



普通高等教育“十二五”规划教材  
科学教育专业系列教材

# 大学科学双语教材

BILINGUAL TEXTBOOK  
OF SCIENCE FOR UNIVERSITY

赵惠芳 主编



科学出版社

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赵惠芳 主编

**科 学 出 版 社**

北 京

## 内 容 简 介

本书科学、有趣地介绍了自然科学中最基本的内容和最新的发展前沿, 包含生物学、化学、物理学、地理学、生态学、太空和信息学等内容, 图文并茂。课文主要选自原版教材、专著、文献、托福、雅思和美国之音 (VOA) 最新报道等。本书共有 5 章 (chapter), 每章分 3 部分 (part), 第一部分为一般读物, 第二部分为高级读物, 第三部分为该学科发展前沿的 VOA 最新报道。每部分含若干单元 (unit), 每个单元后都列出专业术语/生疏单词和词组 (New Words and Expressions), 并注有国际音标 (美音) 和双语 (英语和汉语) 解释, 便于读者自学。每章的第二部分后附有练习题 (附录一为其答案), 利于提高学习效率。

本书是大学科学双语通识教材, 可作为高等院校文科、理科和工科大学生的专业必/选修课和公选课教材。也不失为研究生考试、职称考试及托福、雅思等备考人士的良好复习资料。

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# 《大学科学双语教材》

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# 前 言

根据我国大学教育国际化的要求及发展趋势,本科教育应该不仅仅局限在对本专业的强化发展上,同时也要注意大学生的国际视野和整体素质的培养,尤其是与时俱进的科学通识素养的提升。

本人自 2010 年起从事上海师范大学生命与环境科学学院科学教育专业的专业必修课——科学(SCIENCE)双语课的全程教学(本课程是我校 2013 年 6 月至 2015 年 6 月的主干课程建设项目课程)。这几年来,我根据学生使用本教材的反馈意见,不断更新教材,使其丰富多彩,图文并茂,现在得以以日臻完善的《大学科学双语教材》的形式呈现在读者的面前。

这本《大学科学双语教材》的课文主要选自原版教材、专著、论文、雅思(IELTS, international english language testing system)、托福(TOEFL, test of english as a foreign language)和美国之音(VOA, voice of America)的最新报道等,编者略作删改,确保“原汁原味”。

本教材共有 5 章(chapter),依次为第一章生物学(Biology)、第二章化学(Chemistry)、第三章物理学(Physics)、第四章地理和生态学(Geography and Ecology)、第五章太空和信息学(Space and Informatics)。每章分 3 部分(part),第一部分为一般读物(General Reading Materials),第二部分为高级读物(Advanced Reading Materials),第三部分为该学科发展前沿的 VOA 最新报道(News from VOA)。每部分含若干单元(unit),每个单元后都列出专业术语/生疏单词和词组(New Words and Expressions),专业术语/生疏单词注有国际音标(美音),并用双语(英语和汉语)解释,便于读者自学。每章的第二部分后面有练习题(书的最后附有答案,见 Appendix I Answers to the Questions),利于提高自学效率。

本教材能使繁忙不堪的当代知识分子在较短的时间里全面、快速、轻松地掌握自然科学领域的基本专业词汇、科学文章的特点,并了解当今世界自然科学的主要研究热点。它是帮助您系统、与时俱进地提升自己的综合科学素养,提高英语科技论文的阅读、写作、翻译及学术交流能力的良好读本,是协助您走向成功的一块缺则坍塌的敲门砖。

本教材每篇课文的后面,都注明了该篇课文的具体引用出处(包括页码),书的最后附有全书主要参考文献(Appendix II References)。在此,编者一并向所有参考文献的原作者深表谢意!感谢李利珍教授曾就本教材的格式提出良好的建议。感谢龚秀芳副教授对本教材部分选材的良好建议。感谢科学出版社陈露老师及其他编辑老师为本书的出版付出的辛勤劳动。向所有关注本书的读者朋友们致以诚挚的谢意。感谢上海师范大学为本书的出版提供了资金资助!

由于编者水平有限,本教材中的疏漏和不足在所难免,恳请广大读者朋友们和同仁不吝赐教(zhf2366@163.com),以便再版时修缮。

赵惠芳

2015 年 6 月于上海师范大学学思湖畔

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# **Chapter One**

## **Biology**



## Part One

# General Reading Materials

## Unit *1*

### The Fundamental Concepts and Principles of Biology

As you know, biology is the branch of science, it is much more than a collection of facts. Biology studies living things: their structure, function, evolution and interactions with one another and with their nonliving environment. We can identify several fundamental concepts and principles in living organisms.

