生物学专业英语教程

English for Biology

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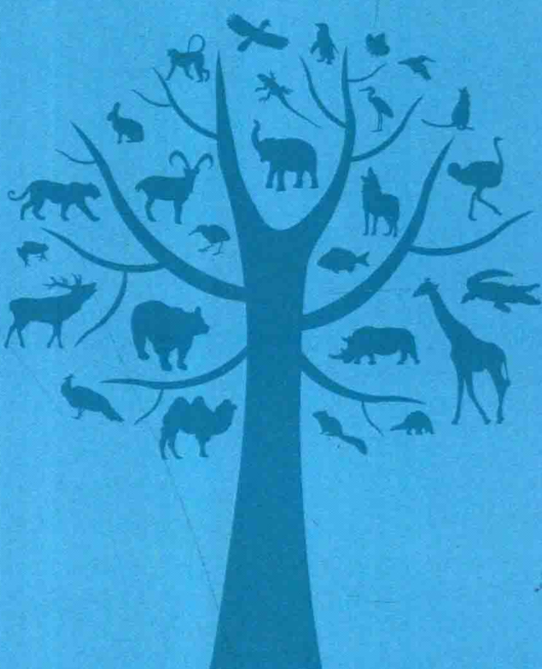

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生物学专业英语教程

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内 容 简 介

本书共分为三大部分，第一部分是生物学专业英语基础阅读，选编的19篇文章涵盖了生物学的主要分支学科的基本内容，通过这部分的学习，学生能够掌握该领域的基本词汇和写作方法。第二部分是生物学专业英语提升篇，选编的30篇文章涉及到生物学主要分支学科的研究方向和研究前沿，这部分不仅有助于提高学生的阅读能力，而且能够使学生了解生物学主要分支学科的研究内容。第三部分是英语科技论文写作与发表，作者根据一篇具体的论文详细介绍了英语科技论文的写作特点，并结合作者多年发表论文中遇到的问题及积累的经验献给读者。

本书可作为高等院校生物学相关专业本科生和研究生的专业英语教材，也可作为相关研究领域科研人员的阅读材料。

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前　言

迄今国内大多数高校及大多数专业都开设了专业英语课程，作为21世纪最具发展潜力与前景的生物学专业，其相关领域的最新研究成果多以英文形式发表于本学科主流期刊。因而，生物学相关专业的学生对专业英语的学习就显得更为重要。本书在编写过程中广泛征求学生意见，并基于编者多年生物学专业英语教学实践及多篇英语科技论文撰写和发表经验编写而成，以期能够更好地满足学生对生物学专业英语的需求。

本书主要分三大部分，第一部分是生物学专业英语基础阅读和基本专业词汇。所选文章基本上涵盖细胞、微生物、植物、动物、生态和生物技术的主要内容。通过这部分的学习读者能够掌握相关领域的基本专业词汇和写作特点。第二部分是生物学专业英语提升篇，这一部分所收录的文章都是从高水平的英文期刊上选编而来，并根据需要做了一定的整理和改编。所选论文基本涵盖生物学主要分支学科研究内容和前沿。第三部分是英语科技论文写作与发表技巧。作者以一篇具体论文为例详细介绍了英语科技论文每一部分的写作特点和注意事项，并将作者多年发表英语科技论文所积累的经验一并献给读者。这三部分内容旨在使读者在有限的时间内既能掌握一定量的生物学基本专业词汇，又能具备一定的英语科技论文阅读、翻译和写作能力。

在本书编写过程中，河北大学 2012 级生物科学专业梁娜同学、2013 级生物技术专业范江玲同学，以及 2016 级生态学专业研究生陈国亮、郭春延和张楠同学给予了热情的帮助并提出了很好的建议。另外，本书选编了部分同行作者的文稿内容，在此一并向他们表示诚挚的谢意。

本书是“白洋淀流域生态保护与京津冀可持续发展协同创新”系

列成果之一，感谢其资金的支持。同时，也感谢科学出版社在本书编写和出版方面给予的大力支持和帮助。

本书初稿已先后在河北大学2013级生物科学专业（本科）和2016级生态学专业（研究生）的学生中使用，已将教学过程中发现的问题和错误进行了反复的修订，但可能仍存在不足之处，恳请广大读者不吝赐教（yaoxiao301@126.com），以便再版时做得更好。

姚晓芹

2017年2月

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Part I Base Components

基础篇

Biology is one of the six basic natural science disciplines, which is concerned with the study of life and living organisms, including their structure, function, growth, development, and the relationship between biology and environments. Modern biology is a vast field, composed of many branches and subdisciplines. Subdisciplines of biology are defined by the scale at which organisms are studied, the kinds of organisms studied, and the methods used to study them: biochemistry examines the rudimentary chemistry of life; molecular biology studies the complex interactions among biological molecules; botany studies the biology of plants; cellular biology examines the basic building-block of all life,the cell; physiology examines the physical and chemical functions of tissues, organs, and organ systems of an organism; evolutionary biology examines the processes that produce the diversity of life; and ecology examines how organisms interact in their environment. This part mainly summarizes the basic knowledge of the main subdisciplines which are the main courses in the College of Life Science of all university, including cell biology, microbiology, botany, zoology and ecology.

