

– a reproductive process unique to flowering plants. His incorporation of the account of the evolution of the world's largest seed, that of the coco de mer (*Lodoicea maldivica*, otherwise known as the “double coconut”), first detailed by Peter J. Edwards, Johannes Kollmann, and Karl Fleischmann in 2002, is particularly interesting.

As entertaining and informative as this work is, it could have benefited from a greater degree of organization and focus. Most of the book is made up of somewhat disconnected anecdotes illustrating different aspects of plant evolution, sometimes from a plant-centric perspective and sometimes a human-centric perspective. I found these switches in perspective distracting. For example, pages 92-97 contain a long digression about the evolution of colour vision in primates in the context of detecting fruit ripeness, though primates are not the only important dispersal agents of fruit. Pages 129-134 focus on the increasing concentration of a cycad seed poison in bats and people in Guam – an interesting story, but less about seeds *per se* than about food webs and metabolism.

The author's love of literature and history is quite evident – he begins every chapter with a quotation from Shelley, Blake, or some other author, and cites Shakespeare and the Bible liberally. The use of such references in the body of the text sometimes overshadows its scientific content. For instance, the author spends a page (128) describing favism, a genetic condition in humans that makes its bearers' red blood cells break down when they eat fava beans, mentioning that favism has now been shown to confer some resistance to malaria. While the author devotes a paragraph to discussing favism as a possible explanation of why Pythagoras forbid his followers to eat beans and cites *that* in the “Sources and Further Reading” section, no such mention is made of the research connecting favism and malaria.

The arrangement of chapters also seems inconsistent. For instance, a chapter titled “Luscious Clusters of the Vine” is subtitled “Fruit,” but the next chapter, called “Winged Seeds,” is also about fruit – winged dry fruit – though it is subtitled “Dispersal.” The following chapter, “Circumstance Unknown,” subtitled “Fate,” is also about the hazards of dispersal. Why not include all three in a chapter about the role of fruit in the dispersal of seeds? Chapters about “Enemies” and “Poisons” are also widely separated in the book, though plants use poisons to deter peckish enemies, and castor beans are discussed in both chapters. A very clearly written chapter about mast years in nut trees stands on its own, discussing masting as a strategy to overcome seed predation, but without relating this strategy to other strategies to outmanoeuvre seed predators, such as the production of seeds filled with poisons.

The value of this book as a source of information about plants as living beings, however, outweighs these structural shortcomings. I would recommend this book without hesitation to educated but non-botanically-inclined friends and fellow plant lovers alike. The short chapters and lively writing, jumping from anecdote to anecdote, make for enjoyable reading without the need for a long stretch of undivided attention. To my mind, any book that inspires a fascination with plant life is worth sharing!

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STEPHEN H. KELLERT, *Borrowed Knowledge: Chaos Theory and the Challenge of Learning across Disciplines*, Chicago / London: The University Chicago Press, 2008, x + 292 pp., £20.50 / \$35.00.

Stephen Kellert has written a clear and insightful monograph about disciplinary

pluralism as a defense of knowledge crossing disciplinary boundaries. The exemplary body of (traveling) knowledge is Chaos Theory, though it is not so much “theory” that is crossing several boundaries but rather its methods, language, concepts, and its results. To be clear, this is not a book on chaos theory. Chaos theory is used only as an example of a popular body of knowledge receiving a lot of interest, at least for a certain period, from disciplines like economics, legal theory, and literary studies. It was a “challenge” because chaos theory made one reconsider standard methodology; that is, “methodology of physics widespread among nonscientists, including philosophers of science” (12).

The phenomenon of borrowed knowledge is studied “to identify useful patterns and cautions for the transfer of scientific knowledge across disciplines, with the ultimate purpose of discerning lessons for our knowledge-making pursuits” (3). Thus, the ultimate goal is normative: to develop evaluative judgments about what works well and what does not when knowledge crosses boundaries, to create tools for rigorous critique of cross-disciplinary work.

This book is not only about disciplinary pluralism but is also an exercise in pluralism. To study borrowed knowledge, it itself makes use of different approaches, like rhetoric, sociology, and history, to make sense of the functions of borrowed knowledge. Beside the obvious rhetorical function of borrowing from chaos theory to give the disciplinary prestige of the natural sciences to economics, legal theory, and literary studies, Kelvert shows that borrowing has other – more challenging – roles to play, especially in arguments for changes in a discipline’s methodology. The prestige of a field in science functioning as the source of borrowed knowledge will, of course, strengthen the appeal of change, but the promise of success equal to the success in the source field makes change less daunting. Chaos theory has brought a variety of new phenomena within the scope of scientific understanding and enlarged the range of behaviors amenable to mathematical analysis. In economics, chaos theory appealed to methodological change in three directions: “(a) a move away from modeling randomness in terms of external shocks; (b) a willingness to explore nonlinearities in economics equations; (c) a reconception of the role of economic models; and (d) a redirection toward economic dynamics as opposed to equilibrium” (87-88). Although this appeal might have been “strong” for a period, looking at current economics, it did not change mainstream economics at all. The core models are dynamic stochastic general equilibrium models, which means random external shocks on a general equilibrium model; that is, a linear model where all the dynamics comes from these external shocks. Indeed, chaos theory did not live up to its promise in economics.

