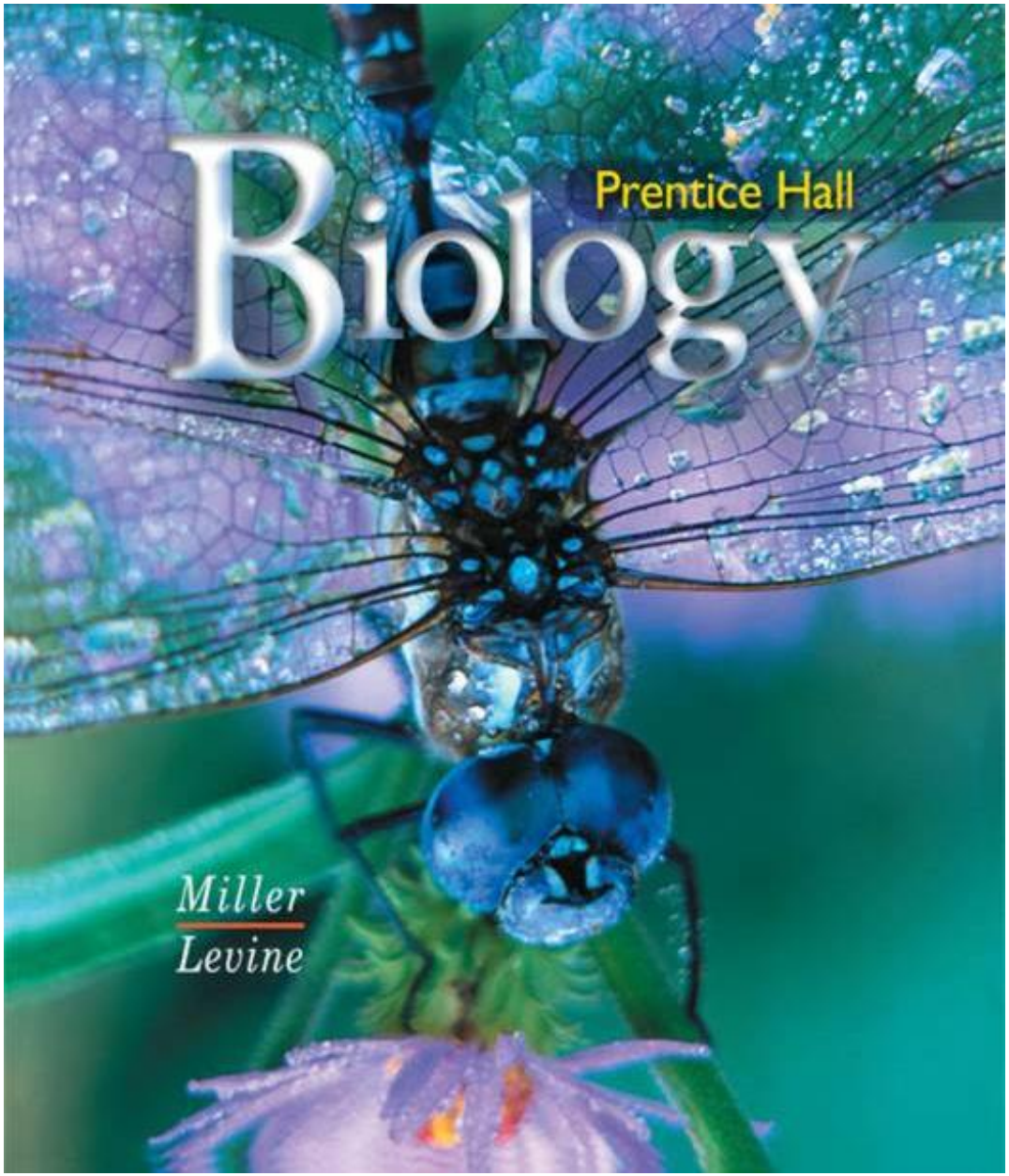

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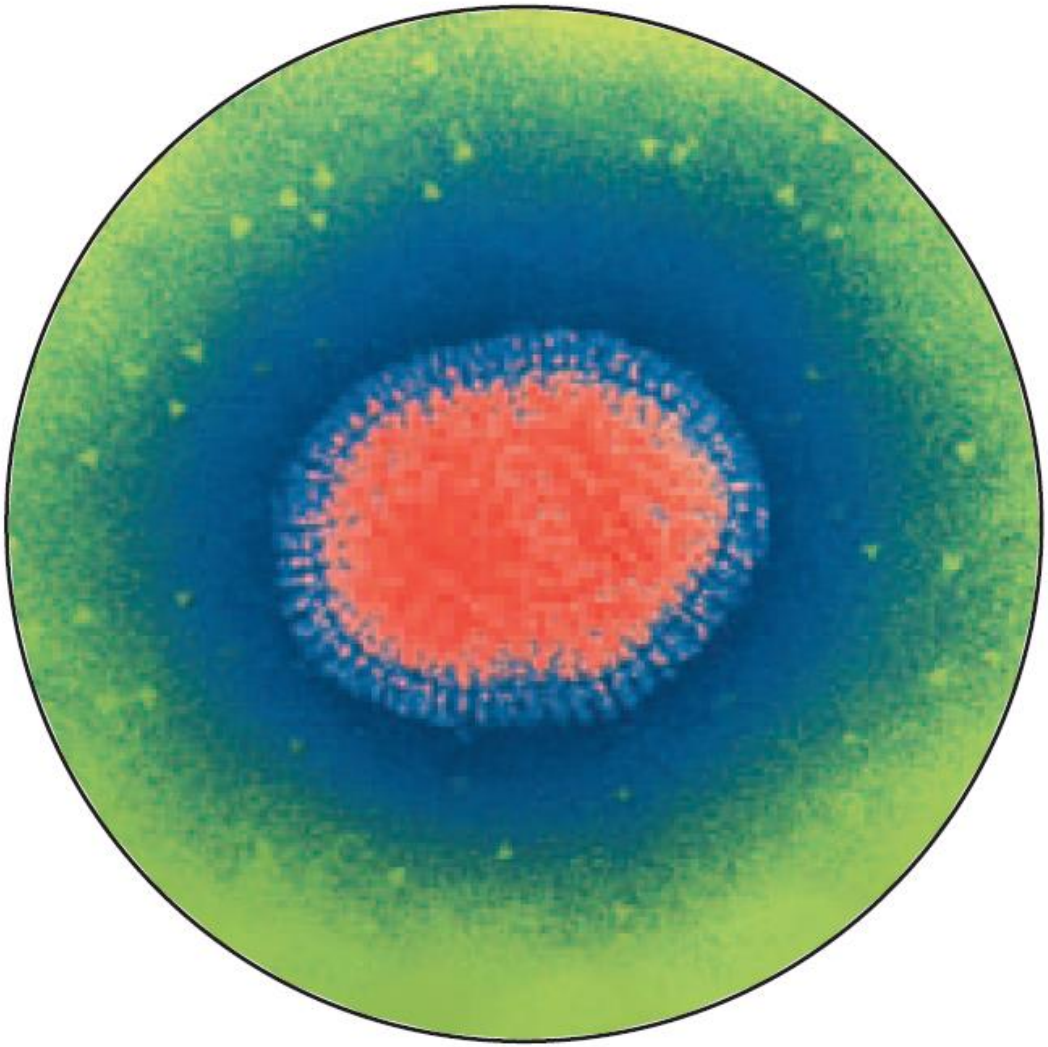
19–3 Diseases Caused by Bacteria and Viruses



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19–3 Diseases Caused by Bacteria and Viruses

Bacteria and viruses are everywhere in nature, but only a few cause disease.

Disease-causing agents are called **pathogens.**

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Bacterial Disease in Humans

Growth of pathogenic bacteria disrupts the body's equilibrium by interfering with its normal activities and producing disease.

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How do bacteria cause disease?

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Bacteria produce disease in one of two general ways.