Living organisms are organized into units called cells. Many small organisms such as bacteria and most protists, consist of one cell each, so we must use a microscope to see them. Large organisms, such as trees and humans, contain up to hundreds of millions of cells. Each cell is a discrete packet of highly ordered living material, biochemistry factory. It takes in nutrients and energy and uses them to maintain itself, to grow, to respond to changes in their environment, and eventually to reproduce, forming two new cells. Hence, cells are the units of structure, function, and reproduction in organisms.

Living organisms metabolize. The essence of metabolism is the result of energy transfers between substances. When organisms take in materials from and give materials back to environment, the materials undergo extensive transformations. In this process, energy is produced to maintain the activity of the living organisms. For example, in a process called photosynthesis, plants absorb solar energy and use it to form compounds such as adenosine triphosphate, or ATP, then the energy of ATP is used to build sugar, starch and other molecules. Hence, energy is transferred from the sun to ATP and then to molecules that the cell uses as building blocks or tucks away as energy reserves.

Living organisms respond actively to their environment. Most animals respond rapidly to environmental changes by making some sort of movement-exploring: fleeing, or even rolling into a ball. Plants respond more slowly but still actively: stems and leaves bend toward light, and roots grow downward. The capacity to respond to environmental stimuli is universal among

living things.

Living organisms reproduce themselves. All living things must die sometimes, and if their kind is to continue, they must make copies of themselves before they die. This is reproduction. It is the process by which plants and animals give rise to offspring and which fundamentally consists of the segregation of a portion of the parental body by a sexual or an asexual process and its subsequent growth and differentiation into a new individual.

Living organisms evolve. Today's organisms have arisen by evolution, the descent and modification of organism from more ancient forms of life. Evolution proceeds in such a way that living organisms and their components are well suited to their ways of life. Fish, earthworms, and frogs are all so constructed that we can predict roughly how they live merely by examining them. The adaptation of organisms to their environments is one result of evolution.

曹仪植, 王子仁, 曹依民, 等. 1998. 生物学专业英语. 兰州: 兰州大学出版社: 1-3.

刘彩云, 赵光强, 常志隆. 2007. 生物学专业英语教程. 北京: 科学出版社: 10-11.

### New Words and Expressions

bacteria [bæk'tɪriə] n. the simplest and smallest forms of life. 细菌, 病菌

protist ['proutɪst] n. any of a diverse taxonomic group and esp. a kingdom (Protista syn.) of eukaryotic organisms that are unicellular and sometimes colonial or less often multicellular and that typically include the protozoans, most algae, and often some lower fungi (as slime molds). 原生生物

discrete [dɪ'skri:t] adj. independent of other things of the same type. 分立的, 不连续的

reproduction [ˌri:prə'dʌkʃn] n. the act or process of producing babies, young animals or plants. 繁殖, 生殖

metabolism [mə'tæbəlɪzəm] n. the chemical processes in living things that change food, etc. into energy and materials for growth. 新陈代谢

transformation [ˌtrænsfər'meɪʃn] n. a complete change in somebody/something. 转化 (作用), 变换, 转型

photosynthesis [ˌfəʊtəʊ'sɪnθəsis] n. the process by which green plants turn carbon dioxide and water into food using energy obtained from light from the sun. 光合作用

adenosine [ə'denəsin] triphosphate [traɪ'fɒs,fɜ:t] 腺苷三磷酸 (ATP)

starch [stɑ:rtʃ] n. a white carbohydrate food substance found in potatoes, flour, rice, etc; food containing this. 淀粉

building block (儿童游戏用的) 积木, 构件, 建筑砌块, 基础材料

sexual ['sekʃuəl] adj. having or involving sex. 性的, 有性的

asexual [eɪ'sekʃuəl] adj. not involving sex; not having sexual organs. 无性的

## Unit 2

### Test-tube Babies

Robert Edwards (Fig. 1) in collaboration with Patrick Steptoe in England, enabled the first birth of a baby by *in vitro* fertilization (IVF), Louise Brown, in 1978. Their research had been considered controversial, and the birth was met with a mixture of surprise, excitement and dismay. As the title of this article by Edwards indicates, infants born by IVF were almost immediately dubbed “test-tube babies”, even though only the fertilization of the egg by sperm and very initial growth of the embryo were conducted “in glass”. Edwards implies that by 1981 the technique was already becoming routine, with 15-20 IVF babies born in the UK that year. In that sense, this paper records the “normalization” of this form assisted conception.

