The Simple and Courageous Course: Industrial Patronage of Basic Research at the University of Chicago, 1945–1953

Joseph D. Martin

Abstract

The University of Chicago was the site of a remarkable ideological alignment after World War II. Its chancellor, Robert Maynard Hutchins was one of mid-century America's fiercest critics of science and of the moral stature of scientists. His administration nevertheless forged a détente with Chicago's physical scientists in the process of establishing the Institutes for Basic Research, which consolidated the personnel and resources the Manhattan Project had brought to campus. Chicago's left-leaning group of scientists and administrators then made common cause with a series of conservative industrial interests in order to fund the new institutes, on the basis that industry had an obligation to support basic research. This intersection of otherwise divergent ideological strands exposes the institutional malleability of patronage relationships in the years after World War II.

"Dress well. Put on your best clothes and let them be costly. Let your linen be immaculate. See that your boots are polished, and also that your hands are kept clean and your hair well brushed, not only in the morning, but kept so throughout the rough and tumble of the day.... People are judged by these apparent trifles of personal appearance far more than is often supposed, and the streets of Chicago soil the person hourly."[1]

—Frederick Taylor Gates, excerpt from fundraising manifesto, 1890

When pitching the Cotton Council, it pays to wear seersucker. University of Chicago development officers Guy Martin and Arthur Feltes reasoned as much on a cloudy August day in 1948 when they donned their best seersucker suits for a lunch in Washington, DC, with Leonard Smith, Acting Director of Utilization Research for the National Cotton Council of America. Martin and Feltes might well have had Frederick Taylor Gates's canvassing advice in the back of their minds. Robert Maynard Hutchins, the university's president, had plucked Gates's nineteen-point fundraising manifesto from a dusty file drawer and circulated it to Chicago's development committee some years earlier, before World War II forestalled a planned fundraising initiative. When the campaign resumed after the war, it did so with a focus on attracting industrial support for Chicago's new natural sciences laboratories; that was the mission for which the two development officers had groomed themselves.

The Cotton Council was a potential patron of Chicago's newly formed Institute of Radiobiology and Biophysics, one of three new institutes, and the University's representatives were charged with selling the basic research vision upon which those institutes were founded. The seersucker suits, Martin and Feltes reported, "made a good impression on Mr. Smith, who launched into a 45 minute lecture on what a fine and useful material cotton was," pausing for

breath "long enough to tell us that he was an organic chemist."[2] Smith, gratified by his dining companions' sartorial sense, received their pitch cheerfully. "He appeared fully familiar with the distinction between basic and applied research that the University is emphasizing," Martin and Feltes reported. "He believes that agriculture has not devoted the proper amount of time and money to basic research in the biological sciences, and believes that in time this amount can be increased."[3] Although Smith cautioned that the Council's research budget was entirely devoted to applied work, the natty duo left the meeting feeling they had won a sympathetic ear and rated Smith and the Cotton Council as good contacts to pursue in the future.

Through the late 1940s, University of Chicago faculty, staff, administrators, and alumni held hundreds of similar meetings as part of an aggressive development campaign to amass support for its new research institutes, which included the Institute for Nuclear Studies and the Institute for the Study of Metals alongside the Institute of Radiobiology and Biophysics.[4] The Institutes for Basic Research (IBRs), as they came to be known, were established to cement the legacy of Chicago's Metallurgical Laboratory. Colloquially known as the Met Lab, this wartime nuclear research installation—housed in the west stands of the university's football stadium, Stagg Field—investigated the properties of uranium and plutonium for the Manhattan Project. It was where Enrico Fermi's team produced the world's first controlled nuclear chain reaction on December 2, 1942, generating the most rousing applause the stadium had heard since the varsity football team took its last snap in 1939.[5] Chicago's physical scientists and administrators sought to capitalize on the cultural currency nuclear research earned from the success of the Manhattan Project. They originally called the laboratories the Nuclear Institutes or Nucleonics Institutes and courted

industrial support by emphasizing the wide-ranging potential of radioisotopes and the as-yet-unforeseen potential hidden within the atomic nucleus.

