Book Reviews

A Guinea Pig's History of Biology.
By Jim Endersby. Cambridge: Harvard Univ. Press, 2007.
Pp. 499. $27.95.

The 200th anniversary of Darwin's birth is a good time to review Jim Endersby's book *A Guinea Pig's History of Biology*. This well-written book is a series of short articles about major events in the development of genetics. Endersby's heroes in the stories are the experimental subjects of observation or experiment, as well as the observer/experimenter. This includes such unexpected heroes as the Quagga, a now extinct zebra, the evening primrose, and corn, as well as the better-known orchids and Mendel's peas, and the more recent choice of experimental subjects—Drosophila, Arabidopsis, zebrafish, and mice. Woven into the story is the struggle to make sense of biological variation and the 18th- and 19th-century skills in animal and plant breeding, and to reconcile it all with orthodox religious belief in divine creation. Endersby also explores the basis for our modern effort to understand the role of sex in evolution.

The most important message to send to prospective readers of this book is that it is well written and enjoyable. The individual episodes are somewhat in the style of mystery stories, with real suspense that draws the reader on and on. The book is to be read for pleasure, as well as insight into the struggles of remarkable scientists and their fascinating experimental subjects. A subtext is the growth of science from casual to systematic observation, and then to organized experiment.

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Mendel emerges as a special hero in his contributions to experimental methods, most of which were unappreciated in his time.

It is a truism that our progress in science is marked by the development of new tools with which to measure nature. A critical tool for most of the science of the last two centuries has been the experimental subject—animal or plant. But each species is unique, often leading the experimenter down a "primrose path," as Endersby describes in his discussion of inheritance in the primrose plant. The continual problem with using experimental models is the extent to which the patterns are generalizable to other species and to man, and to what extent they are unique to the experimental subject. Endersby makes it clear that our remarkable progress is rarely the product of a single mind, but that it requires several or many scientists to winnow out what is particular and what is generalizable in experimental results. Often, progress is fostered by argument and controversy, which also makes for good stories. Endersby's stories make clear that "science is a social activity, carried out by communities of researchers."

The list of experimental models considered in this book is not exhaustive. Exploring and developing new models to address specific biological questions is a very active field, and several recent books have discussed new candidates for experimental models. This is a popular activity for scientists, because if a model is brought into the mainstream and achieves general use, it brings fame to the originator—and, if the model can be patented, sometimes fortune. Some areas that may be important in the future but that are not discussed in detail in Endersby's book include immortalized cell lines, which are now used extensively to avoid the social problem and cost of using intact animals. Another especially intriguing future opportunity, recently popularized because of a fraud case, is stem cell lines that carry disease-related gene abnormalities, or more intriguingly, that come from individuals with complex genetic diseases. Still another experimental subject that could prove fascinating is the computer. Some complex processes have been captured in code sufficiently well that experiments can be performed on the computer program itself.

Reluctantly, I do report a disappointment with the book. Mathematical statistics is intrinsic to the progress of genetics, but Endersby includes only traces of the origins of probability theory and practice. The issue is critical, judged by Albert Einstein's rejection of probability: "God doesn't throw dice." Probability theory is especially important for population studies of humans (clinical trials), an activity that has grown dramatically in the last decade and is now supported by the recent stimulus package passed by Congress. An excellent theme for another book by this talented writer would be the coevolution of genetics and probability theory—and I would welcome it.

The readability of this book is especially important at this time, when evolution and the critical role of genetics is challenged by the lay public's debate over creationism and how evolution should be taught in schools. Endersby does not

venture into polemics on this topic; he simply tells vivid stories of our efforts to make sense out of natural variation. This is beautifully illustrated in his quote from Darwin: "The more I study nature, the more I am impressed with . . . the contrivances and beautiful adaptations slowly acquired" through natural selection, which "transcend in an incomparable degree the contrivances and adaptations which the most fertile imagination of the most imaginative man could suggest with unlimited time at his disposal."

Harry A. Fozzard

University of Chicago
hafozzar@uchicago.edu

The Art and Politics of Science.

By Harold Varmus. New York: Norton, 2009. Pp. 315. $24.95.

In this autobiography and collection of essays, we learn how Harold Varmus created a life of consequence, enabled by his passions, a competitive streak, a certain quirky social deftness, a sixth sense for navigating political minefields, and a dose of chutzpah. Varmus readily admits that it was prizes (actually the Nobel Prize, although he also won the Lasker and many others) that opened doors for him to the halls of power. While the Nobel provides a public voice, it is the rare laureate who can parlay the media attention into a second career as the successful leader of a public institution and from there on to statesmanship. (Varmus was recently appointed co-chair of President Obama's Council of Advisors on Science and Technology.)

Arguably, ascending to positions of influence in science requires fluid communication skills and proficiency in the social realm as much as creativity in the laboratory. Varmus—who as an undergraduate at Amherst demonstrated a love for the novels of Shaw and Ibsen, served as editor-in-chief of the student newspaper and wrote a thesis on Dickens, and then spent a year in the Ph.D. program in English at Harvard—has easy facility with language. He enjoys lecturing and speaks widely on topics as varied as the genetic basis of cancer and global health. He has become one of the few public intellectuals of the 21st century to emerge from medical science, instead of from the ranks of social science, the arts, or literature.

Varmus also seems to thrive on community and collaboration. These personal qualities no doubt contributed to his success in the laboratory and his easy transition from cloistered University of California, San Francisco (UCSF) professor managing a small research group to visionary leader and public persona. His perspective on scientific teamwork is elaborated in a chapter on "Partnerships in