Adjusting the flow of information within colonies; how inactives affect interaction networks

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Social groups require efficient communication to coordinate workers and tasks according supply and demand. However, mechanisms that facilitate communication can also ease the spread of pathogens among group members. As such, groups must balance the benefits of increased information flow against the costs of increased pathogen spread. Here we investigate how group composition can affect disease and information transmission dynamics. Specifically, we test whether inactive workers play a role in regulating the flow of information between the external environment and the internal environment by acting as a permeable barrier to worker movement that can be dynamically adjusted to different conditions. By comparing network topologies of colonies during normal colony function and after being fed following a 1 week starvation period, where we expect information flow to be facilitated, we can determine whether colonies are able to regulate information flow according to external conditions. Tracking the flow of movement of workers and the spatial aggregation of inactives will allow us to determine whether the mechanism through which colonies adjust information flow can be linked to inactives acting as barriers. Social insect colonies are distributed biological systems that have evolved strategies to solve complex problems. By examining how colonies can dynamically adjust their behavior to changing conditions we will advance our knowledge of both behavioral plasticity and of the regulation of distributed systems.