Knowledge packaged as a metaphor seems to cross borders easier than theory. To investigate the cognitive function of metaphors as a kind of borrowed knowledge, Kellert adopts the so-called interaction view, according to which metaphors take the structure of associations and relationships that surrounds the source field and brings some of that structure to bear part on the target realm. Kellert could have skipped the more than 10 pages-long defense of this structuring role of metaphors if he would have referred to James Clark Maxwell’s introduction of the method of analogy in physics, hereby deeply influencing the other founders of modern physics, Heinrich Hertz and Ludwig Boltzmann. But metaphors cannot only structure new fields, but also *re*-structure stuck and rigid structures, by shaking up the existing structure of a field, inducing researchers not to take its organizing assumptions for granted by defamiliarizing stagnant assumptions. It appears that it is this role of *re*-structuring that chaos as a metaphor has played in economics, legal theory, and literary studies.

When knowledge travels, it travels with baggage. To investigate this traveling, one should therefore have a look at what this baggage contains. Metaphors carry values and are value-laden. This insight from rhetoric, however, does not only apply to metaphors, but

in a political (read: normative) science such as economics, it also applies more generally to the full scope of its language and its explanations. This view was already comprehensively expounded by Gunnar Myrdal (1974 Nobel Prize laureate in economics) in his *Value in Social Theory* (1958, Routledge) during the 1950s, the heyday of positivism.

Kellert's picture of scientific practices as being essentially pluralistic on various levels is very adequate, as every scholar investigating research practices would confirm. I am only a bit less happy with taking chaos theory as the leading exemplar. It never really took hold in economics, despite the energetic attempts of its proponents. Mechanics is still the most successful showcase, across various disciplines and across a long period.

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MICHAEL RUSE, *Defining Darwin. Essays on the History and Philosophy of Evolutionary Biology*, Amherst, New York: Prometheus Books, 2009, 271 pp., illus., \$26.98.

Defining Darwin consists of a number of essays written by the noted philosopher and Darwin expert Michael Ruse on various aspects of Darwin's thought and developments of evolutionary views rooted in that thought. After a brief preface in which Ruse refers to the "moral crusade" requested to fight the "forces of darkness" represented by Intelligent Design, he provides a "part one" which consists of just one essay, a discussion of the *Origin of Species* and some perspective it has given to our times.

Part II follows with an essay on Kant and evolution or, rather, why Ruse (like most of us) thinks Kant was theoretically against evolutionary views. Perhaps here one would have liked to find a discussion of why Anton Dohrn, a convinced Kantian, saw himself as the true heir to Darwin's views, a point shared and emphasized by Michael Ghiselin. If we want to look for some kind of philosophical reference to Darwin we would have to refer to David Hume, as Jonathan Hodge showed years ago, and Ruse is a perfect conversant with such debates. Hume, of course, was not an evolutionist although his intellectual framework is somehow close to Darwin's, but one must be very careful to say "Evolutionist good, non-evolutionist bad" as the case of Cuvier, Kantian, anti-evolutionist, and great naturalist proves, as Ruse shows. Then, we find an interesting piece of Darwiniana in Ruse's discussion of Wallace's approach to human evolution and its differences with Darwin's.

Part III contains essays dealing with the impact of evolution on different fields, with Herbert Spencer, the official philosopher of evolution in the nineteenth century whose evolutionary views are not known so much as they ought to be. Then, Julian Huxley and G.G. Simpson on evolution and ethics are considered and, again, Hume appears in the background, and an essay on evolution and the novel follows, a topic quite popular these days, with a welcome appearance of Jack London and Social Darwinism and a discussion on whether it was Darwin or Spencer who served as the source of evolutionary aspects in literature.

Part IV tackles the most controversial consequence of evolutionary thought, the conflict between science and religion/theology. First, Darwin's view on the origin of religion in human evolution, so Humean in all its aspects is considered, this being one of Ruse's main concerns. Our author then moves to discuss the controversial ideas and activities of Richard Dawkins, so involved with the often quite crude controversies with creationists. Ruse is more moderate than Dawkins and, though clearly Darwinian, would prefer a less radical and aggressive attitude than Dawkins's.