

Study shows bee brains process positive and negative experiences differently

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A team of researchers at the University of Illinois at Urbana-Champaign has found that when bees experience positive versus negative events, their brains process and remember the events differently. In their paper published in *Proceedings of the Royal Society B*, the group describes their study of bee brain processing and memory retention and what they found.

Scientists have known for a long time that vertebrates handle positive and [negative events](#) differently, storing and retrieving those memories in their brains differently, as well. In this effort, the researchers wanted to know if the same could be said of invertebrates such as the common honeybee. To find out, they exposed test bees to positive or negative events and then studied gene expression in a part of their brain known as the mushroom body—an area involved in processing [sensory information](#), learning and memory.

More specifically, the researchers exposed the bees to positive experiences such as tending to their young or [negative experiences](#) such as dealing with a threat like an enemy or a predator.

They then quickly froze the [bees](#) to keep the brain chemical state intact. Next, they studied the brain chemistry related to [gene expression](#) in samples taken from the mushroom bodies, focusing on genes that prior research has shown respond very quickly to external stimuli. The team then looked for differences in other parts of the mushroom bodies after the bee had been exposed to a positive or negative event. They report that they did find differences between the two, which, they suggest, indicates that bee brains process and store memories of the two types of events differently. The researchers were surprised by the results, considering the very small size of the bee [brain](#).

The researchers suggest their findings could lead to a better understanding of social behavior in invertebrates and how they respond to different sorts of stimuli. They also note that because of the two types of memory involved in the two types of events, there is a link between vertebrate and invertebrate cognition despite the two groups diverging approximately 600 million years ago.

More information: Ian M. Traniello et al. Valence of social information is encoded in different subpopulations of mushroom body Kenyon cells in the honeybee brain, *Proceedings of the Royal Society B: Biological Sciences* (2019). [DOI: 10.1098/rspb.2019.0901](#)

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