Communication in Honeybees

Zoologists have studied honeybees' exploitation of food sources for decades, but its study still offers important challenges. One area of research concerns the extent to which honeybees communicate the location of food to other bees. A worker bee that returns to a hive laden with nectar and pollen stimulates other experienced workers to leave the hive and visit productive pollen and nectar sources. Inexperienced workers are also recruited to leave the hive and search for nectar and pollen, but stronger stimuli are needed to elicit their searching behavior. In the darkness of the hive, the incoming bee performs what researchers have described as a round dance and a waggle dance. Throughout the dancing, other workers contact the dancing bee with their antennae and mouthparts, sensing the odors associated with pollen, nectar, and other objects in the vicinity of the incoming bee's food source. During the dance, the incoming bee moves first in a semicircle to the left, then in a straight course to the starting point. Next, she follows a semicircle to the right, and then another straight course to the starting point. During the linear parts of the dance, the bee waggles her abdomen. These stimuli apparently encourage inexperienced workers to leave the hive and begin searching for food. As described in the text, their search relies heavily on olfaction, and pollen and nectar similar to what the dancing bee brought back to the hive tend to attract workers.

The round and waggle dances may also convey information on location of a food source. Biologists have found that the dance contains information regarding the direction and distance of a food source from the hive. The angle that the waggle dance makes with the vertical of the comb approximates the angle between the sun and the food source (figure 1). Similarly, the number of straight line runs per unit time, the duration of sounds made during the dance, and the number of waggles during the dance vary with the distance of the food source from the hive.

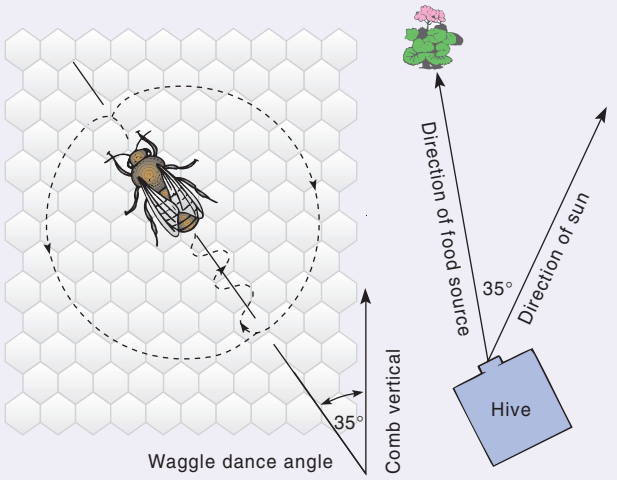

FIGURE 1 **Insect Communication.** The waggle dance of the honeybee. *From:* "A LIFE OF INVERTEBRATES" © *1979 W. D. Russell-Hunter.*

These observations indicate that bees communicate information regarding distance, direction, and kind of food to other bees after a foraging trip. Thus, the exploitation of pollen and nectar is a very efficient process and is evidence of the highly evolved nature of the honeybee colony.