the engineers, after two hundred years, have learned to straddle the contradictions built into our nation state" (p. 207).

Philip L. Shiman
History Department,
Duke University,
Durham, NC 27706, USA

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Workings of HIV

HIV and the Pathogenesis of AIDS. JAY A. LEVY. ASM Press, Washington, DC, 1994. xiv, 359 pp., illus., + plates. Paper, $49; to American Society for Microbiology members, $39.

That human immunodeficiency virus causes AIDS has long been evident from its global and detailed epidemiology; for example, about 50 percent of HIV-infected hemophiliacs have developed AIDS thus far, whereas no HIV-negative hemophiliac has done so. Just how HIV causes AIDS has seemed more mystifying, although the salient clues have been there from the beginning. In 1981 Michael Gottlieb reported that AIDS patients exhibited a severe depletion of CD4-positive T-helper lymphocytes, and in 1984 David Klatzmann showed that these very cells are selectively sensitive to infection by HIV. Thus their depletion is explained by HIV infection, due either to the cytopathic effects of the virus itself or, more likely, to destruction by HIV-specific CD8-positive cytotoxic T lymphocytes. At first it seemed puzzling how few HIV-infected cells were detectable in peripheral blood at any one time. But by 1986 Klara Tenner-Racz had shown that the lymph nodes of asymptomatic HIV-positive people are actually chockablock with HIV, which is not a latent infection at all. In fact, the viral burden is high in many individuals. As George Shaw's and David Ho's groups recently reported, the turnover of HIV and HIV-infected cells is so rapid that it is a wonder how the immune system maintains its integrity for many years in the face of this viral onslaught. We may ask, therefore, why such an effective immune response is not successful in clearing the virus altogether? Yet if it cannot, why does it keep the more severe effects of HIV at bay so long, and what co-factors herald progression to AIDS? These questions about HIV pathogenesis are germane both to vaccine development and to therapeutic strategies to prevent or delay AIDS.

Jay Levy's monograph on HIV and the pathogenesis of AIDS tells you everything about HIV infection you might wish to find out without tackling the daunting literature on AIDS, which generates thousands of new research reports each year. It is a considerable achievement that one scholar could grasp the entire subject and distill our knowledge of it in 12 concise chapters and some 2000 references. Levy was a pioneer of HIV isolation and characterization, and he and his colleagues at the University of California at San Francisco have made signal contributions to the understanding of HIV in the brain, of HIV tropism, and of the role of CD8 cells in controlling infection. In this volume he has kept abreast of the ever-burgeoning field in a remarkably informed and balanced way. Indeed, I would have preferred him to be more opinionated about controversial aspects of HIV infection, as he can be in informal discussions, for that is a privilege of the single-author book amid so many multi-author volumes.

Levy moves from a description of HIV to features of transmission, the cell and molecular biology of infection, the enormous genetic and phenotype heterogeneity of HIV and its variable tropism for lymphocytes, macrophages, and dendritic cells, to the host's immune responses. He describes the pathogenesis of HIV not only in the immune system itself but also in the central nervous system, gastrointestinal tissue, and other organs. He does not dwell in detail on the various opportunistic infections that result from AIDS but includes a useful chapter on AIDS-related cancers. The final chapters deal with the prognosis for long-term survival featuring non-progressors and how antiviral approaches linked with immune modulation might form the pattern of future treatment.

The text is clearly illustrated with mainly black-and-white diagrams (and some colorful histopathology), useful boxed tables and lists, and appendixes on the clinical categories and classifications of AIDS. This volume will be valuable to the seasoned virologist, immunologist, or physician and to the newcomer to AIDS research alike.

Robin A. Weiss
Chester Beatty Laboratories,
Institute of Cancer Research,
London SW3 6JB, UK

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Patterns of Peopling

The History and Geography of Human Genes. L. LUCA CAVALLI-SFORZA, PAOLO MENOZZI, and ALBERTO PIAZZA. Princeton University Press, Princeton, NJ, 1994. xiv, 1032 pp., illus. $150 or £150.

In 1978 the authors of this volume, in a paper in this journal, helped reinvigorate interest in the analysis of geographic patterns of genetic variation as a method for inferring pattern and process in the evolution and history of human populations. The paper, and the cover of the issue of *Science* that contained it, became well known as having introduced the method of synthetic gene-frequency maps. The present volume is the culmination of a 20-year collaboration to document the extent and patterning of human genetic variation using classical markers. According to the authors, the "book was started with the desire to analyze the geography of human genes, using new techniques we have developed for the purpose of studying ancient human migrations."

Cavalli-Sforza and colleagues have compiled an unprecedented array of genetic data on the world's populations. The original database consisted of over 76,000 allele frequencies from 6633 separate samples. The authors exercised a mixture of culling and pooling strategies to reduce the database to a more analytically manageable 491 populations with observations on over 120 alleles. Although the criteria applied in this culling and pooling of samples are left frustratingly vague, the appendixes make clear which populations are used in the basic analyses presented throughout the book.

The largest section—the second half—of this compendium consists of more than 500 gene-frequency maps. For each allele for which sufficient observations are available there is a map reflecting the world distribution of its frequency, as well as separate maps displaying the allele frequency diversity on separate continents: Africa, Asia, Europe, America, and the Pacific Islands, including Australia and New Guinea. The maps include the geographic location of each population from which data are used, symbols intended to help the reader judge the fit between the original data and the map, and three small graphs, one summarizing the descriptive statistics of the distribution of the allele frequencies, one showing the sample sizes, and a variogram, a standardized method of indicating the relationship between geography and genetic variation. In addition to these single-gene maps, color maps reflecting the conjoint distribution of the first three principal-component scores of allele frequencies are also given for the world and the five continental areas.

The single-gene maps are an impressive summation of genetic data. Valuable as I believe they are, however, they should be viewed with considerable caution. The map of *HLAA*2* for the Americas is illustrative. The portion of the map of North America north of Mexico is based on only 10 data points: two in western Alaska, two on the Arctic coast of Canada, one in the U.S. southeast, and five clustered closely in the U.S. southwest. Additionally, Greenland is represented by a single observation on the