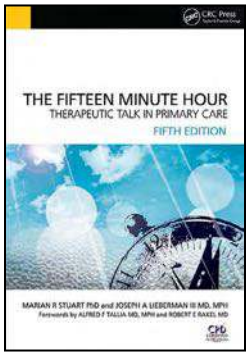
Reviews and reflections

David A. Bennahum, MD, and Jack Coulehan, MD, Book Review Editors

The Fifteen Minute Hour: Therapeutic Talk in Primary Care, Fifth Edition

Marion R. Stuart, PhD, and Joseph A. Lieberman III, MD, MPH (ΑΩΑ, Sidney Kimmel Medical College, 1990, Alumnus)
Radcliffe Publishing, London, 2015

Reviewed by Dean Gianakos, MD



For Christmas, my wife ordered an elaborate train set for our two-year-old grandson. The gift arrived in the mail two days before the holiday. My job was to assemble it. How hard could it be? After dinner, I went to the basement and opened the large, brown box. There were hundreds of pieces, including more than fifty screws and bolts, and fifteen pages of instructions! Several hours into the construction, I felt frustrated and inept. I have never considered myself mechanically inclined. That's the story I've been telling myself for years. However, what would happen if I told myself a different story? I could say to myself: I may not be an engineer, but with time, patience, and persistence I can put this thing together.

In their superb, fifth edition of *The Fifteen Minute Hour: Therapeutic Talk in Primary Care*, Marion Stuart, PhD, Professor Emeritus of Family Medicine, Robert Wood Johnson Medical School, and Joseph Lieberman, MD, MPH, Professor of Family and Community Medicine, Thomas Jefferson University, define psychotherapy as "helping patients to edit their stories. It is clear that the stories we tell ourselves about who we are and of what we are capable determine how we will function in the world and to what extent we will achieve our potential."[p86]

Patients usually don't complain about their inability to build toy trains, but they do stress over how to quit smoking, modify their diets, curb alcohol use, or live a meaningful life. Stuart and Lieberman provide pragmatic ways for primary care physicians to coach patients through these challenges. One of my favorite tips is: recognize the amazing power of the word "yet." Remind the patient, you haven't quit smoking yet. This statement communicates the physician's confidence in the patient's ability to quit—maybe not today, but sometime in the future. Over time, the patient begins to tell himself a different story—I can do this!

The authors report that primary care professionals fail to recognize two-thirds of emotional disorders. Productivity demands, time constraints, lack of curiosity, and insufficient skills hinder their efforts. Stuart and Lieberman urge practitioners to use a technique called "BATHE," an easy acronym to help remember to explore the psycho-social problems of a patient:

B is for background—"What has been going on in your life since your last visit?"

A is for affect—"How do you feel about it?"

T—"What troubles you the most about it?"

H—"How are you handling it?"

E is for empathy—"That must be difficult for you."

The authors explain how the same BATHE acronym can be used to explore not only the patient's psychosocial problems, but also the positive experiences in the patient's life:

B—"What's the best thing that's happened to you since your last visit?"

A—"How did that make you feel?"

T—"What are you most thankful for?"

H—"How can you make that positive experience happen again?"

E is for empowerment—"That's fantastic!"

In this new edition, they expand on ways to make the patient feel responsible, confident, and accepted for the person they are. Therapeutic progress does not occur unless the patient feels heard, appreciated, and highly regarded by the professional:

> Before we can make a therapeutic intervention, we must listen and hear the patient's experience of pain, frustration, anxieties, or perceived limits. Patients must be allowed to tell their stories. It is crucial to encourage patients to give us a brief synopsis rather than a multivolume saga. A useful technique is to lead with an open question, such as "Tell me briefly" . . . let the patient talk for about two minutes and then summarize what we have heard. . . . When you actively listen and then reflect the patients' concerns back, patients know that they have been heard and understood. We cannot provide reassurance or remove impediments to adherence until we accurately define the patient's concerns. When this is followed by empathic responses, it makes patients feel competent as well as connected to the practitioner. This creates a highly therapeutic condition.[p86]

None of this is easy to do, especially in an era in which physicians are rewarded more for productivity, efficiency,

and documentation than their ability to form trusting relationships with their patients.

