

# Cyprian honeybees kill their enemy by smothering them

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For the first time, researchers have discovered that when Cyprian honeybees mob and kill their arch enemy, the Oriental hornet, the cause of death is asphyxiation. They reported their findings in the September 18, 2007, issue of *Current Biology*.

“Here, for the first time we detail an amazing defense strategy, namely asphyxia-balling, by which Cyprian honeybees mob the hornet and smother it to death,” said Gérard Arnold of CNRS in Gif-sur-Yvette, France. “The domestic bee has never ceased surprising us.”

Previous studies showed that Asian honeybees similarly attack hornets, leading the predatory insects to die from the heat inside the ball of bees. That murderous “thermo-balling” strategy is used against invaders, mainly hornets, armored with a hard cuticle that is impenetrable to the bees’ most familiar weapon: their stingers.

However, scientists knew from earlier studies that various subspecies of the domestic honeybee (*Apis mellifera*), which form comparable balls around hornets, couldn’t raise the temperature high enough to finish off the heat-tolerant hornets, explained the study’s first author, Alexandros Papachristoforou of Aristotle University of Thessaloniki, Greece. It had been shown that the mobbing bees go for the gut, targeting the hornets’ abdomen, which is critical for the insects’ ability to breathe. By pumping their abdominal muscles, the hornets bring in air through small openings called spiracles, which are covered by structures known as tergites when air is released.

To find out whether the bees could be blocking the hornets' breathing, the researchers monitored their respiration under normal conditions and those designed to mimic the balling behavior, in which they covered either two or four of the insects' tergites. The hornets' respiration declined by about 33 and 87 percent, respectively, in these experiments.

Next, they tested whether the bees could kill hornets whose tergites were held open with tiny plastic blocks. They found that the bees took twice as long to kill such manipulated hornets.

“To kill the high-temperature-tolerant hornet, Cyprian honeybees have developed an alternate strategy to thermo-balling and stinging,” Arnold said. “They appear to have identified the hornets' ‘Achilles heel’ by asphyxiating the predator. This ability indicates that under extreme conditions, honeybees can present a high level of adaptation in order to survive.”

Source: Cell Press

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