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Analysis: biologists slam kin selection heretics

by Andrew Letten

Thursday, 26 August 2010

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SYDNEY: On the hallowed cover of this week's edition of *Nature* is a paper destined to reignite the flames of a fiery debate that has troubled every generation of biologists since Charles Darwin.

Paying short shrift to the idea of 'kin selection' - which has formed the cornerstone of sociobiological theory for almost half a century - the authors of the offending article propose a contentious new model to explain the evolution of 'eusociality'. (Read a news story about the paper, in [Kin selection is dead, says E.O. Wilson](#)).

Eusociality is exhibited by organisms such as ants, wasps and bees, which live in complex, hierarchical social systems - and it has even been used to explain why young men give their lives in war.

Greatest mind of modern biology?

It's the kind of upstart paper evolutionary biologists would normally dismiss as attention-grabbing heresy in an obscure journal.

Problem is, among the heretics is E.O. Wilson, one of the greatest minds in modern biology ... and the journal is *Nature*, one of the most respected. And all three authors are at Harvard, one of the world's top universities.

Not only that, but the British journal even deemed it worthy of the cover, showing two ants head-to-head above the bold headline, "Social services: how standard natural selection explains the evolution of eusociality".

"Liberating the study of social evolution"

Wilson - a scientific provocateur who through his prolific career has revelled in upsetting the status quo - co-authored the paper with mathematical biologists Martin A. Nowak and Corina E. Tarnita.

In the accompanying press release, they pull no punches:

"We hope our new theory for the evolution of eusociality will open up sociobiology to new avenues of



research by liberating the study of social evolution from mandatory adherence to kin selection theory. After four decades ruling the roost, it is time to recognise this theory's very limited prowess."

Kin selection, and the parent concept of 'inclusive fitness', attempt to explain why individuals perform selfless tasks that will not benefit them directly, but have a fitness payoff for their shared genetic heritage with the family, the tribe - or the hive.

It seeks to explain why individuals take the seemingly paradoxical step of sacrificing their own reproductive potential in order to care for the offspring of relatives.

Biologists: flawed, incorrect, irrelevant study

Most evolutionary biologists are unimpressed. In fact, some had trouble staying calm enough to explain their objections. A straw poll of leading names in sociobiology found almost all were at a loss to explain how such a "flawed" (their words) body of work could have found its way into *Nature* - let alone onto the front cover.

"The paper is so obviously incorrect that it won't have any impact on the study of eusociality," asserted Stuart West, a professor of evolutionary biology at Britain's University of Oxford who has had a long interest in the evolution of social behaviours. "The proposed model may be of mathematical interest, but it is unfortunately based on a scenario that empirical data show is irrelevant."

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While the authors argue that emerging evidence is undermining the basic idea that relatedness is a driving force for the rise of eusociality, West counters that "the discussion of the existing empirical data ignores the last 40 years of empirical research, which is actually a period when the interplay between inclusive fitness theory and data has led to a golden era in research on the social insects and indeed on living organisms in general."

Evolutionary biologist David Queller of Rice University in Texas is not even sure if the paper presents a new theory of eusociality.

"They have not explained how their theory differs from kin selection, or what predictions it makes ... and though they denigrate the importance of genetic relatedness, their model involves, and I suspect *requires*, close kinship," he said.

Other experts decline to comment

Ben Oldroyd, a behavioural geneticist of the University of Sydney, refutes outright the suggestion made by the trio that inclusive theory and the role of relatedness has been unproductive as a font of new theory and testable predictions.

Equally interesting was the number of key researchers in the field who heatedly declined to comment on the record. This reporter could not tell if whether they don't want to get caught in the crossfire, or are biding their time until they can retaliate in full.

And yet, the debate around kin selection is not a new one: debate surrounding the apparent evolutionary paradox began with the publication of *On The Origin of Species*.

Darwin himself was stumped on the issue

Darwin humbly admitted to "one special difficulty, which first appeared to me insuperable, and actual fatal to my theory." The conundrum in question concerned the



nature of colonies of social insects such as ants, wasps and bees, and how to explain how sterile worker castes could have evolved if they produce no offspring.

In viewing the entire colony as the unit of selection, Darwin compared it to a vegetable domesticated through artificial selection, with sterile casts representing the fruit, and the queen the plant that produced it. Later biologists fermented this idea in the now taboo guise of 'group selection', but it wasn't until the 1960s that researchers arrived at a rational explanation for how selective forces acting on an individual could result in the staggering levels of altruistic cooperation evidenced in insect colonies. That idea was kin selection.

Fiery debate set for Amsterdam

In the intervening period, a plethora of studies have elegantly illustrated the apparent validity of kin selection theory. Wilson was among those who for a long time backed it.

However, in the last few years, an academic minority - led by Wilson as chief protagonist - have begun to question their own original beliefs in favour of models that appear more reminiscent of early group selection arguments.

The debate is sure to get fiery: a major symposium is being held in Amsterdam on September 22. Entitled *The Evolution of Cooperation*, it brings together many notable figures in the field ... including two of the authors of the incendiary *Nature* paper, as well as the journal's editor.

More information

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