

Creating a Tradition of Biomedical Research

Contributions to the History of The Rockefeller University

Edited by
Darwin H. Stapleton



ON THE COVER:

(background) The protein chemistry laboratory of P.A.T. Levene in Founder's Hall, c. 1909, with researchers Walter Jacobs (left) and Donald Van Slyke (right). Courtesy of the Rockefeller Archive Center.

(inset) Alison North, Research Assistant Professor and Director of the Bio-Imaging Resource Center, operating the dual Zeiss LSM 510 confocal/multiphoton system, 2003. Courtesy of Gregory Khitrov.

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Part I: Context

- 1 **The Rockefeller (University) Effect:
A Phenomenon in Biomedical Science**
Darwin H. Stapleton 5
- 2 **Institutionalizing Excellence in Biomedical Research:
The Case of the Rockefeller University**
J. Rogers Hollingsworth 17

Part II: Case Studies

- 3 **New Images of a New Medicine:
Visual Evidence for the Widespread Popularity
of Therapeutic Discoveries in America after 1885**
Bert Hansen 65
- 4 **Research at the Hospital of the
Rockefeller Institute for Medical Research**
Olga Amsterdamska 111
- 5 **Rufus Cole and the Clinical Approach**
Jules Hirsch 127
- 6 **Innovation in Modern Surgery:
Alexis Carrel and Blood Vessel Repair**
Shelley McKellar 135
- 7 **Building “A new type of body in which to grow a cell”:
Tissue Culture at the Rockefeller Institute, 1910–1914**
Hannah Landecker 151
- 8 **“The doctors are so sure that they only are right”:
The Rockefeller Institute and the Defeat of
Vivisection Reform in New York, 1908–1914**
Bernard Unti 175

<i>9</i>	The Start of a Cancer Research Tradition: Peyton Rous, James Ewing, and Viruses as a Cause of Cancer Ton van Helvoort	191
<i>10</i>	Women Scientists at the Rockefeller Institute, 1901–1940 Elizabeth Hanson	211
<i>11</i>	Hideyo Noguchi, the Pursuit of Immunity and the Persistence of Fame: A Reappraisal Aya Takahashi	227
<i>12</i>	Gasser, Bronk, and the International Network of Physiologists Abigail Tierney	241
<i>13</i>	James B. Murphy, the Rous Sarcoma Agent, and Origins of Modern Cell Biology Carol L. Moberg	259
<i>14</i>	The Rockefeller University and the Molecular Revolution in Biology Robert Olby	271
<i>15</i>	Paul A. Weiss, 1898–1989: The Cell Engineer Sabine Brauckmann	283
	Index	297

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Darwin H. Stapleton

Creating a Tradition of Biomedical Research

Contributions to the History of The Rockefeller University

The Rockefeller (University) Effect: A Phenomenon in Biomedical Science

Darwin H. Stapleton

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At least since Francis Bacon depicted the ideal scientific institution in *The New Atlantis* (1626), Western literature has envisioned an island as the quintessential location for the pursuit of unfettered scientific research. In fact, in Sinclair Lewis's *Arrowsmith* (1925), the fictional McGurk Institute—modeled after the Rockefeller Institute for Medical Research in New York City—was referred to as a “Grecian isle,” even though its location was in the heart of bustling Manhattan.¹

The Rockefeller University, founded as the Rockefeller Institute for Medical Research (RIMR) in 1901, has approached the image of the ideal research institution portrayed by Bacon and Lewis, and is often described as an oasis of learning. However, its life history is best understood if it is viewed not as a walled-off sanctuary, but as a continuing symposium open to other individuals and institutions. The two most important sets of connections for The Rockefeller have been those that have bound it to a network of Rockefeller-related institutions, and those that have linked it to other worldwide biomedical research institutions. These connections have influenced the lives and careers of biomedical researchers throughout the world, and have created what might be termed as the “Rockefeller effect.” A consideration of those influences is central to this volume’s collection of essays on the history of the Rockefeller University.

It is important to recognize that the university’s connections to ideas, people, and institutions, and its effect on them, have much to do with the shaping of the twentieth century and with establishing an agenda for biomedical research in the twenty-first century. They place Rockefeller University near the center of such important currents as the globalization of scientific education and knowledge; the integration of science, medicine, and technology; and the actions of market capitalism, government, and educational institutions. In particular, the intersection of philanthropy and research at the university has served as a magnet for highly educated, highly imaginative, seekers of change.² Thirty years ago Kenneth Clark, in a sweeping review of the rise of Western civilization, argued that it was a measure of science’s high esteem in modern life that the most capable people are drawn to it and judged by their contributions, regardless of cultural and national origins.³ Certainly Rogers Hollingsworth’s essay in this volume demonstrates that generation after generation of outstanding researchers have come to the Rockefeller University from all over the globe. To understand the milieu that has drawn and sustained them, we need to look not only at the scientific core of the institution but also its setting and interrelationships.

