

KIN SELECTION AND THE EVOLUTION OF EUSOCIAL INSECTS

Summary

Charles Darwin identified eusocial evolution in insects as a particular challenge to his theory of natural selection. A century later it was William Hamilton how provided a framework for kin selection theory, explaining evolution of altruistic behaviours and by this also the origin of eusociality in Hymenoptera. Since in these insects males develop from haploid unfertilized eggs and females from diploid ones the females are more related to full-sisters (0.75) than to their daughters (0.5). As a result females would have higher inclusive fitness if they reared monandrous mother's offspring rather than their own. However, this concept still remains contentious despite the fact that all evidence currently available indicates

that obligatory sterile eusocial castes only arose via the association of lifetime monogamous parents and offspring. Unexpectedly support for Hamilton's rule came from examples of conflicts in eusocial insects, because the causes of these conflicts and their resolutions both are based on the inclusive fitness of colony members. A conflict over sex allocation is predicted between the workers who rear the brood and the queen who lays the eggs. Worker policing, whereby workers selectively destroy eggs laid by their worker sisters, is predicted when the queen has few partners. These and other examples strongly suggest that an individual and not the superorganism (colony) is the basic level of natural selection.