When sketched in such broad strokes, Chicago's campaign seems to mirror institutional changes around the United States that rebuilt university campuses after World War II and brought academic, industrial, and government—especially military—research into closer accord.[6] By organizing natural science research within laboratories that drew upon resources from throughout the university, Chicago participated in the trend toward centralized research infrastructure pioneered by East Coast institutions like Cornell University and the Massachusetts Institute of Technology (MIT).[7] By clothing themselves in cotton to cater to the expectations of a potential patron, Martin and Feltes acted out a microcosm of the Cold War reorientation of academic research programs toward the demands of military and industrial funders. Literature on industrial and government patronage of universities focuses on the shaping effect money has on the type of research conducted in academic settings. Just as individuals make wardrobe choices to flatter funders, historians have suggested, institutions manicured their research profiles to compete in a Cold War context flooded with military and industrial dollars.[8] Stanford University and MIT in particular have been held up as examples of how military and industrial interests imposed their research priorities on academic science during the Cold War.[9]

The encroachment of industrial and government interests into campus laboratories fits within a larger story about the increasingly pragmatic bent of American universities during the Cold War. John Dewey, the godfather of American pragmatism, was a potent intellectual force driving reforms in American education, both before and after World War II.[10] The collective mission of American higher education and its responsibility to the body politic were reexamined

and renegotiated during the Cold War. The result was a more populist academy. Military and industry money poured into universities alongside beneficiaries of the GI bill (formally, the Servicemen's Readjustment Act of 1944), who might previously have had little opportunity for higher education. Demographic shifts among the student population prefigured the relevance and responsiveness of American universities to a wide array of political and cultural currents.[11] The outward willingness Martin and Feltes showed to bend to the expectations of an industry group, and their solicitation of its patronage in the first place, seem largely compatible with these trends.

Upon closer scrutiny, however, the University of Chicago sits uncomfortably within these narratives. Patronage relationships, first of all, are negotiated relationships.[12] Historians addressing these negotiations and their outcomes, need to confront them empirically—the mere presence of a financial relationship does not tell us how a funder's interests were or were not reflected in the use of their funds.[13] Rather than welcoming industrial and government patrons into the deliberations that defined research priorities, Chicago courted external funding for a basic research program of its own devising and fought vigorously to ensure that those funders had no expectations that their contributions would go toward producing applied windfalls. Chicago's development program demonstrated that the influence of money on research could be dragged from the shadows and made a central element of funding negotiations. The university's representatives made repeated and explicit assurances, in both internal deliberations and external negotiations, that factors such as the defense establishment's technical needs and the economic interests of industrial patrons would not sway the university's research agenda. That agenda, in turn, had to fit within an institutional context defined by the imperious Hutchins's contrarian views about the proper

nature and role of higher education, which contrasted the pragmatic trends of the age and included sharp antagonism toward the sciences.

To what extent assurances that external funding would not influence university research were born out in laboratory practice is a separate and open question. Nevertheless, the unequivocal and uncompromising basic research ideology Chicago pursued after World War II puts it at odds with well-known narratives of the convergence of academic, government, and industrial interests in the early Cold War.[14] This contrast raises the question the of extent to which Chicago was a distinctive institution, thumbing its nose at national trends, and the extent to which it was emblematic of larger currents that have evaded sustained historical attention. The story of the IBRs and the development campaign mobilized to fund them, framed within timeworn and as-yet unresolved disagreements about the roles and responsibilities that institutions of higher learning in the United States hold, is a forum for exploring that question.

Doing so requires examining the productive intersection of three ostensibly conflicting ideological strands. The first is Hutchins's own vision for the university, which emphasized liberal education grounded in the humanities and regarded the sciences, and the specialization that often came with them, with suspicion. The second is the outlook of Chicago's physical scientists, so often the target of Hutchins's disdain. Chicago had been a key Manhattan Project research site, but it also produced the Franck Report advising against the military use of nuclear weapons. It was from Chicago's Metallurgical Laboratory that the *Bulletin of Atomic Scientists* emerged, promoting social responsibility around nuclear weapons by disseminating accessible, policy-relevant scientific information. The third strand is the ideology of the IBR's industrial patrons. Unlike both Hutchins—a committed political liberal—and the Chicago scientists, industrialists tended to be

conservative. Their interests lay not in the advancement of science per se, but in the rehabilitation corporate America's image, which had taken a beating in the Great Depression. The IBRs emerged at the unlikely overlap of these ideological interests, and so offer a revealing case through which to examine the flexibility of emerging patronage patterns after World War II.[15]

Grand Visions: Gridiron and Great Books

To the extent that Chicago was idiosyncratic in its dealings with industry, it was in large measure due to the influence of its young, headstrong leader. The Institutes for Basic Research were funded in accordance with a research ideology that intertwined with the prevailing educational philosophy at the University of Chicago. That philosophy was held and enacted by Robert Maynard Hutchins, president of the university from 1929 until 1945, when he became chancellor, a post he held through his departure in 1951. Hutchins is best remembered as a brash educational reformer, a keen proselyte of the Great Books curriculum, and as the man who decommissioned Chicago's varsity football program in 1939. These administrative agendas are emblematic of the educational ethos Hutchins espoused, which also guided the founding of the Institutes for Basic Research.

