

Signalers and Receivers

MECHANISMS AND EVOLUTION OF
ARTHROPOD COMMUNICATION



MICHAEL D. GREENFIELD

Arthropods have occupied a central position in the study of animal communication from the earliest natural history observations to current neuroethological, biochemical, genetic, and theoretical investigations. *Signalers and Receivers: Mechanisms and Evolution of Arthropod Communication* presents the story of how this important group of animals use pheromones, sound, vibration, and light for sexual and social communication.

In many ways, arthropod communication differs fundamentally from communication in higher vertebrates. *Signalers and Receivers* describes how the small to minute body sizes of most arthropods pose actual physical problems for sending and receiving information along acoustic and optical channels. Consequently, sound and visual communication operate under severe constraints and assume strange forms that we may find difficult to imagine. Chemical signaling, however, is relatively immune to these effects of scale, and this channel is by far the predominant one among arthropods. Particularly among social species, a veritable lexicon of chemical signals—and extreme sensitivity to them—is found.

At the same time, communication in arthropods also bears some striking parallels with vertebrates. These similarities are all the more remarkable when the length of their separate evolutionary histories, 550 million years at the very minimum, is considered. In particular, evolutionary processes involved in sexual selection and speciation have led to nearly identical patterns of signaling and signal evaluation in both groups, and many of our recent advances in understanding these evolutionary processes are derived from intensive studies of signaling in certain arthropod species. *Signalers and Receivers* presents the latest theoretical and experimental findings from these studies and suggests that close parallels between the two groups reflect a very limited number of solutions to problems in behavior that are available within the confines of physical laws.

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Communication

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