

## The Genetics of Adaptation: A Reassessment

*American Naturalist*

by H. Allen Orr and Jerry A. Coyne 140:  
725-742, November 1992

Jerry Coyne (Department of Ecology and Evolution, University of Chicago) and H. Allen Orr (Center for Population Biology, University of California, Davis) have “unexpectedly” — their adverb — found “that there is little evidence for the neo-Darwinian view.” In this paper Orr and Coyne argue that the neo-Darwinian emphasis on mutations of small effect “is not strongly supported by evidence.”

While noting that they are not “macro-mutationists” (a dreaded label that can get one banished from the circle of respectable Darwinians), Orr and Coyne stress that evolutionists do not actually know, either by theory or observation, that mutations of small effect have played the only (or even dominant) role in the origin of adaptations. Indeed, the central theme of their paper stresses how little is known about this

matter. Discussing Russell Lande’s micro-mutational theory, for example, they write:

*We simply have no information here. We do not know, for example, whether mutations adding four bristles to a fly are more than four times as harmful as mutations adding only a single bristle (p.731).*

This theme of nescience continues: “Genetic analyses of adaptive differences ... are surprisingly rare (p. 733) ... We simply do not know enough about adaptations within species to allow any conclusions (p. 734) ... our major conclusion — that there are surprisingly few rigorous genetic studies of adaptation — is surely correct” (p. 738).

These judgments may prompt a reflective moment in the non-evolutionist observer. What then was all the heat and rather less light, the non-evolutionist might ask, in the fierce debates about neo-Darwinism

within evolutionary theory — if, in the end, so little was in fact known about the genetic basis of adaptation? Did the ferocity of the debate stem from real knowledge about evolution or from its relative *absence*?

Orr and Coyne call for armchairs to be vacated and soapboxes abandoned. The genetics of adaptation, they write, “is an empirical question that can only be settled with data.” But what if mutations of large effect turn out to be insufficient? We hope that Orr and Coyne will consider that some other current certainties (such as the common descent of all organisms by naturalistic mechanisms) may also have to go into the skeptical balance pan to be weighed.