

## Lesson I: Introduction to Entomology

What is an insect? An insect is any kind of bug. Well, no, that is not a very descriptive or clear definition. An insect can be defined simply as a small, six-legged animal. Of the million kinds of animals that scientists have described and named, more than 800,000 are insects. Around 7,000 to 10,000 new kinds of insects are discovered every year. Insects live almost everywhere on earth – from steamy tropical jungles to cold polar regions, from snow-capped mountains to deserts below sea level.

### Entomology

The study of insects is called *entomology*. The study of insects includes their development, anatomy, physiology, life history, behavior, environment, and classification. Why should we spend time studying insects? Why is entomology important to us? Although some people may think that the study of insects is a small, isolated field, entomology is important to all of us because of the wide range of influence insects have in our lives. Their effect is both direct and indirect, both positive and negative. Entomology gives people a better understanding of the environment, biology, and the world in which they live. An understanding of entomology is also needed to reduce the extensive economic losses in crop damage and health problems caused by insects.

### Uses of Insects

**Agriculture:** In agriculture, insects are considered harmful and beneficial. Agriculture includes any field involved in growing crops for food and fiber, horticulture (fruits, flowers, and ornamental plants), forestry (managing forests, wood production, and wood products), and animal science (raising and caring for animals whether as pets or for food production). Insects are one of the chief competitors for food and fiber. Each year insects cause millions of dollars in damage to field crops, vegetables, fruits, and fibers in all stages of growth, production, storage, processing, and distribution.

Insects are not just pests to our society. Many are beneficial to humans. Insects are an important part of

the food chain. Birds and fish eat insects directly to survive. Many mammals and reptiles feed on insects as well. The indirect contribution can be seen in the work of bees. Not only do bees make honey, but they also play an important role in pollinating plants. Some insects are helpful to humans by preying on and destroying other insects that are considered harmful. Another example of useful insects is the silkworm, which makes a valuable fiber for clothing and other items.

**Environmental sciences:** Besides their role in the agricultural fields, insects are very active in breaking down many of the substances in the environment. Many kinds of chemicals, minerals, and organic matter are broken down, recycled, and reused in the environment. Insects play an instrumental part in this degradation process, which is very important to the earth.

**Medicine:** Insects can transmit diseases by many methods. Insects are a very important part of the research to find out about diseases. This includes animal and plant diseases as well as human diseases.

Because insects reproduce so efficiently and can be handled so easily in large populations, they have been used extensively in genetic research. This contribution to science has provided researchers with a great wealth of knowledge about heredity, biological growth and development, and the causes and treatments of diseases.

**Construction:** Another large area of insect management is in building construction and maintenance. A knowledge of entomology is important when choosing the type of wood to be used in buildings and other structures. Termites cause much damage to wooden structures and building framing. Soil insects are an important consideration when constructing building foundations, roads, structural supports, and landscaping.

**Product development:** Insects are used in the research and development of many products used in society. Some of the most common products are cosmetics, shampoos, cleaning materials, food preservatives, manufacturing supplies, and medicines.

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## Careers in Entomology

Scientists devote much study to insects that affect plants or animals which are important to man. Scientists who specialize in studying insects are called *entomologists*. Entomologists are involved in a wide variety of professions, both directly and indirectly. Some careers require an extensive knowledge of entomology while other careers only require a general knowledge of insects. Many of these career areas overlap one another. One specialty may be used in many different ways in many different fields.

Entomologists can be grouped by their area of insect study. Most professional entomologists are engaged in some branch of *economic* or *applied* entomology. This is a very broad category that describes the basic focus of these individuals. They not only want to control the numbers of insects, but to increase those insect populations that are beneficial and to decrease those that are harmful to people's welfare. Economic and applied entomologists use the study of insects in a practical way. Other entomologists study insects solely to learn more about their life cycles and behaviors.

**Agricultural entomologists:** Agricultural entomologists study insects that affect the production of foods and fibers. These individuals work in areas of agriculture such as agronomy, animal science, horticulture, floriculture, forestry, and wood processing. Some of the careers as an agricultural entomologist follow.

- ◇ Crop scout – Scouts monitor crop fields and take samples of the types and quantities of insects present. This is important in determining the amount of potential damage which may be done by the insects. From this information, a producer is better able to select an appropriate insect management plan. Usually, attending a training program is the minimum requirement for a scout. However, experience and education in entomology will enhance an opportunity for a better job in scouting.
- ◇ Agricultural product dealer – Any background at all in entomology will help one as a product dealer. Dealers must keep up with a wide variety of agricultural products and how they work. Since insect

control is a major concern for producers, dealers are frequently asked for their suggestions and recommendations in selecting the products to be used.