For those of us who want to improve our communication and relational skills, there are few books better than this one. I've read it multiple times, and return to it frequently. The fifth edition provides updated chapters and excellent references on mind-body relationships, cognitive behavioral therapies, and the particular challenges of difficult patients. Furthermore, I've found the BATHE techniques helpful in my relationships with friends and family. For example, when I ask my daughter, what's the best thing that happened in school today, it implies something positive really happened in school today (she simply has to search her mind for it).

The authors can be a little repetitious (they spend a lot of time on BATHE), and they include more psychology than most internists and family physicians probably care to read about. However, I believe the payoffs are considerable. Developing curiosity, deep knowledge, and concern for the patient's psychological health is a great way to connect with our patients, and to get the results we want for our patients. Building trusting relationships is one of the fundamental joys of practicing primary care medicine.

Speaking of building, I finally finished my grandson's train set. The train tracks, tunnels, and bridges fit together, and the train runs smoothly. I doubt my grandson will notice that there were several screws and bolts left over.

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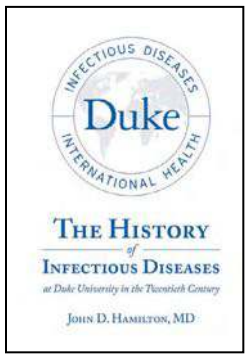
The History of Infectious Diseases at Duke University In the Twentieth Century

John D. Hamilton, MD
Lulu Publishing Services, Raleigh, North Carolina, 2015

Reviewed by Daniel Friedman, MD

Dr. John Hamilton, now retired, was a long-standing member of the Infectious Disease Staff at Duke University. He details the history of that department from his own extensive experience as well as the memories of many other faculty members and personnel. Having



completed innumerable interviews, Hamilton compiles and organizes this vast amount of information into an exceptional and easily readable account. Some of the book is written for an audience limited to specialists in the field, but Hamilton's descriptions of the beginnings of American public health, and the outline that he offers of various infectious agents, will be of interest to the general reader as well as the specialist.

To be honest, I was not certain this read would be terribly fun. I wondered how a single division of one department could form the basis for an entire book. I was most happily surprised.

The book is more than just a history of academic life, as Hamilton completes a thorough review of the Duke University Medical Center Archives. He examines the importance of many relevant infections, and gives his own account of some of the more important infectious diseases in the history of the American South.

The reader will better understand how tuberculosis, HIV, and a number of other diseases shaped communities, medical education, and public health. Most interesting to me as a cardiologist and a Duke University Medical School graduate, is how Hamilton reviews the development of the Duke criteria for endocarditis developed by Dr. David Durack and his colleagues.

As detailed in the book, many major contributors to academic medicine passed through the halls of Duke University, and shaped both the home institution and numerous other medical centers over the years.

The author also acts as a skilled historian in recounting the history of North Carolina, the city of Durham, the South, and the place of each in the United States as a whole.

Hamilton provides insights into the racial issues during the boom of the tobacco industry that so profoundly shaped the area. It is important to remember that racial segregation required separate medical schools and medical societies for Caucasian and African-American physicians. Conditions were poor, and mortality was much higher for African-Americans than for whites.

The author also details the $40 million gift James B. "Buck" Duke gave in December 1924 to create what is now known as Duke University. He describes the major players in the development of this most important

medical center and university, how challenging the start of the medical school was, and how persistence and Mr. Duke's support paid off.

The references are extensive and will allow those interested in specific areas to delve much deeper. One cannot imagine the countless hours Hamilton invested in writing this book. The charts outlining the history of the Department of Medicine and the Division of Infectious Disease are very helpful. The average reader may not probe into every word, but the author's historical insights are worthwhile and will be valuable to many readers.

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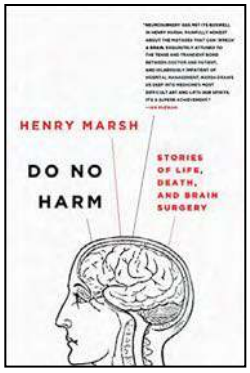
Do No Harm: Stories of Life, Death, and Brain Surgery

Henry Marsh, MD
St. Martin's Press, New York, 2015

Reviewed by Herbert J. Hoffman, PhD



Dr. Henry Marsh's treatise is more than just about life, death, and brain surgery. The strong philosophical observations, which are liberally sprinkled through the various chapters, enhance the author's contribution to understanding the professional and personal life of a leading neurosurgeon.

