

## Book review

### **A Life Decoded: My Genome: My Life**

**J. Craig Venter**

**New York: Viking/the Penguin Group, 2007<sup>1</sup>**

HUB ZWART<sup>2</sup>

Scientists communicate their views and experiences through various genres, ranging from highly esoteric ones (notably academic papers in peer-reviewed journals) to much more exoteric ones (such as interviews and public lectures). Whereas in the former scientific authors will justify themselves vis-à-vis their peer communities, in the latter they will justify their role and work vis-à-vis broader audiences, or even society at large. Moreover, the use of exoteric forms of output (often in co-production with science journalists or science writers) is usually a privilege (or obligation) of a relatively small group of “visible” scientists, representing the larger research communities they are involved in.

A famous subject for autobiographical reflections has been the discovery by Watson and Crick of the structure of DNA in 1953, which marked the beginning of the “classical period” in molecular biology, as Francis Crick phrased it.<sup>3</sup> Their concise letter published in *Nature* on 2 April 1953 could only be read and appreciated by experts acquainted with their field. Since then, however, much broader audiences have been informed about their work, notably through autobiographical accounts. Beginning with James Watson, all the principal characters had their memoirs published (Watson 1968/1996,<sup>4</sup> Crick 1988,<sup>5</sup> Wilkins 2003<sup>6</sup>), with the exception of Rosalind Franklin, who died too early, not only to receive the Nobel Prize, but also to produce an autobiographical account of her own. Yet, in her case, important biographical studies have been written.<sup>7</sup>

The Human Genome Project (HGP) is now giving rise to a similar phenomenon. An increasing number of participants are now publishing autobiographical testimonies. Documents of this type are interesting for various reasons. They focus on the “context of discovery”, that is: on the “inside” of scientific research,<sup>8</sup> on the internal dynamics of research communities and the psychology of scientific discovery. They reveal what often remains invisible or unsaid in more formal, academic publications (such as journal articles), focusing on the often unpredictable and hazardous vicissitudes of research work and its openness to societal, cultural and political influences. They may also reveal the sometimes decisive role of factors that have no place in the official methodologies of scientific research, such as friendship, animosity and rivalry, religion and dreams, strategic behaviour and chance events. Thus, in comparison to the official channels and avenues of scholarly publication, biographies and autobiographies may constitute an important complementary source of information for understanding scientific change. For the HGP, three publications in particular fall under this heading. They are, in chronological order: *The Common Thread* by John

Sulston (2002/2003),<sup>9</sup> *The Language of God* by Francis Collins (2006)<sup>10</sup> and, now, *A Life Decoded* by J. Craig Venter.<sup>11</sup>

*A Life Decoded* is an exhilarating document, to begin with, reading like a novel or even a science epic. In the author's own words, it is "a tale of seemingly impossible quests and grand objectives", of "great rivalries and bitter disputes", of "battles of ideologies, morals and ethics" and of "clashes of egos" (p. 2), an adventure that swept the author "from peaks of incredible exhilaration as I marshaled a relatively small but dedicated army of scientists, computers and robots to achieve what seemed almost impossible, and then plunged me into black pits of depression as I faced opposition from Nobel laureates and senior government officials, my colleagues, and even my wife" (p. 2). Moreover, besides being an autobiography proper, the book also contains a series of reflections on the genes present in the author's own genome, one of the first individual genomes that was sequenced and made publicly available on the web – the "recipe" that made Craig Venter, as he himself describes it. In separate boxes dedicated to his sequenced genome, he especially focuses on genes that are associated with behavioural characteristics such as thrill-seeking behaviour, ADHD and the ability to cope with almost superhuman amounts of stress. Thus, in Venter's case, autobiography and the genome are connected in more than one way with one another.

His autobiography is built along three basic strands: career, marriages and sailing. And they co-evolve, in the sense that major career shifts are associated with crucial and more or less simultaneous events in the other dimensions. Moreover, on the basis of his autobiography, a number of career stages can be distinguished in Venter's life, separated from one another by dramatic changes, and these subsequent stages roughly correspond to changes in terms of marriage partners, sailing boats and physical appearance.