- ◇ Pest controller – Individuals have a large selection of jobs as pest controllers. Pest controllers evaluate insect populations and damage, recommend insect management programs, implement these programs, apply insecticides, and dispose of any chemicals. Home care, industrial insect management, and termite control are leading employers in this area. Depending on the particular job responsibilities, individuals may need little or much formal education. Certain types of insecticides require special certification.
- ◇ Insecticide applicator – Insecticide applicators are responsible for the correct application and disposal of insecticides. This includes applications on the ground or by air, privately or commercially, and on domestic or public grounds. Usually, the applicator needs to attend a special training course to be certified.
- ◇ Researcher – There are many options in research involving insects. Most university and industrial research positions require a doctoral degree. To be a research assistant, a laboratory technician, or field technician, individuals may need a master's degree, a bachelor's degree, or less depending on the place of employment and the responsibilities of the position. Consultants may have any level of education, although a graduate degree is frequently required.
- ◇ Forester – Forest entomologists specialize in studying insects that affect different woods and how to properly treat these woods. A bachelor's degree is usually necessary.
- ◇ Greenhouse manager – Working in a greenhouse or any similar environment involves insect control. Some fruits and vegetables as well as flowers are grown and shipped to all parts of the country. A bachelor's degree or higher is standard at this management level. Technicians and assistants may be hired with less qualifications.

# Introduction to Entomology

**Entomology instructors:** Individuals may teach entomology at elementary, secondary, and postsecondary levels. An individual can be an educator in many areas of specialization. Different training levels are required depending on the educational setting and student level. A doctoral degree is frequently needed to teach in a university. High school and vocational teachers need a bachelor's degree. Some states require that high school teachers be certified in pesticide application as well.

**Medical and veterinary entomologists:** These entomologists are concerned with insects that influence the health of humans and animals. It is largely through the efforts of these scientists that insecticides have been developed to protect crops and to reduce the incidence of insect-borne diseases. Jobs in this area generally require a graduate degree in the area of medical specialization. The degree may or may not be in entomology, but extensive college training in entomology is necessary. It is possible to become a research assistant, laboratory technician, or teaching assistant with a bachelor's degree or perhaps even a 2-year degree. There are a variety of choices and flexibility in this area.

**Industrial entomologists:** Individuals work in the research and manufacture of many types of products for industrial and domestic use. There are some jobs available for individuals with a high school diploma and some technical training. Many other jobs will require additional training. A knowledge of insects is useful in the testing and development of products. Examples of products are cosmetics, shampoos, cleaning materials, food products, industrial supplies, medicines, and insecticides. Many products contain insecticides as a preservative or as part of the chemical formulation.

**Ecological entomologists:** These entomologists are concerned with making regulations and enforcing the standards for protecting the environment, public health, and safety. Proper waste disposal and treatment are also included. Usually a bachelor's degree or higher is necessary.

## Career Areas Enhanced by Entomology

There are many careers that do not require a professional degree in entomology, but they are enhanced by a general or working knowledge about insects. The job will determine how much knowledge about insects is required. Some occupations may require special licensing, such as in pesticide application. Occupations that benefit from a working knowledge of entomology include landscaping and turf management, animal and human medical care, food science, and biological science.

**Landscaping and turf management:** This area involves the care and maintenance of landscaped areas. People in this area take care of lawns and ornamental plants at domestic homes, public grounds, parks, golf courses, etc. Generally, a bachelor's degree or higher is required to be a supervisor. Less education is needed to be a technician or assistant. The job requirements will vary greatly depending on the size of the operation and the responsibilities one has. The area of pest control greatly overlaps here. Workers may need to have a pesticide certification if they apply certain insecticides.

**Animal and human medical care:** Areas of animal and human health care enhanced by a working knowledge of insects include medical assistants, research assistants, field technicians, horse groomers, livestock workers, and pet shop workers.

**Food science:** This is a large area involving any aspect of handling food. This includes processing, preservation, storage, packaging, transportation, and distribution of food for people or animals. People involved in food science also work in the development of new foods and serving methods. They work in restaurants or cafeterias and as dieticians. Some individuals work with agencies concerned with the regulation and enforcement of food quality and health and safety standards.

**Biological science:** This area includes all aspects of agricultural, ecological, and environmental sciences. For example, a conservationist needs to understand how changes in the environment affect insect populations.

# Entomology

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## Summary

Entomology is the study of insects. Entomologists study the development, anatomy, physiology, life history, behavior, environment, and classification of insects. The impact of insects on society is enormous. There are many fields that employ entomologists and many others that are enhanced by a working knowledge of insects.

## Credits

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