Hutchins's ambitious and idiosyncratic approach to higher education was still forming when he assumed the University of Chicago presidency at the tender age of thirty. It matured during his first decade in office through tense standoffs with the faculty over his proposed curricular reforms and his close association with the educational philosopher and incorrigible provocateur Mortimer Adler, whom he had installed on the Chicago faculty shortly after arriving in Hyde Park. By the time Hutchins brought the axe down on the football program in 1939, both

his vision for the university and his plan for achieving it were firmly established.[16] Hutchins's approach to football and the undergraduate curriculum are worth exploring further because they highlight how analogous motives shaped the evolution of the IBRs.

Chicago Maroons football, under the direction of the renowned coach Amos Alonzo Stagg, had been an early twentieth-century powerhouse. The Maroons were the first to challenge Ivy League dominance and their success spurred college football's rise as an American cultural phenomenon.[17] The heights the team reached in the 1920s made Hutchins's decision to eliminate varsity football all the more striking.[18] The Maroons had fallen a long way by 1939, but their struggles were a pretext for ending the program, not the motivation. Hutchins deplored the circus atmosphere surrounding football games, feeling it distracted from intellectual pursuits. He had developed this attitude during his undergraduate years at Yale, where football fever was one element of what he regarded as an unserious approach to education geared to pampered high-society scions. Yale, to Hutchins, was "a place where you could get excited about girls or liquor or parties or athletic contests, but it wasn't a place where you'd get excited about learning."[19] This was the foil against which he modeled Chicago, including his decision to deemphasize varsity athletics.

Despite the witticism he was wont to repeat that his policy was to lie down until he felt better whenever he felt the urge to exercise, Hutchins did not object to athletics *per se*. He rather distained the popular notion, borrowed from a nineteenth-century aristocratic British ethos, that athletics instilled moral qualities academic study did not.[20] Prepared for backlash from students, alumni, and the general public, on the basis of the ubiquity of this notion, Hutchins got ahead of the story with a sharply worded op-ed in a December 1938 issue of *The Saturday Evening Post*. Hutchins's screed, entitled "Gate Receipts and Glory," distinguished between "athletics," the

recreational pursuit of physical wellbeing, and "athleticism," the coopting of amateur athletics by monetary interests. His catalogue of the myths of athleticism summarized the popular understanding of the benefits university athletic programs offered:

> Athletics, we are told, produces well-rounded men, filled with the spirit of fair play. Athletics is good for the health of the players; it is also good for the morals of the spectators. Leadership on the playing field means leadership in life. The Duke of Wellington said so. Athletes are red-blooded Americans, and athletic colleges are bulwarks against Communism. Gate receipts are used to build laboratories and to pay for those sports that can't pay for themselves. Football is purely a supplement to study. And without a winning team a college cannot hope to attract the students or the gifts which its work requires.[21]

In setting set out the pernicious effects of these myths, Hutchins reserved his sternest disapprobation for the connection between alumni giving and the success on the gridiron. When Hutchins ended varsity football, it was in large measure because he deplored seeing the fortunes of the university dictated by matters he considered tangential (and sometimes anathema) to educational concerns.[22]

The same conviction that motivated Hutchins's enmity for football drove his effort to reform undergraduate education at Chicago. In a controversial move shortly after taking over the presidency, Hutchins appointed Mortimer Adler to a joint appointment in philosophy, psychology, and law. If some of the Chicago faculty found the youthful Hutchins callow, his exertion of executive authority to appoint Adler, two years his junior, to an important post across influential departments did little to assuage this concern. The philosophers in particular

interpreted Adler's appointment as a shot across their bow. The great pragmatist John Dewey had left Chicago for Columbia University in 1904, but the philosophy department still owed much to his legacy. Adler, who preferred the metaphysical approach of Saint Thomas Aquinas to hard-nosed Deweyan pragmatism, seemed impossibly old fashioned to Dewey acolytes like George Herbert Mead, who became a vocal opponent of Hutchins's agenda. Dewey himself spoke out against Hutchins's reforms, charging, for instance, that the Great Books movement that Hutchins and Adler championed amounted to "an open and avowed attempt to return to that dualistic separation of ideas and action, of the 'intellectual' and the 'practical,' of liberal and service arts, that marked the feudal age."[23] Hutchins was eventually forced to restrict Adler's appointment to the law school, and his friend's outspoken Thomism would continue to engender skepticism of Hutchins's reform efforts, especially among faculty in philosophy and the social sciences.