The volume is composed of twenty-five chapters with titles such as "Haemangioblastoma," "Leucotomy," "Medulloblastoma," and "Oligodendroglioma." However, while these medical terms will be familiar to physicians, they should not deter the lay reader from opening *Do No Harm*.

Each chapter is like a short novella. The first ten chapters focus on the surgical successes (extraordinarily difficult cases primarily to remove or reduce brain tumors), and individual cases of Dr. Marsh, a British neurosurgeon. The descriptions of the surgery hold one's attention with fierce focus.

The following chapters focus on Marsh's mistakes and failures, both in surgery and diagnosis. He is brutally honest, and owns his responsibility and accountability in a way most accomplished neurosurgeons would have difficulty incorporating. Marsh even makes reference to instances in which he has advised next of kin to sue.

Marsh, who is now sixty-five years old, began his medical career as an orderly, matriculated through medical school, and was a senior house officer for eighteen months on an ICU. He was becoming bored and disillusioned by a career in medicine, when by happenstance he was invited to observe an operation to remove a brain aneurysm. This was his first time in the neurosurgical operating theatre, "it was considered too specialized and arcane for mere students,"[p12] he said. It was an operation to clamp off an aneurysm, and for Marsh, "it was love at first sight."[p14] His passion for and dedication to his "love" is evident through out the book.

Marsh's choice to become a brain surgeon, specializing in tumors, turned out to have an ironic twist. At the age of three months his son was diagnosed with a tumor, located deep in his brain. Fortunately, following surgical removal, the tumor turned out to be benign. This experience helped Marsh gain insight about holistic care of his patients. "Anxious and angry relatives are a burden all doctors must bear, but having been one myself was an important part of my medical education."[p110]

He gained further insight into his profession when he became a patient as a result of a severe threat to his eyesight, critical for a surgeon. In retrospect, he dismissed symptoms that he would have recognized in a patient. His treatment was spaced over a couple of months, interspersed by a broken leg, a vitreous hemorrhage and a retinal tear. After a series of successful outcomes, he reflected, "I had been lucky compared to my patients, and I was full of profound and slightly irrational gratitude for my colleagues that all patients have when things go well."[p230]

Every surgeon deals with life and death decisions on a daily basis, working through outcomes that may or may not be positive for the patient. Marsh makes a number of pointed, relevant observations. He notes that surgeons, other than neurosurgeons, have patients who either die or recover. Not so for the neurosurgeon, their "failures" may linger on the wards for months, a constant reminder for a caring surgeon like Marsh. The favorite surgeon defense mechanisms of compartmentalization and denial are not prominent in Marsh's repertoire. He describes cases in

which he develops an emotional investment in the patient and his efforts to cope, which underscores his basic humanity and commitment to his patients.

The neurosurgeon deals directly with issues of life and death on a daily basis—in addition to the in-between space of permanent disability. Brain surgery rarely comes about without significant risk to the patient's quality of life—or life, itself. Marsh observes that as he has become older and more experienced, he has become more "realistic about the limitations of surgery,"[p124] and more concerned about the patient's quality of life post surgery. "It is easy enough to let someone die if one knows beyond doubt that they cannot be saved."[p235] The struggle comes for Marsh, "when I do not know for certain whether I can help or not, or should help or not, that things become so difficult."[p235] Marsh shares his process of judgment on numerous occasions, including both his spectacular successes and dismal failures; his sharing with patients that there is no hope, that it is time to die; and his fear of being wrong.

Throughout the book, Marsh rails against the National Health Service and what he perceives as over regulation, irrational regulations, and how things used to be better. These comments in no way take away from the greater significance of his volume, but do provide additional insight into his feelings of loss of authority and his lamenting of how things used to be.

Marsh's command of the written word, his ability to share his observations, and the many metaphors liberally sprinkled throughout, make for an easy and compelling read. The reader will also gain more than a modicum of medical education. I enjoyed the book and I enjoyed meeting Dr. Marsh. I hope you have a similar experience for this book will do you "no harm," and perhaps a lot of good.

