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Mice proved the ability to associate stimuli with memories even under anaesthetics
Halsek

Smell Plays a Crucial Part in Long-term Memories

Mice remembered smells they had been subjected to while sleeping

A new scientific study endeavored to discover exactly how smell contributes to long-term memory formation. People usually have sudden recollection of past events when entering a room where a particular smell is present. Some reported that this reminded them of events or people that had been part of their life as far as a few decades before. Knowing that, researchers at the Duke University Medical Center set out to discover exactly what makes that happen on a cellular level.

 They began their study on mice, by sedating them and then forming new memories for them while the creatures were asleep, by using a hormone known as noradrenaline, which is usually associated with strong emotions, such as fear and joy. Then, when subjects were up and about again, certain stimuli, previously associated with the generated memories, were released into their cages - and the mice reacted.

 The researchers say this has something to do with the fact that noradrenaline also influences the olfactory bulb in the brain, a nervous center that controls the nasal region and the smell receptors. By associating a certain smell with a situation, scientists say that whenever the smell is present, the situation will spring into the conscious mind uninvited. This was the basis of Pavlov's experiment, who trained a dog to expect food after a bell rang.

 "When an animal forms a strong memory about another, it is reliant on odor cues and noradrenaline. Both need to be present at the same time in order for the memory to be formed. Long-term memories created under these conditions often result in a permanent change in behavior," says lead author Stephen Shea, Ph.D.

 The main step forward that this experiment hinted at was that memory and other long-term associations could take place even when the mice were sleeping, which shows that the unconscious part of the brain is very active and can discern and interpret outside stimuli even when the subject is fast asleep.