Hutchins at first envisioned restructuring the whole of American higher education. He advocated merging the last two years of high school and the first two of a traditional four-year undergraduate education into a four-year program of general education, after which the Bachelor of Arts would be awarded. The final two years would be reserved for study in a specialized academic field. The aim would be to combat pressure from academic departments to introduce specialized training earlier and earlier, which he felt eroded the broad educational base necessary for responsible citizenship and the unfettered pursuit of understanding. In 1936 he set out this vision in a short manifesto entitled *The Higher Learning in America*.[24] It echoed Thorstein Veblen's 1918 book of the same title, in which Veblen worried that "the intrusion of business principles in the universities goes to weaken and retard the pursuit of learning, and therefore to defeat the ends for which a university is maintained."[25]

Hutchins, eighteen years later, shared Veblen's concern about corrosive financial pressures. His own characterization of the problems with higher education began:

> If the problem is to clarify the higher learning, let us examine the causes of its confusion. The first of them is very vulgar; it is the love of money. It is sad but true that when an institution determines to do something in order to get money it must lose its soul, and frequently it does not get the money. Money comes to education in three ways—from students, from donors, and from legislatures. To frame a policy in order to appeal to any one of these three is fatal, and, as I have suggested, often futile as well.... Dependence on the casual interest of donors means that nobody can tell from one year to another what a university's policy is. It will become next year whatever somebody is willing to pay to make it. I do not mean, of course, that universities do not need money and that they should not try to get it. I mean only that they should have an educational policy and then try to finance it, instead of letting financial accidents determine their educational policy.[26]

The educational policy Hutchins established at Chicago was not quite so sweeping as he hoped, but it was nonetheless ambitious. The College, devoted to undergraduate education, became a two-year program in the foundations of general knowledge. Class attendance was optional and anyone could obtain a BA upon completing the general exams.[27] A culture of excellent teaching and lively conversation was entrusted to keep the classrooms full.[28]

The goal of a course of general education was not to prepare students for specialized study in a particular discipline, or to train them for a profession, but to engender the type of broad, humanistic thinking that could confront the moral challenges of the age. This goal reached its apotheosis in a course Hutchins and Adler delivered each year to a handpicked group of students

based on the curriculum Adler had studied at Columbia under John Erskine, the architect of the Great Books movement.[29] Hutchins was never able to eliminate the incentives that inspired departments to demanded an opportunity to recruit students in their first two years, and so never realized his ambition to impose this system at full scale. It nevertheless represents the purest expression of his philosophy of education. The fervor for a rigorous, humanizing institution that fueled Hutchins's objections to football also shaped his thinking about undergraduate education. It would condition his approach to scientific research infrastructure as well.

Although Hutchins considered the natural sciences an important part of a strong university, he had little knowledge of them and, revering ideas over facts as he did, saw them as ancillary to true education. "I yield to no one in my admiration for and belief in the accumulation of data, the collection of facts, and the advance of the empirical sciences," he wrote in his 1936 manifesto. "Taken together these constitute one of the grand activities of modern times. It must be continued and encouraged. I wish merely to point out that this activity must be conducted in such a way as not to confuse or prevent that intellectual training and development which in my view are education."[30] His view shortly after assuming the presidency was that the value of the sciences lay principally in research and advanced training, but that they had little to do with education, properly understood. He was a humanist at heart, and his educational agenda championed the university's power to instill humanistic values.

By the end of World War II, his views had sharpened considerably. When he departed Chicago in 1951, he viewed scientists themselves with evident disdain; he thought them intellectually parochial and held them responsible for the degradation of wider regard for the arts and humanities. Speaking at Chicago's Foundation for the Study of American Institutions in

1953, shortly after resigning his chancellorship, Hutchins claimed: "The reverence that natural science has inspired is in large part responsible for the steady narrowing of education that the progress of specialization has caused during the last thirty years," and lamented that "the scientific method has discredited the methods of history, philosophy, and art."[31] With characteristic panache, he developed this position in a 1963 pamphlet on the role of scientists in politics: "My view, based on long and painful observation, is that professors are somewhat worse than other people, and that scientists are somewhat worse than other professors." He suggested that scrupulous commitment to standards of scientific conduct within narrow specialties freed scientists to be looser in their other dealings—"the narrower the field in which a man must tell the truth, the wider is the area in which he is free to lie"—and insisted that scientist's illusions that they required no metaphysical assumptions led them routinely into error. Hutchins deplored the "paralyzing educational repercussions" of the hubris he perceived in the mid-twentieth-century American scientific community, which placed science on an epistemic plane above other academic pursuits. Seduced by facts, Hutchins complained, over-specialized scientists rendered themselves unwilling and unable to engage with areas of thought beyond their increasingly narrow research.[32]

