生态学
专业英语教程

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内 容 简 介

本书共分为三大部分，第一部分是生态学专业英语基础阅读，选编的文章根据生命系统结构层次进行分类，通过这部分的学习，读者能够掌握该领域的基本词汇和写作方法。第二部分是生态学专业英语提升篇，通过这部分的学习，不仅能够提高读者的阅读能力，而且能够使读者了解生态学研究前沿。第三部分是常用外文数据库介绍及SCI论文写作技巧，该部分结合案例详细地介绍了SCI论文各部分的写作技巧，并把作者发表论文中遇到的问题和积累的经验一并献给读者。

本书可作为高等院校生态学相关专业本科生和研究生的专业英语教材，也可供相关研究领域的科研人员阅读。

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前　言

生态学是研究生物与环境之间相互关系的一门学科。2011 年国务院学位委员会将生态学由二级学科提升为一级学科，充分体现了国家对生态学研究与生态学专业人才培养的高度重视。生态学专业英语是生态学专业课程结构的重要组成部分。为适应近年来生态学学科的飞跃发展和高等学校教学改革的需要，我们着手编写了这本生态学专业英语用书。本书在编写过程中广泛征求学生意见，并依据编者多年生态学专业英语教学实践及英文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态学专业英语的需求。

本书共分三大部分，第一部分是生态学专业英语基础阅读和基本专业词汇。所选文章是按照生命系统的结构层次进行分类的，即个体生态、种群生态、群落生态、生态系统生态和全球变化生态。通过这部分内容的学习，读者能够掌握相关领域的基本专业词汇和写作特点。第二部分是生态学专业英语提升篇，这部分所收录的文章都是从与生态学相关的高水平英文期刊上选编而来，并根据需要做了一定的整理和改编。所选论文也是按生命系统的结构层次进行分类的。第三部分是常用外文数据库介绍及 SCI 论文写作技巧，这部分主要介绍了常见英文数据库的具体使用方法及 SCI 论文各部分的写作技巧和主要事项，并结合具体案例进行分析。通过这三部分内容的学习使读者在有限的时间内既能掌握一定量的生态学基本专业词汇，又能具备一定的英文科技论文阅读、翻译和写作能力。

在本书编写过程中，河北大学 2016 级生态学专业研究生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“生物学河北省国家重点学科培育项目”“河北大学协同育人试点班建设项目（2017）”和“河北省生物工程技术研究中心”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。

本书初稿已在河北大学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3月

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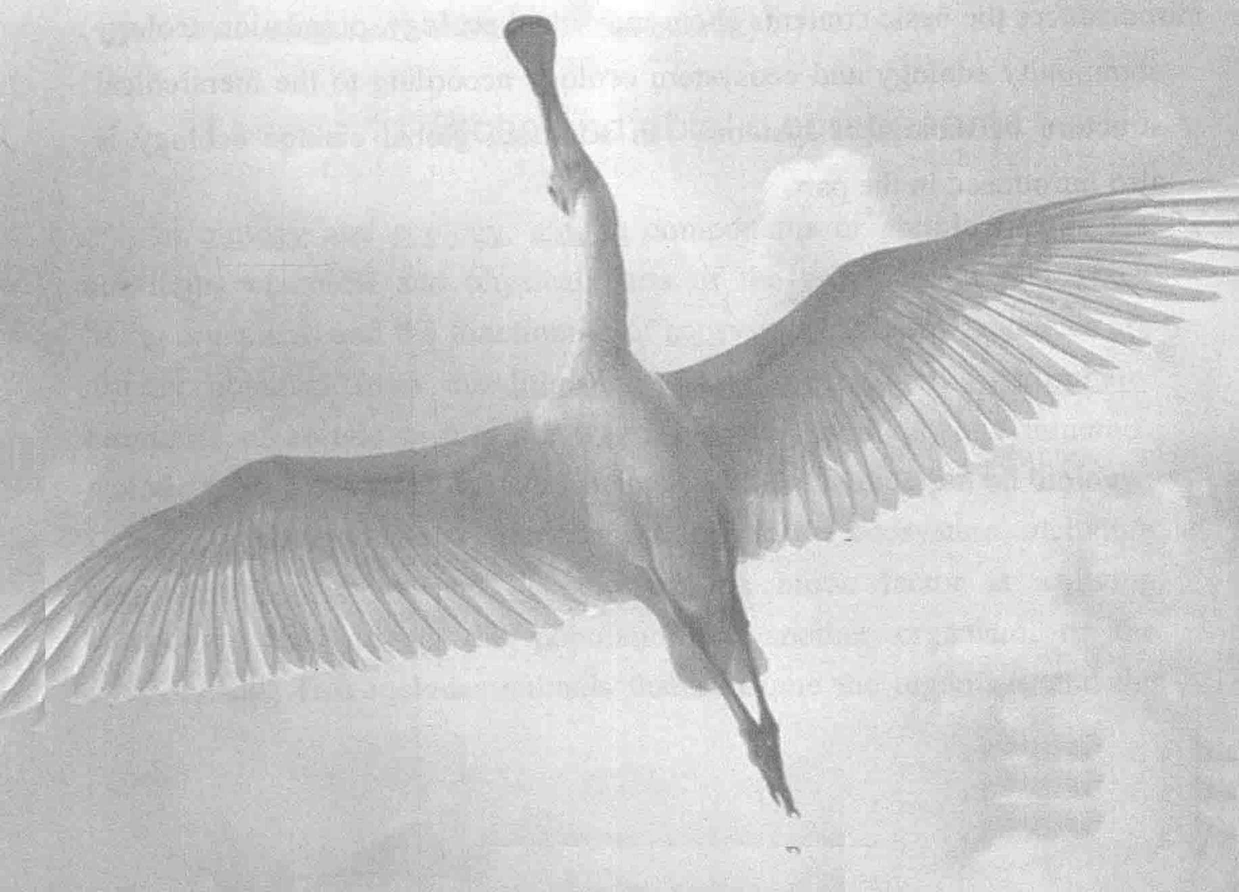
Part I Base Components

