BOOK REVIEWS

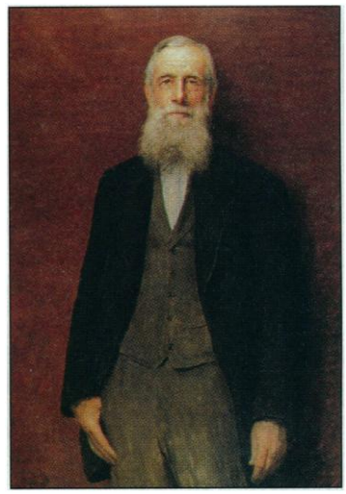
Ongoing Ecology

Long-Term Experiments in Agricultural and Ecological Sciences. R. A. LEIGH and A. E. JOHNSTON, Eds. CAB International, Oxford, UK, 1994. xiv, 428 pp., illus. $95 or £55. From a conference, Harpenden, UK, July 1993.

Any discussion of "long-term" studies among ecologists automatically brings to mind the "Rothamsted Experiments" known for decades because of their uniqueness—the longest-running set of experimental crop-fertilization studies—and their impact on ecology and evolutionary biology. It might be a surprise to some (it was to me) to learn that the familiar Park Grass experiments are only one of several long-term studies ongoing at the Rothamsted Experimental Station in Britain. And they were initiated as a follow-up experiment on the original fertilization studies initiated by Joseph Henry Gilbert and John Bennett Lawes, which focused on arable crops and animal nutrition.

Insights such as this into the history of the Rothamsted and other long-term studies are one of the many valuable contributions of this collection of papers written for a conference held to commemorate the 150th anniversary of the Rothamsted Experiment Station. As in many such compilations, the papers are uneven in quality; a few are little more than superficial summaries of previously published work or inventories of existing studies. But there are also a number that provide both a current and a historical context for the scientific contributions of long-term studies for ecology and agriculture.

The papers in the first section, The Contribution of Long-Term Experiments to Agriculture and Forestry, provide a historical overview of some well-known long-term studies in the United Kingdom, the United States, and Australia. I particularly enjoyed the chapter by A. E. Johnston on the history of the Rothamsted Classical Experiments. He provides a historical context for the scientific questions, controversies, and personalities that motivated the establishment and continuation of these experiments. The experiments were not originally planned as long-term studies. Johnson argues that the impetus for Lawes and Gilbert to continue them arose, in part, from a controversy with Justus Liebig over the source of nitrogen for plants and what inputs were needed to maintain crop productivity. "I suspect that Lawes and Gilbert needed to go on showing that they were right on all counts. And not only right, but right beyond all reasonable doubt. And so they kept the experiments going" (p. 33).



J. B. (later Sir John) Lawes, who, with J. H. (later Sir Henry) Gilbert, started the Rothamsted experiments in 1843. [Courtesy A. E. Johnston]

The second and fourth sections, Unforeseen Uses and Benefits of Long-Term Field Experiments and Monitoring Long-Term Ecosystems, Population Dynamics and Environmental Change, focus on the unique features and value of long-term studies to understanding environmental change and the interactions that occur in natural and managed systems. The claim that long-term studies can acquire value not predicted (or anticipated) by their initiators is aptly documented in the chapters by Powlson on nutrient cycles, by Jenkinson, Bradbury, and Coleman on models of soil carbon and nitrogen turnover, and by Jones, Johnston, and McGrath on monitoring organic contaminants in soils. These papers also demonstrate the value of preserving samples from long-term studies—the analysis of trends in carbon, nitrogen, and contaminants in soils from Rothamsted was only possible because both soil and plant samples from the experimental plots had been archived.

The Rothamsted Park Grass experiment on the manuring of permanent grassland, started in 1856. At left is an unmanured plot with many species present; at right is a monoculture of *Holcus lanatus* on a plot where nitrogen, phosphorus, and potassium are applied and soil pH is 3.5. [Courtesy A. E. Johnston]

The claim that long-term studies are needed because short-term results do not always parallel long-term patterns or dynamics is supported in several chapters in section 4. Most ecologists are familiar with the dramatic results of the Park Grass experiments (summarized here by Tilman *et al.*) that demonstrate the effects of fertilizer on plant community composition and diversity. Woiwod and Harrington provide an excellent summary of the Rothamsted Insect Surveys and demonstrate how these surveys revealed the time scales necessary to detect density dependence in insect populations and resolved a long-running controversy regarding insect population dynamics. They point out the exciting potential and necessity of long-term data for testing theoretical models of population dynamics and determining what possible patterns (including chaos) occur in "real populations." Similarly, Greenwood, Bailee, and Crick point out that the long-term surveys of bird populations conducted by the British Trust for Ornithology (BTO) have provided data on demographic patterns that have made valuable contributions to life-history theory and are necessary for conservation planning.

Despite the acknowledged importance of long-term studies, many are at risk of abandonment. The fate of data from studies that have ceased is a major theme of a paper by Swift *et al.* describing the status of long-term projects in agriculture in Africa. The authors call for the establishment of an international database and information system that would provide a means of preserving—and accessing—data that are only published in the "gray" literature or are held in files. The cost of repeating these experiments is prohibitive, and given the need for the development of sustainable agriculture and land-use planning in Africa (and the rest of the world) it would seem wise to invest in "mining the past" rather than continuing to develop "new programs" to answer old questions.

