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Nicolas Rasmussen, *Gene Jockeys: Life Science and the Rise of Biotech Enterprise* (Baltimore: Johns Hopkins University Press, 2014), pp. 249, hardback, ISBN: 978-1-4214-1430-2.

Gene Jockeys is a gracefully written and authoritatively researched account of early American biotech (ca. 1975-1990) organized around five genetically engineered protein drugs, starting with human insulin and ending with tissue-type plasminogen activator (tPA). Human growth hormone, interferon, and erythropoietin are the other three drugs examined from what now appears “a golden age, as well as a gold rush, for scientists working to bring the first biotech drugs to market” (p. 183). With narrative verve and matchless command of sources including interviews, scientific papers, newspaper and magazine articles, and legal documents from court battles over patents, Nicolas Rasmussen reconstructs a history from which he draws lessons that deserve wide attention. Packed into this short book is an extraordinary amount of information and insight, on everything from how exactly the cloning of genes got done in 1978 to the geopolitics of science funding in the twentieth century.

Perhaps Rasmussen’s most exciting lessons concern the link between those two, understood in light of his own studies synthesized with a rapidly growing body of superb scholarship on and around Cold War science. He gives his point of view concise expression when he observes, near the end of the chapter on human growth hormone (each drug gets a chapter unto itself), that the biologists who left academia for Genentech et al “were idealists in remaining true believers in the scientific culture that had grown up around the Cold War ideology of basic research” (p. 96). As explained in a bravura opening chapter, generous funding of basic research came to be prized by the US government after the Second World War as useful symbolically as

well as materially, serving both to advertise the freedom that creative minds enjoyed in the capitalist democracies and to ensure a steady supply of the better weapons and medicines that, put into production by private firms, would keep the free world ahead of communist tyrannies. Molecular biology was exceptionally well placed to benefit, for it had all the intellectual and moral glamor of science pursued for science's sake, yet all the applied-science associations of its disciplinary parents, physics (the bomb) and genetics (eugenics), as well as those of a disciplinary near-neighbor, endocrinology (drugs). By the early 1970s, molecular biology was booming, above all at the elite institutions privileged by Cold War funders. But then came *détente*, and a drying up of the funding, leaving a pool of very good, very competitive, and very pampered young men who sensed professional opportunity in the new technology of recombinant DNA and obstruction in the hierarchical, increasingly regulated and impoverished world of academia. On Rasmussen's telling, they joined industry not in the first instance to make money but to make discoveries and reputations.

Back when he was a graduate student in molecular biology at Stanford in the 1980s, Rasmussen participated in a small way in the scientific-business culture that these "gene jockeys" – their semi-joking term for themselves – helped to create. (The acknowledgments include thanks to "the fine people I worked with briefly in marketing services at a certain biotech company," p. vii.) He thus brings a marvellous blend of insider sympathy and outsider detachment to the stories of the recombinant drugs born of that culture. It is the more instructive that he writes with such disapproval about the one drug in his five from elsewhere: erythropoietin, or "Epo" for short. If Genentech was, in Rasmussen's words, "a postdoc's republic" (p. 96), where elite scientific talent was nurtured and scientific priorities took precedence over

business and legal ones, Amgen, which secured the patent for the Epo gene, was the land of the drug-company executive turned venture capitalist. Rasmussen is relentless in his prosecution of arriviste Amgen: cutting corners and cutting deals; hoarding research materials and findings; hiring staff from non-elite places and getting routine science from them; and making a fortune on the basis of a patent it did not much deserve, for a drug that, though it seemed for a while to help anemia sufferers who lacked natural Epo (which stimulates the production of red blood cells), rapidly became the cheater's choice in athletics and cycling, and eventually came under suspicion for causing cancer. Not that it was, as it were, all Amgen's fault. Aiding and abetting, in Rasmussen's view, were what amounted to increasing deregulation throughout the 1980s and 1990s in US intellectual property rights and drug trialling regimes. Even so, with Amgen, the rot set in, and an overall ambience of crass commercialism from which the historian must now rescue the likes of Genentech, Biogen, the Genetics Institute, and other first-generation biotech firms.

What did they achieve, and what should we learn? Rasmussen reckons that recombinant insulin and the rest would have come to market anyway, though less quickly, since protein drugs had long been at the center of the biology-industry nexus, and recombinant versions were so obviously the next step for pharmaceutically directed genetic engineering. They were the easy pickings, and early biotech's success is inseparable from their availability. So it is misguided, Rasmussen suggests, to try to replicate that (in any case exaggerated) success by recreating the biology-and-business friendly conditions that led to the founding and flourishing of those first firms. To do so, as he writes in conclusion, "would be as futile as capturing a breaking wave in a bottle" (p. 191).

Gregory Radick

