New insights into how the brain perceives and processes odors

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New research makes advances in understanding how smells are perceived and represented in the brain. The findings were presented at Neuroscience 2019, the annual meeting of the Society for Neuroscience and the world's largest source of emerging news about brain science and health.

Olfactory cues provide essential information for finding food, navigation, predator avoidance, and social interactions, among other functions. Yet our understanding of how the brain perceives and processes smells lags behind our understanding of the neural basis of other senses, such as vision.

Today's new findings show that:

- Neurons in early odor-processing areas of mice respond quickly to dynamic features of airborne odors, which may help the brain track sources of odor molecules in complex environments (Suzanne Lewis, University of Washington).
- Fast sniffing can improve the ability of mice to focus on the most relevant information about an odor to track its source (Roman Shusterman, University of Oregon Institute of Neuroscience).
- In mice, odors can serve as landmarks to guide navigation by increasing the number of cells that show location-specific activity in the hippocampus, a brain area important for spatial navigation (Walter Fischler, Columbia University).
- By mapping neuronal connections using DNA sequencing,

scientists uncovered the building blocks of an olfactory circuit in mice that appears to send odor information to multiple different brain areas (Yushu Chen, Cold Spring Harbor Laboratory).
- Individual scents are represented in the brains of mice by timed sequences of cell activation, in which both the cells activated and the order in which they are turned on are important (Dmitry Rinberg, New York University Langone Health).

"The sense of smell is one of the last mysteries in sensory neuroscience," said Alexander Fleischmann, Ph.D., a professor at Brown University who studies sensory perception and behavior. "This research advances our understanding of how the brain perceives, represents and navigates a complex olfactory environment."

More information: Related Neuroscience 2019 Presentation
Minisymposium: Sensory Circuits for Vision and Smell: Integrating Molecular, Anatomical, and Functional Maps
Tuesday, Oct. 22, 8:30 - 11:00 a.m., Room S105

Provided by Society for Neuroscience