Hutchins's shift from quiescence about science to active skepticism over his decades at Chicago can be traced both to the conflicts his administrative agenda generated and to World War II. Chicago scientists—along with its philosophers, whom Hutchins regarded as under the sway of scientific thinking—most fiercely opposed his educational reforms. At a time when the natural sciences and medicine were specializing, scientific training began to require longer periods of apprenticeship. Science departments pushed hard against Hutchins's efforts to devote a full two years of the undergraduate degree to generalized study.

The war, however, was the more significant factor in shaping Hutchins's attitude. Nowhere were the moral risks of science—especially when applied to technical problems—clearer for Hutchins than in nuclear weapons, which had been manufactured, in part, on his campus. The bomb heightened Hutchins's feeling that broad, humanistic education was essential to confront the challenges facing American society; he began to see science as a source of the moral challenges his system of education was designed to train students to confront.

A staunch isolationist before Pearl Harbor, Hutchins executed a sharp about-face after the Japanese attack and put his institution's resources at the disposal of the mobilizing war machine. The University of Chicago provided technical and linguistic education to servicemen, trained Army and Navy pilots, and led the Manhattan Project's research into the properties of uranium and plutonium in the coyly named Metallurgical Laboratory.[33] The central role his university played in bringing about the bomb did nothing to soften Hutchins's reaction to its use against Japanese civilians, which he condemned with the same alacrity and conviction that compelled him to temper his isolationism after Pearl Harbor.

At the time, the university hosted the Chicago Round Table, a popular radio program syndicated by the National Broadcasting Corporation that featured debates and disquisitions on current events. Hutchins used this program as a pulpit from which to air his concerns about the technology of war in general and the bomb in particular. On August 12, 1945, just a few days after the bombings of Hiroshima and Nagasaki, Hutchins announced, "the United States had lost its moral prestige."[34] Ever the pedagogue, Hutchins was already concerned about the challenges rapid scientific and technological development along military lines posed for higher education, proclaiming: "If we are going to have a society which knows what to do with these constant

surprises from the physical scientists, we are going to have an entirely different level of general intelligence in the community from the one which we have been used to in the past."[35] Science, previously a distraction from liberal education in Hutchins's mind, had become one of the most pressing challenges the liberally educated would have to confront.

Aware that seemingly abstruse research had made nuclear weapons possible, Hutchins was little moved by assurances that basic science was an inherent good to be pursued unfettered. This conviction, combined with his dim view of the moral standing of the sciences, informed his attitude to the post–World War II expansion of Chicago's scientific research infrastructure. The Institutes for Basic Research were a continuation of efforts that had developed during the war and a mechanism to consolidate the resources those efforts had brought to campus. The precise form they took, however, and the plans to support them, reflect the subtleties of Chicago's institutional mission and Hutchins's hand in crafting it. The Institutes were conceived, in part, to ensconce basic nuclear physics research in the humanizing confines of a university. For Hutchins, natural knowledge was ennobled, not by virtue of its purity, but through thoughtful custodianship.

Hutchins's mission can therefore be understood as an effort to humanize the sciences, cutting sharply against the grain of concurrent efforts, even on his own campus, to scientize all of human knowledge.[36] The IBRs represent, in part, an answer to Hutchins's concerns about the moral dangers of scientific hubris. After World War II, he viewed science as the source of many of the most pressing contemporary moral challenges. The University of Chicago, if Hutchins had his way, would not combat it by bending to the will of government and industry, even thought it had been happy to do its part to fight fascism. The sciences were valuable just to the extent that they

could cultivate truth, and industry was a valuable partner just to the extent that it could help prevent military interests from perverting basic science.

In great measure, Chicago's approach to science after the war was a reaction to its participation in the war effort, but it was also consistent with Hutchins's prewar philosophy of education. Having academic and financial decisions dictated by industry or government was, for Hutchins, little different from having such factors dictated by football. He therefore faced a challenge navigating his institution through a post–World War II world in which corporate and military patrons were eager to enter into financial arrangements with university scientists. As the next section makes clear, the basic research ethos that the IBRs adopted forged a functional alliance between Chicago's scientists and its administration, permitting the institution to articulate a consistent ideology to its patrons.

