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Review Of "The Microbial Models Of Molecular Biology: From Genes To Genomes" By R. H. Davis

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The Microbial Models of Molecular Biology: From Genes to Genomes (review)

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1930s. Little's personality and social standing helped to "sell" genetic arguments for cancer causation, and the importance of inbred mice in determining these causes, as much as did his actual research results.

The Depression drastically reduced most of these sources of funds and forced Little to commercialize the production of inbred mice at the Jackson Lab—to sell mice that had previously been given away. JAX mice, as they were known, became the gold standard for inbred mice, and were central to cancer research as well as other areas of biomedical research. Rader portrays very well the tension between the commercial and the research sides of the laboratory, but she misses the chance to explore more fully the issue of the commodification of living subjects of research. The mice at times disappear among the institutional detail.

Rader begins her book with the 1947 "Great Bar Harbor Fire" that destroyed the Jackson Lab's breeding facility, seeing this as a turning point in the laboratory's history as well as in American consciousness about scientific research and research animals. However, her account of the 1950s largely shifts the focus from the Jackson Lab to genetics research on radiation risk, particularly that at Oak Ridge Laboratory in Tennessee. She closes her account with a look at current issues, noting briefly the "cultural legacy" of experimental mice. Although this reader would have liked more on this cultural significance, this is a minor criticism of a very valuable book on an important topic. While the book itself is nicely designed and well-illustrated, it has a truly astounding number of typographical errors (about one per page), which is not the standard I would expect from Princeton University Press.

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Rowland H. Davis. *The Microbial Models of Molecular Biology: From Genes to Genomes*. Oxford: Oxford University Press, 2003. xiv + 337 pp. Ill. \$30.00 (0-19-515436-3).

Rowland H. Davis, a distinguished researcher in molecular genetics and metabolism through his work with the fungus *Neurospora crassa*, has contributed a thoughtful chronology of the emergence of molecular biology, from the unique perspective of the choices of organisms employed for critical, landmark studies. He posits that microbial models have "positioned us for our twenty-first-century, postgenomic exploration of biological variation and complexity" (p. viii). His book is written for biologists who strive to learn about systems at all levels of complexity. The text is supported with extensive footnotes and references, as well as comprehensive name (of investigators) and subject indices. It would be valuable reading for advanced undergraduate students, graduate students, and postdoctoral fellows, to acquaint them with how and why biologists select specific organisms in pursuing fundamental questions. Moreover, there are three short

appendices that serve as primers on (1) Life Cycles and Principles of Genetics, (2) Macromolecules and the Central Dogma, and (3) Genetic Engineering. This brief treatment of fundamental principles serves as a concise review and, for physical scientists, mathematicians, and computer scientists involved in interdisciplinary research problems, a good introduction.

Davis aims to describe the revolution that ensued after microbes became the focus of genetics studies. He articulates three goals in writing the book: (1) to show how the few microbial model systems were chosen for study; (2) to describe how each model, as influenced by prevailing attitudes and technology, was eclipsed by the succeeding model; and (3) to show that the models served biology well in a transitional period, the products of which now have us poised again to investigate the complexity of living organisms in their environments.

Davis's narrative, punctuated with descriptions of people, historical times, and methods of study, reads more like a fireside reminiscence than classroom lecture notes—yet the material is substantive, carefully annotated, and technically authoritative. He begins by distinguishing between model systems: “organisms widely used for particular research projects” (p. 6), and model organisms: “organisms whose biology is understood at many different levels—organisms that can be used as a representative or basis of comparison for a large taxon or kingdom of life” (p. 13). Davis briefly establishes the context of the field of genetics at the turn of the twentieth century, work that relied on the use of higher organisms with grossly macroscopic, visible traits. Then, in chronological order of ascendance to the status of model organism, he devotes individual chapters to the exploitation of *Neurospora*, *Aspergillus*, yeast, *E. coli*, and the T and temperate bacteriophages to examine the nature and action of genes.

These sections are followed by chapters describing the establishment of the double helix model of DNA, the reprise of the prominence of prokaryotes as models, cytoplasmic inheritance, and organellar genetics. Two more chapters contrast the establishment of yeast as a “supermodel” and the reemergence of filamentous fungi as a model group. The closing chapters of the book include a discussion of the critical role played by biochemistry in enabling the discoveries made with model organisms; a call for the integration of studies in physiology and metabolism; and a recapitulation of the impact of genomics on biological research. Lastly, Davis reviews the legacy provided by these model organisms as biological science looks to embrace, at a detailed level, the complex subjects now made accessible through the integrated application of molecular tools.

Davis answers questions about how choices of study systems are made, starting with the state of research on genetics and inheritance—shedding light on the personalities, biases, training, and eccentricities of scientists, and even the influence of geographic isolation and the amassing of a group of intense investigators. He eloquently reminds us that science is a process that builds on what has come before and is dependent on cross-talk as well as healthy competition. He points out that many problems of biology that were crucial in motivating the reductionists to seek simple, distinctive systems of study are now able to be addressed with new tools, databases, and systems approaches. The goals that Davis articulated in

his introduction are achieved in his timely and authoritative book. He provides an insight as to where we have been and how we got there, which should help us take the next exciting steps that look beyond model organisms to organisms that have societal value in medicine, agriculture, ecology, and commerce.

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Thomas Gerst. *Ärztliche Standesorganisation und Standespolitik in Deutschland, 1945–1955*. *Medizin, Gesellschaft, und Geschichte*, no. 21. Yearbook of the Institut für Geschichte der Medizin der Robert Bosch Stiftung. Stuttgart: Franz Steiner, 2004. 270 pp. €38.00 (paperbound, 3-515-08056-2).

The history of the modern German medical profession has gone from a virtual wasteland to a respectable edifice in the last fifteen years or so. The field has moved from dominance by self-interested members of the profession to analysis by scholarly, critical, social, and medical historians, producing a string of works in German as well as English, from specialized monographs to comparative studies of learned professions.¹ Inevitably, the role of doctors in the Third Reich has drawn considerable attention, and some is finally being paid to what is now a very long “postwar” period, particularly since about 1955. Largely neglected by historians, the immediate postwar period of occupation, dismantling of the Nazi establishment, (re)construction of a medical profession on decentralized Federal lines (West Germany) or Stalinist principles (East Germany), and initial recovery has lacked sufficient well-researched study up to now.

This gap is meant to be filled by Gerst’s book, originally a Ph.D. dissertation at the University of Stuttgart. As this reviewer can attest, research on this period in the history of the German medical profession was long rendered problematical to impossible by the condition and limited accessibility of relevant primary source material, which Dr. Gerst has finally been able to use—particularly the files of the directors of the federal and state medical chambers (*Ärztelkammer*)

1. A representative sample might include Claudia Huerkamp, *Der Aufstieg der Ärzte im 19. Jahrhundert* (Göttingen: Vandenhoeck & Ruprecht, 1985); Michael Kater, *Doctors under Hitler* (Chapel Hill: University of North Carolina Press, 1989); Rebecca Schwoch, *Ärztliche Standespolitik im Nationalsozialismus* (Husum: Matthiesen, 2001); Konrad Jarausch, *The Unfree Professions: German Lawyers, Teachers, and Engineers, 1900–1950* (Oxford: Oxford University Press, 1990); and Charles E. McClelland, *The German Experience of Professionalization* (Cambridge: Cambridge University Press, 1990).