



A review of J. Craig Venter's *A Life Decoded*

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In the early 1980s, a number of researchers suggested sequencing and mapping the human genome to help the science community better understand diseases and evolution. Following the announcement that the human genome had been sequenced, scientists wrote in peer-reviewed journals that we are not as hardwired as was once believed, and that the sequencing of the genome was just the beginning. Today, researchers have a new set of goals.

In popular journalism, however, the science was lost in the shuffle. The media focused more on the dynamics of the conflicting philosophies of the private and public projects. This emphasis is also clear in the titles of several books chronicling the Human Genome Project, all appearing prior to the recent release of Craig Venter's autobiography, *A Life Decoded: My Genome: My Life* (2007). Readers will find that Robert Cook-Deegan's *The Gene Wars* (1995) and *The Common Thread* by Sir John Sulston and Georgina Ferry (2002), both written by insiders, are biased towards the philosophy of the public project, a commons approach. Sulston is a socialist who grows runner beans and drives a second hand car. By contrast, Venter travels in Lear jets and conducts business from his yacht.

Three other books are more objective. Kevin Davies' *Cracking the Genome* (2002) and James Shreeve's *The Genome War* (2005) are filled with minutiae that only a professional historian could appreciate. By contrast, Ingrid Wickelgren's *The Gene Masters* (2002) is a breath of fresh air. She uses a different approach, with a series of stories about each major character - allowing readers to reach their individual perspectives on the bitter rivalry.

As good as Wickelgren's work is, missing was the perspective of the main character himself. Everyone, including top scientists, has been curious as to how a former California surfer without the grades to get into college turned his life around and made ground-breaking contributions to genomics. Venter's autobiography, *A Life Decoded*, is essential to a full understanding of his journey, science, and philosophy.

The rivalry has provided a melodramatic story with the characters sometimes overshadowing the plot, providing the makings of a Hollywood script. If a screenwriter prepared such a script, Act I would comprise the events that led up to the Human Genome Project. In 1985, molecular biologist Robert Sinsheimer organized a meeting in Santa Cruz, California; however, the idea was

rejected but not forgotten. Further meetings were held to assess the feasibility of a large-scale project.

According to Leroy Hood, the participants in these meetings were evenly split on whether the Human Genome Project would be a good idea. The skeptics were concerned about the science and the development of technologies for sequencing and analyzing data, but more concerned with various practical matters: the hefty price tag; interference with existing National Institutes of Health research and the possible loss of NIH funding; deciding who could best manage big science; and the vast amount of junk DNA in the human genome.

NIH edged out the Department of Energy for the lead role, and in 1990 the project was formally established and funded with 2005 as the goal for completion. This set the stage for Act II with sixteen public sequencing centers collaborating – each focusing on different chromosomes. The cost of sequencing a single nucleotide was reduced from \$10 in 1985 to 10-15 cents in 1993. However, in 1997, halfway through the project, only 3 per cent had been sequenced.

By this point, the original concerns with a grand project had resurfaced, notably the question of who could best lead. Would the NIH involvement with big science parallel the experience of the US Postal Service when it had looked to Federal Express and United Parcel Service for help? Meanwhile, Venter had left NIH and moved to the private sector, made business connections, and performed several small sequencing projects of his own. Using his connections, he formed Celera Genomics. The name was derived from "celerity," meaning swift and rapid in motion or action.

In the May 10, 1998 edition of *The New York Times*, Nicholas Wade reported that Celera intended to compete with the public project. As Celera's chief scientist, Venter declared that he could accomplish the same task with a \$300 million budget, one-tenth of the public project's budget, and in three years, a fifth of the time of the public project. Venter's rival plan drew a number of critics and skeptics, namely those in the public project.

James Shreeve wrote, "It was the exceptional hubris of the plan that riled them." It's not clear whether someone forgot to tell Venter – or the memo was lost in the mail – that if the public project was beaten it would make them look bad. The rivalry provided the equivalent of a double shot of espresso and a Sputnik satellite, as a race soon began, setting the stage for Act III.

In his autobiography, Venter reveals that the mystery surrounding his status as a successful scientist and businessman is simply the result of his background. After a less-than-stellar high school academic background, which led to a life of surfing and retail to pay the bills, he became a medic during the Vietnam War. This experience, although painful, changed the direction of his life and developed his interest in science and medicine. After attending junior college, he was mentored in college and graduate school; he then taught in medical school, and eventually obtained his own lab at NIH. While working as an NIH researcher, he was repeatedly denied funding through politics and a system that did not reward outside the box thinking.

According to Venter, the private/public rivalry began because, "They tried to humiliate me when they couldn't beat me with their science." What his critics considered technological obstacles, he considered challenges. In the private sector, and backed by private funding, he found that the rules suddenly changed; he was now accountable to stockholders. Consequently, his outside the box thinking led to a number of innovative techniques including paired end sequencing, ESTs, shotgun sequencing, cDNAs, the bar coding of repeat sequences, and algorithms for assembling DNA fragments which accelerated the sequencing of the genome. This resulted in a personal victory for Venter as well as the free market system.