But it is fair to say that two years after his first publication his sample success rate is less than it was a year before, despite many improvements in apparatus, shielding, and (supposedly) understanding.

The book presents results by B. Y. Liaw, P.-L. Tao, P. Turner, and B. E. Liebert on a molten-salt cell containing LiD as providing a power excess of 25 watts for 1.68 watt of input electrochemical power—a 15-fold excess. But not emphasized is the input power of 69 watts to the heater; if that input is taken into account the "excess" is a troubling 40 percent rather than an astounding 1500 percent. I bet against it as a demonstration of cold fusion.

"Tom Droege, a superb engineer who has built state-of-the-art instrumentation for the particle physicists at Fermilab, now . . . perfects an extraordinary calorimeter," Mallove reports. Indeed, and in the process Droege has identified and overcome many problems that must have afflicted less cautious workers. At present, with electrolytic power input of some 1000 milliwatts his sensitivity is about 1 milliwatt, with no clear indication of net excess heat. Those who claim to know how to treat their cathodes to obtain excess heat would do well to adopt Droege's apparatus.

Despite Mallove's contention that cold fusion is not a member of the class defined by Irving Langmuir as "pathological science" and his recommendation that Langmuir's rules for identifying such be "retired to the junk heap," I believe that cold fusion is more likely than not to be an example. Still, if anyone can show me a history and demonstration of strong, reproducible, emission of neutrons, tritium, or heat in a cold (or dry) fusion cell, I will not only urge support but repeat the experiment.

Mallove captures the flavor of the vigorous verbal exchanges at scientific meetings and reports some valuable clarifications. *Fire From Ice* is written in a lively fashion and provides interesting glimpses of the personalities and concepts involved in the cold fusion furor.

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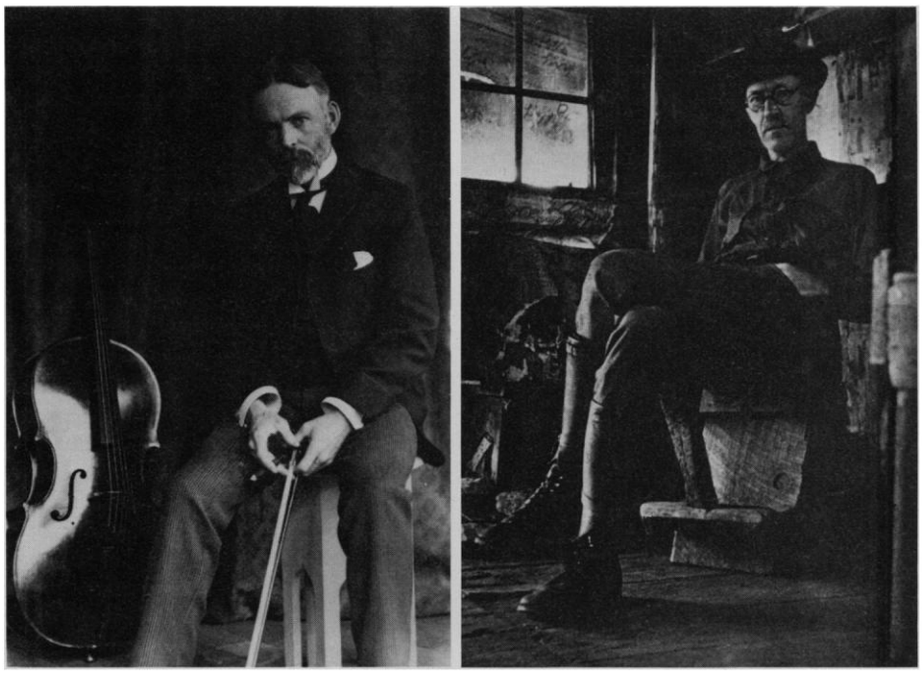
A Pathbreaking

Transforming Traditions in American Biology, 1880–1915. JANE MAIENSCHEIN. Johns Hopkins University Press, Baltimore, MD, 1991. xii, 366 pp., illus. $48.