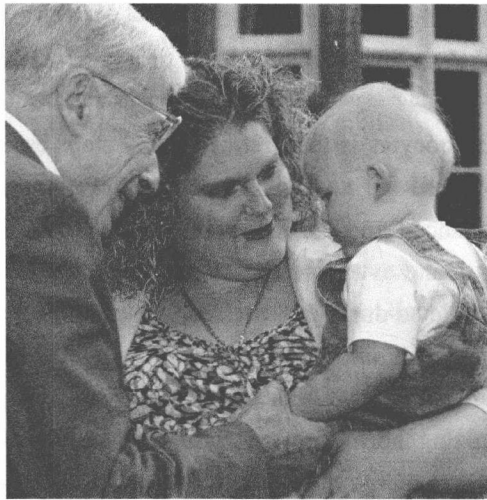


Fig. 1 Test-tube baby pioneer, Robert Edwards (left)

Between fifteen and twenty babies will be born this year after the *in vitro* fertilization of human eggs. Many of the essential steps now have high rates of success, including the recovery of preovulatory oocytes, and fertilization and embryo cleavage *in vitro*. Implantation of the embryo following its replacement in the mother remains the major difficulty. Some implications of the work are discussed.

This year should prove a turning point for the birth of children by the fertilization of human eggs *in vitro* (Fig. 2). Between 15 and 20 such babies will be born in approximately equal numbers in the United Kingdom and Australia, and there will be one or two elsewhere.



These methods will be introduced in many countries, primarily to alleviate human infertility. Fundamental aspects of human conception will be analyzed and increasing debate will presumably be given to genetic engineering. This is, therefore, an appropriate time to assess the relevant clinical and scientific issues raised by this work.

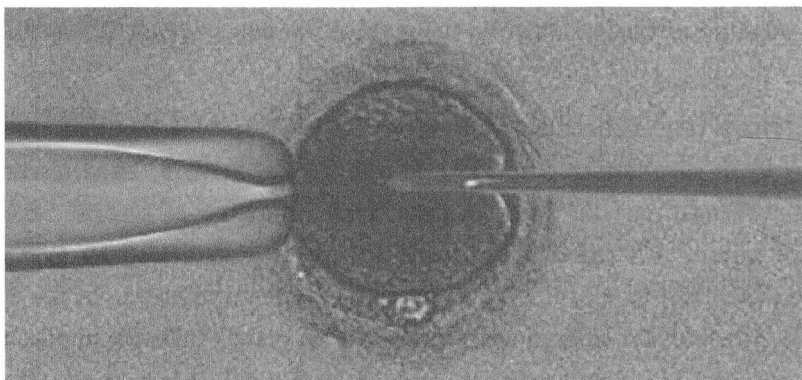


Fig. 2 Intracytoplasmic sperm injection (ICSI) procedure

### **The First Essential: Timing of Ovulation**

I will first discuss the methods involved in timing ovulation for the collection of preovulatory oocytes.

Harvesting preovulatory oocytes is the first of several steps essential for obtaining human embryos. They must be collected during their final stages of maturation just before ovulation occurs, when meiosis is advanced and cortical granules have established the defence against polyspermy. Follicular growth and ovulation must be regulated by endocrine therapy, or natural ovulation must be closely predicted during the menstrual cycle.

The regulation of ovulation is undoubtedly easier. Several follicles can be primed using human menopausal gonadotropin (HMG) or clomiphene early in the menstrual cycle. An endogenous surge of luteinizing hormone (LH) will then induce ovulation. Alternatively, a single injection of human chorionic gonadotropin (HCG, 5,000IU) can be given between days 11 and 14, according to the follicular response of each patient. Levels of urinary oestrogens of 80-100 $\mu$ g per day, or follicular diameters of 1.5-2cm measured by ultrasound are believed to be appropriate indications to inject HCG. Ovulation can be induced at any desired time of day or night, a considerable help in organizing laboratory or surgical teams for oocyte recovery. Two or more preovulatory oocytes can be collected from many patients, another advantage of stimulating the ovary.

There may be problems to offset these advantages. Wide variations exist in the rate of growth of individual follicles in each patient, revealed by the different levels of steroids in follicular fluids and by variations in embryonic growth when superovulation techniques are applied to animals. Some patients fail to respond to clomiphene. Others produce increasingly

large amounts of oestrogens as several follicles grow, and their endogenous LH surge stimulates ovulation. A difficult situation occurs in patients with moderate or high levels of oestrogens and no endogenous surge of LH. As in other tissues, clomiphene may have depleted cytoplasmic oestrogen receptors in the pituitary gland of such patients over several days, so preventing the LH surge in response to rising levels of oestrogens. HCG must be given at some arbitrary time, before follicles become atretic, yet while it is uncertain if the patient will have her own endogenous LH surge. Ovarian stimulation can also distort the menstrual cycle, inducing a short luteal phase and a disorganized endometrium, both incompatible with establishing pregnancy. An average of eight cycles of treatment with clomiphene is needed for oligomenorrhoeic women to conceive naturally. Such disadvantages may be greater with HMG than with clomiphene.

