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Researchers Challenge E. O. Wilson Over Evolutionary Theory

by [Elizabeth Pennisi](#) on 23 March 2011, 2:00 PM | [Permanent Link](#) | [4 Comments](#)

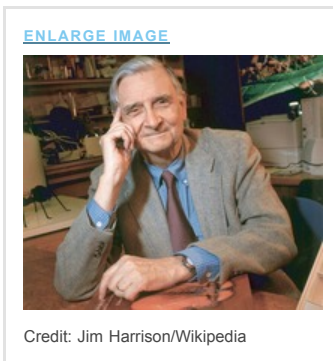
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Online today in *Nature*, nearly 150 evolutionary biologists challenge Harvard University's [Edward O. Wilson](#), one of the world's most preeminent scientists, and two colleagues. At issue is the usefulness of a 50-year-old theory about the role of relatedness in the evolution of complex social systems like those of ants, bees, and humans. Wilson, along with Harvard mathematicians Martin Nowak and Corina Tarnita [argue](#) that the theory, called inclusive fitness, does not explain how these complex societies arose; in a [rebuttal](#) today in *Nature* and in an upcoming issue of the *Journal of Evolutionary Biology*, their critics say that the Harvard trio have misrepresented the literature and are simply wrong.



"They are wrong both empirically and theoretically," says critic Edward Allen Herre of the Smithsonian Tropical Research Institute (STRI) in Balboa, Panama.

"I think it's so wrong I don't think it will have any effect on what people in the field are doing," adds University of Oxford evolutionary biologist Stuart West, who orchestrated one letter to *Nature* with more than 130 signees. West said he and his colleagues reacted so strongly because they worried that, given Wilson and Nowak's fame and *Nature's* prestige, others will take notice. "[Our] letter is written in the hope that it will keep nonspecialists from wasting time on it."

Nowak, Tarnita, and Wilson have responded that their paper has been misunderstood. "Very few people have really taken the time to work through our arguments," says Nowak.

The idea in question was developed by William D. Hamilton back in 1964. Called Hamilton's rule and kin selection, or inclusive fitness, the concepts have been standard fare in evolutionary biology textbooks for decades. According to Hamilton, altruistic behavior, such as a worker bee caring for young produced by a queen rather than producing and caring for its own offspring, can evolve if the worker is closely related to the queen's young. The idea is that the young bees carry enough of the worker's genes to compensate for its own lack of reproduction.

In the 1980s, Wilson himself was a strong proponent of this theory to explain the origins of eusociality—the type of very complex society seen in bees, ants, and termites. In the past few years, however, he changed his mind, favoring an idea called group selection, which provides a mechanism for the evolution of eusociality that does not require individuals to be related to others' offspring. His new way of thinking [slowed](#) the publication of one of his recent books, *The Superorganism*, because he disagreed with his co-author. In a series of papers between 2004 and 2008, Wilson outlined his new views, but the papers "were simply ignored," he recalls.

Then 2 years ago, Nowak called him up and said he'd been working on inclusive fitness from a mathematician's perspective and had some problems with it. In August 2010, Wilson, Nowak, and Tarnita published a very strongly

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worded *Nature* [paper](#) arguing that one didn't need to invoke inclusive fitness to explain the evolution of complex social behaviors and that inclusive fitness wasn't helpful in explaining these traits. They came out with a new mathematical model to explain eusociality. "Relatedness is better explained as the consequence rather than the cause of eusociality," they wrote. "Grouping by family can hasten the spread of eusocial alleles, but it is not a causative agent. The causative agent is the advantage of a defensible nest, especially one both expensive to make and within reach of adequate food."

Immediately, there was a flurry of activity on the blogosphere. Some, such as University of Chicago evolutionary biologist Jerry Coyne, went on the [attack](#). David Sloan Wilson, who co-authored a paper with E.O. Wilson in 2007 on group selection, [praised](#) the work. "I do not agree with them in every respect but I'm glad that they have aroused the evolutionary community from its stupor," he wrote.

A few blogs seemed to take a middle ground. In [one](#), a biologist explained the strengths and shortcomings of kin selection and group selection, and gave cool-headed evaluations of both the paper and its critics. [An ant researcher](#) called the debate "largely pointless"—and urged better cooperation among those who study it.

Now, with a list of authors that reads like a Who's Who in social evolution studies, five letters take Nowak *et al.* to task in print. "I sympathized with the central idea [of the paper]," says Regis Ferrière, an evolutionary biologist at the University of Arizona, Tucson, who co-wrote one letter. "But I found the tone of the paper unnecessarily aggressive and unfair to inclusive fitness theory."

The critics argue that Nowak and his colleagues make an unwarranted distinction between inclusive fitness and natural selection theory, and assert that inclusive fitness has been quite valuable. They stress that inclusive fitness ideas have helped yield insights into many biological phenomena, such as why social insects have skewed sex ratios. "Their announcement of the demise of inclusive fitness is wrong," says STRI's William Wcislo. "They've done a service in a sense: [Their paper] forced people to again rethink something, and it's quite clear that the evidence in favor of Hamilton's theory is quite convincing."

A few letters discuss how the Harvard team misinterpreted the experimental data cited. And a few are critical of the new mathematical model that Nowak *et al.* propose to explain eusociality.

Nowak is convinced that his critics haven't really done inclusive fitness calculations or they would understand the theory's limitations. He says he and his colleagues do not negate the importance of relatedness in the evolution of eusociality, as the critics say. To him, the letters "are the reactions of people who are clinging to an obsolete theory."

Raghavendra Gadagkar, an evolutionary biologist at the Centre for Ecological Sciences of the Indian Institute of Science, Bangalore, supports Nowak. "Much of what is in the paper is correct," he says. His own response to *Nature* "was not published on the grounds that I did not sufficiently disagree with the authors," he says. Instead, he has published a [commentary](#) in *Current Science*, saying, "for the healthy growth of science it is useful to periodically rock the boat and when a body of knowledge grows into a large ship we need giants like Wilson to rock it."

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[joanbray](#) Good grief. That headline will be quoted in every creationist argument for the next ten years. Couldn't you



have come up with something less easily misconstrued?

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jim

Agree that it can be misconstrued but the creationists you are worried about are so determined that they will always find something to juicy to quote.

It is a futile endeavor to worry that irresponsible individuals will use a phrase or headline in a way that does not fit the content of the scientific points.

Yesterday, 19:23:46 GMT – Flag – Like – Reply



ullhen.embryo

Sorry Mr. joanbray an jim , but your quotes are a nothing more than a old and false argument.

I can read. I can understand what i read an it is clear, there is no argument against evolution in this storry.

I am such a "creationist" in your eyes, but the reasons to be skeptic about evolution are not only bad headlines.

"Very few people have really taken the time to work through our arguments," says Nowak and I to.

Think about it and not about the missuse of phrases and headlines.

Yesterday, 22:14:46 GMT – Flag – Like – Reply



Frank Lornitzo

In their face, I don't understand the arguments. Is there something intermediate such as wild species such as bumblebees or hornets with just a few in a nest and solitary wasps on the other extreme to compare both behavior and DNA?

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