Ross Granville Harrison is one of my heroes. He was born in 1870 and in the course of a long life (he died in 1959) he became one of the greatest experimental embryologists, developing tissue culture among other contributions; was founding editor of the *Journal of Experimental Zoology* and edited it for 42 years; and chaired the National Research Council through the Second World War. But remarkably, Harrison was not the only American zoologist of such stature in the early part of this century. There were also T. H. Morgan, E. G. Conklin, and E. B. Wilson, who together with



Left, E. B. Wilson with cello, 1889 or 1890. [From *Transforming Traditions in American Biology*; collection of Linda Timmons] *Right*, Ross Harrison on a canoeing trip, possibly in Canada. [From *Transforming Traditions in American Biology*; Harrison Papers]

Ross Harrison (second from left) and Thomas Hunt Morgan (second from right) on the way to Blue Mountain, Jamaica, with a Chesapeake Zoological Laboratory group, 1891. [From *Transforming Traditions in American Biology*; Marine Biological Laboratory Archives]

Harrison played major roles in a reorientation of biological research that took place at the turn of the century. There is general agreement that research in 1915 looked very different from that practiced in 1880, but there is argument about the nature of the change. Garland Allen has argued that the change was so radical that it constituted a revolution, whereas others, including Jane Maienschein, take the view that it was gradual and evolutionary.

This is the period covered by Maienschein in the present book, and she has chosen to examine the question by studying the lives and research of these four zoologists, looking to see how they developed their research topics and how they interacted with each other. The Four were closely linked throughout their careers, and it is an attractive project to examine how their common experiences influenced their attitude toward research. Maienschein has done this in what I think is the best way possible—by eschewing sociological interpretations and concentrating on the details of what the Four actually did. She does not, however, ignore either the social aspects of her subjects' work or the problems of interpretation. Rather, she chooses not to be confined within a particular historiographic approach, recognizing that scientific change results from a "confluence of intellectual, institutional, social, and personal factors." I welcome her "eclectic" approach and especially her jargon-free, straightforward style that contrasts with the gobbledygook of some other treatments of science and scientific change. How well, then, does her account help us to understand what went on in American biology at the turn of the century?

Maienschein begins by describing the separate origins of the Four, then brings them together to show how they interacted in developing biological research, and then separates them again in describing how their research careers evolved. Her approach in the first and last parts of the book is thus biographical. In the first part of the book it works reasonably well. Here the common experiences of the Four with W. K. Brooks at Johns Hopkins University Medical School, their subsequent work in Europe, and the influence of Charles Otis Whitman at the Marine Biological Laboratory at Woods Hole provide unifying themes. The biographical approach is much less satisfactory in the third part of the book, where Maienschein describes the lives in four separate chapters and I lost the sense of how the Four continued to interact. These chapters are not meant to be biographies—of necessity they are too short and too selective—but I was left wanting to know much more about these fascinating scientists. Further, Maienschein employs a sharp cutoff date of 1915 that leaves some issues hanging. For example, it appears that Conklin, having pursued a campaign to demonstrate the unique role of the cytoplasm in development and to deny a crucial role for the nucleus, began to endorse Mendelian inheritance round about 1910. This seems to be a significant event in his scientific life, but we do not learn why or how because it is too close to the 1915 cutoff.

Turning to the central theme of the book—the changes in biological research at the turn of the century—Maienschein uses the idea of "traditions" to identify elements and themes that group together individual scientists. As Maienschein puts it, scientific traditions are sets of shared assumptions about things that matter for doing good scientific work—the types of problem that are interesting, the tools to be used, the criteria to be used to decide what are reliable data, and so on. A virtue of thinking in terms of traditions is that they are not immutable. Rather, there is a historical continuity that is maintained even as particular elements change. This may seem to be a somewhat vague concept, but I find that it fits closely with my experiences of the social organization of research. It will be clear from this that Maienschein argues that there was not a revolution in biological research but instead a gradual transformation of research aims, interests, and strategies within a tradition that began with morphological research and became more physiological and experimental. And I find her argument persuasive that the principal change was in what was counted as good scientific work and reliable scientific knowledge. The Four wanted definite results, and the techniques, organisms, and problems that they adopted were directed toward that end.