Rockefeller Philanthropy

John D. Rockefeller Sr., who founded RIMR, was raised in a Baptist household in which the idea of tithing to the church was firmly instilled. For example, his first personal account book, begun at sixteen after receiving his first salary, listed donations to his church, missionary causes, and the poor.⁴ This practice of giving continued throughout his life at a rate that met the biblical

goal of the tithe, and then exceeded it when he began to donate large sums to establish or support organizations.⁵

It is important to understand that Rockefeller's Christianity was stamped with the evangelical passions of upstate New York and northern Ohio that not only promoted a heavenly reward but also a belief in the potential perfectibility of humans on Earth. Both Rockefeller and his wife, Laura Spelman Rockefeller, were raised in households that supported the abolition of slavery even before the American Civil War. In their married life, they were committed to such causes as controlling or prohibiting the use of alcoholic beverages, saving orphaned or delinquent children, wholesome recreation, and aid to African Americans.⁶ Thus, Rockefeller's philanthropic acts were intended not just to relieve suffering, but were made explicitly to provide for human improvement. His habit of carefully considering or even investigating every potential recipient was an attempt to ensure that his money would be used wisely to achieve long-term goals.

Although Rockefeller was not alone in this style of giving, over the years his philanthropy included two elements that were unusual. First, he had more money to give than any of his predecessors. The success of Rockefeller's Standard Oil corporation in the 1880s made him very wealthy; after the turn of the century, he became the richest man in the United States—exceeding even Andrew Carnegie's fortune by a substantial margin.⁷ Second, Rockefeller's genius in creating the modern corporate business form was paralleled only by his skill in shaping nonprofit entities or what he famously called "the business of benevolence."⁸ He was remarkably successful in creating long-lived organizations in both sectors.

The factors in Rockefeller's organizational genius that are easiest to isolate are planning and delegation. In fact, his strategic thinking could be compared to a great general or admiral, who studied the field of engagement with great care, made every preparation for failures as well as successes, who kept the long-range goals always in mind, and who trusted his personally chosen field officers to make appropriate tactical judgments.⁹ In the most recent Rockefeller biography, Chernow noted that Rockefeller "believed there was a time to think and a time to act. He brooded over problems and quietly matured plans over extended periods. Once he had made up his mind, however, he was no longer troubled by doubts and pursued his vision with undeviating faith."¹⁰

Equipped with this steely mind and indomitable purpose, Rockefeller was a major figure in reshaping the role of philanthropy in American life. Although Andrew Carnegie, Margaret Olivia Sage, and a few others were also pioneers in systematic philanthropy, it could be argued that Rockefeller set a standard for the disposition of industrial wealth that has not since had its equal in either scale or long-term effects.¹¹ Guided by experts and advisers, and always adhering to his core belief that education and health were fundamental to the improvement of humankind, Rockefeller focused on creating organizations that would alleviate the root causes of human problems.¹² In retrospect, it is clear that he fundamentally affected the course of the twentieth century by founding, or taking a major role in founding, Spelman College in 1884 (the first higher education institution for African American women in the United States); the University of Chicago in 1884 (one of the earliest post-graduate institutions in the United States); RIMR in 1901 (the first biomedical research institute in the United States); the General Education Board in 1902 (by far the largest philanthropic organization dedicated to the improvement of education in the American South); the Rockefeller Foundation in 1913 (the largest global philanthropy of the first half of the twentieth century); the International Health Board in 1913 (dedicated to worldwide public health, and successor to the short-

lived Rockefeller Sanitary Commission for the Eradication of Hookworm Disease); and the Laura Spelman Rockefeller Memorial in 1918 (the first large-scale philanthropy dedicated to support of the social sciences).¹³ He capped this sequence of acts, which transferred half of his wealth to charity, by giving virtually all the rest of his fortune to his son, John D. Rockefeller Jr., who continued his father's tradition of creating institutions as a means of perpetuating philanthropic goals.¹⁴

Founding the RIMR

Nowhere is Rockefeller's style more evident than in the founding of RIMR. Because he held a deep interest in health, Rockefeller made significant gifts to medical colleges and research hospitals.¹⁵ When at the turn of the century his philanthropic adviser Frederick Gates, and Rockefeller's son, Junior, approached him with a vision of building a substantial medical research organization, the elder Rockefeller was receptive but demanded a thorough consideration of its possible functions, goals, and form. It took nearly a year to satisfy him, and for a few years after its founding he kept a tight leash on the RIMR budget.¹⁶

Rockefeller did not interfere in the least with the researchers or their research even though, as Bert Hansen's article demonstrates, medical research was a new and only recently respectable idea. He allowed his son and Gates to monitor and report, and the first director, Simon Flexner, to administer the new organization without restraint. As in his business life, Rockefeller was content to have well-chosen leaders carry out his projects. In this case, it was a two-pronged design including the creation of a laboratory-centered institute searching for new ways to attack disease while at the same time nurturing a generation of young investigators who would travel throughout the United States and the world with cutting-edge research agendas. Flexner, whose style of leadership matched Rockefeller's inclinations, was an exemplar of the modern laboratory director.¹⁷ Bernard Unti's contribution to this collection shows that he had excellent public relations skills as well.

