The Insect as Chemist

Thomas Eisner

Cornell University, Section of Neurobiology & Behavior, W347 Mudd Hall, Ithaca, NY 14853

Insects are among nature's most versatile chemists. Throughout life and in virtually every interactive context, they depend on chemicals for survival. Insects use chemicals to lure their mates, defend their offspring, deter their enemies, and combat disease. They commonly produce the required substances themselves but also may appropriate them from exogenous sources. Among terrestrial animals, they are doubtless the most chemically skilled.

Entomologists have long known that chemicals play crucial roles in the mediation of insect activities. Thanks to the current interest of chemists in such compounds, dozens of pheromones and defensive substances from insects have now been isolated and characterized. The findings have been enlightening and have contributed greatly to our understanding of the adaptive success of insects.

The study of insect chemistry—although by now a thriving component of the field of chemical ecology—has only begun. There are several million species of insects on earth, far more than the million or so that have been described. The fraction that has been examined chemically comprises far less than 1% of the total. What has been learned is fascinating but hardly indicative of the full range of chemical riches that insects might still have in store.

My purpose here is to provide an account of some ways in which insects operate as chemists and to make a plea for the increased chemical investigation of insects. What we are bound to learn through such study is beyond imagining and almost certainly would be of eventual practical use.