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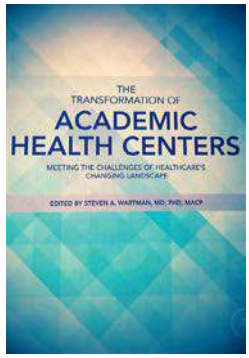
The Transformation of Academic Health Centers

Steven A. Wartman, MD, PhD (ΑΩΑ, Johns Hopkins University, 1970), editor
Academic Press, Elsevier, Cambridge (MA), 2015

Reviewed by Norman H. Edelman (ΑΩΑ, New York University, 1961)



One of the most cherished beliefs in American academic medicine is that our system of integrating education, patient care, research, and community service in university based academic medical centers has proven superior to the often more dispersed arrangements elsewhere. But even cherished beliefs deserve reevaluation. This is an excellent time to do so as it is about one hundred years since the issuance of the Flexner report—which started it all—and because the basic foundations upon which academic medical centers are built may be beginning to crumble.

The Flexner report had two major goals—one was to eliminate the many rather marginal proprietary medical schools, and the other was to establish the university-based, science-oriented teaching hospital that originated in Germany and had been recently introduced into the United States at Johns Hopkins, as a model for medical education. Both goals were achieved, the elimination of the small proprietary schools quite rapidly, the dominance of the university-based academic medical centers more slowly, but eventually quite profoundly. This dominance was greatly facilitated in the post World War II years by the extensive expansion of the National Institutes of Health (NIH) extramural program, the huge influx of clinical dollars generated by the proliferation of both public and private health care insurance, and several decades of strong support for public universities.

As pointed out by many of the contributors in this timely and informative collection of twenty-five essays sponsored by the American Association of Academic Health Centers (AAHC), the keystone upon which the structure of these centers has depended is the ability to cross-subsidize within and between their several missions. The most important of these has been the ability to use funds generated by the practice of medicine—both by hospitals and individuals—to subsidize education, research, and public service. It is the large decline in the availability of this subsidy, as a result of reductions in reimbursements by both public and private payers, that now provides the strongest challenge to academic medical centers. But there are others as well. NIH funding has plateaued, and public support for state universities has been reduced over the past two decades, in some cases severely.

There seems little choice to the contributors of this volume but to learn to adapt to the new environment. To

this end, Dr. Wartman has gathered an impressive array of academic medical center leaders to lay out the problem, describe the steps they have already taken to adapt, and opine on future directions.

The book is roughly organized into three sections: financial considerations, research challenges, and educational changes. The first section was the most informative, perhaps because it is the most compelling. The brief foreword is a candid description of the current state of affairs; no white wash, no platitudes, ending with the conclusion that "we have a dire need to re-engineer our organizations."

The descriptions of the reorganization approaches at Northwestern University and Vanderbilt University, each of which have adopted somewhat differing models of the corporate approach to achieving efficiency, were most informative.

The chapter on market consolidation is especially well done, pointing out to skeptics like me that we are mostly past the time when virtually the only rationale for consolidation was the enhanced negotiating power provided by enlargement of market share. There are now many imperatives to consolidate, and continued movement in that direction seems inevitable.

The chapters on research mostly advise our institutions to tool up in order to follow the new trends in funding exemplified by the large population-based initiatives sponsored by the Patient Centered Outcomes Research Institute. One contributor did advise expansion of university/private sector partnerships as a source of substantial new research funding. However, the potential challenge of such partnerships to the historical role of the university as the site of unrestrained scholarship unencumbered by commercial ties is not discussed here. Nonetheless, there is a separate chapter which does discuss the impact of the current evolution of the academic medical center on its relationship with the mother university. Suffice it to say, the ongoing forces are strongly centrifugal.

The chapters on education tend to manifest the basic conceit of most medical educators—the belief that the educational process can change the delivery system. For example, there is considerable attention given to the virtues of inter-professional education among the various health care professions, but few examples of institutionalized success.

In a somewhat similar vein, there is discussion of the need to teach medical students and residents the principles of population health. This is well meaning but off base. It is hard enough to teach students to be good practitioners, and adding a bit of material on population health to the curriculum won't make them competent in public health. In this era of the team approach, we need to add professionals adequately trained in public health to the skill mix of modern health care delivery teams and systems, rather than expect undifferentiated physicians to do it all.

