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CHAPTER 1 AN INTRODUCTION TO PARASITISM

1.1 BUILDING AN UNDERSTANDING OF THE BASICS OF PARASITISM

Parasites live in or on their hosts and cause them harm

Opinions vary on how to define some of the key aspects of parasites and their biology

The residence time for a parasite in or on a host is highly variable

There are many additional ways to categorize parasites

1.2 HOSTS—ESSENTIAL LIFELINES FOR PARASITES

Hosts also fall into several different categories

1.3 APPRECIATING PARASITISM'S PLACE IN NATURE

Parasitism is one of several categories of symbiotic associations

Parasitoids straddle the boundary between predation and parasitism

Our understanding of parasitism is enhanced by an appreciation of its relationship to another ubiquitous type of symbiosis, mutualism

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CHAPTER 2 AN OVERVIEW OF PARASITE DIVERSITY

2.1 THE DIVERSITY OF PARASITE SPECIES

What constitutes a parasite species requires some explanation

Given these considerations, how many species of parasites inhabit the Earth?

Evolutionary trees are used to visualize evolutionary relationships and to display parasite diversity

Efforts are well underway to reveal the overall tree of life

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Early medical and natural history studies gave rise to an understanding of parasite life cycles

Mosquito transmission was first demonstrated for filarial worms

Arthropod transmission for filarial worms suggested that other diseases may be similarly transmitted

3.2 AN OVERVIEW OF PARASITE LIFE CYCLES

Parasites with direct life cycles use only a single host
Two or more hosts are necessary for those parasites with indirect life cycles

3.3 THE PARASITE'S TO DO LIST

Effective transmission is essential for all parasites

High reproductive rates are common in many parasite life cycles

Both sexual and asexual reproduction are used by apicomplexans such as *Toxoplasma gondii*

Parasites may use strategies other than high fecundity to achieve transmission

Many factors can complicate an understanding of parasite transmission

Mathematical models provide a useful tool to predict transmission rates

Many parasites must migrate to specific sites or tissues within the host

The evolution of complex migration within a host is not always clear

Parasites are adapted to maintain their position on or within the host

Finding a mate is a requirement for many sexually reproducing parasites

Parasite genomes reflect their adaptations to a parasitic lifestyle

The relationship between parasitism and genome size is not always clear

Propagules are released through a portal of exit

Parasites undergo complex developmental changes in response to environmental cues

Epigenetic phenomena and co-opting of host signaling molecules may be important in parasite development

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4.1 AN EVOLUTIONARY PERSPECTIVE ON ANTI-PARASITIC IMMUNE RESPONSES

Prokaryotes have developed remarkable immune innovations during their billions of years encountering parasites

Many kinds of parasites compromise the health of plants so it is important to know how plants defend themselves

Although plants lack specialized immune cells, they still can mount effective, long-term responses to parasites

Many nematode species are specialized to parasitize plants

Invertebrates have distinctive and diverse innate immune systems

Invertebrates, including vectors and intermediate hosts, mount immune responses to contend with their parasites

Invertebrates also adopt distinctive behaviors to supplement their anti-parasite immune responses

Parasites suppress, manipulate, and destroy invertebrate defense responses

Some parasites rely on symbiotic partners to subvert the immune responses of their invertebrate hosts

Some invertebrates enlist symbionts to aid in their defense

Researchers hope to manipulate invertebrate immune systems to achieve parasite control

4.2 AN OVERVIEW OF VERTEBRATE DEFENSE

4.3 IMMUNE RESPONSES TO EUKARYOTIC PARASITES

Recognition of PAMPS initiates the immune response to protozoa

Immune responses to protozoa include both humoral and cell mediated components

Protective immunity to malaria develops as a consequence of repeated exposure

Immune responses are generated against each stage in the *Plasmodium* life cycle

Helminth parasites provoke a strong Th-2 response

Extensive changes to the intestinal epithelium occur in response to intestinal helminths

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