Unit 1 Cell

Cells are the basic units of living organisms. All living things are composed of one or more cells. Although there are many different kinds of cells, they have much in common in structure and chemical composition. This unit mainly introduces the structure and chemical composition of cells, and the structure and function of DNA.

Lesson 1 Cell structure

Most cells are too small to be seen with naked eyes. We can only see them by a microscope. Cells come in two basic types—prokaryotic cells and eukaryotic cells. Prokaryotic cells found in bacteria and the blue-green algae are no membrane bound organelles, no nucleus (only a nuclear region), and they are typically unicellular organisms. Eukaryotic cells are more highly evolved. They have membrane bound organelles (including but not limited to the mitochondria, chloroplast, Golgi apparatus, smooth and rough endoplasmic reticulum), and have a membrane bound nucleus too. Eukaryotic cells are found in animals, plants, fungi and protists. Next, cell structures of eukaryotes are described in detail.

Cell membranes

All living cells have cell membranes (also known as plasmalemma or plasma membrane) composed of phospholipid bilayer with embedded proteins. Cell membrane is a very thin biological membrane that separates the interior of all cells from the outside environment, and is selectively permeable to ions and organic molecules, which control the passage of substances into and out of the cell.

Cell walls

Fungi, bacteria and nearly all plant cells also have cell walls outside of the plasma membrane, which are very different from the plasma membrane. Cell walls can't perform the diffusion barrier tasks of the plasma membrane. One of the primary functions of the cell wall is physical support. Some kinds of bacterial cell walls also have other functions. Prokaryotic cell walls are composed at least partially of an interesting substance called peptidoglycan, which is a kind of hybrid between polysaccharide and protein.

Cytoplasm

The cytoplasm is composed of cytosol and organelles. Within the cells of eukaryotic organisms, the contents of the cell nucleus are separated from the cytoplasm, and are then called the nucleoplasm. The organelle is a specialized subunit within a cell that has a specific function. Individual organelles are usually separately enclosed within their own lipid bilayers. There are many types of organelles in eukaryotic cells.

Cell nucleus

The nucleus of cell is enclosed by a double layer of membrane called nuclear envelope whose function is to confine the materials necessary for DNA and RNA synthesis inside the nucleus, and control the movement into and out of the nucleus. The nucleus contains several—generally two to four—dense structures called nucleoli (singular "nucleolus"). Assembly of ribosomes takes place in nucleoli. The nucleus of a eukaryotic cell contains a number of chromosomes, which are composed of DNA and histone proteins.

Vacuole

Plant cells contain a specialized vacuole called the central vacuole, which is a large, membrane bound structure filling in most of the interior of the cell. The central vacuole is filled mostly with water, but always with some impurities—mineral or protein—so the water concentration is always less than 100%. When the cell is surrounded by sufficient water, osmosis makes the central vacuole to swell, and thus makes the cell to press against the inside of the cell wall. This phenomenon in all of the cells of a leaf makes the leaf's tissues to be stiff, and keeps this delicate structure spread out so it can serve its vital function as a solar panel.

Endoplasmic Reticulum

Endoplasmic Reticulum (ER) is a system of membrane-enclosed channels which ramifies throughout the cytoplasm of the cell. It comes in two types—smooth ER and rough ER. The difference is that rough ER has ribosomes all over its outer surface, which performs protein synthesis.

Mitochondria

Mitochondria are very complex, double-membrane-bound organelles. Their function is to perform the aerobic portions of aerobic cellular respiration, the essential energy-producing process of the cell. This is the same function performed by the mesosomes in many prokaryotic cells. Mitochondria contain their own naked, circular DNA and their own ribosomes.

Golgi bodies

Each cell contains a number of Golgi bodies. "Golgi" is the name of the person who first described these structures. Their function is to process materials manufactured by the cell, and then package those products into small structures called "Golgi vesicles". The materials arrive at the Golgi bodies from the smooth endoplasmic reticulum. Golgi vesicles come in two general types—microbodies and secretory vesicles. Microbodies are fated to remain in the cell. They contain materials, usually enzymes, which the cell needs, but which must remain packaged away from the cell's other contents. The best known of these microbodies is the lysosome. Lysosomes contain digestive enzymes, which, if released into the cell, would digest the vital components of the cell and kill it. "Break" it, in other words.

