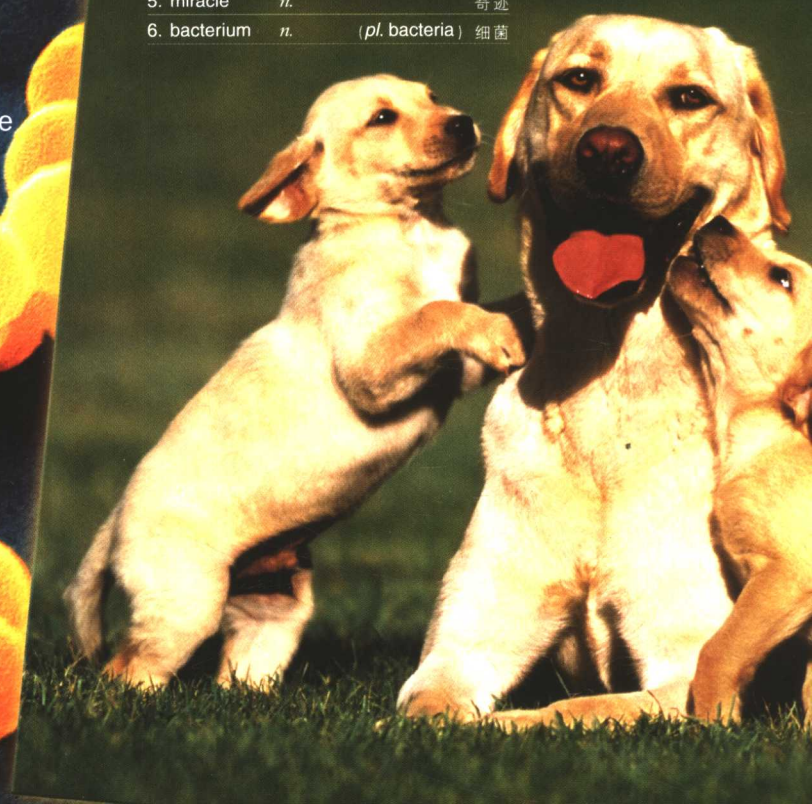
In the late 1800s, Dutch[13] botanist[14] Hugo de Vries[15] did experiments similar to Mendel's.

Chapter 2 第二章

On the Trail of DNA
追寻DNA

If you had lived in the early 1900s, you would have seen amazing[1] things—such as the first airplanes and cars! Progress was being made in the life sciences, too. Scientists were finding the causes of deadly diseases, such as scarlet fever[2] and the measles[3]. The medicines to prevent these diseases were hailed[4] as miracles[5].

1. amazing	*adj.*	令人吃惊的
2. scarlet fever		猩红热
3. measles	*n.*	麻疹
4. hail	*v.*	欢呼认可
5. miracle	*n.*	奇迹
6. bacterium	*n.*	(*pl.* bacteria) 细菌



Scientists were beginning to understand that illnesses like scarlet fever were caused by the bacteria[6] shown here.

What Is a Gene?

While some scientists were probing[1] the mysteries of disease, others were looking into the mysteries of DNA and heredity[2].

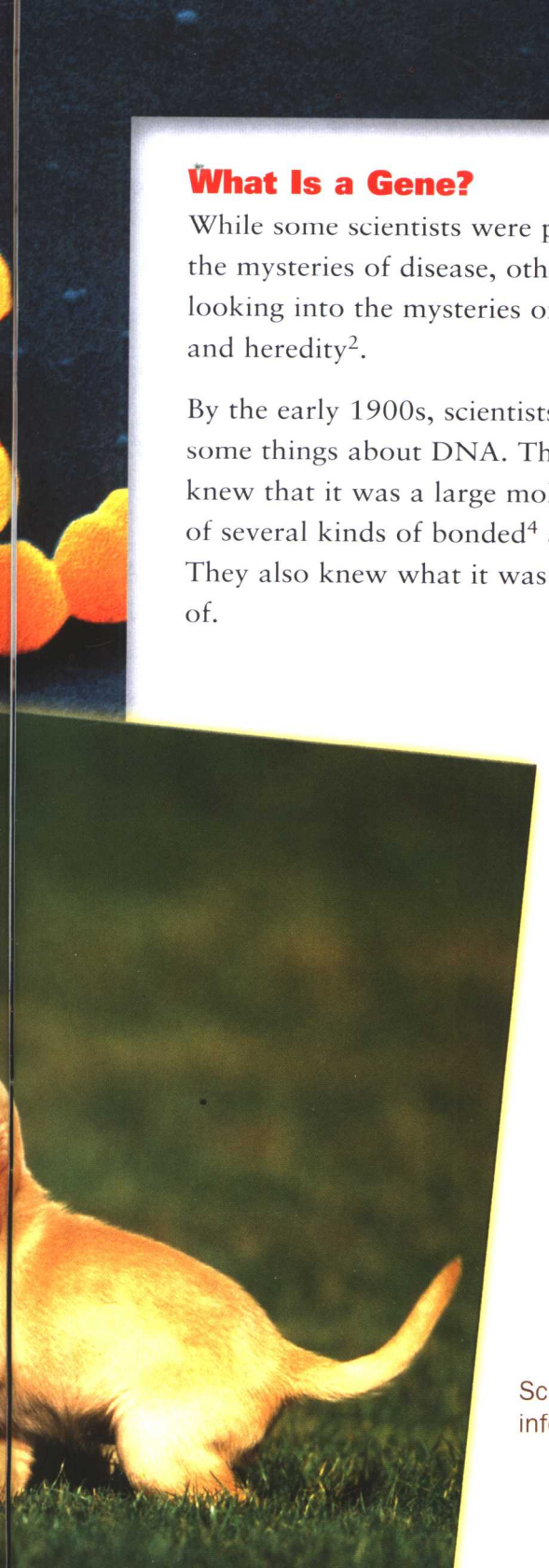
By the early 1900s, scientists knew some things about DNA. They knew that it was a large molecule[3] of several kinds of bonded[4] atoms. They also knew what it was made of.

