

nal pursuit of science; although the Weather Bureau was critical of the efforts, the Army and a special unit of the Department of Agriculture sponsored rainmakers anyway. Finally, in Spence's words, "Rainmaking . . . was not fitted into the legal framework of the country." It still is not.

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Early Environmentalism

Pollution and Reform in American Cities, 1870-1930. MARTIN V. MELOSI, Ed. University of Texas Press, Austin, 1980. xii, 212 pp. \$15.

The "first American environmental crisis," the unifying theme of this book of essays, was produced by the same 19th-century technological changes that accelerated the transition from a rural, agrarian society to an urban, industrial one. It was an often misunderstood by-product of applied science that occurred at a time when scientific knowledge was undergoing dramatic change. Once the relationships were better understood scientifically, society demanded that the deterioration in the "quality of life" be reversed. Increased pollution was unacceptable, but so were decreased industrial production and urbanization, both of which were viewed as contributing to a rising standard of living.

Martin Melosi has assembled an interesting collection of historical essays that do indeed "fill a void in the study of the American city." The essays are written at a level accessible to general readers, and the material presented should be considered by anyone concerned with or about pollution.

The book begins with an essay by the editor in which he relates pollution to such factors as the use of coal, the factory system, and growing concentrations of industry and people. He then discusses the response of the Progressive Era to the growing pollution problem. At first, reform was aimed at obvious, specific health hazards. Over time, reformers, both individuals and groups, gained a wider perspective. In general, abatement was sought through public policy actions; on occasion reformers set about to change industrial operations, nuisance laws, and municipal services. The primitive state of local government complicated matters. The idea of requisite municipal services as a complete package was not well developed, and, in any

event, its implementation was beyond the financial capabilities of most late 19th-century cities. Nonetheless, reform sometimes did come from within a city's public works and health departments.

Melosi's introduction is followed by a section composed of five narrative histories of specific urban pollution problems and the response to them. Stuart Galishoff's study of water supply emphasizes the experience of three cities: Atlanta, Chicago, and Newark. He identifies businessmen and public health officials as the leaders of the movement for improved urban water supplies. Joel Tarr, James McCurley, and Terry Yosie in their study of sewage disposal discuss how improvements in urban water supply systems and the shift to the water-carriage system for waste water removal entailed a considerable increase in urban sewer investment. After a brief discussion of the health effects of the water carrier technology, the authors turn to the development of water quality policy in the years 1900-1930. They examine the positions of public health officials at both the state and federal level and the positions of the leading sanitary engineers. Dale Grindler's study of smoke pollution emphasizes political and legal elements. He identifies women's groups, engineers, and civic groups as the most active supporters of smoke abatement. Melosi's second essay is a history of efforts pertaining to solid wastes. He identifies a set of supporters similar to those involved in the antismoke campaigns. In particular, he focuses on the career of George Waring, a sanitary engineer, whose appointment as street cleaning commissioner of New York City in 1895 "was the major turning point in the development of modern refuse management." The fifth essay is Raymond Smilor's study of noise pollution. His discussion of reform first centers on the work of Julia Barnett Rice, president of the Society for the Suppression of Unnecessary Noise in New York City. He then notes that by 1920 reformers were likely to be drawn less from civic groups and more from the scientific and technological communities. Here he concentrates on the New York City Noise Abatement Commission, appointed in 1929.

In each essay reform is viewed primarily from the perspective of the reformers. This focus may overstate the case for reform, and Melosi notes, "The environmental reformers perhaps faulted in the direction of exaggerating a potential threat, but that was certainly preferable to a lack of caution." The reformers' emphasis was on the problem, not necessar-

ily the solution. In many cases, the alternatives to the status quo were not articulated clearly by the reformers, and consequently they are left implicit in these essays.

All the essays speak to the multidisciplinary nature of pollution problems, but the notes that accompany each essay and the concluding bibliography contain few references to the present-day natural and social science literature on pollution, a literature that emphasizes the need to consider alternatives. One result of the reliance on historical materials is that these narratives raise issues they do not address. The following quotation from the 1932 New York City study on city noise, cited by Smilor, is representative: "If man came first in the mind of man, noise abatement would be effective in a week. But the machine comes first and it is simpler for the machine to make noise." Environmental improvement, Smilor notes, "would require sacrifices and a dramatic shift in priorities." But what are the sacrifices? What priorities are affected and in what ways? Compromise is necessary; there are trade-offs to be considered, in this case between the social costs of pollution and the social benefits of urbanization and industrialization. Most of the essays discuss some of the factors that would have to be taken into account in addressing such issues, but readers must draw their own conclusions.

The final section of two essays examines two groups that played a significant role in the reform movement: municipal engineers and women. Stanley Schultz and Clay McShane focus on the professional response to the public's demand for environmental improvement. This came from municipal engineers who demonstrated that solutions to these problems lay in physical and technological innovations. That some of these solutions were at best temporary is often attributable to the overwhelming growth rates experienced in many turn-of-the-century cities. The authors discuss how the initial success of sewage campaigns lent weight to the engineers' solutions. Continued monitoring of these solutions contributed to the professionalization of urban government; the first generation of city managers were drawn from the ranks of municipal engineers. Suellen Hoy highlights the role of particular women and women's groups in shaping and articulating the public demand for improvement. Hoy's essay is an important piece of women's history, and the efforts she describes were an integral part of environmental history, as several of the earlier essays in the book

attest. Victorian custom may have kept many women out of the labor force, may have disenfranchised them, but they were still active outside the home, involved in important public matters.

