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Max Perutz and the secret of life

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Book Review

In 2002, Georgina Ferry, author of an acclaimed biography of Nobel laureate Dorothy Hodgkin, was called to the bedside of the dying 88-year-old Max Perutz, a former friend and colleague of Hodgkin's. His request was simple — do for him what she had done for Hodgkin. The result is Max Perutz and the secret of life, a thoroughly engaging account of the birth of molecular biology as told through the life story of one of its most enigmatic founders. Perutz shared the Nobel Prize in Chemistry in 1962 with his colleague John Kendrew for solving the 3D structure of hemoglobin. His later work, describing how oxygen binding to hemoglobin induces a tilting movement of the iron atom, led to a structural mechanism for oxygen uptake and delivery. These accomplishments validated the driving motivation for Perutz's life work, namely that determining the 3D structures of biological molecules at the atomic level would result in understanding their function. Ferry is at her best when describing how the intellectual microenvironment at Cambridge and the geopolitical, European macroenvironment during the first half of the 20th century influenced Perutz's life and work. Born in Vienna at the dawn of the First World War into a prosperous, secularized, Jewish, industrialist family, Perutz attended the University of Vienna to study chemistry. In 1936, he moved to pursue […]

Max Perutz and the secret of life

Georgina Ferry
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Ferry is at her best when describing how the intellectual microenvironment at Cambridge and the geopolitical, European macroenvironment during the first half of the 20th century influenced Perutz's life and work. Born in Vienna at the dawn of the First World War into a prosperous, secularized, Jewish, industrialist family, Perutz attended the University of Vienna to study chemistry. In 1936, he moved to pursue his PhD at the University of Cambridge with the physicist J.D. Bernal, a communist intellectual, who with William L. Bragg, head of the Cavendish Laboratory, pioneered the use of X-ray diffraction patterns to study 3D structures of crystals of organic compounds. As a "chemist studying biology in a physics lab," Perutz immediately impressed his supervisors and began work that would stretch well over 60 years, using X-ray diffraction to understand proteins.

This, however, is a story that came perilously close to a disastrous, premature ending. In 1940, Perutz was arrested as an enemy alien and shipped off to an internment camp in Canada. With strenuous effort by colleagues, family, and benefactors at the Rockefeller Foundation, he was eventually released, returning to Cambridge to continue his protein work and to work on a secret war project led by Bernal. For several years, he lived on the edge of financial ruin with no secure academic appointment, depending mainly on annual grants from the Rockefeller Foundation. In 1948, he was named head of a new unit of the Medical Research Council (MRC) that he named Molecular Structure of Biological Systems. The unit initially included only Perutz, Kendrew, and another former Cavendish student, Hugh Huxley, but they soon took on a graduate student, Francis Crick, and shortly thereafter a young American, James Watson. Although Perutz considered himself something of a "plodder" in the lab, there is no doubt that as a scientific leader he was a true genius. The working environment he created was defined by his ambition, nose for talent, and appreciation and tolerance for the controlled chaos of a widely interdisciplinary, highly interactive team. Finally, in 1962, the year that he and Kendrew, and Watson and Crick won their Nobel Prizes, the unit became the independent MRC Laboratory of Molecular Biology (LMB). Ferry effectively captures the intense scientific excitement as discoveries at the LMB laid the foundations for the emerging fields of structural biology, molecular genetics, virology, developmental and stem cell biology, and molecular evolution and led to additional Nobel Prizes for Frederick Sanger, César Milstein, Sydney Brenner, and Aaron Klug.

Perutz, a quiet, family-oriented scientist, surrounded by the towering genius of Crick and Brenner and the outsized personality of Watson, accomplished his successes through incredible persistence and patience at the bench, a relentless approach to collaboration, and an ability to incorporate the ideas of others to advance his progress. It was Linus Pauling who developed the first model of protein α-helical structure, Crick who first described the diffraction pattern of helices and then suggested the use of isomorphous replacement of the iron in heme with a heavier molecule to solve a difficult problem in interpreting diffraction patterns, and Kendrew and Hodgkin who succeeded in elucidating the first structures of small proteins (insulin and myoglobin). It was Perutz, however, who made crystals, photographed diffraction patterns, and laboriously analyzed complex data in order to resolve the structure of hemoglobin and develop a testable model for determining its function.

If there is a minor weakness to Ferry's approach it is her minimal attention to Perutz's legendary eccentricities and his willingness to publish models and data that often turned out to be incorrect and, at times, to skate on the edge of ethical behavior. This is a man who despite maintaining a laser-like scientific focus for 60 years often disappeared from the lab for weeks or months at a time with vague illnesses, yet we never really understand this aspect of his personality. Similarly, the famous episode in which he shared confidential DNA X-ray data from Rosalind Franklin with Crick is described rather dispassionately. Nevertheless, this is a wonderful book, effectively presenting a complex man in a complex time and reminding us that unusual career training pathways, scientific rigor, and collaborative transdisciplinary science are not new ideas of the 21st century.