Sir John Maddox, Philip Campbell, 路甬祥. 2014. Nature, The Living Record of Science (《自然》百年科学经典) VI: 1973-1984. 北京: 外语教学与研究出版社: 1014-1016.

### New Words and Expressions

fertilization [ˈfɜːtəleɪzən] n. the action or process of fertilizing an egg, female animal, or plant, involving the fusion of male and female gametes to form a zygote. 受精, 受精过程

*in vitro* fertilization 体外受精

dub [dʌb] vt. to give somebody/something a particular name, often in a humorous or critical way. 授予称号, 起绰号, 配音, 转录

sperm [spɜːrm] n. a cell that is produced by the sex organs of a male and that can combine with a female egg to produce young. 精子, 精液, 鲸蜡油

embryo [ˈembriəʊ] n. a young animal or plant in the very early stages of development before birth, or before coming out of its egg or seed, especially a human egg in the first eight weeks after fertilization. 胚, 胚胎, 胚芽, 初期

preovulatory [priːˈɒvjʊlətəri] adj. occurring or existing in or typical of the period immediately preceding ovulation. 排卵期前的

oocyte [ˈoʊsaɪt] n. a female gametocyte that develops into an ovum after two meiotic divisions. 卵母细胞

cleavage [ˈkli:vɪdʒ] n. a difference or division between people or groups. 分裂, 卵裂

ovulation [ˌɒvjʊˈleɪʃn] n. the expulsion of an ovum from the ovary (usually midway in the menstrual cycle). 排卵, 产卵作用

meiosis [maɪˈoʊsɪs] n. the division of a cell in two stages that results in four cells, each with half the number of chromosomes of the original cell. 减数分裂, 成熟分裂

cortical [ˈkɔːtɪkl] adj. of or relating to a cortex. 皮层的, 皮质的, 有关脑皮层的

granule [ˈgrænjuːl] n. a small hard piece of something; a small grain. 小颗粒, 小硬粒

follicle [ˈfɒːlɪkəl] n. any small spherical group of cells containing a cavity. 卵泡

follicular [ˈfɒːlɪkjələ] adj. of or relating to or constituting a follicle. 小囊, 卵泡, 滤泡

endocrine [ˈendəkrɪn] adj. connected with glands that put hormones and other products directly into the blood.

内分泌（腺）的，激素的

menstrual ['menstruəl] adj. connected with the time when a woman menstruates each month. 月经的，每月的

menopausal [ˌmenə'pəʊ:zl] adj. of or relating to the menopause. 绝经期的，更年期的

gonadotropin [ˌɡɒnə'dou'trɒpɪn] n. hormone secreted by the anterior pituitary gland and placenta. 促性腺激素

clomiphene ['kloʊməfi:n] n. a fertility drug that is used to stimulate ovulation and that has been associated with multiple births. 克罗米酚，舒经酚（一种合成的助生育药）

endogenous [en'da:dʒənəs] adj. derived or originating internally. 内长的，内生的 n. 内源性

luteinize ['lu:tɪn,aɪz] v. to form corpora lutea. 使成为黄体部分

luteinizing hormone 黄体生成素

chorionic [kɔʊrɪ'ɒnɪk] adj. of or relating to a chorion. 绒（毛）膜的

urinary ['jʊərəneri] adj. connected with urine or the parts of the body through which it passes. 尿的，泌尿的 n. 小便池

oestrogen ['estrədʒən] n. a general term for female steroid sex hormones that are secreted by the ovary and responsible for typical female sexual characteristics. 雌激素

ovary ['oʊvəri] n. either of the two organs in a woman's body that produce eggs; a similar organ in female animals, birds and fish. 卵巢

steroid ['sterɔɪd] n. any of several fat-soluble organic compounds having as a basis 17 carbon atoms in four rings; many have important physiological effects. 类固醇

cytoplasmic [ˌsaɪtəu'plæzmɪk] adj. of or relating to cytoplasm. 细胞质的

pituitary [prɪ'tu:ətəri] n. the master gland of the endocrine system; located at the base of the brain. （脑）垂体

atretic [eɪ'tretɪk] adj. of, relating to, or marked by atresia. 闭锁的，不通的

luteal ['lu:tɪl] adj. of or relating to the corpus luteum. 黄体的

endometrium [ˌendou'mi:trɪəm] n. (pregnancy) the mucous membrane that lines the uterus. 子宫内膜

oligomenorrhea [ˌolɪɡə'mɪnə:'rɪr] n. abnormally light or infrequent menstruation. 月经稀发/异常