BOOK REVIEWS

Pioneers

Brethren of the Net. American Entomology, 1840–1880. W. CONNER SORENSON. University of Alabama Press, Tuscaloosa, 1995. xvi, 357 pp., illus. $59.95. History of American Science and Technology.

A heroic entomologist in a work of fiction is, taxon notwithstanding, a rara avis. For over a century, characters identified as entomologists in novels and stories have generally been depicted as at best dotty and at worst downright deranged. This dubious tradition encompasses virtually everyone from H. G. Wells's delusionary Hawkins (who in the 1985 short story "The Moth" devotes his life to the pursuit of a rare moth he is convinced is a reincarnated rival) to Thomas Harris's capable but peculiar Noble Pilcher (who, in the 1988 novel *Silence of the Lambs*, is described as having eyes that were "a little witchy and too close together"). The image of the entomologist, however, receives a substantial boost in W. Connor Sorensen's *Brethren of the Net: American Entomology, 1840–1880*. Sorensen's book is a detailed account of the lives of the real-life men (and very occasional women) who basically founded the discipline of entomology on the North American continent.

The battle for respectability still waged by entomologists, both in life and in fiction, pales in comparison to the experiences of the early pioneers in the field. These individuals, particularly during the first five decades of the 19th century, faced struggles on several fronts. For one thing, they wanted to gain recognition and legitimacy from their scientific peers in a community that at the time was centered largely in Europe; at the same time, they needed to establish themselves as a distinct entity fully competitive with their European colleagues. America proved a land of opportunity in this respect; the tremendous geographic variability of the continent and its largely undescribed, richly diverse fauna allowed systematists such as Thomas Say, Thaddeus William Harris, Friedrich Melsheimer, and John LeConte to create a body of literature, a series of collections, and an assemblage of professional societies that could not fail to earn the respect of Europeans. In the first three chapters of his book, Sorensen convincingly makes the case that, by midcentury, American entomologists had succeeded in setting up a system for storing, retrieving, and evaluating entomological data that was uniquely American in its scope, its customs, and its practices.

Earning the respect of colleagues was a relatively easy task compared with actually earning a living as an entomologist. For most of the first half of the century, entomology was an avocational pursuit even for the most productive of these pioneers. Thaddeus William Harris, Henry Goadby, Manley Miles, and Asa Fitch all practiced medicine early in their careers; Townend Glover, Albert Cook, and William Saunders owned and operated orchards. Establishing paid positions for entomologists entailed extensive lobbying efforts and, in the process, enduring the ridicule of local, state, and federal legislators whose appreciation of the science was, to say the least, extremely limited. By the 1860s, however, owing at least in part to changing practices in American agriculture (in particular those involved in the shift from a subsistence to a market-driven culture), insect pest pressures had reached such proportions that even Congress recognized the need for professional help. Sorensen devotes a chapter to four pest species—the curculio, the Hessian fly, the chinch bug, and the Colorado potato beetle—whose depredations played a critical role in changing American attitudes toward entomologists and a full chapter to the Rocky Mountain locust plague, arguably "the most dramatic event in the history of American entomology" (p. 127). By 1880, the United States had invested more money in entomology than any other nation; entomologists constituted the largest cadre of zoologists in the country.

"Shaking Trees to Release the Plum Curculio," from J. P. Trimble's *Treatise on the Insect Enemies of Fruit and Fruit Trees* (1865). [From *Brethren of the Net*]

The money, it turns out, was well spent; American entomologists effectively created the problem-centered approach to agriculture and in the process contributed more profoundly to the development of an American science infrastructure than any other single group of biologists. Entomologists played a critical role in establishing and administering the American Association for the Advancement of Science, still the premier scientific society in the country (publishers, of course, of this journal), for creating the concept of the specialized scientific journal, and for establishing the tradition of federally funded research. Sorensen also argues cogently that entomologists were central to the rapid incorporation of evolutionary theory into American biology. In a chapter devoted to the "acceptance and implications of evolution," he points out that Darwin's heavy reliance upon insect examples meant that entomologists were well qualified to evaluate the merits of the case put forward for evolution. Recognition of the tremendous variability of insects, as well as their rapid rate of reproduction, was conducive to accepting the idea of natural selection and evolutionary change. As for why American entomologists passionately advocated the theory while Darwin's own British entomological colleagues hung back, Sorensen suggests that America's great geographic variability and social fluidity predisposed American entomologists toward accepting the notion of evolutionary change; class-conscious Europeans clung to typological thinking for a long time.

Sorensen traces the remarkable progress in the field over this critical 40-year period with extensive use of an astonishing variety of source material, including correspondence, the scientific literature of the day, society proceedings and transactions, and state and federal reports. Statements are meticulously documented, and the enormous bibliography is invaluable to anyone interested in 19th century American science in general, let alone entomology. This book will certainly fascinate almost any entomologist—but for them it will also be a little frustrating. Sorensen is definitely a historian, and not an entomologist, by training; in fact, in his acknowledgments he admits that he originally intended to write about American mammalogy and shifted to entomology only after he discovered that another schol-

Vignettes: Comforts of Science

One way in which an increased knowledge of the nature of the physical and biological world can be of value to the individual citizen is through the conferring on him of an increased equanimity, an increased confidence in natural law and order. The well-being of an individual may be greatly impaired by his fear of the unknown, which may far exceed the fear that he would have of a known danger, which he might prepare to meet in a rational way.

