

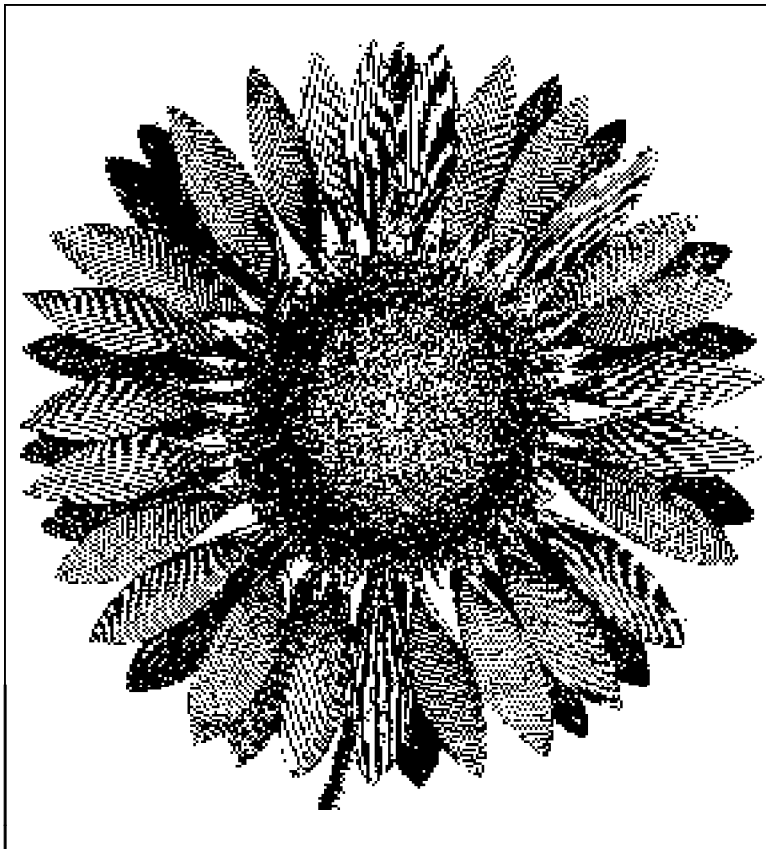
## One giant leap

**Consilience: The Unity of Knowledge.** Edward O. Wilson. Knopf, New York, 1998. 332 pp. \$26.00 (ISBN 0-679-45077-7 cloth).

“Consilience,” according to Webster’s dictionary, is “a leaping together.” Biologist Edward O. Wilson’s latest book, by that title, attempts a grand synthesis, or “leaping together,” of our current state of knowledge by “linking facts and fact-based theory across disciplines to create a common groundwork for explanation” and a prediction of where we are headed. It is a tour de force by one of our age’s greatest scientists—one of the few who possess the depth and breadth of knowledge to even attempt the task.

After a brief introductory chapter on how the author’s personal intellectual journey brought him to be passionately interested in the question of consilience, the book is neatly summarized (both in content and in tone) in the first paragraph of chapter 2:

You will see at once why I believe that the Enlightenment thinkers of the seventeenth and eighteenth centuries got it mostly right the first time. The assumptions they made of a lawful material world, the intrinsic unity of knowledge, and the potential of indefinite human progress are the ones we still take most readily into our hearts, suffer without, and find maximally rewarding through intellectual advance. The greatest enterprise



of the mind has always been and always will be the attempted linkage of the sciences and humanities. The ongoing fragmentation of knowledge and resulting chaos in philosophy are not reflections of the real world but artifacts of scholarship. The propositions of the original Enlightenment are increasingly favored by objective evidence, especially from the natural sciences. (p. 8)

The book fleshes out and defends these propositions with numerous examples from the natural sciences, the social sciences, and the humanities. Wilson takes an unabashedly logical positivist and reductionist approach to science and to consilience, arguing that “the central idea of the consilience world view is

that all tangible phenomena, from the birth of stars to the workings of social institutions, are based on material processes that are ultimately reducible, however long and tortuous the sequences, to the laws of physics” (p. 266). Deconstructionists and postmodernists, in this view, are merely gadflies, who are nonetheless useful to keep the “real” scientists honest. Wilson takes pains to point out the centrality of the reductionist approach, from a full chapter on its roots in the Enlightenment to separate chapters on its use in the natural sciences, psychology, genetics, evolution, the social sciences, and ethics and religion. He starts the natural sciences chapter

(chapter 4) with vivid and heartfelt descriptions of the scientific method itself and what it takes to be a good scientist (“bright enough to see what needs to be done, but not so bright as to suffer boredom doing it”; p. 58). Along the way, Wilson also provides often insightful comments on the fundamental problems in the various disciplines that have prevented or hindered consilience. For example, he notes that the weaknesses of conventional economic theory “can be summarized in two labels: Newtonian and hermetic. Newtonian, because economic theorists aspire to find simple, general laws that cover all possible economic arrangements...hermetic—that is, sealed off from the complexities of human behavior and the constraints

imposed by the environment” (p. 197).