During the *first stage* Venter works on adrenaline receptors as a university researcher at UCSD La Jolla and in Buffalo New York. He is married to Barbara Rae and wears long hair and a long beard, and we find him sailing, preferably on a catamaran, first at Mission Bay and later on Lake Erie and Lake Michigan. From there – *stage two* - he migrates to the NIH headquarters (Bethesda, Maryland) to become an intramural NIH researcher, moving from adrenaline receptors to the adrenaline receptor *gene*, marrying fellow researcher Claire Frazer and sailing the Atlantic from Chesapeake Bay, notably to the Bermuda islands. He describes it as a turning point in his career: "I had left a safe field in which I had become comfortably established and taught myself and my team a new discipline, molecular biology" (p. 100). His physical appearance has changed dramatically as well. He has become bald, corpulent and beardless. And it is from this position that he becomes involved in the genomics revolution, "transforming the analog world of biology into the digital world of the microchip" (p. 100). Human genomics offers sufficient allure to encourage him to make a leap into the unknown: "I decided I would build a new career in the emerging field of genomics" (p. 109).

After a period of frustration he decides to set sail once again, both literally and figuratively. An adventurous sailing trip to Bermuda, one of the highlights of his

sailing career, also marks his decision to leave the public human genome effort and to start a research institute of his own, based on his EST method and the whole-genome shotgun approach - the *third* stage: “Bermuda would mark the beginning of a battle for survival in which my science, my marriage and my reputation were at stake. When that voyage ended I had sequenced the genome and felt the same visceral thrill I had experienced sailing to Bermuda” (p. 115). Initially he sets up TIGR, but after a prolonged battle for survival with business partner William Haseltine of Human Genome Sciences his wife Claire Fraser takes over as acting president of TIGR, while Venter himself embarks on a new venture, Celera, financed by a company that produces the automated sequencing machines. From this position he begins his highly visible and widely discussed competition with the government effort, the International Human Genome Sequencing Consortium, headed by Francis Collins.

And from that moment on, the story really gains epic momentum. Venter becomes totally immersed in and addicted to his grand project. With his marriage deteriorating, the only refuge left to him is an occasional oceanic sailing voyage. Finally, having first sequenced the genomes of *Drosophila melanogaster* and some other model species, the famous White House Press Conference takes place, announcing that the human genome effort is reaching its completion, and the heroic tale of both collaboration and competition reaches a climax with Venter’s *Science* publication in 2001. But his career is far from over. A new sailing adventure, this time to the Caribbean, marks a new transition in his life, towards a *fourth* stage. Indeed: “Each major transition in my life has been accompanied by a new sailing adventure with an expanded horizon” (p. 330). He decides once again to build a new research effort from scratch. He becomes a geographer of life. And once again, his appearance changes accordingly. Expensive business suits give way to outdoors clothing and once again he grows a beard. His sailing vessel Sorcerer II becomes a floating observatory. After his divorce from Claire Fraser, he now marries Heather Kowalski. Fraser was a prominent genomics researcher and research manager in her own right with an impressive curriculum. Their marriage must have reflected the combination of competition and collaboration that characterised the human genome stage in Venter’s career. Kowalski had a quite different, more supportive and subservient profile. Before the start of their relationship, she acted as his communication officer, in charge of his public relations. In that role, she became his “constant travelling companion and advisor” (p. 292).

His model during stage four became the scientific expedition that had enlisted Charles Darwin as a naturalist: the journey of H.M.S. Beagle around the world (setting sail in 1831). For Venter, the focus now shifts from sequencing the genomes of model species (such as *Homo sapiens*) to sampling the metagenomes of environments. The Sorcerer II expedition develops into a global sampling expedition, a systematic effort to map microbial life worldwide, a geography of life, an effort to “explore the incredible diversity of the sea” (p. 332). According to Venter, the effort of sequencing the genomes of aquatic microbial organisms present in samples of sea water is bound to have a tremendous impact on our views on evolution as well as on our understanding of global warming.

The final chapter of *A Life Decoded* contains a plethora of images connected with exploring the “blue” - that is, aquatic, rather than terrestrial - planet, taking genetic snapshots of ocean life, thus sequencing “the genome of the ocean itself” (p. 343), and opening up previously unknown realms for human exploration and understanding: “We had opened doors to a world that has been mostly unknown to modern science. From the sunlit surface to the darkest submarine canyons stretches an ocean of life that is beyond human imagination” (p. 344). Thus, the team discovered tens of thousands of new species and something like 1.3 million new genes in about 200 litres of surface seawater.

