

Unexpected diversity of egg yolk proteins play a key role in ant sociality and castes

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In the advanced online edition of *Molecular Biology and Evolution*, Claire Morandin et al. performed molecular evolutionary analyses on the egg yolk forming protein, Vitellogenin, and its many forms, amongst seven *Formica* ant species.

The [social insects](#), including bees, wasps, ants and termites have developed a highly advanced society where division of labor amongst workers to serve the queen's reproduction has long fascinated biologists who have wanted to uncover the molecular pathways driving the complex behavior of insect societies.

In the advanced online edition of *Molecular Biology and Evolution*, Claire Morandin et al. performed molecular evolutionary analyses on the [egg yolk](#) forming protein, Vitellogenin (Vg), and its many forms, amongst seven *Formica* [ant species](#). Vitellogenin is known to play a role in the fate and regulation of insect social castes, with previous studies showing Vg expression most prevalent in queens and much lower in the workers.

The University of Helsinki research team discovered three new copies of Vg, called homologues, and examined these in both non-reproductive workers and queens. They demonstrated that the three new homologues of Vg were the result of ancient gene duplications, and that each of these copies plays a different role in ant societies. In contrast to earlier studies, Vitellogenin was not found to be upregulated in the queens, and the caste bias of the three Vitellogenin-like genes was highly variable among

[species](#). However, they did find one Vg homologue, a shortened version of the conventional Vg gene, called Vg-like-C, which was consistently primarily expressed in workers in the seven studied ant species.

"The combination of gene expression, protein modeling and evolutionary analysis of multiple copies of Vitellogenin – a key player in insect reproduction and behavior - suggests that patterns underlying caste differences are not easily generalized across social insects," said Morandin.

The study shows that the expression and role in social regulation of Vg and Vg-like genes are not consistent across species, providing important new insights into the complexity of insect social behavior and gene variation amongst even closely related species.

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