First evidence of a chemical call-for-help in *Cataglyphis cursor* ants

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Background

When *Cataglyphis cursor* ants become trapped and are unable to extricate themselves, nestmates engage in highly sophisticated pro-social behavior performing multiple forms of rescue behavioral patterns (Nowbahari et al 2009). To examine the role of chemical signals in victims' call for help, we performed biochemical analyses of released substances by distressed ants, using Solid Phase Micro Extraction (SPME), mass spectrum chromatography of gland contents, and in vivo application of gland extracts.

Methods

Biochemical analyses:

In separate tests, volatiles released by live ensnared victims were subject to **SPME** (Solid Phase Micro Extraction) during a 20-min test. In addition, mass spectrum chromatography of 3 gland contents (Mandibular glands, Dufour gland, and Poison gland), as well as the extraction of pheromones deposited by an ensnared ant on filter paper, were analysed.

Behavioral analyses:

Dead nestmates (the victims) were painted with one of several different gland extracts and held partially beneath the sand in the foraging area. The rescue behavior performed by the *C. cursor* foragers toward the victim was measured during a 240-sec (4 min) trial.

Results: Biochemical analyses

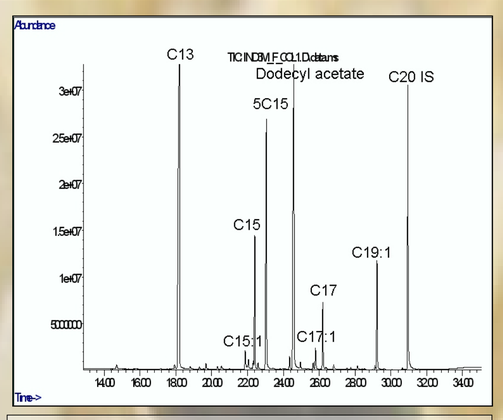


Figure 1. SPME profile of a live ensnared ant with C 20 internal

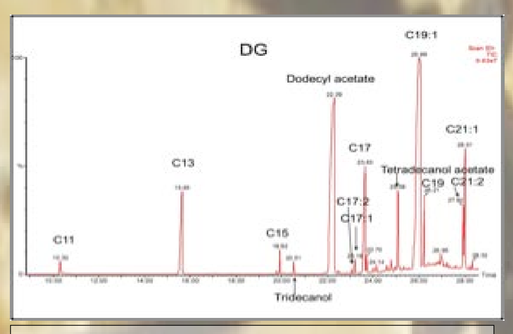


Figure 2. Chromatography profile of Dufour gland

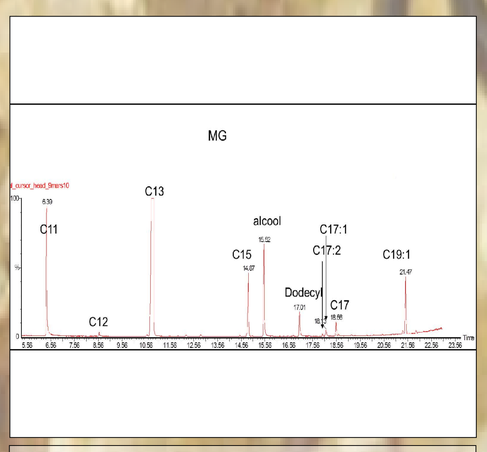


Figure 3. Chromatography profile of Mandibular glands

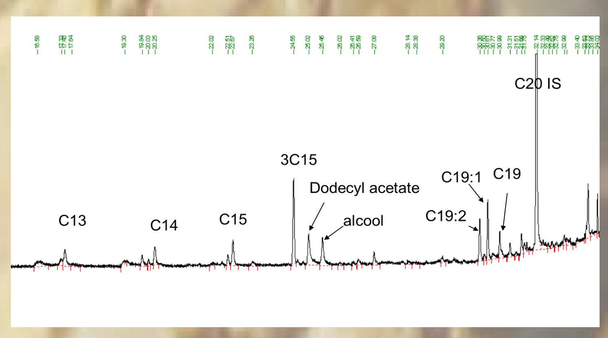


Figure 4. Chromatography profile of filter paper extraction

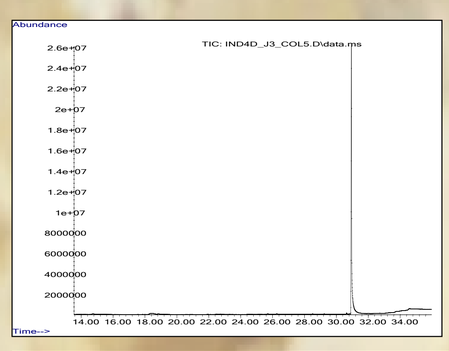
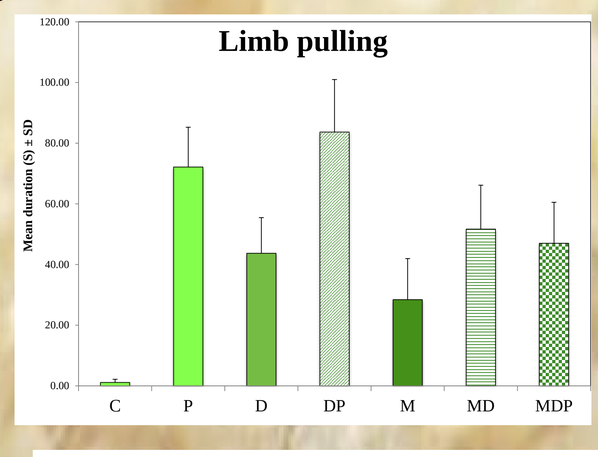


Figure 5. SPME profile of a dead ant (Control) with C 20 internal

Results: Behavioral analyses



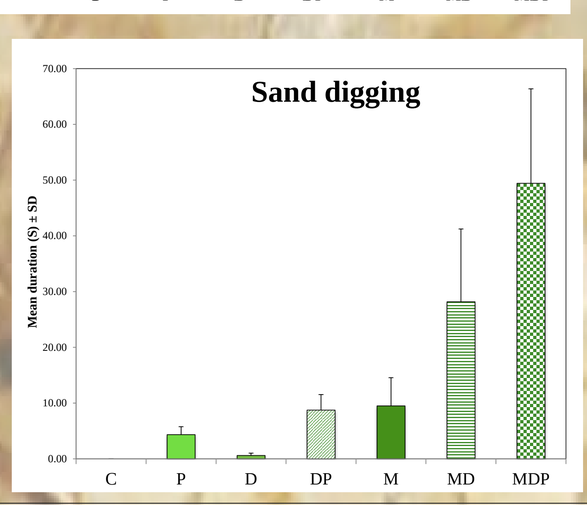


Figure 6. Mean duration of rescue behavior (limb pulling and sand digging) performed by *C. cursor* foragers toward a dead nestmate (victim) painted with different gland extracts (n=12).
C: Control**, P**:Poison gland, **D**: Dufour Gland, **M**: Mandibular gland.

Conclusions

These data, the first biochemical analyses of rescue behavior in *C. cursor* foragers, reveal the presence of specific volatile components in victims' call for help. The chemical signals appear to be, at least partly, similar to alarm signals found in Formicinae ants. Various substances emitted by the Dufour gland, or a combination of substances from Dufour gland, mandibular glands and, even, poison gland are involved. The behavioral responses to dead ants painted with extracts correspond to the response of foragers toward live victims observed under controlled laboratory conditions.

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