The AAHC differentiates itself from the Association of American Medical Colleges by requiring that members train health professionals in addition to physicians. Thus, one omission, although understandable given the magnitude of the task, is a discussion of the other health professions as distinct entities.

What's the bottom line? Where are academic medical centers headed? Those already strong and those that are nimble will survive and may even become stronger by adopting efficient corporate management practices and increasing consolidation, perhaps at a price of further estrangement from their parent universities. Many, however, may fall on hard times and have to downsize one or more of their tripartite missions. At this point, research requiring subsidies (that is, all but private sector-supported research) seems to be at greatest risk. In addition, some centers at state universities may be especially vulnerable as policies regarding public employee prerogatives are often at odds with the imperatives of corporate style reengineering. Thus, it is critical that state policymakers understand the support their medical institutions need to compete effectively in the marketplace.

Perhaps worth mentioning here is an additional dynamic that is challenging the academic medical center model of medical education. This relates to the multitude of new osteopathic and allopathic medical schools that have been, and are being, established. They are a result of the pent-up demand, at least with regard to M.D. degrees, released when the M.D. degree granting establishment lifted its de facto twenty-five-year freeze on nationwide enrollment. One might include the foreign schools training United States nationals in this mix as well. With few exceptions these students do their clinical training in medium-sized community hospitals mainly outside of the academic health center umbrella. Furthermore, partially as a result of an arcane Medicare policy on funding of new residencies, many of these hospitals lack any previous experience in medical education.

Taken together, the trends discussed herein would seem to predict that a considerable number of students who study medicine in the United States will soon do so outside of an environment of scholarship and inquiry.

What would Abraham Flexner say?

Overall, I think that this is a very worthwhile volume and congratulate the AAHC for taking a timely, insightful, and hard look at the present state of academic medical centers. The book should be of interest to all people in academic medicine—even if they are not involved in administration—if only to understand the changes in their own institutions in the context of fast moving national trends. One can only hope it will also be read by a broader audience so that they may understand the profound changes taking place in these essentially unique American and Canadian institutions the public has long held in high esteem.

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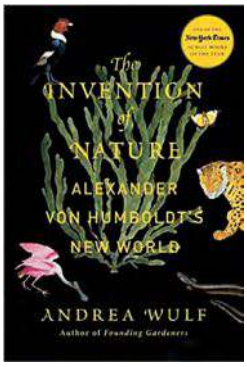
The Invention of Nature: Alexander von Humboldt's New World

Andrea Wulf
Alfred A. Knopf, New York, 2015

Reviewed by Jack Coulehan, MD (ΑΩΑ, University of Pittsburgh, 1969)



The Humboldt current, a vast stream of cold water that flows northward along the west coast of South America from southern Chile to northern Peru, supports an exuberant variety of marine life, and is, by far, the most productive ecosystem in the world. In his time, the Prussian naturalist Alexander von Humboldt (1769–1859), who discovered this current, was considered the greatest scientist in the world, though today his name is far from a household word.

A true polymath—botanist, geologist, geographer, explorer, and visionary—von Humboldt shares his name with glaciers, rivers, waterfalls, mountain ranges, parks, and towns scattered throughout the world from Greenland to Tasmania—though his accomplishments remain relatively unknown, at least in the English-speaking world. In fact, Andrea Wulf, the author of *The Invention of Nature: Alexander von Humboldt's New World*, makes the extraordinary claim, "more places are named after Humboldt than anyone else."[p7]

Why doesn't von Humboldt appear among the handful of popularly celebrated nineteenth-century scientists? The chief reason, Wulf suggests, resides in the man's variety. His contributions range from innovations in the mining industry (e.g., miners' masks and lamps) to discoveries in volcanism, geomagnetism, botany, ecology, and climatology. However, unlike Charles Darwin and James Clerk Maxwell, whose theories changed the world, the significance of von Humboldt's "big idea" was not fully appreciated until recently. Although most people now appreciate the importance of his theory, they do not associate it with his name. Wulf intends to remedy this situation by showing that Alexander von Humboldt invented our modern concept of nature.

