Co-evolutionary adaptation of *Phengaris nausithous* and its host *Myrmica rubra*

G. SOLAZZO¹, K. SEIDELMANN¹, R. F. A. MORITZ¹ and J. SETTELE²
1 Martin-Luther-Universität-Halle-Wittenberg, Halle, Germany
2 Helmholtz Centre for Environmental Research - UFZ, Halle, Germany

---

**Introduction**  
*P. nausithous* larvae are obligate myrmecophiles adopted into *M. rubra* ant colonies. The ability to recognize intruders is important for ant colony integrity. Selection on host colonies to avoid infestation leads into a co-evolutionary arms race between parasite mimicry and host colony defense. To screen for compounds involved in parasite mimicry and host-parasite co-evolution, several *M. rubra* populations with and without *P. nausithous* were chemically, genetically and behaviourally assayed.

---

**Material & Methods**  
Workers from *M. rubra* colonies of an uninfested population were tested in choice essays in which they had to choose between the solvent control and a test item

i) own brood solvent extracts
ii) synthetic candidate compound

Ant brood was extracted with different solvents. Compounds common to active extracts were identified in GC-MS analyses. The antennation and the retrieval of *P. nausithous* were studied to test for local adaptation in infested and non-infested populations

**Population genetics**  
*M. rubra* workers were genotyped at five microsatellite loci to estimate the allelic richness and the frequency of mono- and polygynous colonies in infested and uninfested populations

---

**Results**  
GC analyses and choice test

**Antennation**

<table>
<thead>
<tr>
<th>Test</th>
<th>Infested</th>
<th>Uninfested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>0%</td>
<td>10%</td>
</tr>
<tr>
<td>Extract</td>
<td>80%</td>
<td>20%</td>
</tr>
</tbody>
</table>

**Revision**

<table>
<thead>
<tr>
<th>Infested</th>
<th>Uninfested</th>
</tr>
</thead>
<tbody>
<tr>
<td>23%</td>
<td>36%</td>
</tr>
</tbody>
</table>

---

**Conclusion**  
*P. nausithous* attract *M. rubra* foragers with tetracosane (C-24) as a major compound. The infestation is more frequent in populations with polygynous colonies. Monogyny in the host population may therefore facilitate the decline and eventually local extinction of *P. nausithous*. After a period of parasite absence, polygyny may be promoted again rendering the population more susceptible again for *P. nausithous* infestations. Hence oscillating equilibria might be expected in this host – parasite system.