Scholars from across the academic spectrum will find much food for thought, discussion, and disagreement in all the book’s chapters. Although there is probably broad agreement that integrating the currently fragmented sciences and humanities is a good idea, many will disagree with Wilson’s neo-Enlightenment, reductionist prescription. The problem is that the type of consilience envisioned by Wilson will not be a real “leaping together” of the natural sciences, the social sciences, and the humanities. Rather, he sees a total victory by the natural sciences and the reductionist approach in general. There are, however, several well-known problems with the strict reductionist approach to science (Williams 1997), and several of its contradictions show up in the book itself.

Wilson recognizes that the real issue in achieving consilience is one of scaling—that is, how understanding is transferred across the multitude of spatial and temporal scales, from quarks to the universe and everything in between. But he seems to fall back on the overly simplistic reductionist approach to doing this—that if we understand phenomena at their most detailed scale, we can simply “add up” in linear fashion from there to get the behavior at larger scales. Although he states that “the greatest challenge today, not just in cell biology and ecology but in all of science, is the accurate and complete description of complex systems” (p. 85), he puts aside some of the main findings from the study of complex systems—that scaling in adaptive, living systems is neither linear nor easy, and that “emergent properties,” which are unpredictable from the smaller scale alone, are important. And although he acknowledges on the one hand that analysis and synthesis, reductionism and holism, are as inseparable as breathing out and breathing in, Wilson glosses over the difficulty of actually doing the synthesis in complex adaptive systems and the necessity of studying and understanding phenomena at multiple scales simultaneously, rather than reducing them to the laws of physics.

The consilience for which we are really searching, I believe, is a more balanced and pluralistic kind of “leaping together,” one in which the natural and social sciences and the humanities all contribute equitably. A science that is truly transdisciplinary and multiscale, rather than either reductionistic or holistic, is, in fact, evolving, but I think it will be much more sophisticated and multifaceted in its view of the complex world in which we live, the nature of “truth,” and the potential for human “progress” than the Enlightenment thinkers of the seventeenth and eighteenth centuries could ever have imagined.

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#### THE HUMAN FACTOR IN SUSTAINABLE AGRICULTURE

**Facilitating Sustainable Agriculture: Participatory Learning and Adaptive Management in Times of Environmental Uncertainty.** Niels G. Röling and M. Annemarie E. Wage-makers, eds. Cambridge University Press, Cambridge, UK. 1998. 318 pp. \$85.00 (ISBN 0-521-58174-5 cloth).

*Facilitating Sustainable Agriculture* is a major revision of the papers from a 1993 workshop at the 15th Congress of the European Rural Sociological Society. Although the essence of many of the presentations at this workshop remains, the papers were modified and updated as the book evolved. The resultant book is a work in progress in which the editors point out the “loose ends” of sustainable agriculture. Overall, this book provides a fascinating and usable perspective by examining the implications of ecologically sound agriculture for land users and other stakeholders.

It is the organization of the book and the information it contains that

will make it a valuable addition to the library of any sustainable agricultural researcher or educator. The first section contains three excellent chapters that together ask some uncomfortable questions and challenge the reader’s thinking about the role of people in the environment. The book ends with a synthesis that addresses the basic questions of the book: Can we “learn” our way to a more sustainable agriculture? And if so, what does it take?

*Facilitating Sustainable Agriculture* is not just another sustainable agriculture book that is hung up on agriculture’s changing structure or its dependence on fossil fuels, chemicals, and pesticides. It probes, tries to answer, probes again, and often admits lack of conclusions because sustainable agriculture is, after all, about people. People defy quantification, and so, perhaps, does their environment. The book has many faults, some admitted to by the authors. Its largest hurdle, for me, at least, was the extensive use of sociological jargon. As an agronomist, I struggled with many of the coined words, but I assume my social-science colleagues have just as much of a problem with agronomic lingo in books pertaining to agronomic issues of sustainability.

The book starts with an introductory chapter by the editors that leads the reader into the deep waters encompassed in the book by defining what is meant by sustainable agriculture and the divergent opinions surrounding definitions of sustainability. Anyone who has followed the writings of Jules Pretty will appreciate his deep insights, expressed in the second chapter, about the lessons learned from policies at work. His chapter alone is worth the price of the book. Pretty even gets into the issue of sustainable intensification of agriculture, a term recently popularized by the World Bank to introduce the concept of making sustainable agriculture more productive.