Vignettes: Field Exercises

I soon learned . . . that one could never sit at the feet of Dobzhansky when he was at a field station. When he was not sleeping or eating, he was either setting out baited traps for *Drosophila*, catching them in bottles, preparing and examining their squashed chromosomes, or taking his "leisure" by mounting a horse and riding rapidly in a chosen direction. The only possible way of communicating with him was to mount another horse and ride equally rapidly in the same direction.

—G. *Ledyard Stebbins, in Genetics of Natural Populations: The Continuing Importance of Theodosius Dobzhansky* (Louis Levene, Ed.; Columbia University Press)

Some things [are] more difficult to accomplish underwater: for example, sitting on a rock for a few hours writing up notes; changing film in your camera; eating lunch; talking; marking a place so you can return to it reliably the next day or week or year. But there are compensations. . . . I could "fly"—like Superman!—over the undersea forests of my choice, taking conspicuous advantage of three dimensions, gliding down whenever I chose and landing precisely where I wanted to (as long as it was not more than about 150 feet deep).

—*Sylvia Alice Earle, in Sea Change: A Message of the Ocean* (Putnam)

Despite the intent to cover a wide range of topics, there is an obvious bias among the chapters toward terrestrial (17 of 22 chapters) and botanical (12) studies and studies from the United Kingdom (13). Such a bias is not totally unexpected given the origins of the volume, but it would have been useful, in light of the growing recognition of value of long-term studies for conservation planning and environmental policy, to include more of the well-known long-term studies of animals.

Overall, however, this is a commendable compilation of papers that will be of interest to a wide audience both because of the scientific contributions that are summarized and for the perspective it provides on the historical and social context that motivated the initiation and continuation of many of these studies. It is interesting to reflect that many of the long-term studies described in this volume (including the Rothamsted Classicals) were initiated at a time when there was concern about declining soil fertility and its consequences for agricultural productivity. The environmental concerns of today are broader—and encompass spatial scales that extend to the global—but include these same issues. It will be interesting to see whether the foresight of today's planners results in a legacy of scientific insight comparable to that which has come from the Rothamsted experiments.

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Environmental Debate

Reinventing Nature? Responses to Postmodern Deconstruction. MICHAEL E. SOULÉ and GARY LEASE, Eds. Island Press, Washington, DC, 1995. xviii, 189 pp. $34.95; paper, $17.95 or £16.95.

Postmodern forms of critical analysis have proven to be unsettling to conventional wisdom far beyond the bounds of the disciplines within which they first appeared, crossing the barrier that has traditionally separated the natural sciences from the humanities and mounting a challenge to modern beliefs regarding the certainty of our knowledge of the natural world. This collection is an outgrowth of a series of conferences inspired by the work of one such postmodern critic, historian of science Donna Haraway, and its particular concern is to consider the role postmodern thought has supposedly played in undermining attempts to defend nature, and more specifically wilderness areas, from the wide variety of threats presented by modern society.

Historian Gary Lease provides an even-handed introductory essay that outlines the terms of the debate, but the dominant tone of the collection is set by the contributors who flatly reject postmodernism. Asserting an unmediated relationship with the natural world, zoologist Paul Shepard characterizes postmodernism as the most recent version of the Western intellectual tradition's humanistic alienation of human from nature, now lending aid and comfort to the encroachments of the inauthentic "virtual reality" of contemporary consumer culture. Stephen Kellert, a professor of forestry and environmental studies, describes the results of his quantitative cross-cultural study of modern attitudes in Japan and the United States and concludes that human values regarding nature are fundamentally alike and are determined by human biology and evolution, not culture. He finds contrary views, such as those linked to relativistic "deconstructionist" points of view, to be dysfunctional and dangerous.

Michael E. Soulé, a professor of environmental studies, argues that while there are many differing views of nature in Western society, "living nature" is unquestionably under siege, both physically, from developers, the "wise use" movement, and others who contribute to the current extinction crisis, and ideologically, from the advocates of postmodernism who pave the way for the physical threats. Soulé summarizes the potential dangers of postmodernism's influence in the policy arena and calls for an approach to wilderness management that would allow the expertise of the scientific community, especially that of conservation biologists, to come to the fore.

Two contributors look more closely at these issues as they relate to the management of wilderness areas. The desire to preserve nature in its pristine state, unaltered by human society, guides wilderness management today, but, argues conservationist Gary Paul Nabhan, the natural world has always been actively managed by indigenous cultures and the "untrammeled" pre-Columbian wilderness that our parks are mandated to preserve and restore is a myth. Ethnobiologist David M. Graber describes a further irony confronting wilderness managers: aggressive human intervention is required if we are to maintain what remains of the wild. To allow nature to take its course, untouched, will now only lead to a quickening of the extinction crisis. The meaning of the difference between "the wild" and human society is becoming increasingly difficult to define, even for the professionals, as the physical landscape itself comes to be seen as a social construction.

Not all the contributors, however, decry these intellectual developments. Environmental historian Donald Worster describes the impact of historicism on ecological thinking, in which the ecosystem concept, a balanced vision of orderly change, has been displaced by the notion of a fragmented, "disturbed" nature, and still finds that history, or at least a moderately historicist perspective, has valuable lessons to offer us. Philosopher Albert Borgmann sketches a history of humankind's gradual estrangement from nature and still chooses to plot a course "across the postmodern divide,"