(that is, behavior suited to a particular recurrent set of circumstances).

Consider a honeybee that remembers for life (no consciousness is implied) the association made between a flower scent or color and a food reward after just one or two trials. With but a few sightings at different times it interpolates (and learns) the sun's path through the heavens and uses it as a landmark. It also uses fixed landmarks to guide it back to its hive, after having committed them to memory after one orientation flight. Consider now a platylabine ichneumon wasp, a hymenopterous relative of the bee, that has no home base. One of its main missions in life is to track down a rare and highly camouflaged geometrid caterpillar mimicking a twig, in order to inject its egg into it. The bee requires elaborate mechanisms of learning, as are being elucidated by Randolf Menzel and associates, who contribute a paper to the volume. Many of these mechanisms may well be much like those we ourselves use. And though the wasp seems to rely on "instinctive" behavior, it may, like the bee, also be endowed with specific, or, in James L. Gould's term, "customized" learning predispositions. As Daniel R. Papaj points out in his contribution, an "instinct" could be generated either when the insect becomes so congenitally predisposed to a stimulus that response cannot be improved through learning or when it can learn so quickly that a single experience is sufficient for the expression of the appropriate behavior.

Insect Learning contains 14 chapters by 22 authors including physiologists, field ecologists, and theoreticians. The authors share an evolutionary perspective, but, as is typical of such community efforts, there is lack of consistency. Even definitions of learning and adaptation are not uniform, as each author has his or her own perspective on the issues. As the editors point out, however, "such incongruities form the core of academic debate" and "it is more in the collective interest for editors to foster debate than to feign consensus."

Most authors beat the drum for more studies in order to gain "better understanding." But it is generally not clear precisely what the biological puzzle is that is in need of a solution. We are all too often left with debate over semantics. On the other hand, attempts at hard generalizations are often futile and sometimes divisive, since adaptation to diverse environments is necessarily a matter of differences. As one example consider the debate over whether particular learning traits are recent adaptations or are traits retained from evolutionary ancestors. Legs and wings have not evolved *de novo* in each species, yet they are highly adaptive features because they enabled those organisms that evolved them to radiate profusely. Learning predispositions need not be viewed in a special light. To do so leads to chicken-versus-egg arguments. Surely specific morphological, physiological, and behavioral capacities such as learning ability, predispose animals to occupy specific ecological niches, and the occupation of these niches in turn promotes further evolution not only in the organisms themselves but sometimes also in others. For example, it is intriguing to note that the "cognitive" abilities of bees and other insects to distinguish colors, scents, and shapes and to learn and remember them are now reflected in the variety of flowers so pleasing to our senses. *Insect Learning* will be a valuable reference for anyone wishing an entree to the literature and to the ideas and research of many of the practitioners of a wide-ranging field.

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