structure is regulated through the ability of species to coexist by partitioning an array of resources. Hutchinson's brilliant student Robert H. MacArthur fashioned models from the local, contemporary population processes of Lotka and Volterra that predicted qualitative attributes of biological communities, setting off a flurry of empirical and experimental field investigations in the 1960's and 1970's to find support for the ideas. Ecologists, whose attention span is forcibly narrowed to the here and now by graduate school tenure, grant periods, and criteria for promotion, had at last found the largest of ecological systems brought within their own scale of time and space. History was deliberately relegated to the obscure shadows of classical biogeography, systematics and paleontology.

The scientific appraisal of the Hutchinson-MacArthur revolution has begun, and its basic position on history is becoming a major source of controversy. For Kingsland, this is not yet history. Even as she takes up Hutchinson and MacArthur there is a perceptible change in tone, seeming to expose a dispassionate historian struggling against the seductive power of intellectual excitement and promise. But the ultimate value of history derives from the absence of a boundary between it and the present. Although neither *The Background of Ecology* nor *Modeling Nature* lectures ecologists on their concepts, perceptions, or methods, the lessons of history will not be lost on readers of either book.

ROBERT E. RICKLEFS
Department of Biology, University of Pennsylvania, Philadelphia 19104

Trends of Chemistry

Chemistry in America, 1876–1976. Historical Indicators. ARNOLD THACKRAY, JEFFREY L. STURCHIO, P. THOMAS CARROLL, and ROBERT BUD. Reidel, Boston, 1985 (distributor, Kluwer, Hingham, Mass.). xxiv, 564 pp., illus. $79.50. Chemists and Chemistry.

Those of us in the humanities find it hard to avoid feeling at least an occasional pang of envy as we survey the magnificent facilities and resources available to our colleagues in the natural sciences. We know, of course, that the sciences have not been immune from budget cuts in recent years. Nevertheless, to the outsider the natural sciences appear to enjoy an impregnable position in our society; their history seems like a tale of mounting status, wealth, and power punctuated only occasionally by such events as the depression of the 1930's and the inflation of the 1970's.

Chemistry in America, 1876–1976 does not overthrow all these conceptions, but it does make some of them untenable, at least as regards that science which has the largest community of practitioners, chemistry. The authors, four historians of science, have accumulated quantitative data whereby trends in the development of chemistry in America might be analyzed. They look at indicators as diverse as the employment of chemists, the pages devoted to chemistry in newspapers and encyclopedia yearbooks, and the frequency with which chemists have been appointed to college presidencies. Their conclusions are both simple and provocative. Chemistry, they tell us, has indeed grown steadily during the past century if its dimensions are measured in absolute terms; but when viewed against the growth of other occupations, disciplines, or professions, it has been in decline for the past half-century or more. Some examples may illustrate this point. Although chemists in the labor force have increased more than a hundredfold since 1870, chemists today represent a much smaller percentage of all professional and technical workers than they did in 1950 or even in 1920. In 1921 one out of every three persons engaged in industrial research was a chemist; in 1957 one out of every 19. Chemistry departments awarded one of every five doctoral degrees in 1940, but only one of every 15 in the early 1970's. The authors' tables yield scores of similar statistics. Where chemists used to hold leading roles in industrial laboratories, federal agencies, and universities, they now have been reduced to positions in ever larger supporting casts. Though they may still enjoy greater opportunities and privileges than colleagues in the humanities, their standing vis-à-vis engineers, physicists, and biologists has suffered erosion for decades.

What one makes of these findings will depend, at least to some degree, on one's disciplinary affiliation. If chemistry is indeed losing its share of the American market for scientific expertise, is that erosion a symptom of serious illness in the chemical profession? Does it, for example, indicate a loss of intellectual vitality? Or does it simply reflect a process whereby the science that was the first to become fully integrated into American institutions is now being joined by others that grow alongside it, but not at its expense? The authors refrain from making an explicit choice between these interpretations. On the one hand, they detect no sign that American laboratories are abdicating their position of leadership in research; although the American share of the world's chemical literature has declined in recent decades, the lion's share of the most frequently cited papers continue to come from American institutions. On the other hand, the authors repeatedly call attention to evidence of decay in exactly those things which any discipline requires for enduring prosperity: patronage, career opportunities, and public interest. Extrapolating from these trends, it seems improbable that intellectual leadership can long be maintained.

The authors, however, neither prognosticate nor prescribe. Nor, for that matter, do they attempt to interpret the past. Repeatedly they skirt precisely those questions which the historian would most like to see explored. Why was it chemists who played such a crucial role in the development of graduate education in America? What accounts for the extraordinary rapidity with which laboratory training established itself in schools and colleges at the end of the 19th century? How does the evolution of this science in the American setting compare with its history in Europe? The authors describe their goal as being akin to that of the medievalist who seeks to establish a pure text; they wish to establish reliable quantitative information that might serve as a prologue to more satisfying work on the history of science and science policy. In this they have succeeded richly; through painstaking effort they have retrieved an immense yield of valuable data. Nevertheless, I wish they had been less ruthless in suppressing their interpretative instincts and more forthcoming in discussing those issues which, after all, give those data meaning.

JOHN W. SERVOS
Department of History, Amherst College, Amherst, Massachusetts 01002

The Stress Response

Changes in Eukaryotic Gene Expression in Response to Environmental Stress. BURR G. ATKINSON and DAVID B. WALDEN, Eds. Academic Press, Orlando, Fla., 1985. xviii, 381 pp., illus. $65. Cell Biology.

It has been 23 years since Ferruccio Ritossa discovered that heat and chemical treatments induce the formation of puffs in the polytene chromosomes of the salivary glands of *Drosophila* larva but only seven years since clues began appearing in the literature that virtually all