



普通高等教育“十一五”国家级规划教材  
全国高等医药院校规划教材

何深一 主编

# 人体寄生虫学

*Human Parasitology*



山东大学出版社



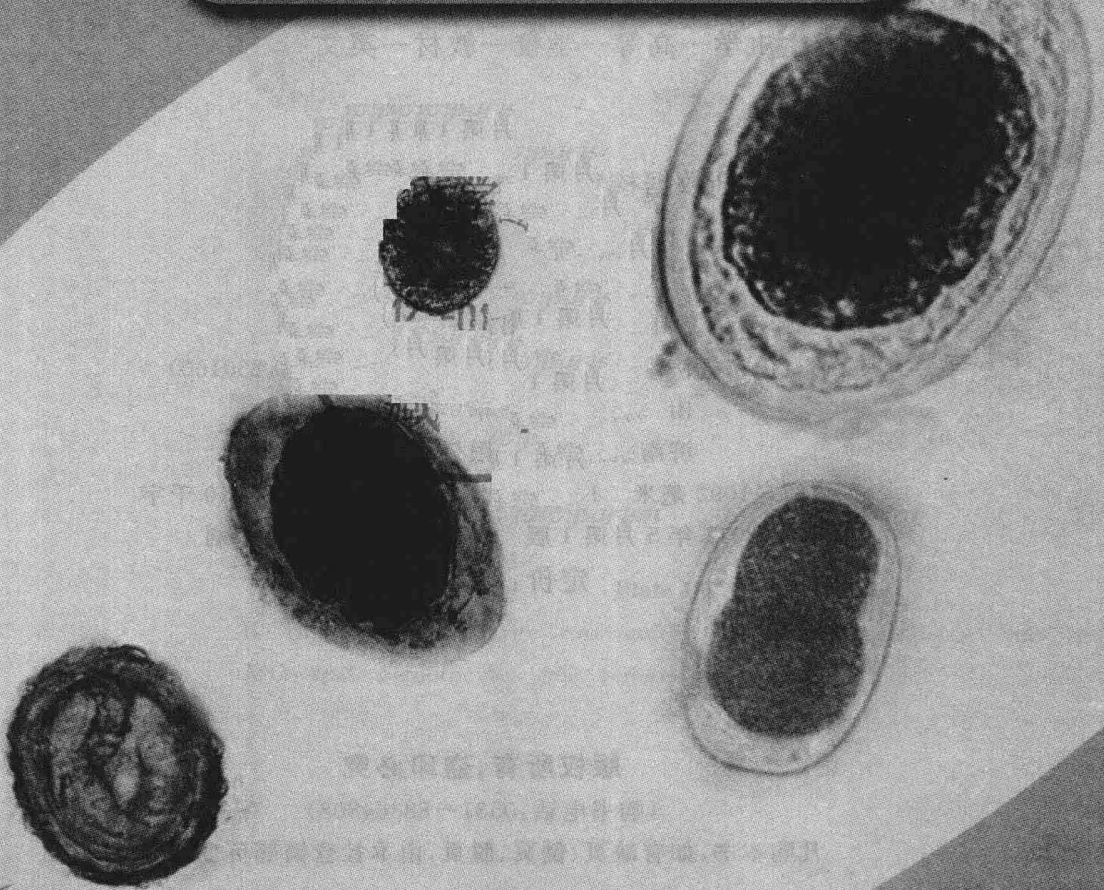


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## 内容简介

全书为英文编写,包括总论、医学原虫、医学蠕虫、医学节肢动物、寄生虫病的诊断技术、实验指导和英汉对照词汇等内容。该教材在认真总结五年制、六年制、七年制、八年制和留学生英语教学经验的基础上编写而成,并依据高等医药院校五年制和长学制培养计划,结合国情重点阐述了我国常见的严重危害人体健康的寄生虫和重要病媒节肢动物,同时收录了世界上重要的寄生虫和我国少见的人体寄生虫,共计 100 余种。本书系统地介绍了寄生虫病实验诊断技术。为配合全英文和双语教学的开展,全部内容用英语表达、描述,插图新颖、实用,并用英文标注。

本教材适合于高等医药院校五年制、长学制临床、基础、预防、口腔、麻醉、影像、护理、药学、检验、法医等专业学生和留学生使用。也可用作医药卫生专业教师、临床医护人员、疾病控制中心人员和科研人员的参考书和专业英语学习的工具书。

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# 前言

《人体寄生虫学》曾于1989年由学苑出版社出版发行,被国内开设英语教学的许多医学院校采用,受到同行和学生的好评。2006年,本书被遴选为普通高等教育“十一五”国家级规划教材。在本书以“十一五”国家级规划教材面世之际,感谢本教材上一版主编王永祥教授及各位编者的努力。