He was born in 1769 to an army officer father—who died when von Humboldt was a young boy—and a wealthy domineering mother. Always adventurous and nature loving, von Humboldt longed to travel and study natural science, but his mother insisted on a practical education and a "useful" career. After studying finance at university, the young man became an inspector in the Prussian Ministry of Mines. He was responsible for visiting mines throughout Prussia, but carved out time to study geology and search historical documents for evidence of possible ore deposits. When his mother died in 1796, von Humboldt's inheritance freed him to pursue his chief ambition, a prolonged journey of scientific exploration. After obtaining the best scientific instruments available, in 1799 he and his companion, Aimé Bonpland, set out on a five-year odyssey through the Spanish colonies in South America, Mexico, and Cuba.

Their exploits included climbing Chimborazo, a volcano then thought to be the highest mountain on Earth, where a chasm forced them to turn back at 19,400 feet. No one had ever climbed that high before.

They explored the Orinoco River system, proving that it communicated with the Amazon. South of Quito they discovered the Earth's magnetic equator. And, of course, they collected thousands of specimens.

On the trip home to Europe in 1804, von Humboldt visited the United States, where he struck up an enduring friendship with President Thomas Jefferson, who had just dispatched Lewis and Clark on their epic journey to the Northwest.

Lionized throughout Europe, von Humboldt settled in

Paris to begin the process of analyzing his data and writing about his discoveries. Among his first books were *Essay on the Geography of Plants*, in which he invented the concept of vegetation zones, and *Personal Narrative*, a description of his travels that later served as a model for Darwin's *Voyage of the Beagle*. For more than two decades, von Humboldt remained primarily in Paris and Berlin, refining his theories about what are now called ecology, climatology, and environmental science.

His only other journey of discovery occurred in 1829, when he led a six-month expedition through Siberia.

He died in April 1859 at the age of eighty-nine, several months before one of his greatest admirers published a book called *The Origin of Species*.

Before von Humboldt's time, Europeans viewed the natural world from an instrumental perspective. God created plants and animals for man's use. Wilderness served no useful purpose and was, therefore, to be exploited. Human beings gave meaning to the land by controlling, improving, and cultivating it. However, von Humboldt introduced the idea that nature is "a living whole, not a dead aggregate."[p88] He appreciated the complex interaction of flora and fauna as a natural system that existed for its own sake, without reference to humanity. As Wulf explains:

> Humboldt revolutionized the way we see the natural world. He found connections everywhere. "In this great chain of causes and effects," Humboldt said, "no single fact can be considered in isolation." With this insight, he invented the web of life, the concept of nature as we know it today.[p5]

His systematic observations led him to develop the modern concepts of isotherms, plant geography, ecological systems, vegetation zones, and climate change, the latter of which is of particular importance today. He was the first to demonstrate the destructive effects of human activity on climate. He studied deforestation in Venezuela, showing that it led to soil erosion and crop reduction. He argued that forests enrich the atmosphere with moisture and freshen the air (without, of course, understanding the roles of oxygen and carbon dioxide). He predicted that man's manipulation of the environment might someday lead to deleterious global climate change.

These ideas were originally expressed in *Views of Nature*, "a scientific book unembarrassed by lyricism."[p132] In later life, von Humboldt published *Cosmos*, an immense five-volume work that presented a comprehensive survey of natural history, starting with the origin of the universe. He was the first naturalist to target a general audience in his books, rather than solely writing for fellow scientists.

His works strongly influenced a wide range of major figures, for example, Simon Bolivar embraced the unitary conception of land and nature when developing a revolutionary ethos for South American independence. Darwin studied and annotated von Humboldt's *Personal Narrative* throughout his journey on HMS *Beagle*. Henry David Thoreau incorporated ideas he found in *Cosmos* and *Views of Nature* into his own philosophy. John Muir brought von Humboldt's environmental ideas to fruition.

Two final points about Wulf's excellent biography. First, von Humboldt's sexuality. He never married, and his life was characterized by a series of intense male relationships, beginning with his colleague, Aimé Bonpland. His letters to these men certainly suggest sexual intimacy. However, in the long run, curiosity about a historical figure's sexual practices seems pointless. The much more important issue is von Humboldt's strong and consistent opposition to slavery. In his books on the Americas, he dedicated sections to describing the conditions of slaves and indigenous people. He often expressed disgust for the inhumane conditions in which indigenous people and others were treated. In fact, abolition of slavery was the one issue upon which von Humboldt and Jefferson disagreed.