The second prong of the design is less appreciated than the first one. The desire to have RIMR serve as a wellspring of biomedical research for the entire globe is reflected in the trustees' early decision to initiate a grant-giving program, an effort that continued for fifteen years.¹⁸ Small grants to researchers in the United States and Europe not only nurtured scientific medicine when the link between science and medicine was still a fragile one but also helped establish relationships between RIMR and a wide range of laboratories.¹⁹ From the beginning, the RIMR needed well-trained young researchers to carry out the imaginative agendas of the laboratory heads recruited by Flexner, and it was important to know where leading research was occurring.

Simon and Abraham Flexner

RIMR's connections with other researchers and research programs were facilitated by its close relationships with the other Rockefeller philanthropies, primarily the Rockefeller Foundation.²⁰ Simon Flexner was the most obvious embodiment of these relationships. He served as a trustee of the Rockefeller Foundation for over fifteen years (1913–1929), often sitting at the center of discussions dealing with medical and scientific questions. Robert Kohler has noted that Flexner's "endorsement in any [Foundation] matter could be decisive."²¹ In 1915, Flexner was made a

trustee of the China Medical Board, a spin-off from the Foundation, and in that same year he was one of the board's commissioners who visited medical and research institutions in Japan and Korea before undertaking an extensive review of Chinese hospitals and medical schools. In 1916, he was elected a trustee of the Peking Union Medical College (created by the China Medical Board), and later went to its opening ceremonies in Beijing in 1921.²² He also was a trustee of the International Health Board from its inception in 1913 until its merger with the Rockefeller Foundation in 1928.

In terms of his influence on Rockefeller philanthropy in general, it should be noted that Flexner was a personal friend of John D. Rockefeller Jr., the chairman of the Rockefeller Foundation and creator of the International Education Board. In fact, Flexner and his wife Helen often visited Rockefeller Jr. and his wife Abby, and spent summers near the Rockefellers at Seal Harbor, Maine.²³ On several occasions, Flexner assisted the Rockefeller family by arranging for RIMR hospital physicians to accompany them on their travels or by providing consultations on medical conditions.²⁴

Another relationship of importance to the course of Rockefeller philanthropy was Simon's closeness to his brother Abraham Flexner who, drawing substantially on his brother's views and experience, wrote a monumentally influential report on medical education in the United States and Canada (1910) for the Carnegie Foundation for the Advancement of Teaching.²⁵ Soon after, Abraham became an officer of the General Education Board and was the central figure in creating its new program of aid to medical schools; a few years later, he also became an officer of the Rockefeller Foundation. In 1930, Abraham Flexner became the founding director of the Institute for Advanced Study, whose leading scientists often traveled to RIMR in the 1930s and 1940s.

The Institute and the Foundation

All of the RIMR's directors after Simon Flexner, through Frederick Seitz (1968–1978), simultaneously served as trustees of the Rockefeller Foundation. These interconnects fostered certain direct relationships that lasted for over fifty years. After the United States's entry into World War I, for example, the Foundation established on RIMR's campus a War Demonstration Hospital for the improvement of surgical techniques to repair battle wounds. Headed by RIMR's Nobel Prize-winning Alexis Carrel, whose innovations are described in this volume by Shelley McKellar, the hospital gave specialized training to dozens of military surgeons and doctors, and in the process acquainted them with RIMR.

At about the same time the International Health Board, which collaborated closely with the Rockefeller Foundation, began to investigate the possibilities of a global anti-yellow fever campaign. As Aya Takahashi notes in her essay, RIMR researcher Hideyo Noguchi was quickly drawn into this project, leading a Foundation-supported research team to Guayaquil, Ecuador in 1918 to establish a temporary laboratory with a goal of identifying a microbial cause of yellow fever. For the same purpose, he later traveled to Mexico, Peru, and Brazil at the behest of the Foundation, and died—a martyr to scientific medicine—on a Foundation yellow fever expedition to West Africa.²⁶

In 1929, the Foundation decided to place a virus research laboratory on the RIMR campus, and staffed it with outstanding figures like Max Theiler, who received a Nobel Prize in 1950 for developing a vaccine for yellow fever. This laboratory, though completely funded by the

Foundation and operating under its direction, was integrated with the operations of RIMR at a number of levels. Its staff used the facilities of the RIMR, including its library and the dining room—famous for its scientific interactions. The virus laboratory was the site for the development of important instrumentation, such as the ultracentrifuge and the electron microscope, which were shared with RIMR.²⁷ There was also a certain exchange of staff: for example, Frank Horsfall, an epidemiologist, moved from the virus laboratory to the Institute in 1941; and Jordi Casals, an immunologist, went from the Institute to the virus laboratory in the 1952.²⁸ Until the virus laboratory was relocated to Yale University in 1964, it was deeply interwoven with the life of the Institute.²⁹

