

Fields in the Life Sciences

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CHAPTER

1

Fields in the Life Sciences

- Define life science.
- Describe the major fields within the life sciences.
- Explain what is studied in cell biology, genetics, and evolution.



What kind of scientist studies dolphins?

Dolphins are living organisms, so studying them is part of the life sciences. The life sciences, however, are broken down into many fields. Scientists that study dolphins and other life in the ocean are called marine biologists.

Fields in the Life Sciences

The **life sciences** are the study of living organisms. They deal with every aspect of living organisms, from the biology of **cells**, to the biology of individual organisms, to how these organisms interact with other organisms and their environment.

The life sciences are so complex that most scientists focus on just one or two subspecialties. If you want to study insects, what would you be called? An entomologist. If you want to study the tiny things that give us the flu, then you need to enter the field of **virology**, the study of viruses. If you want to study the nervous system, which life science field is right for you (**Table 1.1**, **Table 1.2**, and **Table 1.3**)?

TABLE 1.1: Subspecialties That Focus on One Type of Organism

Field	Focus
Botany	Plants
Zoology	Animals
Marine biology	Organisms living in oceans

TABLE 1.1: (continued)

Field	Focus
Freshwater biology	Organisms living in and around freshwater lakes, streams, rivers, ponds, etc.
Microbiology	Microorganisms
Bacteriology	Bacteria
Virology	Viruses
Entomology	Insects
Taxonomy	The classification of organisms

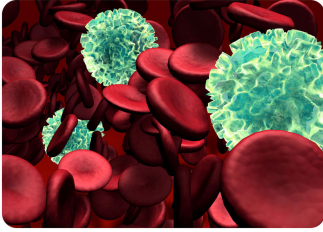
TABLE 1.2: Subspecialties That Examine the Structure, Function, Growth, Development, and/or Evolution of Living Organisms

Field	Focus
Cell biology	Cells and their structures/functions
Anatomy	Structures of animals
Morphology	Form and structure of living organisms
Physiology	Physical and chemical functions of tissues and organs
Immunology	Mechanisms inside organisms that protect them from disease and infection
Neuroscience	The nervous system
Developmental biology and embryology	Growth and development of plants and animals
Genetics	Genetic makeup of living organisms and heredity
Biochemistry	Chemistry of living organisms
Molecular biology	Nucleic acids and proteins
Epidemiology	How diseases arise and spread
Evolution	The changing of species over time

TABLE 1.3: Fields of Biology That Examine the Distribution and Environments of Organisms

Field	Focus
Ecology	How various organisms interact with their environments
Biogeography	Distribution of living organisms
Population biology	The biodiversity, evolution, and environmental biology of populations of organisms

During the study of the life sciences, you will study **cell biology**, **genetics**, **molecular biology**, **botany**, **microbiology**, **zoology**, **evolution**, **ecology**, and **physiology**. Cell biology is the study of cellular structure and function (**Figure 1.1**). Genetics is the study of **heredity**, which is the passing of traits (and **genes**) from one generation to the next. Molecular biology is the study of molecules, such as DNA and proteins. Ecologists study **ecosystems**, which are made of both living and nonliving parts of the environment. A botanist may work in a botanical garden, where plant life can be studied. What will you study with the other subspecialties?

**FIGURE 1.1**

This illustration shows a virus among red blood cells. Which fields study red blood cells and viruses? (Keep in mind that viruses are actually much smaller than cells.)

**FIGURE 1.2**

Other life science subspecialties include biogeography, which is the study of where organisms live and at what abundance.

Summary

- There are several subspecialties within the life sciences that focus on one type of organism, such as virology and bacteriology.
- There are several fields of the life sciences that examine interactions between organisms and their environments, such as ecology.

Explore More

Use the resource below to answer the questions that follow.

- **Branches of Biology** at http://www.youtube.com/watch?v=OrlOOJ0Tm_E (3:28)

extremely low
temperature on living
organisms and cells

MEDIA

Click image to the left or use the URL below.

URL: <http://www.ck12.org/flx/render/embeddedobject/57470>

1. What is the study of reptiles and amphibians?
2. What is the study of prehistoric life by means of fossils?
3. What is the study of mollusks?
4. What is the study of cells?
5. What is the study of fungi?
6. What is ecology?

Review

1. What is name of the field of the life sciences that studies insects?
2. What is name of the field of the life sciences that studies the nervous system?
3. What are cell biology, genetics, and molecular biology?

References

1. Image copyright Jiri Flogel, 2014. [Drawing of viruses among red blood cells](#) . Used under license from Shutterstock.com
2. Rocky Mountain Research Station/U.S. Department of Agriculture. [Biogeography of a coral reef](#) . Public Domain