The editor established four goals for this collection: to "provide a better understanding of the impact of pollution on industrial cities . . . establish the foundation for more comprehensive and speculative historical studies of the urban environment, broaden the study of American environmental history to afford more attention to the cities and urban life, and provide essential background for those individuals grappling with current environmental problems." The collection convincingly accomplishes all four goals, but I am disappointed that the sights weren't set higher, that the essays in the second section weren't more speculative, more analytical.

Although some of the essays end on rather negative notes (for example, the New York Noise Abatement Commission disbanded in 1932 without having a significant impact on noise pollution), the book's underlying message is positive. The response to pollution in the Progressive Era was swift and often successful, especially where public health was involved. Whatever else, the reformers successfully heightened public awareness. Our cities are far more livable today than would have been the case had the public consciousness not been piqued a century ago.

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Double Stars

Close Binary Stars. Observations and Interpretation. Papers from a symposium, Toronto, Aug. 1979. MIREK J. PLAVEC, DANIEL M. POPPER, and ROGER K. ULRICH, Eds. Reidel, Boston, 1980 (distributor, Kluwer Boston, Hingham, Mass.). xx, 598 pp., illus. Cloth, \$68.50; paper, \$31.50. International Astronomical Union Symposium No. 88.

This large volume of symposium proceedings contains 104 papers ordered in ten major subject categories. It is clearly not possible to do justice to all of the research on binary stars in one meeting or one book, and the volume does not adequately cover work on cataclysmic variables, x-ray results from the Einstein Observatory, or SS433. It does contain a good representation of current trends in sections on Algols, revisited (again!)

with definitive data on masses, and on accretion and mass-loss mechanisms. Sections on "theory," mainly concerning evolution and mass exchange, and on RS Canum Venaticorum stars also seem to me to be particularly worthwhile.

Only 31 of the contributions can be read as complete papers. The rest are generally brief summaries of work in progress or to be published elsewhere and are not really useful without further reading.

The "theory" section contains many new ideas and shows that theoreticians are seriously attempting to come to grips with the observations. This is perhaps a result of the present state of maturity of both theory and observation. Many specific evolutionary scenarios are dealt with in this section, and models of mass transfer and accretion phenomena are dealt with throughout the book. These are clearly the outstanding topics of interest in binary star research today.

The section on RS Canum Venaticorum stars is also stimulating—again perhaps because ideas about star spot models and data are ready for critical comparison. The study of these stars is still in the stage of rapid data accumulation, from x-ray, radio, and high-quality optical observations, and we should expect more exciting developments over the next few years.

A section on contact binaries is somewhat dull by comparison but contains an excellent overview of theory by Shu and a discussion of some exciting new data possibilities by Anderson *et al.* The cataclysmic variables clearly suffer from the proximity in time of IAU colloquium 53, on white dwarfs and variable degenerate stars, but I found the two papers on this subject by Mitrofanov stimulating reading. Other sections tend to be filled with short papers of limited interest, but there are some highlights: good discussions of polarimetric measurements by McLean, Aspin *et al.*, and Simmons *et al.*, of Wolf-Rayet star light-curve analysis by Smith and Theokas, and of Wolf-Rayet star evolution by Vanbeveren and de Loore. Both Andersen *et al.* and Kitamura present sound ideas about fundamental research on binary stars for the 1980's, and Plavec presents his exciting International Ultraviolet Explorer data on a new class of mass-transfer systems, W Serpentis stars. Finally, there are a good brief overview of x-ray binaries by Crampton, an interesting presentation on the symbiotic AG Pegasi by Keyes and Plavec, and an interesting discussion of binaries in globular clusters by Webbink.

The editors are to be thanked for the useful subject and star indexes at the back. The book is reproduced from typescript, and typing errors are fairly numerous; my favorite is the "monotoneous" function on p. 77.

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Vulpes vulpes

The Red Fox. Symposium on Behaviour and Ecology. Saarbrücken, Germany, Jan. 1979. ERIK ZIMEN, Ed. Junk, The Hague, 1980 (U.S. distributor, Kluwer Boston, Hingham, Mass.). vi, 286 pp., illus. \$73.50. Biogeographica, vol. 18.

Red fox populations in Europe have increased an estimated two- to fourfold since the beginning of this century. The causal factor seems to be primarily a reduction in hunting accompanied by changing land-use practices. The population increase has been most noticeable since World War II and has been paralleled by repeated epidemics of sylvatic rabies. From 1972 through 1976 in 11 Central European countries 63,672 cases of rabies in animals were reported, 82 percent of them being in wildlife. Red foxes accounted for almost 75 percent of all wildlife cases. Studies of rabies epidemiology indicate that only foxes maintain the chain of infection.

Because of the magnitude of the fox-rabies problem, the World Health Organization and the U.N. Food and Agriculture Organization have supported and coordinated a research program on wildlife rabies in Europe for the past ten years. Emphasis has been placed on understanding the epidemiology of rabies, especially as influenced by population ecology and behavior of foxes. It is accounts of these studies on population ecology and behavior that constitute the most interesting sections of this symposium volume.

In addition to an introduction and concluding remarks the book contains a chapter on habitat requirements, one on distribution and history of the fox in Europe, three on food habits, three on population dynamics and ecology, four on behavior, two on relations with other species, and four on rabies. The authors include some of the leading fox researchers in Europe. The chapters on social behavior and population regulation alone make the book worthwhile. MacDonald's behavioral studies represent truly