During the quarter century heyday of global Rockefeller philanthropic support of the natural and medical sciences, about 1925–1950, the RIMR also served as a major destination for Rockefeller-supported scientific tours of the United States.³⁰ Beginning with the fellowship programs of the short-lived International Education Board—founded by John D. Rockefeller Jr. in 1923, and merged with the Rockefeller Foundation in 1928—and the International Health Board, and continuing through the 1930s and 1940s, the Institute (being in the port city where ocean liners from Europe most often discharged their passengers) was often the first stop for overseas recipients of what were unofficially known as “Rockefeller traveling fellowships.”³¹ RIMR hosted dozens of such visitors for periods of a few days to several months. Sometimes they were merely brief observers, but often they received substantial instruction in particular laboratory procedures, and occasionally they joined a laboratory’s staff, participating in its research program.³² In the records of visitors who came under the auspices of other Rockefeller organizations one may read such remarks as: “Rockefeller Institute Dr. Carrel arranged for B. to see techniques used in the cultivation of tissues” (Arthur Neville Burkett, Australia, 1924), and “C.’s experience at [the RIMR’s Princeton, New Jersey laboratories] is all that he has dreamed of. He is taking up a new line of work there, namely a problem of Kunkel’s on the transmission of plant viruses. . . .” (Alvaro Santos Costa, Brazil, 1942–1943).³³

Such visitors both spread the research gospel of the Institute, and brought to it word of the latest developments elsewhere. For some of these visitors, the Institute was not just a stop along the way, but a primary destination. As Elizabeth Hanson noted

In the first half of the [twentieth] century, before formal postdoctoral training became routine, a stint at the Institute became almost a prerequisite—although an unofficial one—for young scientists pursuing a research career [in biomedical science]. The concentration of renowned researchers, and opportunities for short-term research appointments, drew a steady stream of fresh ideas and scientific expertise to the Institute.³⁴

Many of those researchers were physicians, and their commitment to research and education led them to positions of leadership in U.S. medical schools, and throughout the world. For example, Dr. John Auer received a medical degree from Johns Hopkins in 1902, and then conducted research at RIMR from 1903 to 1921 (less two years as an instructor at Harvard). He moved to the St. Louis University (Missouri) School of Medicine, where for twenty-seven years he was a professor of pharmacology and later the director of that department.³⁵

Certainly the Institute’s intended role as a postgraduate teaching and training institution often served the purposes of the Rockefeller Foundation. A small, but consistent, number of its fellowships were essentially educational stipends intended to substantially upgrade a fellow’s

knowledge and skills, and often to equip them to take positions with Rockefeller Foundation-funded institutions in medicine and public health. Although many fellows who received this kind of support were sent to traditional graduate programs at Johns Hopkins, Cornell, Harvard, Chicago, and other leading schools, a steady stream came to RIMR. This program contributed substantially to the international cast of RIMR, bringing Chinese, Latin American, and European researchers to the laboratories beginning in the 1910s.³⁶ In the 1950s and 1960s, when the Rockefeller Foundation was consciously involved in improving race relations, the fellowship program brought outstanding African American researchers to the campus.³⁷

There was also a modest reverse flow of RIMR staff who temporarily went to Rockefeller-related institutions. Most notably, Alfred E. Cohn, Henry Houghton, Ann G. Kuttner, Louise Pearce, Carl Ten Broeck, and Donald Van Slyke went to the Peking Union Medical College—opened in 1921 under the auspices of the Rockefeller Foundation’s China Medical Board.³⁸ While engaged in their mission to found a tradition of scientific medical education in China by teaching Chinese students, they served as evaluators for the Foundation’s fellowship program, recommending especially promising young investigators who were sent to RIMR.³⁹ The first, Dr. Edgar Chen, arrived in 1918.

A more complex kind of diffusion of RIMR expertise, illustrated by the career of Dr. Edmund V. Cowdry, also occurred under the reach of the Foundation but in collaboration with RIMR. Cowdry received a PhD in anatomy from the University of Chicago (1913), and taught first there, and then at Johns Hopkins. In 1917, he took an appointment at the Peking Union Medical College, and then went to RIMR from 1921 to 1928 as an Associate Member. He moved to Washington University (St. Louis, Missouri) in 1928, and in the 1930s he received Rockefeller Foundation funding for his cytology laboratory. Although he served on the Rockefeller Foundation Yellow Fever Commission, he remained at Washington University until retirement. Cowdry’s career, thoroughly and remarkably shaped by a trajectory through Rockefeller-related institutions, was the epitome of the Rockefeller effect on many other biomedical researchers of his generation. Often the molding of a life in science by Rockefeller appointments, fellowships, and grants is not fully revealed by scientists’ biographies and autobiographies, which tend to depict careers as a fabric of research problems. But for hundreds of scientists, including some of the women discussed in Elizabeth Hanson’s essay, the Rockefeller effect was substantial.

