



REVIEWS AND BRIEF NOTICES

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HISTORY, PHILOSOPHY & ETHICS

DARWINIAN REDUCTIONISM: OR, HOW TO STOP WORRYING AND LOVE MOLECULAR BIOLOGY.

By Alex Rosenberg. *Chicago (Illinois): University of Chicago Press.* \$40.00. x + 263 p; ill.; index. ISBN: 0-226-72729-7. 2006.

This volume is Alex Rosenberg's extended (and spirited) defense of the thesis of reductionism as it applies to biology. Reductionism holds, roughly, that the behavior of higher-level phenomenon is explained by (because caused by) the behavior of lower-level phenomenon. The author's thesis, as applied to biology, is that the facts of cellular, organismal, developmental, and evolutionary biology are best explained by (because caused by) the facts of molecular biology. He argues that one cannot permit the facts of developmental biology to "float free" from those of molecular biology. Unless one wishes to slip into a kind of mysticism regarding biological facts, these facts about molecules must be connected in some way to those about development. As a matter of *practice*, it may never be possible to account for the facts about development in terms of only facts about interactions among particular molecules (or the behavior of groups of molecules), but Rosenberg argues that it must, nevertheless, be possible *in principle*.

The author's defense of reductionism is at times compelling, but the distinction between antireductionism in practice and in-principle reductionism is less well developed than one might wish. For example, when should impossibility in practice begin to color our perception of what it means for something to be possible in principle? Rosenberg also takes on an unnecessary challenge in his defense of the notion of the genome (and only the genome) "programming" development. His defense

of gene-centrism is relatively weak, and it fails to take seriously much of the literature on this topic. For example, one of the few challenges he considers is DNA methylation, and his analysis is limited to a single case that may or may not prove to be typical. Since this gene-centrism is mostly tangential to his main thesis regarding the causal and explanatory primacy of molecular biology, this weakness is merely distracting.

Perhaps the most peculiar sounding claim in this book is that, for the kind of reductionism Rosenberg envisions to hold, the "Principle of Natural Selection" must in fact be something like a basic law of nature, albeit one that in its most basic form applies to molecules. The implications of this claim for biological explanations remain somewhat opaque, but the author's work suggests that they are at least worth exploring.

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THE KANTIAN LEGACY IN NINETEENTH-CENTURY SCIENCE. *Based on a conference held in Cambridge, Massachusetts, November 2000. Dibner Institute Studies in the History of Science and Technology.*

Edited by Michael Friedman and Alfred Nordmann. *Cambridge (Massachusetts): MIT Press.* \$45.00. vi + 370 p; ill.; index. ISBN: 0-262-06254-2. 2006.

Immanuel Kant is a towering figure in the history of philosophy, and his writings have influenced the development of modern thought to the present day. In particular, his views have been instrumental both in guiding scientific practice and in shaping our understanding of the nature of science and its scope and limits. This volume is a collection of papers that were presented at a conference devoted to Kant's impact on 19th-century scientists and philosophers that was held in 2000.

originally set aside by a Presidential Executive Order for rangeland research when New Mexico became a state in 1912. The site is situated on the Jornada del Muerto, or Journey of the Dead Man, a name associated with aridity since the Conquistadores crossed America's largest desert, the Chihuahuan, to establish colonies in New Spain. In his volume, *Ecology of Desert Systems* (2002. San Diego (CA): Academic Press), Walter Whitford reviewed aspects of the Jornada's ecology.

The 36 authors of the current volume include botanists, geographers, agronomists, geologists, climatologists, and zoologists who review everything from geology, climatology, soils, and geochemical cycles to plant communities, net primary productivity, faunal ecology, grazing management, and modeling. Each chapter is filled with data (an extensive bibliography is included) and, in many cases, the data sets for Jornada research equal or exceed those available for other deserts. The text is clearly written and graphs are effective for the most part. Somewhat annoyingly, different authors used different fonts and styles, often within the same paper. Chapters are written for specialists, but provide a wealth of information on each topic. A good analogy would be as if an issue of *Annual Reviews* were dedicated to the Jornada ecosystem.

The Jornada is a well-defined ecosystem with numerous biotic and abiotic connections tying it together, but management practices that worked for livestock in more mesic areas are not applicable to desert grasslands. Desertification continues to take place, but is now at lower levels because of 95 years of research. The volume develops a landscape model to clarify how this system functions in the face of management and mismanagement. Such findings point out the need for long-term research to clarify management strategies for such a challenging habitat. This book will be welcome by desert researchers and by anyone responsible for managing rangelands in arid ecosystems.

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FUNDAMENTAL PROCESSES IN ECOLOGY: AN EARTH SYSTEMS APPROACH.

By David M Wilkinson. Oxford and New York: Oxford University Press. \$89.50. xi + 182 p; ill.; index. ISBN: 0-19-856846-0. [Expansion of a paper published in *Biological Reviews*, 2003.] 2006.

This provocative book offers the author's answer to a thought experiment: "For any planet with carbon-based life, which persists over geological time-scales, what is the minimum set of ecological processes that must be present?" (p 8). Wilkinson's

"main intention with this book is to use an astrobiological perspective as a means of thinking about the fundamental processes of ecology on Earth" (p 9). The author's focus on processes contrasts with the more common focus in ecology textbooks on entities such as individuals, populations, species, communities, ecosystems, and the biosphere.

Wilkinson proposes that seven ecological processes are fundamental (not including natural selection and competition, which characterize all of life rather than only ecology). These processes are energy flow (energy consumption and waste product excretion), multiple guilds (autotrophs, decomposers, and parasites), tradeoffs (specialization versus generalization, which lead to biodiversity within guilds), ecological hypercycles (cycles within cycles), merging of organismal and ecological physiology (as life spreads over the planet, biotic and abiotic processes interact so strongly as to be inseparable), photosynthesis (that Wilkinson thinks likely in most biospheres, but not inevitable), and carbon sequestration. These fundamental processes, he argues, lead to the emergence of nutrient cycling.

The unconventional theoretical perspective of this clearly written, concise volume will shed fresh light on areas of one's own interest. Readers will find his or her own surprises and illuminations. For me, the exclamation point was Wilkinson's list of fundamental guilds: autotrophs, decomposers, and parasites. Herbivores and carnivores are absent from this list. Most published food webs pay little or no attention to decomposers and parasites. If the author's inferences are correct (I find them plausible), the great frontiers of understanding the fundamental processes of food webs have hardly been approached.

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MANAGING THE ENVIRONMENT, MANAGING OURSELVES: A HISTORY OF AMERICAN ENVIRONMENTAL POLICY. Second Edition.

By Richard N L Andrews. New Haven (Connecticut): Yale University Press. \$40.00 (paper). xix + 515 p; ill.; index. ISBN: 0-300-11124-X. 2006.

This is a readable, detailed history of American environmental policy. It provides background on current environmental policy and sets a basis for readers to envision a future that sustains our environment and humanity itself. It forcibly shows how American environmental policy has swung (and continues to swing) from concern for protecting and maintaining the environment to efforts to exploit it for economic advantage.