Researchers discover generic 'white' odor Laurax

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(Medical Xpress)—Researchers working at the Weizmann Institute of Science in Israel have discovered that there exists an odor analog of the color white and the sound of white noise. They've been conducting studies on the odor, which they've named Laurax and have published a paper in the *Proceedings of the National Academy of Sciences* describing their results.

Most people are aware of white noise and the color white – both come about from the blending of many ingredients. White noise is what people hear when multiple tones are played at once. Similarly, the color white comes about when multiple wavelengths converge. The research team in Israel wanted to know if there is a similar phenomenon with odors so the set up a series of experiments to find out.

First, they concocted 86 odorants that represented the known olfactory spectrum in such a way as to make them all equally intense. From those they took small samples and mixed them together to create a variety of odor samples, with amounts of each of the basic odorants varying from 1 to 43. They then presented the samples to a group of 59 volunteers who were asked to rate pairs of the samples as to how close they smelled to one another.

In analyzing the results, the researchers found that as the number of odorants in each sample increased, the more difficulty the volunteers had in telling the difference between them. As the number approached 30, they found that most couldn't tell the difference at all, even if none of

the odorants were the same. In addition, the odor that arose at such levels became distinct itself, which the researchers named, Laurax.

To learn more about the new generic odor, the team conducted another experiment where they asked volunteers to sniff one of four samples of Laurax over a period of three days to familiarize them with it. On the fourth day they were asked to sniff four mixtures and label them as Laurax or three other names that had been invented for the experiment. The researchers found that the volunteers were more likely to label a sample as Laurax if it had a high number of odorants in it, and as the odorants approached 30, most were inclined to give it that generic label. The researchers also found that most of the volunteers could tell the difference between different mixes of Laurax, similar to the way most can distinguish different shades of white.

More information: Weiss, T. et al., Perceptual convergence of multi-component mixtures in olfaction implies an olfactory white. *Proceedings of the National Academy of Sciences,* November 19, 2012. DOI: 10.1073/pnas.1208110109

Abstract
In vision, two mixtures, each containing an independent set of many different wavelengths, may produce a common color percept termed "white." In audition, two mixtures, each containing an independent set of many different frequencies, may produce a common perceptual hum termed "white noise." Visual and auditory whites emerge upon two conditions: when the mixture components span stimulus space, and when they are of equal intensity. We hypothesized that if we apply these same conditions to odorant mixtures, "whiteness" may emerge in olfaction as well. We selected 86 molecules that span olfactory stimulus space and individually diluted them to a point of about equal intensity. We then prepared various odorant mixtures, each containing various numbers of molecular components, and asked human participants to rate the

perceptual similarity of such mixture pairs. We found that as we increased the number of nonoverlapping, equal-intensity components in odorant mixtures, the mixtures became more similar to each other, despite not having a single component in common. With ~30 components, most mixtures smelled alike. After participants were acquainted with a novel, arbitrarily named mixture of ~30 equal-intensity components, they later applied this name more readily to other novel mixtures of ~30 equal-intensity components spanning stimulus space, but not to mixtures containing fewer components or to mixtures that did not span stimulus space. We conclude that a common olfactory percept, "olfactory white," is associated with mixtures of ~30 or more equal-intensity components that span stimulus space, implying that olfactory representations are of features of molecules rather than of molecular identity.

Press release