

Honey bee sting: Key aspect of bee defense against hornets

June 7 2021, by Zhang Nannan



Figure 1. (A) An *A. cerana* guard attempting to sting (yellow circle) a *V. velutina* worker that has already been naturally stung in its thorax by another *A. cerana* (red circle). (B) An *A. mellifera* sting left in the veracervix of a fresh dead hornet (red circle). (C) A hornet restrained in wax that is about to be experimentally stung by an *A. mellifera* guard.

Heat balling is an ingenious defense that has co-evolved to protect multiple honey bee species from hornet predators. Previous studies have shown that high temperature, increased concentration of CO₂, and blockage of the hornet's respiratory system contribute to hornet death. However, the role of stinging by bees and hornets in heat balling remains relatively unexplored.

In a study published in *Biology*, researchers from the Xishuangbanna Tropical Botanical Garden (XTBG) demonstrated that honey bee stings

can kill a [hornet](#) predator by stinging the neck-like veracervix, and the combination of stinging and the high temperature generated by [heat](#) balling also contributed to hornet death.

The researchers surveyed dead hornets near and inside honey bee colonies and found stings in multiple locations in hornet bodies, but most frequently in an intersegmental neck-like region, the veracervix.

They found that the hornet survival decreased as the number of bee stings increased. Both heat and sting type significantly decreased hornet survival. However, there was no significant interaction of heat and [sting](#) type and thus no synergistic effect.

Moreover, temperature played a key role. When the hornets heated to 44 degrees Celsius, the average heat ball temperature, the survival reduced 57 percent compared to being stung and maintained at ambient air temperature (21 degrees Celsius). Increased [temperature](#) alone significantly reduced hornet survival by 25 percent at three hours.

Finally, none of the hornets stung in the veracervix retained the bee stings. Therefore, it may underestimate the role of bee stinging by simply censuring the number of stings retained on dead hornets.

"Our study provides the first evidence that [honey](#) bee stings are a key aspect of bee defense against hornets" said Tan Ken, principal investigator of the study.

More information: Gaoying Gu et al, Lethality of Honey Bee Stings to Heavily Armored Hornets, *Biology* (2021). [DOI: 10.3390/biology10060484](#)

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