Founding the Institutes for Basic Research

For all his administrative ambition, Hutchins could not have pressed his agenda without the science faculty's cooperation. Though they been unreceptive to his 1930s educational reforms, Chicago's physical scientists made common cause with Hutchins through a basic research vision. Their motives were different. Hutchins, for all his concern about science and scientists, knew prominence in the physical sciences was integral to the university's reputation. He sought to ensure, though, that Chicago scientists were accountable to the university rather than to external entities such as industry and government. In 1945, in view of the scientific accomplishments of the war, he commented: "The enormous acceleration of science and technology must somehow be matched by an intensification of all those processes which help us to understand what we ought to

do with science and technology."[37] Hutchins wanted his scientists subjected to the same humanizing influences he had sought to cultivate through educational reform. That motivated institutional measures aimed at controlling financial incentives, such as employment contracts that required all external earnings to be forfeited to the university and careful attention to the manner in which scientific facilities were funded. Chicago's scientists, for their part, appreciated the assurance that they would have complete freedom to follow self-defined research agendas within the Institutes for Basic Research.

The Institutes were conceived to consolidate the physical resources and personnel that Manhattan Project contracts had brought to Hyde Park, and plans were afoot before the war ended. Chicago's efforts along these lines—though they mirrored similar efforts at institutions like MIT, which parlayed wartime radar work into a series of interdepartmental laboratories—ruffled feathers elsewhere in the scientific community, and in Washington, after an August 13, 1945, *Chicago Tribune* article exposed the university's intentions.[38] The article, which Hutchins dismissed as "in harmony with the *Tribune*'s policy of representing the city of Chicago as the leader in all fields of endeavor,"[39] listed the eminent scientists war work had lured to Chicago from other institutions and bragged: "There can be no better indication of who the scientific world thinks did the real job on atomic energy than this migration to Chicago by so distinguished a group," identifying the new "institutes of nuclear physics" as the mechanism that would keep them there.[40]

A chastisement from General Leslie Groves, chief administrator of the Manhattan Project, soon crossed Hutchins's desk:

> From the papers, I note that you are planning on establishing an institute which would include among its fields that of nuclear physics. I have had many discussions in the past

> with Dr. Arthur H. Compton, who has expressed the view that the University of Chicago should be a center of such research in the years to come, and that it should receive Government-owned equipment which has been in use at the Metallurgical Laboratory, including the Argonne installation, during the last few years. I feel it incumbent to inform you, in order that there may be no misunderstanding, that there can be no commitment with the University at this time on the part of the War Department in this respect.[41]

Hutchins hastened to allay Groves's concerns: "The University was under the impression that it was performing a great public service by holding together a group in this field which might otherwise disintegrate. Its plan was not to monopolize a scientific area but to promote its development by retaining at a strategic location a combination which was certain to give impetus to this work on a national scale. Far from seeking a monopoly, the University regards itself as a training ground for the country and particularly for the Middle West."[42] Tensions eased after Groves visited Chicago October 1945 to present a War Department scroll recognizing the institution's contributions to the bomb-development effort. Hutchins received a note from a much-reassured Groves afterwards, who wrote: "Your outline of the University's future policies was particularly interesting," and reiterated his appreciation of the Met Lab's wartime labors.[43]

If chagrin over Chicago's opportunism continued to simmer, it did little to slow Hutchins, who tapped William Houlder Zachariasen to chair the physics department and empowered him to make whatever personnel decisions he deemed necessary to bolster its national standing. Zachariasen and Walter Bartky, Dean of the Division of Physical Sciences, undertook a rapid and sometimes ruthless renovation of the physical sciences faculty. The Division of Physical Sciences added as many new staff members in the twelve months following the war as they had in the

previous twelve years.[44] This strategy invited further recriminations from academic scientists at other institutions. In addition to hiring new PhDs such as John Simpson and Anthony Turkevich, Chicago lured a stable of physicists and chemists away from Columbia University that included Nobel Prize–winners Enrico Fermi and Harold Urey, and future laureate Maria Goeppert Mayer (who, accompanying her husband, the chemist Joseph Mayer, worked unpaid).[45] Many, particularly those the East Coast, accused Zachariasen and his colleagues of conspiring to corner the market on nuclear science and compromising the good of the national community.

