Georgina Ferry. *Dorothy Hodgkin: A Life.* 423 pp., illus., index. New York: Granta Books, 1998. $29.95.

Dorothy Crowfoot Hodgkin (1910–1994) was among the most prominent of a generation of great crystallographers. Beginning in the 1930s, when every x-ray intensity was recorded on film and estimated by eye, and when a "computer" consisted of a mechanical calculator and a box of Beevers-Lipson strips, Hodgkin pioneered the x-ray studies of large molecules of biochemical importance. With her coworkers in Oxford, she elucidated the structures of, among other substances, cholesteryl iodide in 1943, then the most complex organic structure ever determined; penicillin and vitamin B_{12}, for which she was awarded the Nobel Prize in chemistry in 1964; and insulin, the protein whose structure she worked on throughout her professional life and discovered in 1969. Described by fellow crystallographer Max Perutz as "saintly" and a "protagonist for peace," Hodgkin cultivated connections with scientists in the Soviet Union, China, and North Vietnam, supported the work of crystallographers in developing countries, and served on international scientific commissions, including a term as president of the Pugwash Conferences on Science and World Affairs. Her scientific personality comes through strongly in this biography, as does the course of her private life, her political outlook, and her relationships with friends and collaborators.

Shortly after Hodgkin's death, her family gave Georgina Ferry, a science writer and broadcaster, access to her papers, which include much of her correspondence, an unfinished biography, and an unpublished autobiographical fragment. Ferry has compiled this material, supplemented by interviews she conducted with Hodgkin's family and many colleagues, into a densely detailed yet vivid chronology. Her breezy writing style seems suitable for a biography published so soon after the subject's death, but her account is, unfortunately, very inadequately referenced and focuses rather narrowly on Hodgkin and her circle without much consideration of the wider scientific, historic, gender, or personal issues that affected her life. Still, Ferry displays a sure grasp of the material at hand, which is inherently interesting and will undoubtedly serve as a resource for others.

Dorothy Crowfoot's "rather rackety childhood" was divided between Cairo, where her father was in the British foreign service, and England, where she and her sisters, separated from their parents for extended periods, received a somewhat irregular education. Her correspondence begins in these early years and continues through her college years in Oxford from 1928 to 1932, thus documenting her intellectual and personal development. We read of Dorothy's early interest in crystals and symmetry patterns, her enthusiasm for organic chemistry and x-ray crystallography, and, most formatively, her first research appointment in Cambridge from 1932 to 1934 with John Desmond Bernal, the charismatic crystallographer who mentored many women scientists, had affairs with quite a few (including Dorothy), and was among the first to investigate proteins and other biological molecules. Dorothy eventually married Thomas Hodgkin and was a devoted wife and mother of three, but Thomas's personality seems thin in this biography and the nature of their relationship remains unclear.

Scientifically, the account is also somewhat uneven. Ferry struggles, not too successfully, to describe the fundamentals of x-ray crystallography, but, inexplicably, she fails to include drawings of Hodgkin's important structures or any clear photos of the complex molecular models that represent the crystallographer's triumphant end result. Nonetheless, Ferry skillfully portrays the adventurous atmosphere of crystallography as it was done in Hodgkin's time and the talented scientists who were her colleagues and friends. All in all, this is a reliable account in which Dorothy Hodgkin, her work, and the people around her come to life.

RUTH LEWIN SIME

Günther Frei; Urs Stammbach. *Hermann Weyl und die Mathematik an der ETH Zürich, 1913–1930.* xviii + 181 pp., illus., bibls., index. Basel/Boston: Birkhäuser Verlag, 1992. Fr 68, DM 78, $43.85.

Zurich was a vital center of scientific creativity in the early twentieth century: as a professor of theoretical physics at the university in the mid 1920s, Erwin Schrödinger constructed wave mechanics, and Albert Einstein studied and later was professor of theoretical physics at the university and at the Swiss Federal Institute of Technology (ETH). This is also the city where Hermann Weyl, as professor of mathematics at the ETH from 1913 to 1930, spent the most productive period of his remarkable career. Upon his return to Zurich from military service in the German army in 1916, Weyl became acquainted with Einstein's general theory of relativity. Seeking relief and transcendence after the misery

of the war, he worked out a bold extension of it (unified field theory); he also wrote an influential high-level textbook on relativity theory entitled *Raum-Zeit-Materie* (1st ed., 1918).

