BECKER THE RESEARCHER

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Contents

Prologue

As I approached the end of a long and satisfying career in science, I felt the necessity to tell the story of Dr. Robert Becker, whom I consider to have been one of the most interesting, altruistic, and important although generally unknown men of science and medicine from the last century. I gained an understanding of him during the sixteen years I worked in his laboratory. When it closed in 1979, ending his odyssey in research and my time with him, I had the impression he was a great man who had an unyielding nature. Inflamed by what I had learned from him, I started my own laboratory and for many years did experiments that followed the path he had charted. Events that occurred during that period helped me evaluate his achievements in the context of time, which facilitated distinguishing between the worthwhile and the insignificant. Following his death in 2008 I decided that my experience and level of maturity were sufficient to guide my selection of stories to tell so that you might more readily understand his character and accomplishments. I offer this book, far from perfect as it is, in the hope of conveying a sense of the heights of thinking he reached, the level of abstraction he achieved, how deeply he saw into the nature of medicine, and the single-minded determination with which he pursued his goals. The story is about who he was, what he sought, why, and the consequences he faced, which I am leaving so that he will be remembered with the admiration he deserves.

The passage of so many years has not dulled my recollections of him, which were aided by the laboratory records he left me, his letters to me after we parted, and the many remembrances I have of him, the most treasured of which surround me now as I write—his pen-and-ink drawings of Galvani's experiments; an electrical model of bone's response to injury constructed by painstakingly soldering an interlaced network of numerous resistors; a photograph of him operating his prized spectrometer; an oil painting he made of the rural environment of upstate New York that he loved so much; his watercolor of an old red barn; a photo taken the day he received the Middleton Award; and the newspaper headline that appeared the day his laboratory closed, "International Authority on Regeneration Quits."

His physical features and mannerisms impressed me strongly from the beginning, and never ceased to impress me. He was of average height but so slim that he seemed taller. During our conversations his eyes would remain firmly fixed on mine when he spoke, their intensity seemingly magnified by the glasses he wore. The firmness of his jaw was accentuated when he was smoking a pipe, which he did frequently. He had a long face that extended from the tip of his jutting jaw to the top of his head, where his hairline began. His countenance gave the impression of a determined man on a serious mission. His personality, the spell of his words, and the sharpness of his mind have always remained vivid to me.

When I began working in his laboratory, the edifice of science appeared to me to be like a great book of Truth, the Word of God written in atoms and energy for the edification of the chosen few. Now I can see that the book contains something far less certain than I had imagined, more shadowy, fragmented, and always incomplete. I learned things about the ways of the world and ultimately came to an understanding of how a valiant and highly ethical man who generated unique insights into the scientific basis of the human condition, who constructed a general plan to find truths that mattered, and who obtained the resources needed to accomplish this task, could ultimately fall victim to a common folly manifested by many great men in literature and in life. So I have written about him, and connected my observations and impressions with what I learned from talking to witnesses whom I thought trustworthy. Occasionally, to make the events I relate more comprehensible, I will describe what the world of science and medicine was like and what was happening, as I understood these things then and remember them now in the light of what I learned, doing the best I can to identify and interrelate the important developments, some of which were confusing.

Chapter 1.
Physician

1923–1956: He grows up in New York, attends medical school, serves in the army, becomes an orthopedic surgeon, and chooses a career in biomedical research

Robert Becker was born in 1923, the only child of a Lutheran minister and his wife, both German. He grew up in Long Island, New York, graduated in 1945 from a Lutheran College, by which time he had already served two years in the Army, and married Lillian Moller in 1946. After finishing medical school at New York University in 1948, he interned for a year at Bellevue Hospital and for the next seven years studied pathology, surgery, and orthopedic surgery, and served as a medical officer in the Army. His training in orthopedics, the clinical area in which he chose to specialize, took place mostly at the Veterans Administration hospital in Brooklyn.

According to him, orthopedic surgery at that time typically attracted athletes or lower-ranking medical students. Before I began writing this book, I had never thought about the reason he chose that specialty. He did not engage in sports when I knew him, except for fishing if that counts. He liked to take long walks in the country, which required stamina, particularly in the winter, but that is not the kind of athletic ability I think he had in mind when he described the prototypical orthopedist. In medical school he had been elected to Alpha Omega Alpha, so he was probably competitive for any specialty that appealed to him. Perhaps during his youth he had an inspirational encounter with an orthopedist, which is a common reason given by orthopedic residency applicants when they are forced to explain why they chose orthopedics. There may have been a deeper reason. I wish I had asked him.

