Honeybees shown to speak directly to hornets

Honeybee. Credit: James Ward

(PhysOrg.com) -- Most higher order animals have some means for “speaking” with enemies or predators. Dogs and cats growl and hiss for example when threatened to let others know not to mess with them. Lower order organisms on the other hand, don’t generally have such a direct means for such communication, thus when an example is found, it’s generally unique. That’s certainly the case for *Apis cerana*, an Asian honeybee, as a team of international researchers has found. This species of bee has figured out a way to speak very clearly to their gravest threat, as the researchers describe in their paper published in *Animal Behavior*, by banding together and shaking their abdomens.

Abdomen shaking by bees has been well documented, but not in ways that measure its deeper purpose. Doing so creates a visually striking image as well as a lot of noise. In this study, the research team discovered that the honeybees they were studying did so specifically to warn approaching hornets to stay away. They found this out by setting up a special experiment.

To find out if the bees simply banded and shook whenever any type of animal or insect happened by, or if the behavior was meant as a clear signal just for hornets, the researchers set up some of the hornets on tethers so that they could control how close they were moved to a honeybee nest. They next measured the degree of banding together and shaking demonstrated by the honeybees as a hornet approached. They found that the closer the hornets were moved to the nest, the more the honeybees shook, creating a louder and louder sound in the process, behavior that generally convinces hornets in the wild to retreat. Conversely, when the researchers performed the same experiment with a small butterfly that has similar colorings to a hornet, the honeybees didn’t bother shaking at all. This proves, they say, that the message is aimed directly at the hornet.

And no wonder, banding together is how honeybees kill hornets. If one is foolish enough to venture into the nest despite the warning, it is crowded to death, via heat and suffocation, like fans at an out of control sporting event. To adapt, the hornets have had to resort to learning to kill individual honeybees as they are out away from the nest flying around, a much more difficult task.

More information: An 'I see you' prey - predator signal between the Asian honeybee, Apis cerana, and the hornet, Vespa velutina, *Animal Behaviour*, In Press. http://dx.doi.org/ ... .2011.12.031 **Abstract**
When a prey animal displays to a predator, the prey benefits because it is less likely to be attacked, and the predator benefits because it can break off an attack that is unlikely to succeed because the prey has been alerted. We argue that an 'I see you' signal has coevolved between the Asian hive bee, Apis cerana, and its hornet predator, Vespa velutina. When a hornet approaches a bee colony, guards perform a shaking

movement that repels the hornet. To test whether this is an 'I see you' display, we exposed colonies to free-flying and tethered hornets and tethered butterflies. The intensity of the shaking was correlated with the hornet's proximity, whereas guard bees barely responded to a nonthreatening butterfly. The signal is likely to be honest, because the bees can kill the hornet by collective mobbing if it lands on the entrance. The Western honeybee, Apis mellifera, which has not evolved in the presence of Asian hornets, does not produce the signal and is ineffective at killing hornets by collective mobbing. We also found that hornets were more successful at catching A. mellifera than A. cerana bees at the hive entrance.