

## SIGNALLING

## An air of royalty

“the workers exhibited behaviour typical of queenless colonies”

Hoffmann *et al.* have identified *Neofem4* as the gene that produces the ‘royalty scent’ specific to queens in *Cryptotermes secundus* (termite) colonies. Reproduction in female termites is limited to queens — which are identified in termite colonies by chemical signals — although the genetic interactions underlying the production of the royal scent were previously unknown.

Social insects require a high level of communication to carry out the division of labour and cooperation that are necessary for the construction and maintenance of colonies. A previous study had identified several queen-specific genes, including *Neofem4*, using cDNA representational difference analysis. *Neofem4*, a cytochrome P450 gene, is linked to female fertility. Thus, the team hypothesized that loss of *Neofem4* would result in loss of the queen scent. Although queen behaviour and health were unaffected by RNA interference (RNAi)-mediated silencing of *Neofem4*, the workers exhibited behaviour

typical of queenless colonies. This behaviour was not seen when the queen was injected with a control short interfering RNA, which indicates that *Neofem4* silencing, rather than RNAi treatment, caused this change.

To determine whether *Neofem4* affected the chemical composition of the queen scent, the team analysed the chemical cuticular hydrocarbon (CHC) profile of queens and compared them to worker CHC profiles. Queens with RNAi-mediated knockdown of *Neofem4* had reduced amounts of queen-specific hydrocarbons and increased amounts of worker-specific hydrocarbons, suggesting that *Neofem4* directly affects queen scent.

This study provides insights into the genetic underpinnings that identify queens in termite colonies and may be representative of fertility signalling in other social insects.

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**ORIGINAL RESEARCH PAPER** Hoffman, K. *et al.*  
The scent of royalty: a P450 gene signals reproductive status in a social insect. *Mol. Biol. Evol.*  
<http://dx.doi.org/10.1093/molbev/msu214> (2014)



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