By the late 1900s, they knew that it was located[5] in the chromosomes[6], long strands[7] in the nucleus[8] of each cell.

That was an important piece of information because scientists knew that chromosomes were involved[9] with heredity. The chromosomes carried genes (Mendel's "factors"). The genes passed from parents to offspring and carried all the information for how that living thing grows.

Could DNA be the special material[10] that makes up genes? Some scientists thought so, but others disagreed.

1. probe	*v.*	探索
2. heredity	*n.*	遗传性
3. molecule	*n.*	分子
4. bonded	*adj.*	黏合的
5. locate	*v.*	使……坐落于
6. chromosome	*n.*	染色体
7. strand	*n.*	串；丝状体
8. nucleus	*n.*	细胞核
9. involve	*v.*	与……直接有关
10. material	*n.*	原料



Scientists knew that genes passed information from parent to offspring.

Is a Gene Made of DNA?

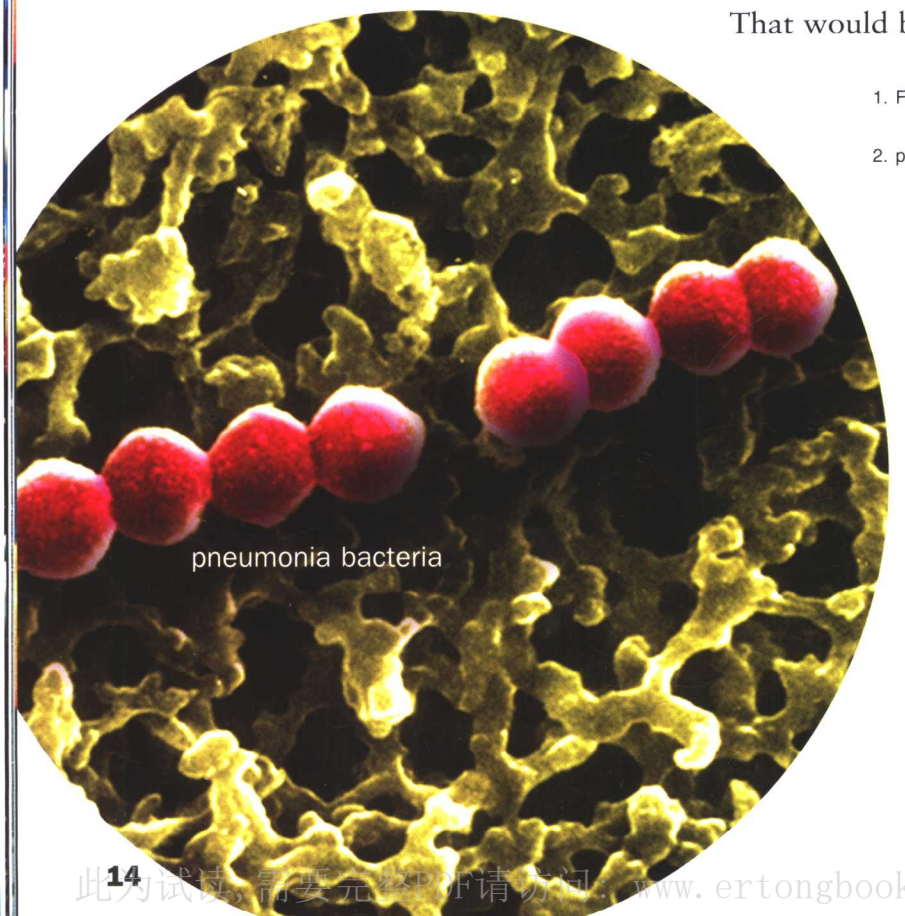
In 1928, British scientist Frederick Griffith[1] came one step closer to finding out that genes are made of DNA. But he didn't mean to.

Griffith was trying to find out how bacteria cause pneumonia[2]. Instead, he found out that one kind of bacterium can pass its genetic material to another kind of bacterium. What was this genetic material?

It wasn't until 1944 that a group of scientists answered that question. They ran experiments that proved that DNA is that genetic material.

At last, scientists had discovered that genes are made of DNA. But a question remained. How does DNA carry information from parent to offspring? Scientists were sure the answer lay in the structure of DNA. They wanted to figure out what DNA looks like—how it's put together—so they could figure out how it works. That would be the secret of life!

1. Frederick Griffith 弗雷德里克·格里菲思（英国科学家）
2. pneumonia *n.* 肺炎



pneumonia bacteria