Other Connections and Networks

The Rockefeller University, throughout its hundred years, has had strong connections with many organizations in addition to the Rockefeller Foundation and its allied philanthropies. The directors and presidents of the University themselves had significant outside relationships. Flexner had connections with German laboratories both from his medical studies there in 1891 and his post-appointment travels, which also took him to the Pasteur Institute in Paris, in 1903–1904.⁴⁰ Among others, he established a friendship with Paul Ehrlich, the great immunologist, and arranged for him a gift of \$10,000 from John D. Rockefeller Sr. when Ehrlich’s Institute at Frankfurt had a funding shortage.⁴¹ Participating in the Rockefeller Foundation’s mission to east Asia in 1915 gave Flexner a set of contacts there.

As Abigail O’Sullivan describes it in her contribution, Flexner’s successors Herbert Gasser and Detlev Bronk had strong affiliations with British neurophysiology laboratories that re-

sulted in campus visits and student migrations. Bronk and later Frederick Seitz were presidents of the U.S. National Academy of Sciences, which brought them into a vast web of American scientists; Seitz was an adviser to the Republic of China on Taiwan.⁴² Joshua Lederberg, David Baltimore, and Torsten Wiesel, presidents in the 1970s, 1980s, and 1990s, respectively, served on numerous corporate, philanthropic, and government boards and commissions. Arnold Levine was at two leading biomedical research institutions (the State University of New York at Stony Brook and Princeton University) before coming to the Rockefeller University in 1998–2002.

The faculty of the university have equally important connections to scientific organizations and networks. In the early years, there were affiliations with the Naples (Italy) Zoological Station and the Woods Hole (Massachusetts) Marine Biological Station, sites not only of research but also of symposia where cutting-edge research was discussed and critiqued.⁴³ In the latter part of the century, faculty had collaborative relationships, or visiting appointments, at biomedical foci such as Cold Spring Harbor Laboratory (New York), the Salk Institute (California), and the Weizmann Institute (Israel). For over a half-century, Rockefeller faculty have collaborated with researchers at the Memorial Sloan-Kettering Cancer Center, and the New York Presbyterian Hospital–Cornell University Medical Center, which are adjacent to the University’s campus in New York City. In 1956, The Population Council—an organization created by John D. Rockefeller 3rd in 1952—established laboratories at the University (now called the Center for Biomedical Research), and its faculty have worked closely with a number of University faculty. In 1986, the University became an affiliate of the Howard Hughes Medical Institute (HHMI), a foundation that appoints and funds biomedical researchers who perform their work at existing centers. By 2001, there were eleven HHMI investigators at the University, tenured faculty who once a year present their research to other HHMI researchers gathered from all over the United States.

Combined with the ebb and flow of researchers and graduate students (since the graduate program began in 1955) who have come to the University, and who have left to join other institutions, or even to found them,⁴⁴ the multi-faceted connections of the faculty and administration have given the University an important set of linkages to the global biomedical research community.

Conclusion

The history of the first century of the Rockefeller University is a record of connectivity—of both persons and institutions—and effects, that give it global significance. Just as the city of New York from inception has been an international crossroads for people and ideas,⁴⁵ the University has been part of a global network. Geographically on an island, it never has been isolated in its roles in the philanthropic and scientific communities.

Each of the following essays, in addition to revealing a particular aspect of the history of the Rockefeller University, in some way connects it to the scientific currents and social fabric of the twentieth century. This volume responds to the call of the distinguished historian of medicine and science, Charles Rosenberg, who asked fellow historians to locate research institutions within “the developing ecology of knowledge.”⁴⁶ What follows recounts some of the extraordinary achievements that have occurred on that small space on the east side of Manhattan, while reminding us that those achievements were linked to the world. To paraphrase a famous

passage in a poem by John Donne: Rockefeller has not been an island, entire of itself; it has been a piece of the continent, and a part of the globe.

