

Giant honeybees may act like a collective lung to beat the heat

The air conditioning is live

Imagebroker, Christian Hatter/FLPA

By Emily Benson

It's practically a hive lung. When it's hot, Asian giant honeybees may chill their colonies through synchronised movements that suck cool air into the nest, then push warm air out.

Unlike common honeybees, which nest in cavities such as hollow tree trunks, giant honeybees build large combs in the open.

To protect the comb, which can grow to 2 metres long, up to seven layers of bees surround it, forming a living insulating cloak called the "bee curtain". It can only provide limited shelter from the elements, however. Keeping cool on toasty days requires the cooperation of the entire colony, says Gerald Kastberger of the University of Graz, Austria.

Different types of honeybees keep cool by spewing water around their nests, beating their wings like fans, and even flying off en masse to dump excess heat through defecation.

To see how giant honeybees cope with hot weather, Kastberger and his colleagues filmed nine colonies near Chitwan National Park in Nepal with infrared video cameras.

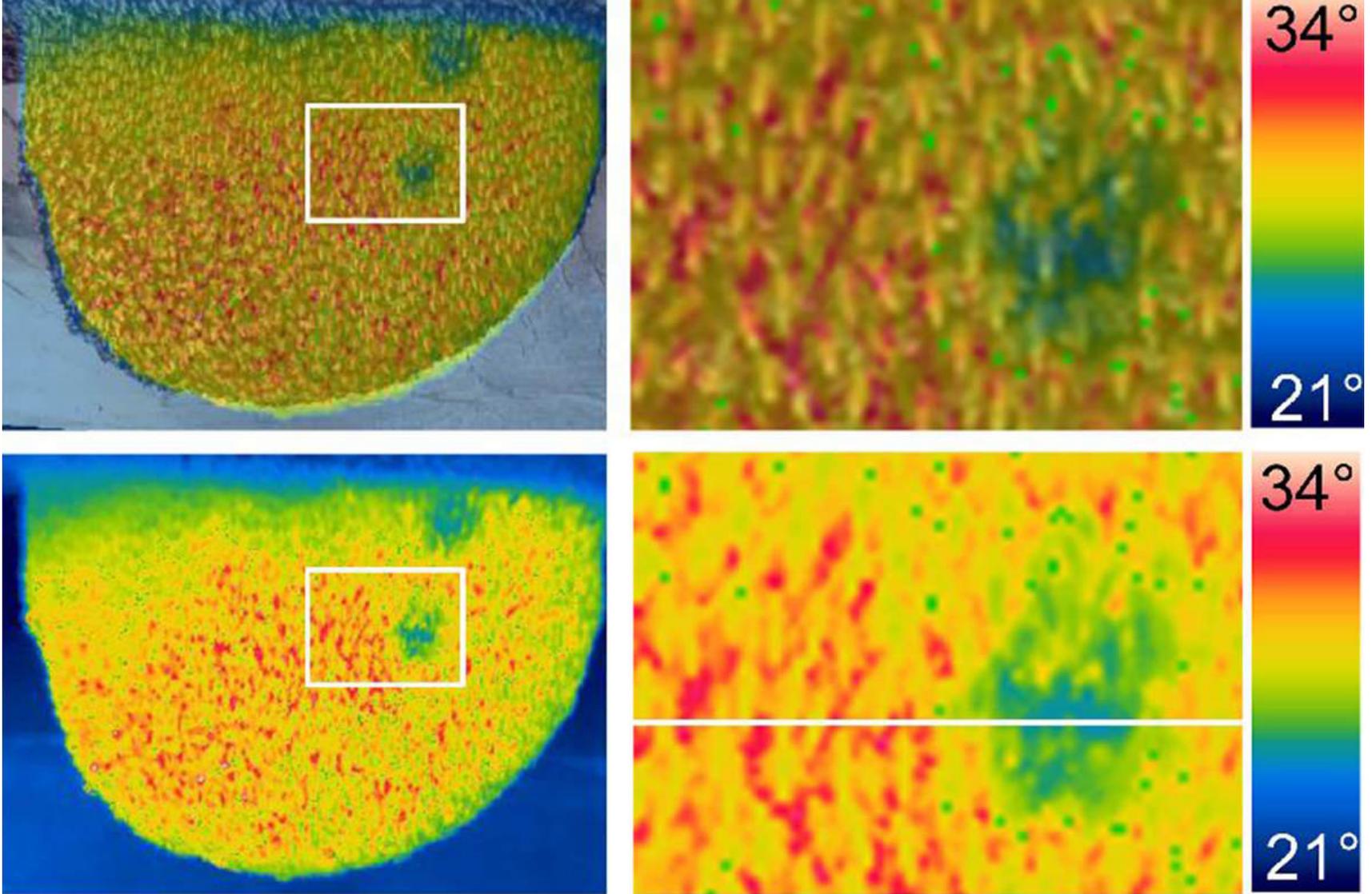
The footage revealed small cool spots on the surface of the bee curtain (see image above) that appeared and faded away within a few minutes. The researchers spied more cool spots during the hottest part of the day, with up to about half a dozen appearing per half-hour at one nest.

The team suggest that the spots may be areas where cooler air from outside the nest is being drawn into the overheated interior, like a breath entering through your nose. "The cooler nest spots are quite analogous to our nostrils," Kastberger says.

The combs also vibrated rapidly as well as more slowly. The researchers found that the fast vibrations were linked to the bees' "shimmering" – a defensive manoeuvre in which individual bees raise their abdomens in turn, much like sports fans performing the Mexican wave.

Kastberger and his colleagues speculate that the slower oscillations are the expansion and contraction of the colony itself as it pulls in cooler outside air, then pushes out warmed air.

Legs against comb



The innermost members of the bee curtain might push their legs against the comb, creating a cavity between themselves and the comb that fresh air fills by rushing through tunnels in the curtain. The tunnel openings correspond to the cool spots detected on the surface of the nest. When the bees relax, the curtain should hug the comb again, forcing stale air out.

The theory is plausible, but direct evidence of flexing bees is lacking, says Benjamin Oldroyd at the University of Sydney in Australia.

The nature of the nests themselves makes observing the inner layers of bees difficult, says Gard Otis at the University of Guelph in Ontario, Canada. “You can never see what’s going on underneath this curtain of bees.” But the study has enhanced our understanding of giant honeybee behaviour, he says.

“We didn’t know before that there were these little cool patches that wink on and off over time,” Otis says. “It adds another layer of subtlety and complexity to what they do.”

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