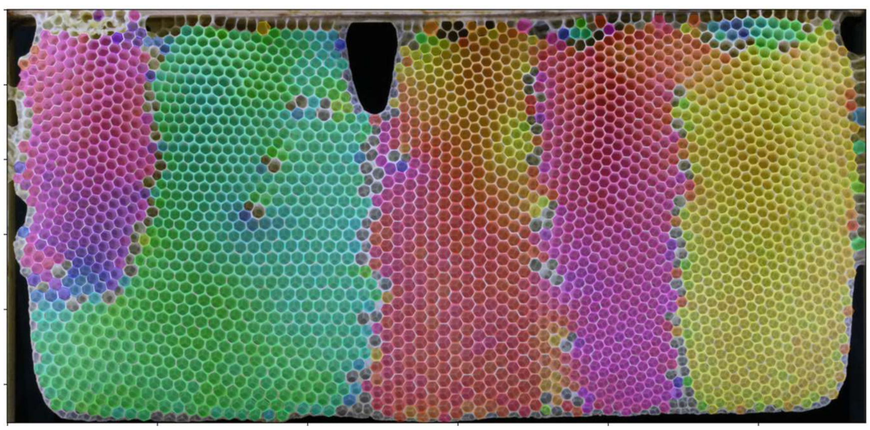
Biology Seminar

Speaker: Michael Smith, Ph.D.
Auburn University | Assistant Professor | Department of Biological Sciences
https://smithbeelab.com/

Nest design, construction, and spatial organization in the superorganism

Wednesday April 17, 2024 | 12:00PM PDT | HCK 132



An organism's appearance is the result of evolutionary pressures, and those same pressures apply to the structures organisms build, such as nests. Superorganism nests function as extended phenotypes to perform key biological processes, to survive, grow, and reproduce. Social insects are masters of solving organizational problems because they must coordinate thousands of individuals to accomplish these goals. One such problem is how to construct nests, and then, how to organize resources within that nest. Both, presumably, are optimized to maximize colony performance. In my lab, we focus on the evolution of nest architecture and spatial organization, using the honey bee, Apis mellifera, as a model superorganism. Honey bees are renowned for their perfectly hexagonal honeycomb, hailed as the pinnacle of biological architecture for its ability to maximize storage area while minimizing building material. However, in natural nests, workers must regularly overcome spatial obstacles. Using automated image analysis, we show how workers incorporate different building techniques to overcome irregular building scenarios. We then expand our analyses across Apis and the social wasps (Vespidae) to explore how other superorganisms solve architectural problems. Surprisingly, despite different building materials, comb configurations, and 179 million years of independent evolution, we show that honey bees and social wasps have converged on the same solutions for the same architectural problems, thereby revealing fundamental building properties and evolutionary convergence in collective construction behavior.

Seminar Speaker Host: David J. Perkel