# Humans, flies smell alike, neurobiologists find

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The nose knows – whether it's on a fruit fly or a human. And while it would seem that how a fruit fly judges odors should differ from how a human smells, new research from Rockefeller University finds that at the neurobiological level, the two organisms have more in common than one might expect.

While it is very easy to ask a person about an odor – how intense it is, what it is similar to – it is slightly harder with an insect. "It is not known in much detail how these insects respond behaviorally to odors," says Andreas Keller, first author of the paper and a postdoc in the laboratory of Chemers Family Associate Professor Leslie Vosshall. Keller designed experiments to look at exactly how a single fly would behave when exposed to different odors. He and Vosshall found that both flies and humans judge odor intensity the same way, but differ in their judgment of quality.

In flies, as in humans, the olfactory system is composed of nerve cells, each of which expresses an odorant receptor. Each receptor recognizes a small set of odors and it is the combination of the nerves that respond to each odor that generates our, or the fruit fly's, reaction to the smell. Each animal has a different number of these odorant receptors – there are 1,200 in mice, 400 in humans and 61 in fruit flies. Vosshall and Keller wanted to know how it is that humans and fruit flies can coexist and develop such very different numbers of odorant receptors.

"It is not well understood how the varying numbers of odorant receptors

impact odor perception across the different species," says Vosshall. "Our research found that while determining the intensity of an odor is conserved in humans and flies, odors that smell similar to a human do not necessarily smell similar to a fly." There may be fundamental variations in the properties of the fly and human olfactory systems that cause the difference.

Vosshall and Keller also saw that the contribution of a specific odorant receptor could not be predicted based on its physiological function. When they genetically removed single odorant receptors from a fly they could not predict how that would change the fly's behavior. "It may be that by removing just one receptor it changes the whole olfactory system and produces an entirely new odor precept," says Vosshall. "Investigating how a fruit fly experiences odors can provide us with clues to our own subjective experiences of smell."

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