The Hopkins Four were heroes for their times and are so for today as well. Wilson, for example, welcomed that biology was entering a new phase that was "characterized by frank recognition of ignorance, by a decline of baseless theorizing, by steadily increasing thoroughness and range of obser-

Vignettes: Enterprises of Technology

However a hypothetical civilization might achieve spaceflight, ours did so as an arbitrary consequence of international military competition. The scientists did not successfully agitate for rockets to loft their instruments above the atmosphere; the businessmen did not float into space on issues of interplanetary stocks and bonds; the general public did not rise up with one voice and shout: "Upward!" Instead, a coalition of fanatic spaceflight enthusiasts, beleaguered military agencies, and capricious political leaders focused enough effort to develop long range missiles using a technology that could be adapted to modest space projects. Whatever emphasis we place on each of these actors, the whole process was neither pretty nor inevitable.

—William Sims Bainbridge in *Goals in Space*
(State University of New York Press)

When I look at the history of my own field—telecommunications—I can only shake my head in frustration at the inability of technology to either follow or lead society. It reminds me of two clumsy people trying to dance, each attempting to lead with the wrong foot. Let me cite four examples—the Picturephone®, home information systems, facsimile, and cellular telephony. The first two were technologically driven market failures, while the last two were unanticipated market successes.

—Robert W. Lucky, in *Engineering as a Social Enterprise*
(Hedy E. Sladovich, Ed.; National Academy Press)

We live in a world of contending value positions that coexist uneasily but completely supersede or displace one another only rarely. It is undeniable that substantial segments of the electorate in most industrialized societies view with increasing indifference or hostility at least some fruits of technology.

—Robert McC. Adams, in *Engineering as a Social Enterprise*

Technology's positive contribution to society grows remorselessly.

—John W. Fairclough, in *Engineering as a Social Enterprise*

vation, and above all by the extensive application in every direction of exact experimental methods to subjects which have, hitherto, hardly been approached along this path." Could there be a better creed for the present-day biologist?

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Some Other Books of Interest

Technology and Choice. Readings from *Technology and Culture*. MARCEL C. LAFOLLETTE and JEFFREY K. STINE, Eds. University of Chicago Press, Chicago, IL, 1991. viii, 341 pp., illus. $30.95; paper, $16.95.

This selection of essays that have appeared in the journal *Technology and Culture* from 1966 to 1989 provides "a spectrum of historical perspectives on how, when, or why individuals, societies, governments, and industries have made choices regarding the use of technologies."

The volume opens with discussions of two 19th-century cases of technological threats to public health and safety that raised issues about the regulatory functions of central governments—Carlos Flick on the movement for smoke abatement in Britain and John G. Burke on explosions of steam boilers in the United States. In a set of papers concerned with the effects of technology in the domestic milieu, Claude Fischer discusses the telephone industry's shift from representing that instrument as a practical device to promoting it as an avenue to sociability, Fred Schroeder recounts how the electrical plug-and-receptacle system came to replace the lighting fixture as a source of power for other appliances, and Suellen Hoy reports on the role of public health concerns in making the garbage disposer a common home appliance. Other essays in the first part of the book deal with mechanization in the Pacific Coast salmon canning industry (O'Bannon), the U.S. government and technology in the Great Depression (Pursell), Consolidated Edison's attempt to build a nuclear reactor in New York City in the early 1960s (Mazuzan), concerns about thermal pollution due to nuclear plants, 1965–1974 (Walker), and political factors that influenced the design of NASA's space station system (Fries).

The final four essays take a critical look at some traditional ways in which technologies have been viewed. In the first of a pair focused on women, Ruth Schwartz Cowan notes industries in which technological change has been variously accelerated (cigar-making) and slowed (garment-making) by the availability of women workers and cites the "specter" of several million American women cooking supper every night over several million separate stoves as evidence that "the household has resisted industrialization with greater success than any other productive locale in our culture." Christine Bose *et al.* question the notion that new household technologies have been unalloyed benefits to women, citing among other counter-evidence the "stresses associated with selecting specific equipment from a large marketplace array, learning to use it, storing it, cleaning it, and repairing it." The final pair of essays is more concerned with matters of engineering: David Billington and Robert Mark, arguing in favor of "historical study from an engineering perspective," address misunderstandings centering on Gothic cathedrals and the long-span bridges of the late 19th and 20th centuries as symbols of their respective eras, and Eugene Ferguson calls for more consideration of the importance of visual imagination, as distinct from formal science, in invention, using examples as diverse as the Newcomen steam engine and wooden toy animals.

