

P137*Pheromone-based collective navigation in the ant *Paratrechina longicornis****Ehud Fonio**, Ofer Feinerman

Similar to many other social insects, *Paratrechina longicornis* ants rely on pheromone scent marking in order to perform collective behaviors such as trail formation and cooperative transport. To date, there were only a few attempts to visualize the dynamics of pheromone marking. Such studies typically rely on the questionable assumption of continuous markings based on the positions of the ants and not on actual marking behavior. We have developed a method that allows us, to our knowledge for the first time, to spatially and temporally pinpoint pheromone scent marks deposited by individual ants over areas that are more than 30,000 fold greater than their size. We measure scent marks from single ant trajectories and use them to assemble a continuously updated scent map. We then analyze the relations between this dynamic map and the kinematics of adjacent ants. We have found that the ants perform highly efficient moment-to-moment collective navigation. In this process, scent marks can be viewed as a means of translating individual information regarding a suggested route into pheromonal messages that are accessible to other ants. This mechanism allows for navigation that, rather than following static predetermined trails, breaks new ground as it advances. This new example of collective navigation is an addition to our growing knowledge on swarm intelligence.