
Insect Behavior

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What is Insect behavior?



An overview of the insect world reveals **two characteristics**: **great diversity** and equally **great constancy**. On the one hand, there are over one million named insect species, with estimates ranging up to three million. **How can such a great diversity be explained?** Study of this basic question has become the domain of **evolutionary biology**. On the other hand, each kind of organism tends to reoccur in virtually the **same form** with the **same basic features** for generation after generation. **Why do they tend to show such constancy, such resistance to change?** The study of this question, in turn, is largely the domain of **genetics**. Together, these two great branches of biology—**evolution and genetics**—form a **powerful tool for the investigation of nearly every aspect of life**. This introductory chapter deals briefly with their application to the study of behavior and then turns to an overview of behavior as a field of study to provide a perspective for the chapters that follow.

What Is Insect Behavior?

A **flashing firefly** flits through the evening shadows. In a tree, a **caterpillar** pauses in its **feeding**, **stiffens**, and sways back and forth. Behind a stone, a cricket chirps, while nearby ants scurry along in precise single file.

Behavior can be simply defined as **what animals do**. More precisely, it is the **ways in which an organism adjusts to and interacts with its total environment**. As such, insect behavior encompasses the relationships an insect has with members of its own species, with members of other species, and with the physical environment. A species must behave in the 'right' ways in order to survive, and its members must survive (at least long enough to successfully reproduce) if it to be evolutionarily successful.

The term 'behavior' covers a very wide range of activities, and it can be helpful to recognize some subcategories. **General locomotion**, **grooming**, and **feeding**, for example, are essentially individual matters. These **maintenance activities** keep an insect in good shape but usually have little influence on others of its kind.

On the other hand, a broad range of **communication activities** are concerned with conveying information to, and influencing the activities of others. Often such actions are conspicuous and stereotyped. The firefly's flash and the cricket's chirp may have the same function, **to gain a mate**. The caterpillar in essence sends the predator world the message that it is not food. The ants share their message that travel along this particular trail is apt to be rewarding. But while the firefly, cricket, and ants are communicating with their own kind, the caterpillar obviously is not. Thus, insect communication signals come in two broad, somewhat overlapping categories; even when the method of signaling is the same, the results of intra-specific and interspecific communication are quite different.

The question 'what is insect behavior?' also can be answered another way. **Insect behavior** is, of course, a discipline **nested within the larger field of animal behavior study**. For many thousands of years, **humans and their ancestors** have keenly observed **animal habits** and **characteristics** for entirely practical reasons, ranging from the need to hunt game animals to the desirability of avoiding biting insects and encouraging useful ones.

-Early Greek and Roman scholars such as **Aristotle and Pliny** often wrote at some length about the natural world, including its insect inhabitants.

-However, the rigorous scientific study of animal behavior only began in the latter part of the **nineteenth century**, with the three major developments

- Publication of the **theory of evolution by natural selection**.
- Development of a systematic comparative method**
- Studies in genetics and inheritance**.

In the 1930s, **Darwinian natural selection** was combined with Mendelian **inheritance** to form what is called '**the modern evolutionary synthesis**'

From these beginnings, different major research areas arose within the general field of animal behavior.

- 1) One approach concentrated on the mechanisms controlling behavior; this became the fields of **comparative animal psychology and physiology**.
- 2) A second approach concentrated on the functional significance and evolution of behavioral traits, especially in natural settings; this became the field of **ethology**.
- 3) Somewhat later, a third area of study concentrated upon the biological relationships between an organism and its environment, especially from an ecological and evolutionary viewpoint; this became the field of **behavioral ecology**.
- 4) Most recently, significant technological genetic advances have been enabling and supporting the emergence of **behavioral genetics and behavioral genomics** as new research concentrations.

In this way, four great disciplines have contributed to the study of behavior—**physiology (particularly neurophysiology), ecology, ethology, and psychology**.