The third chapter, by James Woodhill and Röling, has the intriguing title, “The second wing of the eagle: the human dimension in learning our way to more sustainable futures.” This chapter brings into play the basic premise of the book, that the environmental “cri-

sis,” although real, has to be understood as a part of the human experience. Environmental management has traditionally been regarded primarily as a technical task, whereas the causal agents of environmental damage are people. Until human behavior is brought into the equation, solutions will not be forthcoming. The third chapter introduces the concept of social learning and discusses the need for integration of the scientific and social disciplines to achieve social action. The authors want to get the eagle that is environmental management flying again. The figurative eagle is currently skirting the issues, madly beating the one wing it knows how to use. The coupling between “human systems” and “ecosystems” can only constructively be addressed using the social learning approach.

The middle sections (chapters 4–15) are chapters that I would describe as case studies. They build on the policy chapter and the social learning chapter in supportive ways. Problems and solutions in many countries, including Switzerland, Greece, the Netherlands, Germany, Indonesia, Australia, and the United States are used to provide a framework for the final synthesis. All 12 chapters have good value in their own right, and when put together help make this a powerful book.

The final chapter brings it all together. Röling and Janice Jiggins synthesize the ecological knowledge system about sustainable agriculture by drawing together the major lessons learned in the previous 12 chapters in an understandable fashion. Röling and Jiggins point out that these chapters show that ecologically sound (i.e., sustainable) agriculture puts more demands on professionalism and that changing to more ecologically sound agriculture makes far greater demands on scientific and sociological understanding than does conventional agriculture. This final chapter provides practical guidance for conducting learning in sustainable agriculture and on the implications of using the learning approach for facilitation, teaching, research, funding, and interagency collaboration.

The book is heavily influenced by the experiences with Landcare, the Australian approach to learning and

facilitation of ecologically sound agriculture practices. It is a strong and powerful book that should be regarded as a turning point in the advancement of sustainable agriculture in today’s world. Perhaps, to paraphrase the book’s major lesson, “It’s the people, stupid.”

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#### NEW TITLES

**Behavioral Ecology and Conservation Biology.** T. Caro, ed. Oxford University Press, New York, 1998. 582 pp., illus. \$90.00 (cloth).

**Behaviour and Ecology of Riparian Mammals.** N. Dunstone & M. Gorman, eds. Cambridge University Press, New York, 1998. 391 pp., illus. \$95.00 (cloth).

**Biochemical Pathways: An Atlas of Biochemistry and Molecular Biology.** G. Michal, ed. Wiley Publishers, New York, 1999. 277 pp., illus. \$99.95

(cloth).

**Biophysics of Computation: Information Processing in Single Neurons.** C. Koch. Oxford University Press, New York, 1998. 552 pp., illus. \$59.95 (cloth).

**The Birth of the Cell.** H. Harris. Yale University Press, New Haven, CT, 1999. 288 pp., illus. \$30.00 (cloth).

**Bull’s Birds of New York State.** E. Levine, ed. Cornell University Press, Ithaca, NY, 1998. 622 pp., illus. \$39.95 (cloth).

**Darwin’s Spectre: Evolutionary Biology in the Modern World.** M. R. Rose. Princeton University Press, Princeton, NJ, 1999. 233 pp. \$27.95 (cloth).

**European Forests and Global Change: The Likely Impacts of Rising CO<sub>2</sub> and Temperature.** P. G. Jarvis, ed. Cambridge University Press, New York, 1998. 379 pp., illus. \$100.00 (cloth).

**Evolution and Speciation of Island Plants.** T. F. Stuessy & M. Ono, eds. Cambridge University Press, New York, 1998. 358 pp., illus. \$80.00 (cloth).

**Kea Bird of Paradise: The Evolution and Behavior of a New Zealand Parrot.** J. Diamond & A. B. Bond. University of California Press, Berkeley, CA, 1999. 243 pp., illus. \$29.95 (cloth).

## Taking In the Sites

**B**efore heading out into the warm summer weather, check out the following sites for helpful birdwatching information.

Birdwatching.com ([www.birdwatching.com](http://www.birdwatching.com)) provides birders of all experience levels with useful information and resources. Software, binoculars, videos, and literature can be ordered from this Web site, which also contains detailed interviews with expert birdwatchers; a list of recent name changes in birdwatching guides; links to other birdwatching sites; and a trivia section, which provides a list of the 82 species of birds whose scientific names are tautonyms (e.g., common buzzard, *Buteo buteo*). The authors of this site also give tips on feeding birds in winter, helping baby birds, and "watching birds with your ears."

To augment your ability to "watch with your ears," go to [www.birder.com](http://www.birder.com), where short sound clips of bird songs can be easily downloaded; listen to the blue jay, the great blue heron, the Virginia rail, or the killdeer, among many species. People eager to expand their birding skills to other geographic locales will be interested in lists of the best birding sites in the United States and Canada. Adventurous birders will benefit from the rare bird alerts organized by geographic area. Birders of all skill levels can chat about birding, the environment, or taxonomy at this site and find links to many other sites of interest, including museum collections and ornithological organizations.

