

外教社——麦克米伦中学双语教材系列

# 生物

BIOLOGY 1A

学生用书

Student's Edition

Sarah Rigby (吴珊丽)

李富种 (Eric Lee Fu Chung)



上海外语教育出版社



SHANGHAI FOREIGN LANGUAGE EDUCATION PRESS



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双语教育以外语作为学科的教学语言,直接进行学科知识的教学。这种新的教学尝试引起了教育主管部门、教育工作者、外语专家以及成千上万学子和家长的关注。随着对外开放的不断深入以及成功加入WTO,我国在经济、科技、教育等领域全面步入国际舞台,在更大范围内和更深层次上参与国际竞争,这对我们人才培养的规模和规格提出了崭新的要求。为了培养能够熟练运用外语吸收先进科技知识、参与国际交流的人才,基础教育的改革势在必行。双语教育对教师、学生、教育研究人员以及教育服务机构都是一种新的挑战。这种新的教学方法要取得成功,需要大胆而又科学的摸索与实践,也需要教师、学生、教育研究人员和教育服务机构各方的协同努力。

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2. 教学内容丰富,编写体系完整,例证贴近生活,注重跨学科教育。
3. 版式活泼,插图精美,表格详细,各种知识的表现更加直观易懂,从而提高学生兴趣,增强教学效果。
4. 注意现代化教学手段的运用。页边空白处列出与授课内容相关的网址,为学生了解更多相关知识提供了有益的参考。

尽管本套教材可能在编写体系、知识结构、学科内容等方面与大陆地区传统学科教学稍有不同之处,我们相信其纯正地道的英语、丰富的课程资源以及全新的教学理念会对大陆地区的双语教育产生良好的推动作用。

本套教材可供有较好英语基础的双语学校、国际学校、外国语学校以及重点中学进行双语教学使用。

本教材承蒙上海外国语大学双语学校的李秀萍、胡敏老师仔细审读,在此表示衷心的感谢。同时也欢迎使用本套教材的师生向我们提出宝贵意见。

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# Preface

*Biology – A Process Approach* was first published in 1993 and since then we have been lucky enough to receive a number of comments and suggestions from those Biology teachers using the course. It is these invaluable comments and suggestions that have formed the backbone of changes and which hopefully have resulted in a Second Edition that is even more in tune with the expectations and requirements of both teachers and students.

As we worked on the Second Edition, we took a careful look at the contents and approach of every chapter and reviewed the ‘usefulness’ of every feature of the book. The Second Edition is just as direct and informative in style and, if anything, is more concise as any parts of the book that fell outside the syllabus have been removed or clearly delineated in the section called ‘Understanding more’. Many of the illustrations have been redrawn and relabelled, and the photographs have been more extensively labelled to aid comprehension.

The exercises have been enriched to include both recall and higher level processing types. We have also introduced a section called ‘Misconception analysis’ where students can do a self-check to ensure that they do not hold any wrong concepts.

To show students that Biology really is relevant to everyday life, we have also included even more of the social, environmental and technological aspects of Biology. These are covered in the ‘Understanding more’ sections, in the ‘Talking point’ sections and also in the questions.

In short, we think we have managed to build on all the welcomed features of the First Edition to create a truly improved Second Edition. We would like to thank all those teachers who were kind enough to contribute and look forward to receiving any further comments.

Sarah Rigby  
Eric Lee Fu Chung



## Summary of the important features of this course

### Simple text

- The writing style is direct and informative.
- Text is kept to an absolute minimum and is often presented in clear, numbered points. Paragraphs are short.
- Important words appear in bold.
- Chinese translations are provided where necessary.
- Photographs appear next to relevant diagrams to aid understanding and encourage interest.

### Process diagrams

- Process diagrams explain in a step-by-step way the important processes encountered in Biology.
- They aid learning by avoiding convoluted and wordy explanations.
- They show students what is happening and where.

### Experiments

- All experiments recommended by the CDC and HKCEE Syllabuses are included.
- Experiments are accompanied by detailed step-by-step illustrations.
- The experiments include questions and, in addition, students are encouraged to design control experiments.

### Prevention of misconceptions

- Each chapter contains a set of multiple-choice questions that test for common misconceptions and mistakes. This 'Misconception analysis' allows students to identify their misconceptions early in the learning process and provides a sound foundation for future learning.
- Most chapters also contain an exercise that asks students to identify sentences that contain misconceptions and rewrite them accurately.

### Everyday Biology

- Students' interest in Biology is aroused by a feature called 'Talking point'. These focus on everyday issues and encourage students to think about the everyday relevance of Biology. This feature also prompts students to apply what they have learnt to new situations.
- Every chapter begins with a small cartoon of everyday life that encourages students to think about what they might already know about a subject or what they can expect to learn.