Chicago's rapid, prestige-conscious expansion was not without collateral damage. Physics faculty were in danger of losing their jobs if their research did not pass muster with Zachariasen, who undertook "the unpleasant task of ridding its staff of every member on temporary tenure who did not belong in a great department."[46] One target for dismissal was Niel F. Beardsley, who had managed the physics department's optical shop since 1931. In light of Beardsley's age—then fifty-three—and his long service to the department, Zachariasen was willing to keep him on should be unable to find another position, but he insisted that Beardsley be kept ignorant of this contingency so it would not prevent him from seeking employment elsewhere.[47] Beardsley secured work as a research engineer with the Wright Air Development Center in 1946 and began a career in industry that eventually led him to the defense contractor Raytheon. On June 7, 1960, he and six others disappeared when the Raytheon research vessel *Marie* sank off Santa Cruz Island.[48]

This was the fervent moment in which the Institutes for Basic Research emerged. They represented the lynchpin of the plan to entice the core Met Lab staff to remain in Chicago while also attracting new talent. The west stands of Stagg Field, sometimes referred to as the "rat holes" by physical chemistry professor Thorfin Hogness, were aging, in poor repair, and lacked the

flexibility required of a modern laboratory.[49] The design proposal for the building that would house the three new institutes included ample space for growth. An opportunity to build a new laboratory from the ground up offered further incentive for the Manhattan scientists to remain and an enticement to the Midwest for young recruits.

Facilities were but one element of the draw for Chicago's new hires. If the transition to peacetime presented the opportunity to expand the workforce and rebuild facilities, it also offered the chance to define a consistent research ideology. Chicago promised its new hires "the freedom and flexibility essential to the pursuit of fundamental research."[50] The decision that the IBRs would be dedicated to basic research was in line with both Hutchins's philosophy and the wishes of the science faculty, many of whom had been disillusioned by war work. Chicago scientists had drafted the "Franck Report," which warned of dire political and moral consequences if the US used the bomb in a military capacity against civilian targets, and had formed the *Bulletin of Atomic Scientists* after the war to publicize the perils posed by nuclear weapons.[51] The assurance that their work would not be coopted for further governmental or commercial projects therefore soothed their unease over the uses to which their work had been put during the war.

Chicago's upper administration and its physical scientists found common ground in this shared research ideology, even if they came to it by different routes. Settling on a basic research mission as the foundation of the IBRs was therefore straightforward. Funding it would prove more complicated. Both the military and industry were primed to contribute unprecedented funds to university research in the years immediately after the war, but those charged with funding the IBRs proved hesitant to accept funding before a clear understanding was in place that it would serve their commitment to basic research. Cyril Stanley Smith, a metallurgist who had spent the bulk of

the war at Los Alamos turning his expertise to fissionable metals, was selected to head the Institute for the Study of Metals (ISM) in June 1945.[52] Upon arriving in Chicago, he set about mustering support for his new laboratory. The consensus approach to funding the IBRs was evident when he met with one Dr. Pierce of the New Jersey Zinc Company about supporting student fellowships at the ISM. Pierce was hesitant to commit to an institute without a proven track record of producing applicable results and expressed skepticism about whether the organization of the institute was likely to produce them in the future. Smith, although disappointed, concluded: "I do not believe that we should depart from our present standards purely to gain a little easy money."[53]

The basic research ideal united an administration and a cadre of researchers who had previously been at loggerheads, and might otherwise have remained so. It gave Hutchins cover to propose institutional arrangements that would, in his eyes, insulate scientists from potentially corrupting external influences. It provided researchers with the assurances that they would have a well-resourced opportunity to pursue their own interests, free from the top-down mission orientations and secrecy regimes that had governed their wartime work. With a plan to construct three new laboratories in place and consensus on a mission to guide them, it remained to sell that mission to funders.

Funding the Institutes for Basic Research

The IBRs began their life as the Nuclear Institutes, or Nucleonics Institutes, before an aggrieved Cyril Stanley Smith objected that such branding would deter potential patrons interested in the work of the Institute for the Study of Metals.[54] Smith prevailed, and basic research language supplanted nuclear language as the 1940s drew to a close. The early emphasis on the nuclear,

however, helps explain the funding strategy Chicago chose, which involved approaching industry as the principal means of external support, from the conviction that industrial patronage was both compatible with the institutes' basic research mission, and that corporations could be convinced to support it.