Reading *The Invention of Nature* left me with a sense of satisfaction. It's not often that a book introduces you to a fascinating character so little understood, yet so influential in creating today's view of the world.

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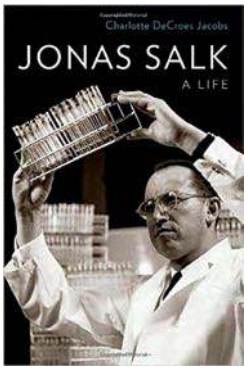
Jonas Salk: A Life

Charlotte DeCroes Jacobs
Oxford University Press, 2015

Reviewed by Elaine Thomas, MD

The paralyzing disease poliomyelitis terrified Americans in the 1950s, and Dr. Jonas Salk was cast as their savior when he created a successful vaccine.



This son of Jewish immigrants was a junior scientist when he pushed his way into the company of polio researchers. His inactivated-virus vaccine was based on relentless laboratory work rather than an innovative idea. He collaborated with the private National Foundation for Infantile Paralysis as well as pharmaceutical companies, earning the disdain of traditional academics.

A working committee of scientists and funders argued about his study design in ways echoed in recent projects such as HIV vaccine trials. The group limited Salk's contribution to the design of the 1954 randomized trial of his vaccine, but the popular press regarded him as the trial's leader. In one of the largest interventional studies ever conducted, mountains of data were collected on punch cards and fed into primitive computers. The public clamored to participate, in contrast to today's suspicion of research and vaccines.

When the trial was successful, Salk became an overnight media star, giving television interviews and writing articles for popular magazines. This brought scorn from his fellow scientists, while his office was swamped with letters and gifts from the grateful public.

Salk's rivalry with Dr. Albert Sabin, the physician who championed a live-virus vaccine, was professional, personal, and hyped by the media. During scale-up of Salk's inactivated vaccine production, the Cutter Company produced batches that inadvertently contained live virus and infected a number of children. Historians refer to this as "the Cutter incident." Sabin called it "the Salk incident."

Only forty years old at the time of the trial, Salk struggled for the rest of his life to maintain relevance and self-esteem in the research world. He remained a public hero without gaining the scientific accolades he craved. Evidence conflicts as to whether Salk was a self-promoting publicity hound or a modest, dedicated humanitarian—or a bit of both.

In the 1960s and 1970s, Salk indulged his lifelong interest in metabiology, a vague exploration of science as a path to higher consciousness, human unity, and care for the planet, asking, "Are we being good ancestors?" Also during this time, to free scientists from the constraints of universities and funders, he created the Salk Institute, although his poor administrative skills almost sank it. The Salk Institute, now a respected research center, never supported his goal of metabiologic research, and eventually pushed him out as director.

Author Charlotte Jacobs, a professor of medicine at Stanford University, meticulously researched this biography, with interviews of people who knew Salk and other key figures.

She explores Salk's personality through his correspondence, insomniac journal musings, and somewhat sad love life. Her style is engaging for medical and lay readers alike.

Jacobs does not cover some parts of the Salk story, such as the reasons his late-life attempt at a therapeutic HIV vaccine failed; or the 1950s FBI investigation of Salk, which could have shut down his work if they had found incriminating communist activities. And little is said of the ironic endgame: years after Sabin's live vaccine displaced Salk's, and after Salk's death, the United States has returned to inactivated vaccine for safety (although live vaccine is still preferred in the developing world because it contributes to herd immunity).

Thanks to these competing researchers and thousands of others, a deadly disease is now close to extinction.

For the story of polio vaccine in its cultural context, a shorter and very readable book is *Polio: An American Story,* by David Oshinsky. However, *Jonas Salk: A Life* is worth reading for those considering a career in science or medicine for the questions it raises: How does personality affect our successes? Why did Salk, rather than others, become a popular hero, and why wasn't he respected in the research establishment? How do social context and pure chance shape careers? How does an early success shape—or derail—a career, and how can a successful scientist avoid being trapped by the notoriety of earlier achievements?

Many of Salk's actions—bending university rules, pushing for early uncontrolled clinical trials, allowing private funders to influence research designs—would have made him a pariah if the vaccine trial hadn't succeeded. However, such gambles are common in the scientific world. How does an aspiring researcher (or clinician or entrepreneur) decide when to play by the rules and when for fight for a new idea?

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