

ulation. But it does not fit on the Procrustean bed of classical homeostasis.

In this book, Nicholas Mrosovsky contends that such alterations in regulated state are in fact rather common in physiological systems. Keeping the internal environment constant is not always an overriding imperative, particularly when competing physiological demands come into conflict. Thus, body temperature may rise to higher regulated levels in fever or exercise, osmotic concentrations and gas tensions may be controlled at different levels during pregnancy, and different body weight levels may be maintained seasonally. Mrosovsky defines such a change in regulated level as *rheostasis* (formerly known as *homeorheusis*). His book is an essay on various forms of physiological regulation; it begins with a brief review of control systems theory and then concentrates on detailed examples of developmental shifts in regulated level (programmed rheostasis) and changes in response to particular stimuli (reactive rheostasis). The book cites scores of examples, covering a very diverse literature, and these are generally very helpful in promoting understanding of the general concepts.

Mrosovsky is very forthright in saying that the concept of rheostasis is not his invention, but he certainly has done the most convincing job of summarizing and popularizing the notion. His book is very well written and accessible to biologists generally. I recommend it to all graduate students in organismal biology and to anyone teaching physiology. The concept of homeostasis is so often approached uncritically that the real plasticity and subtlety of regulation is frequently overlooked. Mrosovsky's short book is a very useful attempt to get us thinking again about our preconceptions.

My only reservations about the book are philosophical. First, its approach is essentially adaptationist. Although Mrosovsky criticizes earlier approaches as failing to incorporate an evolutionary perspective, his own interpretation is colored by a strong belief in optimal design and function. Each example is rationalized in simplistic selective terms. Cases that cannot be so rationalized are termed "pathological rheostasis." The possibility should have been explored that a system may be reset just as a consequence of its design and not for any advantage conferred. Second, I wish the book had been more thoroughgoing in its critique of regulation *per se*. Rheostasis still assumes the importance of regulation; it only incorporates the idea of changes in homeostatically defended level. What about organisms that do not regulate various aspects of their internal environment? With regard to temperature, for

instance, most organisms are poikilothermic and do not regulate temperature, even behaviorally. Are they truly more dependent and less free and, if so, in exactly what sense? How common is homeostasis in the entire scope of life (Mrosovsky's examples are almost exclusively drawn from the vertebrates)? What exactly are the costs and benefits of regulation and *la vie libre*? These are questions appropriate for a broader and more challenging examination of homeostasis.

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## Some Other Books of Interest

**The Charm of Physics.** SHELDON L. GLASHOW. American Institute of Physics, New York, 1991. xii, 307 pp., illus. \$24.95; to AIP members, \$19.95. Also available in paperback as a Touchstone Book (Simon and Schuster); \$12.95. Masters of Modern Physics.

**The Road from Los Alamos.** HANS A. BETHE. American Institute of Physics, New York, 1991. xviii, 286 pp., illus. \$24.95; to AIP members, \$19.95. Also available in paperback as a Touchstone Book (Simon and Schuster); \$12.95. Masters of Modern Physics.

**Citizen Scientist.** FRANK VON HIPPEL. American Institute of Physics, New York, 1991. xvi, 288 pp., illus. \$24.95; to AIP members, \$19.95. Also available in paperback as a Touchstone Book (Simon and Schuster); \$12.95. Masters of Modern Physics.

With these three volumes the American Institute of Physics adds to its varied publishing enterprises Masters of Modern Physics, a series of books intended to convey to the general reader a sense of "the way science works, how it affects our lives, and what it means to those who practice it."

The inaugural volumes are all collections of essays written over a period of some years. Followers of the genre are likely to find the largest proportion of unfamiliar material in the volume by Glashow, many of whose essays have not previously been published in the ordinary sense of the word but were prepared in conjunction with courses in the Harvard Core Curriculum or are based on talks given on various occasions. Of the three authors Glashow also writes the most about physics as such. The opening three papers of his collection, under the heading The Life of a Physicist, are autobiographical in character, including a jocular account of the east-coast author's years of

"internal exile" in California. A second group of essays, The World of Science, deals mainly with cosmology, including some history of the subject and a discussion of radio programs from the Universal Broadcasting System ("daytime programming originates in our very own solar system"); some reflections on the uses of numbers are also included. Two further sets of essays headed The Work of a Theorist deal respectively with elementary particles (eight essays) and grand unification (six essays, including the author's Nobel Prize address). A final set, The Physicist and Society, consists of an argument (coauthored by Leon Lederman) for the Superconducting Super Collider and three brief reflections having to do with the position of the United States in world science, the American educational system, and the nuclear arms race.