基 础 篇



The word “ecology”(“Ökologie”) was coined in 1866 by the German scientist Ernst Haeckel (1834–1919). Ecology is the scientific analysis and study of interactions among organisms and their environment. Within the discipline of ecology, researchers work at four specific levels that are organism, population, community, and ecosystem, sometimes discretely and sometimes with overlap. Ecosystems are composed of dynamically interacting parts including organisms, the communities they make up, and the non-living components of their environment. The part mainly introduces the basic contents about individual ecology, population ecology, community ecology and ecosystem ecology according to the hierarchical structure of biological systems. In addition, global change ecology is also introduced in the part.

Unit 1 Autecology

In contrast to the study of ecosystems, autecology focuses on individuals and species. Researchers studying ecology at the individual level are interested in the adaptations that enable individuals to live in specific habitats. These adaptations can be morphological, physiological and behavioral.

An important research area within autecology is ecotoxicology how individuals and niches respond to a new biotic or abiotic stress. Such studies not only increase knowledge of the consequences of anthropogenic stresses, but also of how variation plays into evolutionary processes, for instance, how it can enable one species to outcompete another. (http://www.umces.edu/cbl/organismal-ecology)

Lesson 1 Biotic and abiotic components

In biology and ecology, abiotic components or abiotic factors are non-living chemical and physical parts of the environment that affect living organisms and the functioning of ecosystems. Abiotic resources are usually obtained from the lithosphere, atmosphere, and hydrosphere. Examples of abiotic factors are water, air, soil, sunlight, and minerals. Abiotic factors and phenomena associated with them underpin all biology.

Biotic components are the living things in the ecosystem, including producers, consumers and decomposers. A biotic factor is a living component that affects the population of another organism, or the environment. This includes animals that consume the organism, and the living food that the organism consumes. Biotic factors also include human influence, pathogens and disease outbreaks. Each biotic factor needs energy to do work and food for proper growth.

Relevance

The scope of abiotic and biotic factors spans across the entire biosphere, or global sum of all ecosystems. Such factors can have relevance for an individual within a species, its community or an entire population. For instance, disease is a biotic factor affecting the survival of an individual and its community. Temperature is an abiotic factor with the same relevance.

Some factors have greater relevance for an entire ecosystem. Abiotic and biotic factors combine to create a system, or more precisely, an ecosystem, meaning a community of living and nonliving things considered as a unit. In this case, abiotic factors span as far as the pH of the soil and water, types of nutrients available and even the length of the day. Biotic factors such as the presence of autotrophs or self-nourishing organisms such as plants, and the diversity of consumers also affect an entire ecosystem.

Influencing factors

Abiotic factors affect the ability of organisms to survive and reproduce. Abiotic limiting factors restrict the growth of populations. They help determine the types and numbers of organisms able to exist within an environment.

Biotic factors are living things that directly or indirectly affect organisms within an environment. This includes the organisms themselves, other organisms, interactions between living organisms and even their waste. Other biotic factors include parasitism, disease, and predation (the act of one animal eating another).

Interaction examples

The significance of abiotic and biotic factors comes in their interaction with each other. For a community or an ecosystem to survive, the correct interactions need to be in place.

A simple example would be of abiotic interaction in plants. Water, sunlight and carbon dioxide are necessary for plants to grow. The biotic interaction is that plants use water, sunlight and carbon dioxide to create their own nourishment through a process called photosynthesis.

On a larger scale, abiotic interactions refer to patterns such as climate and seasonality. Factors such as temperature, humidity and the presence or absence of seasons affect the ecosystem. For instance, some ecosystems experience cold winters with a lot of snow. An animal such as a fox within this ecosystem adapts to these abiotic factors by growing a thick, white-colored coat in the winter.