本教材根据教学大纲的要求,将相关专业知识与教学内容融为一体,进行了重新编写,增加了大量内容和图表,编者由上一版的1所院校增加到15所。

全书包括总论、医学原虫、医学蠕虫、医学节肢动物、寄生虫病的诊断技术和实验指导、英汉对照词汇等内容。在突出国内流行广泛、危害严重的主要虫种的基础上,也编入目前国内外逐步受到重视的一些人类致病寄生虫。书中融入本学科比较成熟的新进展,增加重要寄生虫病的临床症状、体征、诊断、治疗和预防措施,以期与临床应用的结合更密切。该教材力求科学性、先进性、系统性和实用性相结合,并将免疫学、病理学、流行病学、传染病学、诊断学、影像学和分子生物学等学科的理论、知识和方法应用于寄生虫学中,既体现出高等医学教材的深度和广度,也注意到寄生虫学的特殊性。内容强调“三基”(基本理论、基本知识、基本技能),反映国内外本学科的最新进展。在总结各院校教学、科研经验的基础上,体现编者的新见解和教学特色。该教材在认真总结五年制、六年制、七年制、八年制和留学生英语教学经验的基础上编写而成,尽量做到保证专业水准,符合英语习惯,用词准确,通俗易懂。

为了满足全英语教学的需要,书中图表全部采用英文标注,图文并茂,书末附有专业词汇中英文对照,便于学习。新增了寄生虫病常用实验诊断技术,尤其是病原生物学检查技术;绘制了许多新的寄生虫插图;按照大多数院校的教学顺序编排内容,符合实际教学习惯。本书结合我们网站教学和学习内容使用,将收到更好的效果。

山东大学出版社为本教材的出版做了大量工作,并提供经费支持。在此,谨向他们为本教材顺利出版所做的贡献致以诚挚的谢意。

全体编写人员的辛勤劳动,以及山东大学出版社各位领导、策划、责编们的共同努力,是本书顺利出版的重要前提。袁方曙老师为本书绘制了大量图片。由于编者知识水平所限,书中难免存在不足和错误之处,殷切希望同行专家及广大师生批评指正,将发现的问题反馈给我们,以便今后加以修正,我们将不胜感激。

何深一

2010年12月

# Preface

This book presents basic descriptions of parasites commonly found to cause human diseases. The book was written to provide information for a full course in human parasitology to address the needs of students and other relevant people in the medical and health science fields.

The book *Human Parasitology* is organized into textbook and laboratory manual.

The textbook consists of seventeen chapters divided into five parts. Parasites are divided into three broad groups, that is, protozoa, helminths and arthropods. Part I begins with an introduction (Chapter One), which provides an overview of human parasitology and commonly used terms. Part II consists of four chapters on helminths worms. Nematodes (roundworms) are discussed in Chapter Four and trematodes (flukes) are discussed in Chapter Five. Cestodes (tapeworms) are included in Chapter Six, and Acanthocephala (thorny-headed worms) are covered in Chapter Seven. Part III consists of five chapters devoted to the protozoa. Intestinal amebae and the free-living amebae, *Acathamoeba* species and *Naegleria* species, are discussed in Chapter Nine, while the flagellates are discussed in Chapter Ten. Sporozoa are presented in Chapter Eleven; Ciliates are covered in Chapter Twelve. Part IV consists of three chapters devoted to the medically important arthropods. Part V consists of two chapters devoted to the diagnostic techniques. Chapter Sixteen provides more in-depth information on each type of method. Chapter Seventeen presents current information on immunological techniques available to diagnose parasitic infections. A discussion of molecular diagnostic techniques is also included.

We hope that the book will be fruitful and provides the clear, concise, practical, and clinically relevant information necessary to gain an understanding of the pathogenesis of parasitic infections and be able to diagnose these infections in the laboratory for students. Furthermore, we would like to thank Shangdong University Press, for their cooperation and generous support to produce this book.

He Shenyi  
December 2010

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# TEXTBOOK

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# Part I Introduction to Human Parasitology

## Chapter 1 Basic Conceptions of Human Parasitology

Parasitology, the study of parasites and their relationships to their hosts, is one of the most fascinating areas of biology. Human parasitology is the study of those organisms which parasitize humans, and is a branch of medical science dealing with parasites living in and on the body of humans and with aspects of the host-parasite relationships having medical significance. It is referred to the study of morphology, growth and development of the parasites in the host, the pathogenesis and clinical manifestation caused by the parasites and the diagnosis, and transmission and prevention of the disease. It encompasses elements of medical protozoology, medical helminthology, and medical arthropodology. According to the very broad definition of parasitology, parasites should include the **viruses, rickettsiae, bacteria, fungi, protozoa** and **metazoa** (multi-celled organisms) which infect their host species. However, for historical reasons the first four have been incorporated into the discipline of **Microbiology**. Newly developed techniques in biochemistry and cellular and molecular biology have also opened significant new avenues for research on parasites.

