

AIDS from Its Beginnings

History of AIDS. Emergence and Origin of a Modern Pandemic. MIRKO D. GRMEK. Princeton University Press, Princeton, NJ, 1990. xii, 279 pp. \$29.95. Translated from the French edition (1989) by Russell C. Maulitz and Jacalyn Duffin.

Mirko Grmek of the Ecole Pratique des Hautes Etudes at the Sorbonne, an authority on diseases of the ancient Greek world, has now turned his attention to AIDS. In this important and provocative book he analyzes the recent history of the disease and also delves somewhat more speculatively into the prehistory of the current epidemic.

The book begins with the recognition of AIDS as a new disease, its clinical recognition and epidemiological description, and the initial identification of risk groups. This part of the story is already familiar, but Grmek's inclusion of the European experience adds a dimension usually omitted from American accounts.

Grmek then provides a wonderfully lucid and concise overview of the history of virology. He describes the discovery of oncoviruses, retroviruses, and slow viruses and explains how virology was ready in 1980, as it would not have been ten or even five years earlier, to identify the causal organism of AIDS. This leads into what is perhaps the most controversial episode in the whole history of virology, the priority dispute over the discovery of HIV. In Grmek's view, there is little doubt that the credit properly belongs with Luc Montagnier's team at the Pasteur Institute in Paris.

Grmek's account of Robert Gallo's contributions and subsequent actions paints an unflattering portrait of a man willing to stop at little to gain scientific recognition. His discussion is also framed as a lesson in the pitfalls of prior success. Grmek notes that Gallo and his colleagues had forged the scientific tools that were indispensable to the discovery of HIV and had isolated the first human retroviruses, HTLV-I and HTLV-II. This very success, Grmek argues, became a barrier to the discovery of the AIDS virus because Gallo, convinced that it was a variant of HTLV, spent his time trying to prove that contention. The Montagnier group, unfettered by such preconceptions, had the freedom to explore alternative hypotheses.

When the French team isolated LAV, Grmek suggests, Gallo felt deprived of a prize to which he believed himself entitled in view of his previous discoveries; this led him to

construct a "face-saving scenario" and "to fight with all available means" (p. 71). The real problems began when Gallo tried to prove that the virus he called HTLV-III was identical to the French team's LAV. The story involves electron microscope pictures, supposedly of HTLV-III, that were really images of LAV. When LAV and HTLV-III were shown through genetic sequencing to be all-too-identical twins, the suspicion arose that HTLV-III had actually been isolated from samples sent from Paris. Gallo, either by accident or by design, may have used the French team's viral culture for his own "discovery."

On this account, the subsequent international political compromise in which the United States and France agreed to share credit for the discovery and to divide the considerable royalties from the patented HIV diagnostic test was a poor deal for France. The "official history" that all parties agreed to accept was little more than a chronology that glossed over all the more problematic aspects of the dispute. Grmek's account of this whole affair is fascinating although brief; both the facts and their interpretation continue to be debated.

The second half of Grmek's book is even more ambitious in taking a long perspective on the epidemic and attempting to trace the distribution of AIDS viruses in time and space. Here conjecture replaces conviction and the flow of the narrative is uneven. Many readers, however, will find the discussion rich and suggestive. Having searched the medical literature for probable cases of AIDS, Grmek states that retroviruses capable of causing AIDS have certainly existed for several decades and probably for some centuries. He discusses several plausible cases of AIDS in the 1950s, including that of an English sailor who died in 1959. Grmek argues that HIV-2 probably existed long before the present AIDS pandemic due to HIV-1. He then tries to create an evolutionary tree of retroviruses, its branches representing the ancestry and evolutionary distance between viral forms.

If HIV has been around for a long time, why should it only now lead to an epidemic of AIDS? Grmek argues that a new set of social circumstances has facilitated the transmission of the highly virulent strain of an old virus. These include "organized homosexual promiscuity" and greater liberty in sexual behavior, increased travel, widespread

transfusion of blood and blood products, and escalating use of intravenous drugs.

Grmek emphasizes the concept of "pathocenosis" in arguing that any single disease must be understood in relation to all other diseases affecting the same population. From this perspective, the "worldwide unification of the pool of pathogens" and the spectacular decline of many infectious diseases have provided enticing new viral opportunities. The decline of infectious diseases allowed time for the slow viruses to grow, while other aspects of mid-20th-century life provided the slow viruses with the conditions they needed to multiply and thrive.

Any summary necessarily skims the surface of Grmek's complex arguments. Anyone concerned with the origins of the epidemic and the history of HIV will want to come to terms with his analysis. The translators of the work, who are both physicians and historians of medicine, are well qualified to deal with the technical scientific arguments and, for the most part, have rendered a graceful English text.

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Regulation Reexamined

Rheostasis. The Physiology of Change. N. MROSOVSKY. Oxford University Press, New York, 1990. viii, 183 pp., illus. \$49.95.

Even our greatest scientific concepts become preconceptions, paradoxically illuminating and obscuring our view of the world simultaneously. In physiology, a case in point is the principle of homeostasis, the maintenance of a regulated and constant internal condition. It has been enormously influential in structuring physiological thought since its elements were articulated by Claude Bernard over a century ago. Constancy and regulation of function have become anticipated standards, to the extent that any biological system that does not uphold them is seen as necessarily inferior. Consider mammalian hibernation and its attendant low body temperatures. Bernard himself saw this as an instance of poor and primitive thermoregulatory ability, an example of *la vie oscillante, dépendante*, rather than *la vie libre*. This view warped our appreciation and understanding of hibernation until only 20 years ago. Hibernation then finally became recognized as a highly regulated state with an altered thermal setpoint. It is a response to complex seasonal and energetic demands and cues and is not primitive, inferior, or an abandonment of thermoreg-

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