As the title of his collection indicates, Hans Bethe's career goes back to the Manhattan Project, and the preponderance of his essays have to do with issues stemming from the development of nuclear weaponry. Presented in groups headed The Bomb, Arms Control, and the Freeze, 18 essays on the dangers of nuclear war are arranged in chronological order under each heading, the earliest of all being "How close is the danger?," written in 1947 with Frederick Seitz. Other coauthors of these essays include Richard Garwin, Kurt Gottfried, and Franklin Long. There follow two considerations of the role of scientists in the making of public policy and three contributions (one a debate with Frank von Hippel and one a discussion of the Chernobyl incident) having to do with the benefits and risks of nuclear power generation. Turning away from political topics, a section headed Five Physicists includes an essay on J. Robert Oppenheimer and briefer reflections on Freeman Dyson, Herman Hoerlin, Paul Ewald, and Richard Feynman. Finally, two papers discuss astrophysical topics—energy production in stars and "how a supernova explodes" (the latter coauthored by Gerald Brown).

Frank von Hippel, having begun his career as an elementary particle physicist, made a deliberate transition to "public-policy physics," and that is the concern of the essays in *Citizen Scientist*. The first group is headed Advice and Dissent, echoing the title of a 1974 book by von Hippel and Joel Primack, and deals with the role of scientists as policy advisers, including discussion of "devices by which the executive branch exploits its scientific advisers for political advantage," "ways in which scientists can help bring into being counterbalancing political forces," "peer review of public policy" with special reference to reactor safety, and the protection of dissenters. The largest section of the book (ten entries) is devoted to the

nuclear arms race and includes, along with discussions of weapons testing, potential civilian casualties, and the Strategic Arms Reduction Treaty, a debate with Edward Teller and an analysis of the attacks on critics of the Strategic Defense Initiative. There follow groups of three essays each on automobile energy efficiency and nuclear reactor safety, with a final essay "Blessed are the troublemakers." Alone among the first three volumes of the series, von Hippel's has a section of references and notes at the end.

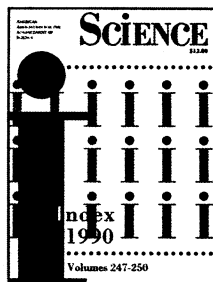
All the volumes include indexes and, under the heading "Acknowledgements," list original sources of the essays and identify coauthors. Also included are notes "about the author" and "about the series," which is being produced under the editorship of Robert Ubell with an advisory board of physicists.—K.L.

**Headline News, Science Views.** DAVID JARMUL, Ed. National Academy Press, Washington, DC, 1991. xvi, 238 pp., illus. Paper, \$14.95.

Another attempt on the part of a learned body to reach a general readership is *Headline News, Science Views*, whose publication by the National Academy of Sciences is timed to coincide with National Science and

Technology Week, 22–29 April. Rather than mining a variety of professional and semi-professional sources as do the AIP volumes, the Academy for its contributions draws on material distributed to some 250 subscribing newspapers by its Op-Ed Service. As befits the medium for which they were prepared, the 75 essays are brief and uniform in length (a little over two pages each) and are intended to be intelligible even to those who found high school chemistry a struggle. The authorship of the items is varied, including not only natural and social scientists from academia, government, and industry but lawyers, ethicists, and others concerned with issues of science and public policy. An opening section, led off by Bill Cosby, deals with public perceptions and understanding of science, with most of the authors feeling that the state thereof needs to be improved. A group on technology in everyday life includes commentary on such topics as automobile and airplane traffic jams, affordable housing, and natural disasters. Under the rubric "sustainable future" are discussed the greenhouse effect, the state of the sea turtle, radioactive waste disposal, and various issues pertaining to agriculture. With respect to "the nation's health" there are discussions of diet, alcohol abuse, fertility and maternity services, AIDS, and even

tobacco chewing. Among the problems specifically designated as social that are dealt with are race relations, the gender gap in wages, child care, and drug treatment. Future prospects involving science that are discussed include missions to Mars, seabed exploration, a post-Iraq energy crisis, and the human genome project. International matters such as technological competitiveness, analytic "tools" to facilitate Soviet democratization, food and agriculture, and vaccination are then taken up, followed by discussions of ethical issues ranging from those posed by the "new diagnostics" to the use of animals as laboratory subjects. The book ends with reflections on the recruitment of future scientists and engineers, problems considered ranging from "kindergarten stress" and math anxiety through the challenge of creationism to the "mommy track" and the representation of blacks. Issues of keeping the scientific household itself in order do not loom large in the collection, though there is one contribution on fraud. In addition to the text (which, it is reported, is reproduced as originally published) the volume contains a number of cartoons emanating directly from newspapers that have used the written material. An index has also been added.—K.L.



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