Decomposers such as bacteria and fungi are examples of biotic interactions on such a scale. Decomposers function by breaking down dead organisms. This process returns the basic components of the organisms to the soil, allowing them to be reused within that ecosystem. (http://www.diffen.com/difference/Abiotic_vs_Biotic)

Glossary

biology 生物学
ecology 生态学
abiotic 非生物的
environment 环境
ecosystem 生态系统
lithosphere 岩石圈
atmosphere 大气圈
hydrosphere 水圈
biotic 生物的
producer 生产者

consumer 消费者

decomposer 分解者

pathogen 病原体

biosphere 生物圈

autotroph 自养生物

parasitism 寄生

predation 捕食

photosynthesis 光合作用

bacterium 细菌

fungus 真菌

Lesson 2 Soil supports diverse and abundant life

The soil is a radically different environment for life than environments on and above the ground, yet the essential requirements do not differ. Like organisms that live outside the soil, life in the soil requires living space, oxygen, food, and water. Without the presence and intense activity of living organisms, soil development could not proceed. Soil inhabitants from bacteria and fungi to earthworms convert inert mineral matter into a living system.

Soil possesses several outstanding characteristics as a medium for life. It is stable structurally and chemically. The soil atmosphere remains saturated or nearly so, until soil moisture drops below a critical point. Soil affords a refuge from extremes in temperature, wind, light, and dryness. These conditions allow soil fauna to make easy adjustments to unfavorable conditions. On the other hand, soil hampers the movement of animals. Except to such channeling species as earthworms, soil pore space is important. It determines the living space, humidity, and gaseous conditions of the soil environment.

Only a part of the upper soil layer is available to most soil animals as living space. Spaces within the surface litter, cavities walled off by soil aggregates, pore spaces between individual soil particles, root channels, and fissures are all potential habitats. Most soil animals are limited to pore spaces and cavities larger than themselves.

Water in the pore spaces is essential. The majority of soil organisms are active only in water. Soil water is usually present as a thin film coating the surfaces of soil particles. This film contains, among other things, bacteria, unicellular algae, protozoa, rotifers, and nematodes. The thickness and shape of the water film restrict the movement of most of these soil organisms. Many small species and immature stages of larger centipedes and millipedes are immobilized by a film of water and are unable to overcome the surface tension imprisoning them. Some soil animals, such as millipedes and centipedes, are highly susceptible to desiccation and avoid it by burrowing deeper.

When water fills pore spaces after heavy rains, conditions are disastrous for some soil inhabitants. If earthworms cannot evade flooding by digging deeper, they come to the surface, where they often die from ultraviolet radiation and desiccation or are eaten.

A diversity of life occupies these habitats. The number of species of bacteria, fungi, protists, and representatives of nearly every invertebrate phylum found in the soil is enormous. A soil zoologist found 110 species of beetles, 229 species of mites, and 46 species of snails and slugs in the soil of an Austrian deciduous beech forest.

Dominant among the soil organisms are bacteria, fungi, protozoans, and nematodes. Flagellated protozoans range from 100,000 to 1,000,000, amoebas from 50,000 to 500,000, and ciliates up to 1,000 per gram of soil. Nematodes occur in the millions per square meter of soil. These organisms obtain their nourishment from the roots of living plants and from dead organic matter. Some protozoans and free-living nematodes feed selectively on bacteria and fungi.

Living within the pore spaces of the soil are the most abundant and widely distributed of all forest soil animals, the mites (Acarina) and springtails (Collembola). Together they make up over 80 percent of the animals in the soil. Flattened, they wiggle, squeeze, and digest their way through tiny caverns in the soil. They feed on fungi or search for prey in the dark interstices and pores of the organic and mineral mass.

The more numerous of the two, both in species and numbers, are the mites, tiny eight-legged arthropods from 0.1 to 2.0 mm in size. The most common mites in the soil and litter are the Orbatei. They live mostly on fungal hyphae that attack dead vegetation as well as on the sugars produced by the digestion of cellulose found in conifer needles.

Collembola are the most widely distributed of all insects. Their common name, springtail, describes the remarkable springing organ at the posterior end, which enables them to leap great distances for their size. The springtails are small, from 0.3 to 1.0 mm in size. They consume decomposing plant material, largely for the fungal hyphae they contain.

Prominent among the larger soil fauna are the earthworms (Lumbricidae). Burrowing through the soil, they ingest soil and fresh litter and egest both mixed with intestinal secretions. Earthworms defecate aggregated castings on or near the surface of the soil or as a semiliquid in intersoil spaces along the burrow. These aggregates produce a more open structure in heavy soil and bind light soil together. In this manner, earthworms improve the soil environment for other organisms.

Feeding on the surface litter are millipedes. They eat leaves, particularly those somewhat decomposed by fungi. Lacking the enzymes necessary for the breakdown of cellulose, millipedes live on the fungi contained within the litter. The millipedes' chief contribution is the mechanical breakdown of litter, making it more vulnerable to microbial attack, especially by saprophytic fungi.

Accompanying the millipedes are snails and slugs. Among: the soil invertebrates, they possess the widest range of enzymes to hydrolyze cellulose and other plant polysaccharides, possibly even the highly