Endnotes

1. Sinclair Lewis, *Arrowsmith* (New York, 1941), 290; Francis Bacon, *New Atlantis* (Los Angeles, CA, 1985).
2. Abraham Flexner, *Medical Education: A Comparative Study* (New York, 1925), 293. In a review of American and European medical research institutions in 1925, Flexner argued that they were places where “workers and teachers from every corner of the compass are brought into close and stimulating contact.”
3. Kenneth Clark, *Civilisation: A Personal View* (London, 1971), 35.
4. John D. Rockefeller, Sr., ledger A, series F, Record Group 1, Rockefeller Family Archives, Rockefeller Archive Center, Sleepy Hollow, New York (hereafter RAC). The Rockefeller Archive Center is a division of the Rockefeller University.
5. John Ensor Harr and Peter J. Johnson, *The Rockefeller Century* (New York, 1988), 22, 60–2.
6. Ibid. 16–17, 25; Kenneth W. Rose, “John D. Rockefeller’s Philanthropy and Problems in Fundraising at Cleveland’s Floating Bethel Mission and the Home for Aged Colored People,” *Ohio History* 108 (1999): 145–61; Darwin H. Stapleton, “Religion, Reform, Race (and Rockefeller): Cleveland History Viewed through the Lens of Philanthropy,” in *From All Sides: Philanthropy in the Western Reserve*, ed. Gladys Haddad (Cleveland, OH, 1995), 20–9.
7. Michael Klepper and Robert Gunther, “The American Heritage 40,” in *American Heritage* (1998) October: 56–7.
8. Two eminent historians of business refer to “Rockefeller’s managerial genius,” Thomas C. Cochran and William Miller, *The Age of Enterprise: A Social History of Industrial America*. Rev. ed. (New York, 1962), 144. See also Alfred D. Chandler, *The Visible Hand: The Managerial Revolution in American Business* (Cambridge, MA, 1977), 321–26, 418–24; and Robert H. Bremner, *American Philanthropy* (Chicago, 1960), 117.
9. Ron Chernow, *Titan: The Life of John D. Rockefeller Sr.* (New York, 1998), 223–4, 228–9. Chernow’s biography, the most recent, builds on a series of studies of Rockefeller that begin with the muckraking books on the Standard Oil empire of a hundred years ago. The standard biography for nearly a half-century was Allan Nevins, *Study in Power: John D. Rockefeller, Industrialist and Philanthropist*, 2 vols. (New York, 1953).
10. Chernow, *Titan* (n. 9 above), 230.
11. Brief entrées into the goals of American foundations and philanthropy in the twentieth century include: Barry D. Karl and Stanley N. Katz, “The American Private Philanthropic Foundations and the Public Sphere, 1890–1930,” *Minerva* 19 (Summer 1981): 236–70; and Barry D. Karl, “Foundations and Public Policy,” in *Encyclopedia of the United States in the Twentieth Century*, ed. Stanley I. Kutler, Robert Dallek, David A. Hollinger, and Thomas K. McCraw. (New York, 1996), 1:491–512.
12. John D. Rockefeller Sr., *Random Reminiscences of Men and Events* (Tarrytown, NY, 1984), 95. When he had amassed sufficient resources to do so, Rockefeller’s philanthropic strategy focused entirely on long-term attempts to remedy the causes of human misery rather than the short-term amelioration of problems. In 1909, he remarked that “to help the sick and distressed appeals to the kindhearted always, but to help the investigator who is striving successfully to attack the causes which bring about sickness and distress does not so strongly attract the giver of money.”
13. For a discussion of the early years of several of these institutions see Kenneth W. Rose and Darwin H. Stapleton, “Toward a ‘Universal Heritage’: Education and the Development of Rockefeller Philanthropy, 1884–1913,” *Teachers College Record* 93 (Spring 1992): 536–55.
14. Joseph, W. Ernst, ed., “Dear Father!”/“Dear Son”: *Correspondence of John D. Rockefeller and John D. Rockefeller, Jr.* (New York, 1994), 67–8.
15. Kenneth W. Rose, comp., *A Guide to John D. Rockefeller’s Charities Index Cards*. Rev. ed. (Sleepy Hollow, NY, 1998) lists gifts totaling \$5,000 or more for five hospitals and dispensaries, and smaller gifts to over a dozen other hospitals in the years up to 1902.
16. The standard history of the first fifty years of the Rockefeller University is George Corner. *A History of*