- **Some bacteria damage the cells and tissues of the infected organism directly by breaking down the cells for food.**
- **Other bacteria release toxins (poisons) that travel throughout the body interfering with the normal activity of the host.**

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Bacterial Diseases

Disease	Effect on Body
Lyme disease	"Bull's-eye" rash at site of tick bite, fever, fatigue, headache
Tetanus	Lockjaw, stiffness in neck and abdomen, difficulty swallowing, fever, elevated blood pressure, severe muscles spasms
Tuberculosis	Fatigue, weight loss, fever, night sweats, chills, appetite loss
Bacterial meningitis	High fever, headache, stiff neck, nausea, fatigue
Strep throat	Fever, sore throat, headache, fatigue, nausea

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Many bacterial diseases can be prevented by vaccines.

A **vaccine** is a preparation of weakened or killed pathogens.

When injected into the body, a virus may prompt the body's immunity to the disease.

Immunity is the body's ability to destroy new pathogens.

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If infection occurs, drugs can be used to destroy bacteria.

These drugs include **antibiotics**, which are compounds that block the growth and reproduction of bacteria.

A reason for increased human life expectancy is an increased understanding of how to prevent and cure bacterial infections.

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Controlling Bacteria

How can bacterial growth be controlled?

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There are various methods used to control bacterial growth, including:

- **sterilization**
- **disinfectants**
- **food processing**

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Sterilization by Heat

Sterilization destroys bacteria by subjecting them to great heat.

Most bacteria are killed by prolonged high temperatures.

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Disinfectants

Disinfectants are chemical solutions that kill pathogenic bacteria.

They are used to clean rooms where bacteria may flourish.

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Food Storage and Processing

Bacteria can cause food to spoil.

Refrigerated food stays fresh longer because the bacteria will take longer to multiply.

Boiling, frying, or steaming can sterilize certain foods.

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Viral Disease in Humans

How do viruses cause disease?

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Viruses produce disease by disrupting the body's normal equilibrium.

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Viruses can attack and destroy certain cells in the body, causing symptoms of the disease.

Other viruses cause infected cells to change patterns of growth and development.

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Viral diseases cannot be treated with antibiotics.

Vaccines are often the best protection against most diseases.

Most vaccines work only if used before an infection begins.

Symptoms may be treated with over-the-counter medicines.

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Viral Diseases

Disease	Effect on Body
Common cold	Sneezing, sore throat, fever, headache, muscle aches
Influenza	Body aches, fever, sore throat, headache, dry cough, fatigue, nasal congestion
AIDS	Helper T cells, which are needed for normal immune system function, are destroyed
Chicken pox	Skin rash of blisterlike lesions
Hepatitis B	Jaundice, fatigue, abdominal pain, nausea, vomiting, joint pain
West Nile	Fever, headache, body ache

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End Show

Viral Disease in Plants and Animals

Viruses produce serious animal diseases including foot-and-mouth disease.

Many viruses infect plants.

These viruses pose a serious threat to many crops.

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Viroids and Prions

Other viruslike particles that can cause disease are viroids and prions.

- Viroids cause disease in plants.
- Prions cause disease in animals.

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Viroids

Viroids are single-stranded RNA molecules that have no surrounding capsids.

Viroids enter an infected cell and synthesize new viroids.

They then disrupt the cell's metabolism and stunt the growth of the entire plant.

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Prions

Prions contain only protein—no DNA or RNA.

Prions cause disease by forming protein clumps. These clumps induce normal protein molecules to become prions.

Eventually, there are so many prions in the nerve tissue that cells become damaged.

Mad cow disease may be caused by prions.

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19–3 Section QUIZ

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1 Biologists know that bacteria can cause human disease by

a. entering cells and using the cell to make new bacteria.

A b. producing toxic substances that interfere with normal cell function.

c. decomposing the remains of dead organisms.

d. changing atmospheric nitrogen into nitrogen compounds.

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2 A process that destroys bacteria by subjecting them to great heat is known as

a. refrigeration.

A b. sterilization.

c. pickling.

d. boiling.

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3 Which of the following diseases is transmitted by a mosquito bite?

a. influenza

b. measles

A c. West Nile virus

d. chickenpox

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4 Which of the following diseases is thought to be caused by prions?

a. diphtheria

A b. mad cow disease

c. tuberculosis

d. smallpox

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5 The best way to combat viral diseases is

a. to use antibiotics.

b. to treat individual symptoms.

A c. to use preventive vaccines.

d. to let the disease “cure itself.”

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END OF SECTION