

Life at the Speed of Light: From the Double Helix to the Dawn of Digital Life

By J. Craig Venter

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Part history, part primer, part argument for a Nobel Prize nomination, J. Craig Venter's *Life at the Speed of Light: From the Double Helix to the Dawn of Digital Life* provides one man's privileged perspective on the burgeoning synthetic biology (synthbio) industry. This text also serves as another step in the largely successful campaign to rebrand the nefarious-sounding discipline of genetic engineering. In opposition to the dystopic (pre)cautionary concerns of the Frankenstein paradigm, Venter frames his story with some of science fiction's more optimistic, proactionary tales such as Isaac Asimov's robot novels as he promotes synthbio's "limitless potential."¹ Despite being jargon thick at times, Venter writes with clarity and conviction to a scientifically literate readership leading indelibly toward the cusp of digital life's titular *Dawn*.

Having set the record straight about the past in his autobiography, *A Life Decoded*, Venter seems keen to shape the reception of his future legacy with his most recent work. When Venter finally receives what many consider a long overdue Nobel Prize, the justification will likely start with his 1995 genetic sequencing of *Haemophilus influenzae*, the first living organism sequenced. This feat was made possible by a novel technique, "whole genome shotgun sequencing," developed by his team. Along with other signal achievements like constructing the virus bacteriophage Phi X 174 using synthetic DNA and creating what has been dubbed the first instance of synthetic "life," *Mycoplasma genitalium*, Venter's centrality to the cultivation of laboratory technique in the growing synthbio discipline is nonpareil.

In order to appreciate how far synthbio has come, Venter provides an overview of discoveries foundational to his own work. His diachronic tour of the "life" sciences puts heavy emphasis on understanding the biological world in order to "master it." To drive home this distinction between merely understanding a phenomenon and intervening to control it, he appeals to the father of empiricism, Francis Bacon, who goes so far as to characterize the Greeks as prattling "boys" because they never produced an experiment to benefit humanity. Clearly, this is meant to adduce some enhanced degree of virility to Venter and his ilk of doers.

¹ His manner of deploying the analogy is a little roughhewn. Venter states Asimov's Laws of Robotics and then assures his readers that "one can apply these principles equally to our efforts" (152). This, of course, is ignoring the fact that the Laws of Robotics were inextricably bound to the physical construction of a robot's positronic brain, which could process information and make decisions, and not a comparatively mindless self-replicating life-form. The in-built protections that are considered best practices in the field of synthbio—"Suicide genes,' molecular 'brakes,' 'kill switches,' or 'seatbelts' that restrain growth rates or require special diets, such as novel amino acids, to limit their ability to thrive outside the laboratory" (157)—have all the subtlety of dead man's switches or fail safe mechanisms. You know, like in *Jurassic Park*. Slipshod analogies work both ways.

The primary antagonists in his narrative are the proponents of vitalism who villainously “set back the discovery of DNA as the information-carrier, perhaps by as much as half a century” (23). Vitalism is the belief that the quality that separates living from non-living is fundamentally unexplainable by purely materialistic analysis. This bias toward complexity and “emergent” phenomenon enticed many otherwise well-meaning scientists down a sordid, “protein-centric” path. He does not outright accuse these scientists of doing *bad science* but rather makes the case that they stubbornly continue to operate under what he considers to be sufficiently disproven presuppositions. If these scientists were explicitly searching for evidence for Malebranche’s Occasionalism or for the biological science’s “God protein,” I might grant a higher degree of legitimacy to his derision, but that does not appear to be the case. Their alleged disciplinary crime appears to be not that they are actively looking for vitalist evidence for life in cell-level protein dynamics, but rather that some vitalist theoretical afterglow prevents them from appreciating the great reductive truth of DNA, and its centrality to life. Venter’s offense and frustration at this oversight is palpable. His bitterness toward the reverse salient of vitalism appears to stem from the niggling thought that synthbio would be all the closer to achieving his dream of cheap, on-demand DNA synthesis if these untenable “beliefs” had not stubbornly resisted refutation by the best available evidence. I, too, would want to live long enough to see on-demand DNA synthesis become not only possible but routine; however, I do not agree that an increased homogeneity of the ideological underpinnings of biology, or any other science for that matter, would necessarily expedite the realization of such a world.

The stark dichotomy Venter promotes between protein-centric and DNA-centric science contrasts a soft murkier distinction between scientists and laypeople. One question looms large in the 10th chapter, *Life by Design: Life by whose design?* From the very first sentence, Venter’s intended meaning is clear. The “we” he refers to is the “scientific community,” comprised of well-meaning actors. Those are the good guys. However, some no-goodnik scientists also work with terrorists and rogue governments. Those are the bad guys. Only toward the end of the chapter does he make allowances for other “non-scientifically trained” actors operating in “noninstitutional settings.” Stopping just short of saying “don’t try this at home,” Venter expresses a rather paternalistic attitude toward these hapless biopunks noting that as the capabilities of DIY synthbio expand “the risks increase” and “our notions of harm are changing” (155). The risks are most certainly real. However, Venter’s paternalism seems resolved to *not breaking anything* as the most he can expect from these wayward children. At no point does he appear to entertain the possibility that valuable contributions may come from the direction of the broader hacking and tinkering world. His apparent attitude toward the general public is only moderately more inspiring.

As a casualty of his laser-like focus and instrumental role in pushing the boundaries of the synthbio industry, Venter comes across as aloof and disconnected from activities of the lay public. Despite his tone he does manage to present a strong, civic-minded proactionary paradigm of techno-scientific progress that he feels will best fuel the J.

Craig Venter Institute (JCVI) discovery machine. While at times his rhetoric surrounding ethical reviews and public accountability of his cutting-edge synthbio work feels perfunctory, it does not seem entirely insincere (while he *does* write: “We have to...listen carefully to the public and remain vigilant in order to earn their trust” (157). He does *not* write: “...in order that we might learn something.”) I do not get the sense from *Life at the Speed of Light* that the JCVI conducts ethical inquiries as a way of proscribing any particular research initiatives, but rather it seems more akin to a glorified PR campaign to “educate” the public about the work they intend to do and why it will be safe. In his own words: “with this great power, however, came the duty to explain our purpose—so that society at large could understand it—and, above all else, to use such power responsibly” (78). Winning hearts and minds. “To know the Good, is to do the Good,” writes Plato.

For my part, I want Venter to achieve his lofty synthbio goals. The potential gains far outweigh the possible risks. However, I think he fails to give sufficient credit to diverse opinions and perspectives in creating better tomorrows. Even if the protein-obsessed “vitalists” are ultimately incorrect in their assumptions about the importance of protein dynamics in defining cellular life, it does not follow that their scientific research should be foregone in lieu of more DNA-based research. As Venter implies time and again in *Life at the Speed of Light*, one of the strengths of scientific research is that significant, paradigm-shifting work does not require the scientist in question to have the correct presuppositions. It simply requires doing good, documented work accessible to a broader community. Venter may long for a greater unity of DNA-oriented effort in synthbio, but the next great paradigmatic leap in biology may likely emerge from a more stochastic and creative process. Perhaps even the anarchic, bio-hacking tinkerers—more concerned with what life *does* rather than what it *is*—have a bigger role to play than Venter imagines.

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