- the Rockefeller Institute, 1901–1953* (New York, 1964). Elizabeth Hanson has recently surveyed the University's first century in *Achievements: A Century of Science for the Benefit of Humankind, 1901–2001* (New York, 2000). For the founding of the Rockefeller Institute for Medical Research see also Howard S. Berliner, *A System of Scientific Medicine: Philanthropic Foundations in the Flexner Era* (New York, 1985), 53–91; and Robert S. Morison, "Frederick T. Gates and The Rockefeller Institute for Medical Research," in *Trends in Biomedical Research, 1901–1976*. Proceedings of the Second Rockefeller Archive Center Conference, December 10, 1976 (North Tarrytown, NY, 1977), 3–11.
17. The only book-length study of Flexner claims that "The Kaiser Wilhelm Institute in Berlin was directly modeled on Flexner's organization of the Rockefeller Institute." John Thomas Flexner, *An American Saga: The Story of Helen Thomas and Simon Flexner* (New York, 1993), 441. Nathan Reingold, a leading observer of American science, argued that Flexner's leadership model was so influential that "when the federal government expanded its role in medicine [after World War II], the National Institutes of Health clearly showed the imprint of his achievements." See Nathan Reingold, ed., *Science in America: A Documentary History, 1900–1939* (Chicago, 1981), 169.
 18. Corner, *History of Rockefeller* (n. 16 above), 44–6.
 19. *Ibid.*, 44–6, summarizes the grant program and its significance, but a thorough study of the program is needed.
 20. It is worth noting that for the four years after the Rockefeller Foundation was created in 1913, up to \$2,000,000 a year was set aside for purposes to be designated by John D. Rockefeller Sr. According to the Foundation's published annual reports, from 1914 to 1917 over \$2,900,000 was given to the Rockefeller Institute for Medical Research (RIMR) as founder's designations, and during the years 1915–1919, the Foundation gave RIMR an additional \$4,700,000 for endowment and research.
 21. Robert E. Kohler, *Partners in Science: Foundations and Natural Scientists, 1900–1945* (Chicago, 1991), 55, 56, 78 (quote), 88, 97, 126, 138, 140, 143–4, 237, 291–4; Reingold, *Science in America*, 221, 340–44.
 22. John Z. Bowers, *Western Medicine in a Chinese Palace: Peking Union Medical College, 1917–1951* (New York, 1972), 44, 48–56.
 23. "Simon Flexner, 1909–1957," folder 453, box 61, Friends and Services series, RG 2, Office of the Messrs. Rockefeller, Rockefeller Family Archives, RAC; Bernice Kert, *Abby Aldrich Rockefeller: The Woman in the Family* (New York, 1993), 130.
 24. For example, Dr. Ralph H. Boots accompanied John D. Rockefeller Jr.'s family on a summer trip to Europe in 1923, and Dr. William S. Tillett went along on travels through the western United States in 1924: John D. Rockefeller Jr. to Simon Flexner, 7 August 1923, and Simon Flexner to John D. Rockefeller Jr., 19 September 1924, John D. Rockefeller Jr. folder, reel 99, Simon Flexner Papers (microfilm of originals at the American Philosophical Society), RAC.
 25. Abraham Flexner. *Medical Education in the United States and Canada* (New York, 1910).
 26. Corner, *History of Rockefeller* (n. 16 above), 189–94.
 27. *Ibid.*, 184–85; 22 September 1936, Warren Weaver diary, RG 12.1, Rockefeller Foundation Archives, RAC. The first electron microscope used by Institute staff, 1943–1945, was located at the offices of the Interchemical Company on the west side of Manhattan; in 1944, the virus laboratory purchased a microscope specifically to share with the Institute. See Carol L. Moberg, "The Electron Microscope Enters the Realm of the Intact Cell," *Journal of Experimental Medicine* 181 (March 1995): 831–7; J. H. Bauer, memorandum on electron microscope, 3 November 1943, folder 83, box 10, series 100, RG 100, Rockefeller Foundation Archives, RAC.
 28. Corner, *History of Rockefeller* (n. 16 above), 387, 466.
 29. An introduction to the history of the virus laboratory is provided by Wilbur G. Downs, "The Rockefeller Foundation Virus Program: 1951–1971 with Update to 1981" *Annual Review of Medicine* 33 (1982): 1–29.
 30. Among other descriptions of Rockefeller philanthropic influence on the development of the natural and medical sciences, see Robert E. Kohler, *Partners in Science: Natural Scientists and Foundations* (Chicago, 1991); and Pnina G. Abir-Am, "The Strategy of Large versus Small Scale Investments, 1930–1960: The Rockefeller Foundation's International Network of Protein Research Projects," in *American Foundations and Large-Scale Research: Construction and Transfer of Knowledge*, ed. Giuliana Gemelli (Bologna, 2001), 71–90.