### Skill Building

- At various points throughout the text, 'Skill Pages' identify skills that may need further reinforcement, for example, drawing diagrams, drawing graphs, analysing a genetics problem, and exam skills.
- 'Important words to learn and spell' are listed at the back of each chapter. Poor spelling is a common weakness and this feature ensures that students address the problem as they learn.
- Word building helps students to learn difficult words by explaining how words are constructed. This feature is introduced in the margin next to the word and will help spelling and also give clues to the meaning of new, unknown terms.

### Extension

- 'Understanding more' introduces extension material. The extension material is designed to help students *understand* more about a topic and does not burden them with excessive new structures and terms.

### Glossary

- The glossary contains all the words in the 'Important words to learn and spell' together with a definition and a Chinese translation. It also contains a range of biological terms that students will encounter both in this textbook and in their wider reading.



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# An introduction to Biology



## biology

**bio** – life, **logy** – knowledge: a knowledge of life

## 1.1 What is Biology?

Biology is the study of living things. In Biology, we investigate:

- 1 the structure of living things
- 2 the way living things work
- 3 how living things interact (相互作用)

The diversity (多样性) of living things is huge (see Fig 1.1). Biology is therefore a complex subject. It is necessary to divide the subject into many specialized areas. The most basic division is between the study of plants (**botany**, 植物学) and the study of animals (**zoology**, 动物学).

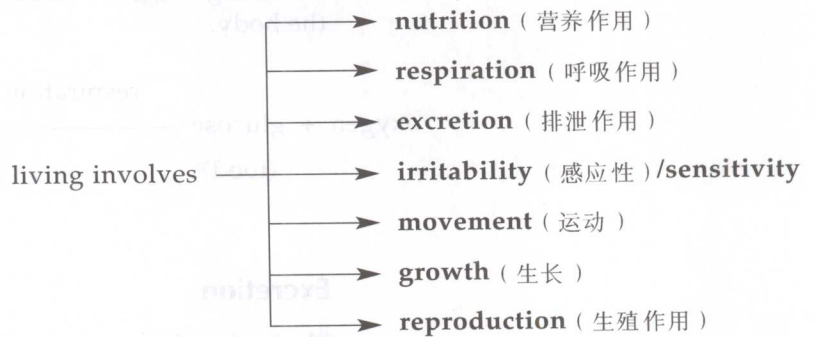


**Fig 1.1** The species in rainforests are particularly diverse. We should stop destroying the rainforests to protect this diversity of species.



## 1.2 How do we define living things?

All living things have seven **characteristics** (特征).



### Nutrition

All living things need energy to:

- 1 grow, and replace worn-out structures
- 2 reproduce
- 3 maintain (维持) the functions of the body
- 4 respond to **stimuli** (刺激)

To get energy, organisms need **nutrients** (营养素) from food (see Fig 1.2). Plants use energy from the sun to make food. They are then consumed by animals. Plants are called **producers** (生产者). Animals are called **consumers** (消费者).

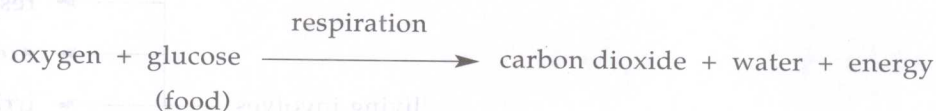


**Fig 1.2** This panda is getting nutrients by eating bamboo.



## Respiration

The energy in food is released by respiration. Respiration takes place in **cells** (细胞). Oxygen is usually required. Carbon dioxide and water are produced. Respiration should not be confused with breathing (呼吸), which is the process of taking air in and out of the body.



## Excretion

Many chemical reactions take place in the body. These reactions produce waste materials, which are harmful to the organism if they accumulate. An example of waste materials is carbon dioxide produced in respiration. These waste materials are removed in a process called excretion.

## Irritability/Sensitivity

Living things must be able to respond to stimuli, e.g. changes in light or climate. To do this, they have structures that detect (探索) changes, e.g. the eye (see Fig 1.3). Organisms respond to both external stimuli (to do with the outside **environment** (环境)) and internal stimuli, e.g. feeling hungry.



**Fig 1.3** A Dragonfly's (蜻蜓) eye has 27,000 units in it – the dragonfly can detect the environment very well.

## Movement

Responses to stimuli often involve movement. For example, **leaves** (叶) moving towards light, animals running after food. It is often thought that plants don't move; however, they respond to light (see Fig 1.4).



**Fig 1.4** Plants can detect the direction of light and move towards it.