Plastids

Plant cells contain a family of organelles called plastids. There are several kinds of plastids, all related to each other and, under appropriate conditions, capable of modifying from one type to another. The best known of these plastids is the chloroplast, which performs the function of photosynthesis. Chloroplasts are double-membrane-bound, like mitochondria. Also like mitochondria, their inner membrane is very complicated. In fact, it's formed into many thylakoid structures which perform the same function the thylakoids done in prokaryotic cells.

Glossary

microscope 显微镜
prokaryotic 原核的
eukaryotic 真核的
bacterium 细菌
blue-green algae 蓝绿藻
fungi 真菌
protist 原生生物
eukaryote 真核生物
cell membrane 细胞膜
phospholipid 磷脂
protein 蛋白
cell wall 细胞壁
peptidoglycan 肽聚糖
polysaccharide 多糖
cytoplasm 细胞质
cytosol 细胞液
organelle 细胞器
nucleoplasm 核质
subunit 亚单位
lipid bilayer 脂类双分子层
nucleus 细胞核
nuclear envelope 核膜
nucleoli 核仁
ribosome 核糖体
chromosome 染色体
histone protein 组蛋白
vacuole 液泡
central vacuole 中央液泡
osmosis 渗透
Endoplasmic Reticulum (ER) 内质网
smooth ER 光滑内质网
rough ER 粗糙内质网
mitochondrion 线粒体
mesosome 中间体
Golgi body 高尔基体
microbody 微体

secretory 分泌的、分泌腺
enzyme 酶
lysosome 溶酶体
plastid 质体
chloroplast 叶绿体
photosynthesis 光合作用
thylakoid 类囊体

Lesson 2 Chemical composition of cells

All living organisms, from microbes to mammals, are composed of chemical substances from both the inorganic and organic world, which appear in roughly the same proportions, and perform the same general tasks.

The basic chemical elements of cells include hydrogen, oxygen, nitrogen, carbon, phosphorus and sulfur, which normally make up more than 99% of the mass of living cells, and when combined in various ways, form virtually all known organic biomolecules. There are four general classes of macromolecules within living cells: nucleic acids, proteins, polysaccharides and lipids.

Nucleic acids

Nucleic acids are nucleotide polymer that store and transmit genetic information. Only 4 different nucleotides are used in nucleic acid biosynthesis. Genetic information contained in nucleic acids is stored and replicated in chromosomes, which contain genes. A chromosome is a deoxyribonucleic acid (DNA) molecule, and genes are segments of intact DNA. When a cell replicates itself, identical copies of DNA molecules are produced, therefore the hereditary line of descent is conserved, and the genetic information carried on DNA is available to direct the occurrence of virtually all chemical reactions within the cell. The bulk of genetic information carried on DNA provides instructions for the assembly of virtually every protein molecule within the cell.

Proteins

Proteins are amino acid polymers responsible for implementing instructions contained within the genetic code. There are twenty of amino acids used to synthesize proteins. A typical cell contains thousands of different proteins that perform a vast array of functions within organisms, including catalysing metabolic reactions, DNA replication, responding to stimuli, and transporting molecules from one location to another. Proteins differ from one another primarily in their sequence of amino acids, which is dictated by the nucleotide sequence of their genes, and which usually results in protein folding into a specific three-dimensional structure that determines its activity.

Most proteins fold into unique 3-dimensional structures. The shape into which a protein naturally folds is known as its native conformation. Although many proteins can fold unassisted, simply through the chemical properties of their amino acids, others require the aid of molecular chaperones to fold into their native states. Biochemists often refer to four distinct aspects of a protein's structure: Primary structure refers to the amino acid sequence. Secondary structure is formed by regularly repeating local structures stabilized by hydrogen bonds. The most common examples are the α-helix, β-sheet and turns. Because secondary structures are local, many regions of different secondary structure can be present in the same protein molecule. Protein tertiary structure refers to a protein's geometric shape. The tertiary structure will have a single polypeptide chain "backbone" with one or more protein secondary structures, the protein domains. Amino acid side chains may interact and bond in a number of ways. The interactions and bonds of side chains within a particular protein determine its tertiary structure. A number of tertiary structures may fold into a quaternary structure.

Proteins can be informally divided into three main classes, which correlate with typical tertiary structures: globular proteins, fibrous proteins, and membrane proteins. Almost all globular proteins are soluble and many are enzymes. Fibrous proteins are often structural, such as collagen, the major component of connective tissue, or keratin, the protein component of hair and nails. Membrane proteins often serve as receptors or provide