—KATHERINE LIVINGSTON

Sex in China. Studies in Sexology in Chinese Culture. FANG FU RUAN, with the editorial collaboration of Molleen Matsumura. Plenum, New York, 1991. xiv, 208 pp., illus. $32.50. Perspectives in Sexuality.

Fang Fu Ruan, now at the Institute for Advanced Study of Human Sexuality in San Francisco, is a medical historian and physician who compiled the "first and only comprehensive sex handbook published in Mainland China since 1949." The present book was written out of his conviction that any genuine political reform in China will have to include a less "conservative and ignorant" attitude toward sexual matters than is currently displayed by the leadership of either conservative or reformist factions. In particular, he is concerned with "strengthen[ing] the position of the common people in their struggle for basic sexual rights" by documenting the existence in China of a tradition of positive attitudes toward sexuality and offering evidence to refute the idea that such phenomena as prostitution and homosexuality are imports from the West or results of progressive social reform. He begins his effort in this direction with an exposition of the concepts of Yin and Yang and of sexual attitudes in the three literate religious traditions of China. He then surveys classical Chinese "sexological" texts (dating from as early as 168 B.C., rediscovered in the 19th century, and currently not easily available in China) and sexual techniques as represented in the literature of Taoism, China's only indigenous religion and "one of the few that has stressed the importance of using sexual techniques for individual benefit." Turning to practices that are currently subject to special efforts at repression, the author traces prostitution and then pornography from their earliest recorded origins in China, through efforts at abolition attendant on the advent of the Communist regime in the 1950s and their subsequent reemergence in the 1970s, to the crackdown that followed the events in Tiananmen Square. Similar treatments of homosexuality and of transvestism and transsexuality draw (in the absence of statistical information) on anecdotal reports of Chinese and other journalists and correspondence received by the author. In a final chapter, "Changing attitudes toward sex in China today," the author reports some survey and medical data indicating that the current official restrictions on sexual expression are at odds with the attitudes and behavior of the population and summarizes efforts in sex education instigated by Chou En-lai in 1963, in which he himself was a major participant prior to his departure from China in 1985. An annotated reference list gives further information about the classical and contemporary literature on which the author draws.

—KATHERINE LIVINGSTON

Books Received

The Altruism Question. Toward a Social-Psychological Answer. C. Daniel Batson. Erlbaum, Hillsdale, NY, 1991. x, 257 pp. $39.95.

Ancient Light. Our Changing View of the Universe. Alan Lightman. Harvard University Press, Cambridge, MA, 1991. xiv, 171 pp., illus. $18.95.

Anelastic and Dielectric Effects in Polymeric Solids. N. G. McCrum, B. E. Read, and G. Williams. Dover, New York, 1991. xvi, 617 pp., illus. Paper, $15.95. Reprint, 1967 ed.

Animal Applications of Research in Mammalian Development. Roger A. Pedersen, Anne McLaren, and Neal L. First, Eds. Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY, 1991. xiv, 334 pp., illus. Paper, $44. Current Communications in Cell and Molecular Biology, 4.

Bioorganic Chemistry Frontiers. Vol. 2. H. Dugas, Ed. Springer-Verlag, New York, 1991. xvii, 252 pp., illus. $89.

Biotechnology of Blood. Jack Goldstein, Ed. Butterworth-Heinemann, Stoneham, MA, 1991. xiv, 463 pp., illus. $115. Biotechnology Series. 18 chapters covering oxygen delivery systems plasma fractions, and in vivo and in vitro regulation of blood cell production.

Bird Migration. Thomas Alerstam. Cambridge University Press, New York, 1991. viii, 420 pp., illus. $105. Translated from the Swedish edition (1982).

Blood Cell Biochemistry. Vol. 4, Basophil and Mast Cell Degranulation and Recovery. Ann M. Dvorak. Plenum, New York, 1991. viii, 415 pp., illus. $89.50.

Cell Separation Science and Technology. Dhinakar S. Kompala and Paul Todd, Eds. American Chemical Society, Washington, DC, 1991. x, 299 pp., illus. $69.95. Based on a symposium, Boston, MA, April 1991. ACS Symposium Series, 464.

Cellular Aspects of Pattern Formation. The Problem of Assembly. Gary W. Grimes and Karl J. Aufderheide. Karger, New York, 1991. x, 94 pp., illus. $84. Monographs in Developmental Biology, vol. 22.