The Ornithological Council, comprising 10 North American ornithological societies, presents BIRDNET at [www.nmnh.si.edu/BIRDNET/index.html](http://www.nmnh.si.edu/BIRDNET/index.html). The site contains links to all 10 societies, as well as extensive links to other organizations. Also available are *Guidelines to the Use of Wild Birds in Research*, an online version of the *Ornithological Newsletter*, and the 1998 checklist of North American birds from the American Ornithologists' Union.

Other sites of interest include:

American Birding Association: [www.americanbirding.org](http://www.americanbirding.org)

American Ornithologists' Union: [pica.wru.umt.edu/AOU/AOU.html](http://pica.wru.umt.edu/AOU/AOU.html)

National Audubon Society: [www.audubon.org](http://www.audubon.org)

Bird On!: [birdcare.com/birdon](http://birdcare.com/birdon)

**Lyell in America: Transatlantic Geology, 1841–1853.** L. G. Wilson. Johns Hopkins University Press, Baltimore, 1998. 429 pp. \$45.00 (cloth).

**The Molecular Basis of Cell Cycle and Growth Control.** G. S. Stein, R. Baserga, A. Giordano & D. T. Denhardt, eds. Wiley Publishers, New York, 1999. 389 pp., illus. \$79.95 (cloth).

**Neuropeptides: Regulators of Physiological Processes.** F. L. Strand. MIT Press, Cambridge, MA, 1999. 658 pp., illus. \$65.00 (cloth).

**Owning the Future: Inside the Battles to Control the New Assest—Genes, Software, Databases, and Technological Know-How—That Make up the Lifeblood of the New Economy.** S. Shulman. Houghton Mifflin, Boston, 1999. 256 pp. \$25.00 (cloth).

**The Pattern of Evolution.** N. Eldredge. W. H. Freeman, New York, 1999. 219 pp., illus. \$24.95 (cloth).

**Rattlesnake: Portrait of a Predator.** M. Rubio. Smithsonian Institution Press, Washington, DC, 1998. 239 pp., illus. \$39.95 (cloth).

**T Lymphocytes in the Liver: Immunobiology, Pathology, and Host Defense.** I. N. Crispe, ed. Wiley-Liss, New York, 1998. 256 pp., illus. \$99.95 (cloth).

### NOW AVAILABLE IN PAPERBACK

**Ecological Vignettes: Ecological Approaches to Dealing with Human Predicaments.** E. Odum. Harwood Academic Publishers, The Netherlands, 1998. 269 pp., illus. \$21.95 (paper).

**The Ecology and Evolution of Inducible Defenses.** R. Tollrian & C. D. Harvell, eds. Princeton University Press, Princeton, NJ, 1999. 383 pp., illus. \$29.95 (paper).

**Facing Death.** H. M. Spiro, M. G. McCrea Curnen & L. Palmer Wandel, eds. Yale University Press, New Haven, CT, 1998. 240 pp., illus. \$14.00 (paper).

**Images of Development: Environmental Causes in Ontogeny.** C. van der Weele. State University of New York Press, Albany, NY, 1999. 182 pp., illus. \$19.95 (paper).

**Interpreting DNA Evidence: Statistical Genetics for Forensic Scientists.** I. W. Evett & B. S. Weir. Sinauer Associates, Sunderland, MA, 1998. 278 pp., illus. \$34.95 (paper).

**The Molecular Origins of Life: Assembling Pieces of the Puzzle.** André Brack. Cambridge University Press, New York, 1998. 417 pp., illus. \$34.95 (paper).

**Numerical Ecology: Developments in Environmental Modelling 20.** 2nd English ed. P. Legendre & L. Legendre. Elsevier Science, New York, 1998. 870 pp., illus. \$73.50 (paper).

**The Neuroendocrine Regulation of Behavior.** J. Schulkin. Cambridge University Press, New York, 1998. 323 pp., illus. \$37.95 (paper).

**Practical Approaches to the Conservation of Biological Diversity.** R. K. Baydack, H. Campa III, J. B. Haufler, eds. Island Press, Washington, DC, 1998. 320 pp., illus. \$35.00 (paper).

**Theoretical Morphology: The Concept and Its Applications.** G. R. McGhee Jr. Columbia University Press, New York, 1999. 316 pp., illus. \$26.50 (paper).

**Untangling Ecological Complexity: The Macroscopic Perspective.** B. A. Maurer. University of Chicago Press, Chicago, 1999. 262 pp., illus. \$14.50 (paper).

**A Wetland Biography: Seasons of Louisiana's Chenier Plain.** G. M. Gomez. University of Texas Press, Austin, TX, 1998. 286 pp., illus. \$18.95 (paper). □