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Animal-to-Animal Variation in Odor Preference and Neural Representation of Odors KYLE HONEGGER, MATTHEW SMITH, Harvard University, GLENN TURNER, HHMI, Janelia Farm Research Campus, BENJAMIN DE BIVORT, Harvard University — Across any population of animals, individuals exhibit diverse behaviors and reactions to sensory stimuli like tastes and odors. While idiosyncratic behavior is ubiquitous, its biological basis is poorly understood. In this talk, I will present evidence that individual fruit flies (Drosophila melanogaster) display idiosyncratic olfactory behaviors and discuss our ongoing efforts to map these behavioral differences to variation in neural circuits. Using a high-throughput, single-fly assay for odor preference, we have demonstrated that highly inbred flies display substantial animal-to-animal variability, beyond that expected from experimental error, and that these preferences persist over days. Using in vivo two-photon calcium imaging, we are beginning to examine the idiosyncrasy of neural coding in the fly olfactory pathway and find that the odor responses of individual processing channels in the antennal lobe can vary substantially from fly to fly. These results imply that individual differences in neural coding may be used to predict the idiosyncratic behavior of an individual - a hypothesis we are currently testing by imaging neural activity from flies after measuring their odor preferences.

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