

# Unlike us, honeybees naturally make 'quick switch' in their biological clocks: research

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Honeybee. Credit: Adam Siegel

Unlike humans, honey bees, when thrown into highly time-altered new societal roles, are able to alter their biological rhythms with alacrity, enabling them to make a successful "quick switch" in their daily routines, according to research carried out at the Hebrew University of Jerusalem.

With people, on the other hand, disturbances to their biological clocks by drastic changes in their daily schedules are known to cause problems -- for example for shift workers and for new parents of crying, fitful [babies](#). Disturbance of the [biological clock](#) – the circadian rhythm – can also contribute to mood disorders. On a less severe scale, international

air travelers all know of the "jet lag" disturbance to their biological clocks caused by traveling across several time zones.

Bees, however, have now been shown to be highly resilient to such change. When removed from their usual roles in the hive, the bees were seen to quickly and drastically change their [biological rhythms](#), according to a study by Prof. Guy Bloch of the Department of Ecology, Evolution and Behavior of the Alexander Silberman Institute of Life Sciences at the Hebrew University. His research is published in the current edition of *The Journal of Neuroscience*.

The changes, he found, were evident in both the bees' behavior and in the "clock genes" that drive their internal biological clocks. These findings indicate that social environment had a significant effect on both behaviour and physiology.

Circadian rhythm, the body's "internal clock," regulates daily functions. A few "clock genes" control many actions, including the time of sleeping, eating and drinking, temperature regulation and hormone fluctuations. However, exactly how that clock is affected by -- and affects -- social interactions with other animals is unknown.

Bloch and his colleagues Dr. Yair Shemesh, Ada Eban-Rothschild, and Mira Cohen chose to study bees in part because of their complex social environment. One role in bee society is the "nurse" -- bees that are busy round the clock caring for larvae. This activity pattern is different from other bees and animals, whose levels rise and fall throughout the day.

Bloch and his team thought that changing the nurse bees' social environment might alter their activity levels, so they separated them from their larvae. The researchers found that the bees' cellular rhythms and behavior completely changed, matching a more typical circadian cycle. The opposite also was true, when other bees were transferred into

a nursing function.

"Our findings show that circadian rhythms of honey bees are altered by signals from the brood that are transferred by close or direct contact," Bloch said. "This flexibility in the bees' clock is striking, given that humans and most other animals studied cannot sustain long periods of around-the-clock activity without deterioration in performance and an increase in disease."

Because [bees](#) and mammals' circadian clocks use the same clock genes and are similarly organized, the question arises as to whether the clocks of other animals also strongly depend on their social environments. The next step is to find just how social interactions influence gene expressions. Further research into this question may have implications for humans who suffer from disturbances in their behavioral, sleeping and waking cycles.

Provided by Hebrew University of Jerusalem

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