

Book Review

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A Genetic and Cultural Odyssey: The Life and Work of L. Luca Cavalli-Sforza. By Linda Stone and Paul F. Lurquin. New York: Columbia University Press, 2005. Pp 227. \$45.

Relatively few books about science explore one of the most pressing questions that young researchers face: How do you choose a scientific problem for study that is likely to yield important results? In their evenhanded and valuable new biography of Luigi Luca Cavalli-Sforza, anthropologist Linda Stone and geneticist Paul F. Lurquin don't address this question directly. But, Cavalli-Sforza's long and incredibly productive career offers many lessons for aspiring scientists.

Cavalli (as the authors refer to their subject, noting that he added the hyphenated "Sforza" to his name when he was adopted by a childless stepgrandfather after his father's death) was born in Genoa, Italy, in 1922 and received a medical degree from the University of Pavia (near Milan) in 1944. But he was never interested in practicing medicine, and, when an opportunity arose to do research on bacterial pathogens, Cavalli leapt at it. He made his first important decision at about this time. Having been introduced to genetics by a medical school professor, he began to study genetic changes in *Escherichia coli*. A few years later, inspired by the work of Joshua Lederberg and Edward Tatum at Yale University, Cavalli made several important discoveries about bacterial conjugation. In the process, he established scientific connections in Britain (where he worked for several years) and in the United States that strongly influenced his subsequent career.

Despite his successes, Cavalli eventually lost interest in bacterial genetics and turned instead to human genetics, Stone and Lurquin write. Their book, which draws on many hours of interviews with Cavalli and other geneticists, is especially good at detailing the circumstances of this shift. A student who was also a Catholic priest had access to records documenting the frequency of consanguineous marriages in the area around Parma, southeast of Milan. Cavalli and his collaborators used these records and their own genetic surveys to document the importance of drift in influencing allele frequencies around Parma. This work provided another turning point in Cavalli's career when he realized that allele frequencies could be used to draw inferences about the history of populations, not only in local regions but worldwide.

That realization led to an explosion of subsequent research. In the early 1970s, Cavalli and archaeologist Albert Ammerman proposed that the early practice of agriculture spread from the Middle East into Europe partly through the migration of

farmers—an explanation that generated great controversy at the time but that is generally accepted today. After his permanent move to Stanford in 1971, he and his colleague Marc Feldman applied principles of genetics to describe the transmission of culture from one generation to the next and among peers. In 1984, with Paolo Menozzi and Alberto Piazza, he coauthored *The History and Geography of Human Genes*, a magisterial survey of the worldwide connections among genetics, history, populations, and language. In the early 1990s, he and a group of colleagues called for the establishment of a Human Genome Diversity Project to document the patterns of genetic variation that human history has produced. Most recently, he has taken on the directorship of a 10-volume history of Italian culture. Throughout a career that now exceeds 60 years, Cavalli has befriended countless students, colleagues, and acquaintances with his generosity, his candor, and his irreproducible combination of Italian gentility, British acerbity, and American openness.

A young researcher eager for success could draw several lessons from Cavalli's career. The first would be to think big. Cavalli was always drawn to the most ambitious problems he could identify—the origins of humans, the migrations of peoples, the transmission of culture. He was willing to take on problems that other people could not see or were unwilling to tackle, and history has proven that many of his bets were good ones.

Another rule would be to not be afraid to cross disciplines. Cavalli never shied away from a field just because he would have to learn it from scratch. He became an expert in archaeology, paleoanthropology, linguistics, history, culture, and many other subjects, and he succeeded in relating them all to genetics.

A third rule would be to not shy away from controversy. Cavalli debated William Shockley over issues of race and intelligence. He has argued ardently that race has no scientific validity in a world of continuously varying clines—that it is not a useful way to think about the division of genetic variation.

An ambitious researcher reading this biography also might take away from it several cautionary lessons. Thinking big, reaching across disciplines, and embracing controversy can be risky. In particular, Stone and Lurquin detail the travails of the Human Genome Diversity Project and the indignities to which Cavalli and his colleagues were subjected when the project attracted withering political attacks. Many of the project's opponents were more interested in advancing their own agendas than in cooperating to produce a better project. But, Cavalli himself missed opportunities to reduce the controversy.

A young researcher might take away from Cavalli's story another lesson. The first people to investigate a new area

of research typically must impose simplifications on the subject matter, which can create later difficulties. For example, human populations are not related to each other through phylogenies as if they were incipient species. Populations—to the extent that such entities can be identified and defined—are constantly mixing, moving, and changing sizes. Cavalli wrote about the limitations of using phylogenetic trees in depicting population histories, but his decision to use them anyway shaped the subsequent history of the field.

Stone and Lurquin devote a chapter to the Human Genome Diversity Project and mention some of the other difficult issues raised by Cavalli's work. But, their main intention is to cele-

brate the many achievements of this remarkable scientist and to explore the sources of his inspiration. Cavalli himself provides the surest insight: "Curiosity is an essential ingredient."

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