OR160
Evolution of task allocation: selection for efficiency or robustness?
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Division of labor is the central innovation after each major transition in evolution, and is thus at the root of biological complexity. Task allocation is the process that achieves this. An understanding of why division of labor evolves, and why particular task allocation strategies evolve, is thus fundamental to our understanding of life. Social insect research has uncovered many such strategies, i.e. behavioral rules or physiological mechanisms that allow workers to choose which task to engage in; but we still lack evolutionary explanations for the diversity in task allocation strategies across species. In an experiment with evolving artificial (in silico) organisms, we showed that even in a very simple system several different task allocation strategies can evolve, including task allocation by spatial position, by developmentally induced stochastic individual differences, and by signaling. All of these strategies have also been proposed to exist in social insects. What environmental or social factors, or what properties of tasks determine which task allocation strategy evolves in a particular species or for a particular task type? Task allocation strategies differ in their accuracy, cost, flexibility, and ability to allow individual specialization. We have shown that specialization is not the only, and not always a beneficial result of task allocation. Here we investigate first how different task allocation strategies are expected to perform in different environmental and social conditions, and second quantify in the ant *Temnothorax rugatulus* how the factors contributing to task allocation differ between task types. We use a semi-automated video tracking system that can dramatically increase the quantity and quality of information on individual behavior in the colony. We show that task allocation mechanisms are likely the outcome of a complex interplay of colony-level and individual-level selection, but also that different measures of performance are selected for in different task types.