—*Linus Pauling*, 1951, as quoted in *Linus Pauling in His Own Words: Selections from His Writings, Speeches, and Interviews* (Barbara Marinacci, Ed.; Simon and Schuster)

Friends, chemist friends, if someone comes before you verbalizing anxiety over a chemical in the environment, don't harden your hearts and assume a scientistic, analytical stance. Open your hearts, think of one of your children waking at night from a nightmare of being run over by a locomotive. Would you tell him (or her), "Don't worry, the risk of you being bitten by a dog is greater"?

—*Roald Hoffman*, in *The Same and Not the Same* (Columbia University Press)

ar had almost completed a dissertation on his chosen topic. Thus, there are the occasional unsurprising entomological errors (for example, p. 81, "this doctoral thesis on the synonymy of the European dragonflies was the first of many publications on the Neuroptera"). As well, his reluctance to provide either modern scientific names or even contemporary common names for many species may leave many entomologists unfamiliar with 19th-century systematics (that is, the vast majority of entomologists) scratching their heads in an attempt to guess just exactly what species are under discussion. Sorensen also has a penchant for presenting data that are utterly uninterpretable from a scientific perspective. Without a statistical analysis, for example, I am considerably more reluctant than Sorensen to ascribe much sociological significance to the fact that "entomologists' families that were engaged in theology account for 21.4 percent of the total whereas families of DAB [Dictionary of American Biography] scientists in the clergy account for only 16.7 percent of the total" (p. 161).

But these are quibbles. This book is a pleasure; Sorensen has done a remarkable job in bringing largely unheralded historical figures to life and in placing the discipline of entomology in a cultural and historical context. In doing so, *Brethren of the Net* is unique. To date, most accounts of this period of entomological history are episodic, fragmentary, purely descriptive, and largely unreadable; whatever its undeniable value as a reference book, for example, Pamela Gilbert's *A Compendium of the Biographical Literature on Deceased Entomologists* (British Museum, 1977) is not a book to curl up with in bed. Though these brilliant, insightful, and innovative individuals are long gone, their legacy endures, and this book is an entirely appropriate, hugely informative, and generally entertaining tribute to their memory.

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Other Books of Interest

The Physical Review. The First Hundred Years. A Selection of Seminal Papers and Commentaries. H. HENRY STROKE, Ed. AIP Press, Woodbury, NY, 1995. xx, 1266 pp., illus., + CD-ROM. $75; to members of AIP member societies, $60.

The Physical Review together with *Physical Review Letters* carries today—and has carried since the 1930s—more physics papers (and more of the most important) than any other journal. Its couple of thousand pages per annum 60 years ago probably then held what today the journal's editor-in-chief, Benjamin Bederson, estimates its 100,000 pages per annum now hold, that is, about one quarter of all published physics literature. To celebrate the centenary of the founding of the *Phys. Rev.* (in 1893, six years in advance of the founding of the American Physical Society, which adopted the journal in 1913) its sponsoring organizations have issued this huge printed volume, and an accompanying CD-ROM, containing the pick of its papers—some 1000 from among the (very roughly) quarter of a million that have appeared in the journal. The selection was limited—with a few exceptions—to papers appearing before 1985 and was left to the discretion of the 14 expert individuals among whom responsibility for physics' several subject areas was divided: E. Gerjuoy (atomic physics), H. Feshbach (nuclear physics), J. L. Lebowitz (statistical physics), P. J. E. Peebles (gravity physics and cosmology), J. A. Simpson (cosmic radiation), P. C. Martin (condensed matter), M. N. Rosenbluth (plasma physics), W. K. H. Panofsky and G. H. Trilling (elementary particle physics experiments), S. Treiman (particle theory), S. Goldstein and J. L. Lebowitz (quantum mechanics), plus M. Hamermesh (the early years) and C. H. Townes (science and technology). Editor Stroke allotted to each of these "area" editors a number of pages—atomic physics got 158 printed pages, particle theory 166, condensed matter 105, particle experiments 133, plasma physics 78, and so on. He provided them with nominations generated by a wide solicitation and left it to them to distribute their pages over the million or so published prior to 1985—subject, of course, to the "exclusion principle" that no paper could be had by more than one editor. Since some of the most important advances—precisely because they were so important—fell in more than one subject area, the pertinent papers are divided up between chapters. Within each chapter, the arrangement of the papers is chronologic. Generally, the papers selected for the printed volume—some 200 of the 1000 on the CD—are skewed toward the earlier years and toward letters (that is, toward *brevity*), while the CD contains a larger proportion of more recent papers and of full accounts of researches. Each area editor has contributed an introduction to his chapter summarizing in 5 to 15 pages the history of that field of physics—that by J. A. Simpson for cosmic rays is especially careful and successful in setting the selected papers in context—and these introductions are enlivened by more than 200 photographs of physicists.

Without being altogether overwhelming, this massive collection is still comprehensive enough to stand as a representation of seven decades (1893–1963) of physical research in the United States, plus two further decades in which the earlier steady trickle among *Phys. Rev.* papers of work done elsewhere was growing at an ever-increasing rate. (The curves crossed shortly after the cut-off date for this collection, and at present *Phys. Rev.* receives more than twice as many manuscripts from abroad as from the United States.) It must be said, however, that readers for whom typographic quality is of importance will be pained by