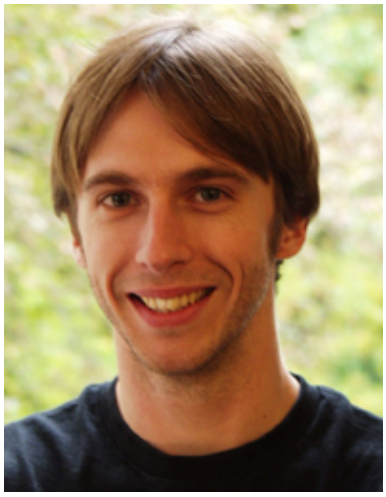

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FOCUS

PROJECT

Conflict Resolution in Biological Systems

Francis Ratnieks, Tom Wenseleers, and I intend to review the evolution of cooperation and conflict in biological systems, including the social insects, genomes, mutualisms between species, and human societies. All of these systems share the property of being composed of low-level units (workers, genes, species, people) that cooperate to form high-level function units (colonies, genomes, species groups, societies). Competition and conflict among the low-level units is expected because individuals often differ in their interests. Our aim is to look for the common processes that unite and idiosyncrasies that divide the resolution of conflict in these systems. The ultimate goal is to better understand the evolution of cooperation.

Recommended Reading

Foster, K. R. and F. L. W. Ratnieks. "Facultative Worker Policing in a Social Wasp." Nature 407 (2000): 692-693.

Foster, K. R. and F. L. W. Ratnieks. "Paternity, Reproduction and Conflict in Vespine Wasps: a Model System for Testing Kin Selection Predictions." Behavioral Ecology and Sociobiology 50 (2001):1-8.

Foster, K. R., A. Fortunato, J. E. Strassmann, and D. C. Queller. "The Costs and Benefits of Being a Chimera." Proceedings of the Royal Society of London, Series B, 269 (2002): 2357-2362.

COLLOQUIUM, 15.02.2005

The Evolution of Cooperation between Species

People have been fascinated by cooperation between species since antiquity. Herodotus described birds that fed upon the leeches in crocodiles' mouths, noting, "The crocodile enjoys this, and never, in consequence, hurts the bird". Many examples where species engage in mutually beneficial behaviours have since emerged. However, cooperation between species represents a major challenge for biologists because Darwin's theory of natural selection makes it clear that competition and selfishness are often the best strategies for success. Why, then, do species involved in mutual exchanges not exploit their partner species by receiving the benefit provided without reciprocating? For example, why do most plants provide nectar for their pollinating hummingbirds? Why do rhizobial bacteria provide nitrate to the legume plants in whose roots they live? And why do cleaner fish, which remove parasites from the mouths of larger fish, so rarely get eaten? Several hypotheses for how cooperative species resolve their conflicts have been proposed. Nevertheless, we still lack a general theory of between-species cooperation that captures the key processes and allows us to generalise across the broad range of examples. We have been attempting to develop such as theory, by extending the established general model for cooperation within-species. The new theory suggests five key factors are important in the evolution of cooperation between species:

(1) High benefit to cost ratio: high returns for investment in another species.

(2) High within-species relatedness: the benefits of aiding another species returns to you or your relatives.

(3) Association of cooperators: more cooperative members of each species tend to occur together.

(4) Partner-fidelity feedback: associations between two species last long enough for investments in the other species to provide a return benefit.

(5) Partner choice: one species only helps cooperative members of the other species.

I will discuss the theory and how it applies to examples from the natural world.

Foster, Kevin R. (Berlin,2011)

Darwins special difficulty the evolution of neuter insects and current theory

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1046032941

Foster, Kevin R. (2010)

Social evolution theory : a review of methods and approaches

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=877001405

Foster, Kevin R. (Amsterdam,2009)

Are mistakes inevitable? : Sex allocation specialization by workers can reduce the genetic information needed to assess queen mating frequency

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1067362002

Foster, Kevin R. (Lawrence, Kan.,2006)

Do we need to put society first? The potential for tragedy in antimocrobial resistance

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=168712924X

Foster, Kevin R. (2006)

Conflict resolution in insect societies

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1047209489

Foster, Kevin R. (2006)

A general model for the evolution of mutualisms

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=1047092875

Foster, Kevin R. (2005)

Hamiltonian medicine : why the social lives of pathogens matter

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=877715432

Foster, Kevin R. (Amsterdam [u.a.],2005)

A new eusocial vertebrate?

https://kxp.k10plus.de/DB=9.663/PPNSET?PPN=770485758

Foster, Kevin R. (London [u.a.],2004)

Pleiotropy as a mechanism to stabilize cooperation

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Foster, Kevin R. (2004)

Pleiotropy as a mechanism to stabilize cooperation

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