The use of aquatic metaphors, linking genomics with ocean sailing in a variety of ways, are very significant in this respect. Since time immemorial the sea has always functioned as an image, an archetype even, of liberation from obstacles, of freedom of movement and openness of thought, of migrating beyond the spheres of action of established institutes.<sup>12</sup> In Venter’s autobiography, science and sailing are intimately connected. Whereas Francis Collins identified himself with the “trusted aid” Meriwether Lewis who, sponsored by the U.S. government, set out to map unknown terrestrial territories as part of a process of annexation and colonisation, Venter is eager to associate his work with embarking and setting sail, to places where one is left to one’s own devices (also in terms of funding) and “where there is still an ocean of great science left ... to explore” (p. 357), discovering new worlds, breaking away from entrenched positions. In Venter’s view, science is an endeavour that takes us “far from shore into unknown waters” (*idem*). It defies, rather than reinforces or expands, established terrestrial authorities.<sup>13</sup>

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<sup>1</sup> J. Craig Venter. 2007. *A life decoded: my genome: my life*. New York: Viking/Penguin Group. 400 pages. Hardback. ISBN-13 978-067-006358-1

<sup>2</sup> Radboud University Nijmegen, Netherlands [haezwart@sci.kun.nl](mailto:haezwart@sci.kun.nl)

<sup>3</sup> F. Crick. 1988. *What mad pursuit. A personal view of scientific discovery*. New York. Basic Books.

<sup>4</sup> J. Watson. 1968/1996. *The double helix: a personal account of the discovery of the structure of DNA*. New York etc.: Simon and Schuster.

<sup>5</sup> Crick, *op. cit.* note 3

<sup>6</sup> M. Wilkins. 2003. *The third man of the double helix: an autobiography*. Oxford/New York: Oxford University Press.

<sup>7</sup> Eg, B. Maddox. 2002/2003. *Rosalind Franklin: the dark lady of DNA*. New York: Harper Collins.

<sup>8</sup> Cf. the subtitle of Kevin Davies’s *Cracking the Genome* (2001/2002. Baltimore and London: John Hopkins University Press), “*Inside the race to unlock human DNA*” (Baltimore and London: John Hopkins University Press); or the title of David Papineau’s review of James Shreeve’s *The Genome War* (2004. New York: Alfred A. Knopf): “Speed-reading the book of life. The *inside* story of Craig Venter’s race to sequence the human genome” (New York Times, 15 February 2004, available at <http://query.nytimes.com/gst/fullpage.html?res=9405E7D7133BF936A25751C0A9629C8B63>). John Sulston also presents his book as an “Insider’s view” (J. Sulston & G. Ferry. 2002/2003. *The common thread: Science, politics, ethics and the human genome*. Bantam/Corgi).

<sup>9</sup> Sulston & Ferry, *op. cit.* note 8.

<sup>10</sup> F. Collins. 2006. *The language of God. A scientist presents evidence for belief*. New York: Free Press (Simon & Schuster). Cf. H. Zwart. *The language of God. A scientist presents evidence for belief* [Book review]. *Genomics, Society & Policy* 2006; 2 (3): 136-141.

<sup>11</sup> Other examples of autobiographical retrospectives relevant to the HGP are: F. Sanger. *Sequences, Sequences and Sequences*. *Annual Review of Biochemistry* 1988; 57: 1-28; and L. Hood. 2002. *My life*

and adventures integrating biology and technology. A Commemorative Lecture for the 2002 Kyoto Prize in Advanced Technologies. (Available at <http://www.systemsbio.org/download/2002Kyoto.pdf>). Some other publications containing important pieces of biographical and autobiographical information are R. Cook-Deegan. 1994/1995. *The gene wars: Science, politics and the human genome*. New York/London: Norton; Davies, op. cit. note 8; Shreeve, op. cit. note 8.

<sup>12</sup> Herman Melville's *Moby Dick* is merely one among countless examples building on this age-old link between independence of mind and the kind of independence offered by the sea: "While the winds of heaven and earth conspire" to cast us "on the treacherous, slavish shore". That is, in the realm of established expertise and "cosmopolite" science, it is in the howling infinite landlessness that new and wider truths and horizons are bound to emerge (H. Melville. 1851/1931. *Moby-Dick: or the whale*. In: *Romances of Herman Melville*. New York: Tudor, pp. 823-824).

<sup>13</sup> This difference is also indicated by the icons Collins and Venter preferably used in self-presentations: Collins seated on his motorbike – or playing *country* music on his acoustic guitar - and Venter on his sailing yacht, icons that symbolise terrestrial and aquatic forms of mobility and shelter.