Weyl's education in Göttingen, where he obtained his doctorate and *Habilitation* in 1908 and 1910, respectively, made him receptive to challenging problems on the border between mathematics and physics. This volume, skillfully put together by Günther Frei and Urs Stammbach, reproduces official and internal correspondence relating to Weyl's career at the ETH. It shows how his interest in physics contributed to his rapid rise to eminence in the world of science and to his increasing material prosperity. It documents in detail the numerous offers of appointments elsewhere, all of which Weyl declined (though he did accept a number of guest professorships) until 1930, when he returned to his alma mater as successor to his *Doktorvater,* the mathematician David Hilbert.

At the end of the summer of 1920, Weyl proclaimed that he and the Dutch mathematician Egbertus Brouwer were about to revolutionize analysis and put it on a new foundation. In early 1921 he discussed the foundation of the analysis of infinity, the general theory of relativity, and the necessity to look more closely at the relationship between field and matter. This and his interest in the foundations of mathematics resulted in Weyl's early recognition that chance was an irreducible feature of atomic physics. The volume thus supports Paul Forman's thesis, where Weyl plays an important role in this work.

The ETH authorities had good reason to believe Weyl's enthusiastic letters. Heinrich Zangger, professor of forensic medicine at the University of Zurich, continually insisted to the ETH authorities that Weyl was one of the most promising representatives of mathematical physics. Though relatively unknown in the history of science, Zangger was a friend of Einstein and Michele Besso—as has been reported by Heinrich A. Medicus in *Isis* (1994, *85*:456–478)—and was influential in the Zurich scientific community during this period.

The 1920s were a restless period for Weyl, though he did enjoy the serenity of the Alps (the mountain air was also good for his recurrent asthma attacks) and in the summers lived a pleasant life on the shores of Lake Zurich with his wife Helene and their friends. In the early 1920s he and his wife discovered Spain. She became the main German translator of the writings of the philosopher José Ortega y Gasset. In the second half of the decade Weyl moved from one guest professorship to another, to the increasing irritation of the ETH authorities. Weyl's move to the United States to be a guest professor at Princeton University was indicative of the massive changes that were under way in the international operation of science: U.S. philanthropy had begun to assert itself. When Weyl left Germany in 1933 to take up a position at the newly founded Institute for Advanced Study, it was a direct outcome of linkages established through U.S. philanthropic networking in Europe in the 1920s.

Frei and Stammbach aim their volume at scientists and historians of mathematics. The annotations are crisp and to the point, but it would have been better had they painted a less hagiographic portrait of Weyl—if they had themselves escaped the spell cast by his seductive literary self-stylization. At times one wonders what it must have felt like to be Weyl's colleague, despite the considerable charm so recognizable in his letters. The volume contains lists of secondary sources and of Weyl's publications during the Zurich years. Both need to be supplemented in light of recent research. There is also a list of archival sources and another of the courses Weyl taught at the ETH.

My criticisms notwithstanding, this volume is essential reading for those interested in the institutional history of the ETH in the early twentieth century, for devotees of the Einstein industry, for Weyl enthusiasts, and for those wanting to decipher how local contexts—such as Zurich—shape the production of knowledge.

SKÚLI SIGURDSSON

Robert M. Hazen. *The Diamond Makers.* xiv + 244 pp., illus., figs., app., index. Cambridge: Cambridge University Press, 1999. $15.95 (paper).

The Diamond Makers is a history of how synthetic diamonds came to be made. Written for the general reader, it is notable for its lively prose and accessible scientific content. Adding to the interest, highlights of the personal lives of the major players in this story are woven into the array of technical details that constitute the scientific plot. This plot, however, is far more complex than the simple word "scientific" suggests. Historians of science will appreciate the extent to which *The Diamond Makers* illustrates the difficulty of conceptualizing science, technology, and commercial industry as separate categories of human activity. They will also recognize in the plot sequence the familiar progression of science transformed from an undertaking of an in-