From how he talked about his background, I saw that even as a young medical student he had begun to chafe at the role dogma played in medical practice. One day in his first clinical year, a diagnostic issue concerning a patient arose during rounds. In the presence of other students and staff, all standing and listening around the patient's bed, Dr. Becker offered his assessment of the patient but was humiliated by his professor who rejected

Dr. Becker's reasoning not because it was inconsistent with the clinical facts but purely as an authoritarian act of dominance. That experience, and likely others that had similar psychological impacts, left their stamps on his character.

He told many stories that, looking back now and understanding him better as I do, I can see were really about his developing sense of dissatisfaction concerning how physicians were taught to think. Once while looking through a microscope at thin sections of human tissue that had been stained with dyes to enhance various features, he realized that his attention was focused on the appearance of the tissue rather than on thinking about how it had functioned before it died. He had come to see that making meaning from what he called "painted tombstones" was like trying to diagnose a wanderer from footprints left behind. The distinction between structure and function always remained important to him, and he often characterized the failure to appreciate it as emblematic of a trend in clinical medicine toward becoming too objectified and technologically oriented, treating patients not as human beings but as if they actually were their test results and x-rays.

Another story that hinted at the early development of his perspective regarding medicine occurred when he was a ward officer treating soldiers who had fractured bones. He began to think seriously about the healing process and wondered how the body knew that a fracture had occurred, what initiated the healing response, how it was controlled, and what ended it after healing was complete. These questions were largely unstudied even though the final result was something amazing, the growth of new bone that was indistinguishable from uninjured bone. The exact replacement of what was lost. True regeneration. "How does that happen," he said to me, "and with such consistency that we are surprised when the bone doesn't heal?" Another time he put the issue this way, "How does the body know to grow arm bone in the arm and leg bone in the leg, and not the other way around?" He felt alone in these thoughts, as if there was no one else who shared them, at least not among those with whom he worked, or the authors of the textbooks he was studying. And some things that were in the books did not ring true for him, like the notion that healing was a thing done by the physician using medicine or surgery, rather than something done by the patient based on intrinsic capabilities. His attitude on this point was fully formed and vital in his philosophy by the time I had first met him,

and never changed throughout his lifetime.

By the end of his medical studies he had developed a sense that the medical profession did not encompass some sound and potentially beneficial perspectives, like a house that was too small. Despite the limited extent of his scientific training and medical experience, probably sometime in 1955 he decided to devote his life to clinically relevant research aimed at addressing what he saw as shortcomings regarding the medical wisdom he had received. Now and then he talked to me fondly about one of his professors, and he delighted in the few instances when he had an opportunity to show them the progress he had made. I never knew whether any of those professors had actually influenced his choice of a career in research. Perhaps the regard he expressed was just the remembrance of a man looking back on his life and trying to create order and necessity out of past events. The only explanation I can offer for his life-shaping decision to devote his career to research is that it emerged by some mysterious process, based on a combination of his genes, medical training and experience, and the values he had been taught in his youth.

Knowing all I do about his life and his work, and nearing the end of my career in biomedical research that was guided by his perspective and motivated by his gospel from which I deviated only in some details, I still have only scant understanding of whether he believed he had a chance of being successful, or even of knowing what counted as success. He had never formally studied how to do research, and had no more training in science than the minimum needed to qualify as a licensed physician, a level of training well below that of the scientists who were then shaping the development of medicine. Nevertheless he boldly pursued his goal, I suppose in the expectation that methodological issues could be mastered as necessary.

He knew that a position at a Veterans Administration hospital would allow him to combine practicing medicine with clinically oriented research. For most physicians, working at a VA hospital was an unattractive career choice because of the low salary, prohibition on engaging in private practice, and the monotonous chronic medical problems that had to be treated. As an employment perk, the Veterans Administration had what amounted to a noncompetitive research program that allowed individual hospitals to award staff physicians the time, laboratory space, and funds to perform research, all of which were promised to him when he was offered a position as chief of orthopedics at the Syracuse VA hospital. In June 1956, the month

he finished his residency, he accepted the offer and continued in that position until 1979 when he went into exile, never having worked anyplace else. There is perhaps no historical parallel in science or even in fiction for the nature, motivation, and circumstances of his decision to devote his professional life to research and then to successfully implement that decision in a career that reached great heights before it ended tragically.