31. The standard history of the International Education Board is George W. Gray. *Education on an International Scale: A History of the International Education Board, 1923–1938* (New York, 1941). See also a recent study, Reinhard Siegmund-Schultze, “Support by Rockefeller’s International Education Board for the Cooperation of Physics and Mathematics at Göttingen and Paris in the 1920s and 1930s,” in *American Foundations and Large-Scale Research: Construction and Transfer of Knowledge*, ed. Giuliana Gemelli (Bologna, 2001), 51–67; and John Farley, *To Cast Out Disease: A History of the International Health Board* (New York, 2003).
32. For example, Ludwik Louis Chrobak of the Jagellonian University in Cracow, Poland joined W. G. Wyckoff’s laboratory at the Institute for studies of x-ray crystallography in 1931–1932: fellowship recorder card for Chrobak, Natural Sciences Division, Rockefeller Foundation Archives, RAC.
33. Fellowship recorder cards for Arthur Neville Burkett. Australia, Division of Medical Education, and Alvaro Santos Costa, Brazil, Natural Sciences Division, Rockefeller Foundation Archives, RAC.
34. Hanson, *Achievements: Century of Science*, 41.
35. Jules Hirsch, “The Role of Clinical Investigation in Medicine: Historical Perspectives from Rockefeller University,” *Perspectives in Biology and Medicine* 41 (Autumn 1997): 117; “Dr. John Auer, 73, is Dead,” *New York Times*, 2 May 1948, p. 76.
36. Although few historians have commented on the significance of the fellowship programs of the Rockefeller philanthropies, the following articles are suggestive: Stanley Coben, “The Scientific Establishment and the Transmission of Quantum Mechanics to the United States, 1919–1932,” *American Historical Review* 76 (1971): 442–66; Laurence A. Schneider, “Genetics in Republican China,” in *Science and Medicine in Twentieth-Century China: Research and Education*, eds. John Z. Bowers, J. William Hess, and Nathan Sivin (Ann Arbor, MI, 1988), 3–29; Marcos Cueto, “The Rockefeller Foundation’s Medical Policy and Scientific Research in Latin America: The Case of Physiology,” in *Social Studies of Science* 20 (1990): 229–54.
37. See Charles W. Johnson Sr., *The Spirit of a Place Called Meharry: The Strength of its Past to Shape its Future* (Franklin, TN, 2000), 132–7. I thank Quentin Jones, archivist at Meharry Medical College, for this reference. See also the fellowship recorder card for Charles William Johnson, Rockefeller Foundation Archives, RAC, which notes that half-way into Johnson’s first fellowship year (1957–1958), “Dr. Merrill Chase [of the RIMR] called to inquire about a second year for [Johnson]. He is very much pleased with [Johnson] and feels that a second year would be very important to completing his training.” Chase’s request was approved, and Johnson remained.
38. Corner, *History of Rockefeller* (n. 16 above), 57; Homer F. Swift to E. C. Smith, 12 June 1937, folder 30, box 17, RG 450.1, Rockefeller University Archives, RAC. I am grateful to archivist Renée Mastrocco for locating this letter.
39. Mary Brown Bullock noted that before 1937, 55% of Peking Union Medical College graduates studied abroad, and that “for the most part, these graduates studied in the United States at Johns Hopkins, Harvard, and the Rockefeller Institute on grants from the China Medical Board.” See Mary Brown Bullock, *An American Transplant: The Rockefeller Foundation and Peking Union Medical College* (Berkeley, CA, 1980), 126.
40. Corner, *History of Rockefeller* (n. 16 above), 58. Board of Director’s minutes, 29 May 1909, 9 October 1909, RG 110.2, Rockefeller University Archives, RAC.
41. Flexner’s correspondence with Ehrlich suggests that they may not actually have met during that trip to Europe: Paul Ehrlich to Simon Flexner, 18 December 1903, 13 January 1904, 9 June 1904, 25 July 1904, reel 32, RAC microfilm of Rockefeller Institute for Medical Research series, Simon Flexner Papers, American Philosophical Society, Philadelphia, PA (hereafter APS). Note that Flexner and Hideyo Noguchi later exchanged research material with Ehrlich and that Noguchi subsequently visited his laboratory: Simon Flexner to Paul Ehrlich, 8 December 1911, 20 October 1912, Hideyo Noguchi to Paul Ehrlich, 5 July 1912, and Paul Ehrlich to Simon Flexner, 2 October 1913, reel 32, APS, RAC microfilm. For John D. Rockefeller Sr.’s gift see Board of Directors’ Minutes, 29 May 1909, 9 October 1909, RG 110.2, Rockefeller University Archives, RAC.
42. Darwin H. Stapleton, “Frederick Seitz,” in *Notable Twentieth-Century Scientists* (Detroit, 1995), 1810–2.
43. Board of Scientific Directors’ Minutes, 21 January 1911, 25 April 1911, 3 June 1911, RG 110.2, Rockefeller University Archives, RAC; Simon Flexner to Reinhard Dohrn, 11 July 1924, reel 29, Simon

- Flexner Papers, APS (This letter is mislocated in the “Doerr” file.); “List of Investigators, Marine Biological Laboratory, Summer of 1923,” attached to Frank R. Lillie to Simon Flexner, 13 July 1923, reel 65, Simon Flexner Papers, APS; Corner, *History of Rockefeller* (n. 16 above), 77–8, 367.
44. Corner, *History of Rockefeller*, 283; Hanson, *Achievements: Century of Science*, 25. A list of staff who have left Rockefeller to found, or to serve as the head of other labs or institutions, would be quite lengthy. Recent examples include Purnell Choppin, who became president of the Howard Hughes Medical Institute in 1986, and Anthony Cerami, who was the founding president of the Picower Institute for Medical Research in 1991.
 45. A recent work that argues this point is Ric Burns, James Sanders, and Lisa Ades, eds., *New York* (New York, 1999).
 46. Charles Rosenberg, “Toward an Ecology of Knowledge: On Discipline, Context, and History,” in *The Organization of Knowledge in Modern America, 1860–1920*, ed. Alexandra Oleson and John Voss (Baltimore, 1979), 452.

