World Wide

NeuRise

Talks by rising stars of neuroscience

The collective behavior of the clonal raider ant: computations, patterns, and naturalistic behavior

Asaf Gal - Kronauer lab

(Rockefeller University)

Colonies of ants and other eusocial insects are superorganisms, which perform sophisticated cognitive-like functions at the level of the group. In my talk I will review our efforts to establish the clonal raider ant Ooceraea biroi as a lab model system for the systematic study of the principles underlying collective information processing in ant colonies. I will use results from two separate projects to demonstrate the potential of this model system: In the first, we analyze the foraging behavior of the species, known as group raiding: a swift offensive response of a colony to the detection of a potential prey by a scout. By using automated behavioral tracking and detailed analysis we show that this behavior is closely related to the army ant mass raid, an iconic collective behavior in which hundreds of thousands of ants spontaneously leave the nest to go hunting, and that the evolutionary transition between the two can be explained by a change in colony size alone. In the second project, we study the emergence of a collective sensory response threshold in a colony. The sensory threshold is a fundamental computational primitive, observed across many biological systems. By carefully controlling the sensory environment and the social structure of the colonies we were able to show that it also appear in a collective context, and that it emerges out of a balance between excitatory and inhibitory interactions between ants. Furthermore, by using a mathematical model we predict that these two interactions can be mapped into known mechanisms of communication in ants. Finally, I will discuss the opportunities for understanding collective behavior that are opening up by the development of methods for neuroimaging and neurocontrol of our ants.

Event link:

https://www.crowdcast.io/e/wwneurise/