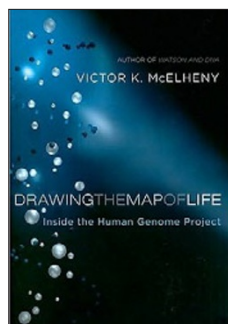


## The tweenage human genome sequence



### Drawing the Map of Life: Inside the Human Genome Project

Victor K. McElheny

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Reviewed by Ewen Kirkness

February 2011 marks ten years since the publication of the first drafts of the human genome sequence. That momentous occasion was the culmination of dedicated efforts spanning 15 years from the first formal discussions of such a project in the mid-1980s. Several books have already captured the excitement and drama of the project as it unfolded. However, these accounts have largely concluded with the crowning events of the publications in 2001. After a decade of the human genome sequence's availability, it is now possible to also consider the long-term influence of the sequence on science and society. In his recent book, *Drawing the Map of Life: Inside the Human Genome Project*, Victor McElheny, a distinguished science writer, has attempted such a synthesis. The book describes the conception and conduct of the project, together with thumbnail biographies of several central players and an evaluation of whether the fruits of the project have fulfilled the promises that were used to justify the substantial financial costs incurred by both public and private institutions that participated.

Victor McElheny was the first director of the Banbury Center at the Cold Spring Harbor Laboratories, and he has been a student, friend and biographer of the first leader of the Human Genome Project, James Watson. His access to many of the project's key participants has provided firsthand accounts of the thinking behind the decisions made at crucial junctures of the project, such as the focusing of publicly funded sequencing efforts at a few academic centers to better compete with the rapid progress of Craig Venter's privately funded enterprise to sequence the genome by alternative means. The product of McElheny's research is not, nor does McElheny claim it to be, a comprehensive description of the winding paths that were trod to achieve the goals of the project. However, it provides a very readable overview that covers the salient events, including the controversial scientific and political disputes, from a relatively neutral perspective.

From the opening chapter, there is a strong emphasis on the key role of new technologies and techniques for successful pursuit of the project. A quote attributed by McElheny to Sydney Brenner—"progress in science depends on new techniques, new discoveries and new ideas, probably in

that order"—is particularly apt. McElheny introduces the reader to many of the technological developments that made conception of the project credible and that were crucial for reaching the goals of the project ahead of schedule. These descriptions also provide a framework to introduce many of the talented and colorful characters that had important roles in guiding the project to a successful conclusion. Many readers will be entertained by these brief biographical snippets, such as Eric Landers's route from mathematician to genome sequencer. For the most part, the snippets mesh well with the larger story of the conduct and consequences of the genome sequencing efforts. One criticism is that some of the subjects covered by these sketches include relative newcomers to the genomics field whose contributions are too recent to evaluate without some historical perspective. But this is certainly not the case for individuals, such as Hamilton Smith, whose contributions to genomics span decades and literally span the pages of this volume from the discovery of restriction enzymes to recent advances in synthetic biology.

The Human Genome Project was the first biology-based project to get the 'big science' treatment of a large dedicated budget, with central planning of coordinated efforts by multiple research teams. Parallels have been drawn between this project and previous large-scale science projects such as the building of the atomic bomb and the Apollo moon landings. McElheny argues that the Human Genome Project differs considerably, in terms of both the costs incurred and the nature of the final product. He suggests that more appropriate comparisons could be made to the ambitious projects that built transcontinental railways and canals in the nineteenth century.

In the ten years since the publication of the draft human genome sequence, there has been only modest progress in identifying the genetic basis of common human ailments, such as Alzheimer's disease and type 2 diabetes. Therapies that derive from understanding such genetic relationships remain a distant promise, and customized therapies that are based on personal genome sequences seem even more remote. McElheny suggests that these disappointments stem largely from overenthusiastic predictions of what could be understood from first readings of our genetic 'instruction manual.' However, even if the immediate value of the human genome sequence was oversold, its long-term value remains priceless.

In the latter sections of the book, the reader learns how the genome now serves as an essential foundation for new large-scale projects such as ENCODE (Encyclopedia of DNA Elements), HapMap and the sequencing of multiple tumor genomes. Although quantum leaps are possible, most of these projects will probably add incrementally to our understanding of the genetic basis of human phenotypes. What is clear, though, is that the paradigm for understanding the genetic basis of human conditions in health and disease has shifted from testing a few candidate genes favored by individual researchers to the unbiased interrogation of the whole genome. McElheny's work leaves the reader with a sense of optimism that this shift will eventually yield genome-based diagnostics and therapeutics on a personalized basis. Over the next decade, as our understanding of the genome sequence matures, we should anticipate that many of the treasures within the 'map of life' will finally be revealed.

#### COMPETING FINANCIAL INTERESTS

The author declares no competing financial interests.

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