IMPRS CHEMICAL COMMUNICATION IN ECOLOGICAL SYSTEMS

Application Call 2024 - Project 6

Learning strategies to avoid danger in the desert ant *Cataglyphis*

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Background:

The desert ant *Cataglyphis fortis* inhabits the hostile salt pans of Tunisia, where its foragers individually search for arthropods killed by heat stress. The ants cover long distances on search for food that can exceed hundreds of meters. They have established a highly efficient navigation system which guides them home quickly, so that they do not die from the heat themselves. The ants rely on a sun compass but also use visual and olfactory cues to finally pinpoint their nest entrance.

Project description:

We could show that ants do not only quickly learn the association between odors and the nest entrance but also can learn numerous food-related odors and use them during future foraging trips. Here we ask whether the ants can also learn from negative experience. Do they learn to avoid odors they have experienced in stressful situations (during e.g. fights with ants from neighboring colonies, attacks by jumping spiders, or when facing pitfall traps of ant lions). Could they potentially even learn to avoid places where they faced these events (i.e. do they remember bypass places on their foraging trips where they had experienced conspecific fights or attacks from predators)?

While we understand well, how the ants navigate during their foraging trips and how their find their way back to the nest, this project shall tell us, whether the ants are aware of and strategically avoid the risks of their harsh environment.

Candidate profile:

Candidates should have experience and a deep interest in animal behavior. As all experiments will be conducted in the field, candidates should be absolutely fit for field work. The field site is a salt pan ca 50 km west of Sfax/Tunisia. The yearly expeditions of the PhD student and 1-2 helping students usually begin in June and last until August. The commuting between field site and housing in Tunisia requires a driver license. The organization of the field trip (Tunisian research permits, housing,

building of experimental setups with local material etc.) requires excellent organizational capabilities. Good skills in French or Arabic are helpful but not mandatory.

Reading:

Knaden M. and Graham P. (2016) The sensory ecology of ant navigation: from natural environments to neural mechanisms Annual Review of Entomology 61:63-76. https://www.annualreviews.org/doi/abs/10.1146/annurev-ento-010715-023703