Smoke

Communication among the tens of thousands of individuals in a colony of honeybees occurs mostly in the near-total darkness of the hive. With so many to reach with any message of importance for the group, a distributive system has evolved to spread the word. Specific chemicals, pheromones, secreted by various glands in the honeybee - and detected by the sense of smell in their antennae - play a large role in coordination of hive activity.

On the front line of defense of the hive - from those who might be attracted to the honey within - are individuals serving as guard bees. If they detect significant threat, a gland in the abdomen, near the sting shaft and also the mandibular gland secrete a number of compounds, including *isopentyl acetate*, detection of which by their hivemates elicits alarm behavior**:** *flying, locating disturbance, pursuing, and stinging*. These are honeybees receiving a specific stimulus, which elicits a specific response **...** a straightforward neurologic paradigm of behavior. In this sense, honeybee defensiveness and aggression (flying, pursuing, stinging) should be understood as individuals doing what they have been told to do, and following a programmed pattern of behavior.

Long ago, humans learned to control and use fire. Sometime later, it was observed that introducing smoke in the vicinity of a honeybee hive greatly suppressed defensive and aggressive behavior, allowing harvesting of honey from the combs. Only much more recently has the complex pheromonal environment of the hive and its colony been understood and have we understood *why* beekeepers are able to enter the tightly-ordered world of the hive to look and to take without taking extraordinary defensive measures themselves.

When smoke interferes with their communication network, honeybees tend *not* to fly and pursue and sting **...** *because no one is telling them to do so*.