There are far more kinds of parasitic than non-parasitic organisms in the world. Even if we exclude the viruses and rickettsiae, which are all parasitic, and the many kinds of parasitic bacteria and fungi, the parasites are still in majority. The study of parasitic disease is timeless and will always be relevant to the practice of modern medicine, especially when considering how easy it is for people to travel from one place in the world to another in just a matter of hours.

### Parasitology and Medical Significance

Parasitic infections and diseases are the most common diseases in the world. Therefore, parasitology has an important role on medicine and public health. During our relatively short history on Earth, humans have acquired an amazing number of parasites, about 530 species of helminth worms and over 120 species of protozoa. Many of these are rare and accidental parasites, but we still harbor about 90 relatively common

species, of which a small proportion cause some of the most important diseases in the world, inevitably, these are the ones that have received the most attention. According to the WHO 2001 year report, parasitic diseases are still important human diseases. In the world, 210 million people reside in the endemic areas of malaria; 10 million cases of malaria occur every year; 20 million infected individuals were estimated in the world. So TDR/WHO has proclaimed 10 major unconquered human tropical diseases: African trypanosomiasis, Dengue, Leishmaniasis, Malaria, Schistosomiasis, Tuberculosis, Chagas disease, Leprosy, Lymphatic filariasis, and Onchocerciasis. Among them 7 diseases are parasitic.

## **Parasitism, Parasite and Host**

### **Symbiosis**

Two different organisms live together and interact, in this association one partner lives in or on another one's body. It includes 3 types: mutualism, commensalism, and parasitism.

**Mutualism** is a permanent association between two different organisms, in which life apart is impossible, and the two partners benefit each other, such as termites and flagellates.

The mutual organisms are metabolically dependent on each other; one cannot survive in the absence of the other.

Mutualism describes a relationship in which both partners benefit from the association. Mutualism is usually obligatory, since in most cases physiological dependence has evolved to such a degree that one mutual cannot survive without the other. Termites and their intestinal protistan fauna are an excellent example of mutualism. Termites cannot digest cellulose because they cannot synthesize and secrete the enzyme cellulase. The myriad flagellates in a termite's intestine, however, synthesize cellulase and consequently digest the wood eaten by the host. The termite uses molecules excreted as a by-product of the flagellates' metabolism. If we kill the flagellates by exposing termites to high temperature or high oxygen concentration, then the termites starve to death, even though they continue to eat wood.

**Commensalism** is the association of two different organisms, in which one partner is benefited while the other neither benefited nor injured.

Commensalism does not involve physiologic interaction or dependency between the two partners, the host and the commensal. The two partners can survive independently. Although at times certain nonpathogenic organisms (e. g. , protozoa) are referred to as commensals, this interpretation is incorrect because they are physiologically dependent on the host and are, therefore, parasites. An example of commensalism is the association between hermit crabs and the sea anemones they carry

on their borrowed shells.

**Parasitism** is the association of two different organisms, in which one partner is benefited while the other is injured, such as *Ascaris lumbricoides* and men.

### **Parasite**

In parasitism, it is the benefited partner. It is an animal organism which lives in or on the host in order to obtain nourishment and shelter from the host as well as does harms to the host.

Parasites may cause mechanical injury, such as boring a hole into the host or digging into its skin or other tissues, stimulating a damaging inflammatory or immune response, or simply robbing the host of nutrition. Most parasites inflict a combination of these conditions on their hosts.

There are many types of parasites.

Most parasites are **obligate parasites**; that is, they cannot complete their life cycle without spending at least part of the time in a parasitic relationship. However, many obligate parasites have free-living stages outside any host, including some periods of time in the external environment within a protective eggshell or cyst.

**Facultative parasites** are not normally parasitic but can become so when they are accidentally eaten or enter a wound or other body orifice. Two examples are certain free-living amebas, such as *Naegleria fowleri*, and free-living nematodes belonging to the genus *Micronema*. Infection of humans with either of these is extremely serious and usually fatal. A **facultative parasite** is an organism which may exist in a free-living state or as a commensal parasite.

Parasites that live on the outside of the host's body are referred to as **ectoparasites**, whereas those that live inside are called **endoparasites**. Arthropods such as mites, ticks, and lice are examples of ectoparasites. Parasitic protozoa and helminths are examples of endoparasites. Parasite may also be called **permanent** or **intermittent** ones according to the duration of parasitism, or they may be accidental or opportunistic by chance or condition available.

When a parasite enters or attaches to the body of a species of host different from its normal one, it is called an **accidental**, or **incidental parasite**. For instance, it is common for nematodes, normally parasitic in insects, to live for a short time in the intestines of birds or for a rodent flea to bite a dog or human. Accidental parasites usually do not survive in the wrong host, but in some cases they can be extremely pathogenic. Parasitism is usually the result of a long, shared evolutionary history between parasite and host species. Accidental parasitism puts both host and parasite into environmental conditions to which neither is well adapted; it is not surprising that the result may be serious harm to either or both participants.

Some parasites live their entire adult lives within or on their hosts and may be called