The months immediately after the war witnessed a conflict between military and civilian interest over who would control nuclear weapons, materials, and energy—and the research into them. The May–Johnson Bill, introduced to the US House of Representatives in October 1945, would have given the military province over nuclear affairs. In response, the Chicago Committee for Civilian Control of Atomic Energy formed, with the mission "to fight any attempts to place control of this new power in the hands of the military."[55] The legislation that eventually passed, the Atomic Energy Act of 1946, was considerably less restrictive, but fears lingered that the federal government would apply a heavy hand to its oversight of nuclear research. Chicago was incentivized to pursue a diversified funding base for its new institutes, and was convinced that industry could be enlisted into the basic research mission on the grounds that it would prevent government secrecy regimes from foreclosing a promising research area with potential new avenues for commercialization.[56]

Even if the image of Martin and Feltes donning their cotton suits seems to reflect an institution primed to kowtow to industrial interests, this was not borne out in the substance of the pitch Chicago's representatives made to their potential industrial patrons. A brochure prepared to attract industrial sponsors noted that applications could likely result from the work the new institutes conducted, but absolved the university of any responsibility to proceed with such

considerations in mind. The pitch to potential sponsors described the type of relationship the university envisioned:

> A number of leading American business organizations, recognizing that progress in applied science and industrial technology depends upon the steady advance of fundamental science, have approached the University to learn how they might contribute to the support of the Institutes and avail themselves of the benefits of their work. Because it is the intention of the University to promote mutually valuable exchanges of information between business organizations and the staffs of the Institute, to accelerate industrial applications of basic scientific discoveries, and to preserve complete freedom of investigation within the Institutes, the University has adopted the plan of Industrial Membership.

Member corporations would be entitled to copies of the institutes' publications and written reports, to send representatives to quarterly meetings for industrial sponsors, and to receive royalty-free license to any patents produced through institute research. The list of privileges excluded any provision for informing the directions of the university's research programs.[57]

Chicago's written pitch to industrial sponsors outlines a clear division of labor: the IBRs would generate fundamental scientific understanding, which it would then be the responsibility of the industrial entities to apply. This document does place significant emphasis on the potential usefulness of basic research, which reflects the audience to which it was directed. The reports of the in-person meetings with industrial representatives, which were confidential and had a limited circulation, and were therefore much franker, provide a fuller picture of how the university sought to fund its basic research.

The University of Chicago had a long tradition of local canvassing for financial support. In 1890 Frederick Taylor Gates, a Baptist minister and John D. Rockefeller's financial guru, composed a nineteen-point canvassing crib sheet based on his experience mustering private support for a new Baptist college in the Chicago area.[58] Much of Gates's advice concerned personal presentation and demeanor and demonstrated keen sensitivity to the psychology of his "victims," as he called them. They should be kept in good humor, he wrote, given the impression that any gift—including its amount—was their own idea, and allowed to talk at any length they chose without meeting disagreement or resistance. He gave dress and personal grooming top billing, advising in his first point, quoted in part in the epigraph of this paper: "it would be necessary to go to hotels occasionally, consult the bootblack, the lavatory, and brush up. This is no trifling thing. People size up one's importance and dignity very largely by his personal appearance and the size of their gifts if not indeed any gift at all will depend not little on their estimation of the importance and dignity of the canvassers."[59]

Gates's insights into the psychology of glad-handing are timeless, but his manual also reflects some contingencies of his context. First, he assumed any canvassing program would be seeking a broad base of support, that the program or institution seeking funds would want to subsist on a large number of small bequests. Second, he admonished his fundraisers to avoid any impression that they were engaged in a commercial transaction. Point seven: "Appeal only to the noblest motives. His own mind will suggest to him all the more selfish ones, but he will not wish you to suppose that he has thought of these. He will wish you to believe; he will wish himself to believe that he is giving only from the highest motives."[60] A broad foundation of small contributions made from an ideological commitment to the nobility of the enterprise they

supported was exactly what Chicago sought when soliciting support for its IBRs in the 1940s. Hutchins distributed Gates's list to the Committee on Development of Chicago's Board of Trustees in 1937 as plans for a new fundraising campaign were underway, and Gates's fingerprints are evident in the campaign that materialized after the war.

Nevertheless, the focus on corporate support was new. Before World War II, the bulk of financial support for the University of Chicago, aside from tuition, came from individual bequests and the ongoing patronage of the Rockefeller Foundation. Fundraising efforts through the 1930s targeted wealthy local individuals first and foremost. In 1936 a detailed fundraising plan outlined a tightly circumscribed role for corporate patronage. Corporate giving, the report noted "is limited almost entirely to fellowships and special research projects which can be represented to other stockholders as good investments in their own financial interest," and concluded: "Although there are possibilities of interesting contributions from corporations, the chief potentialities in this direction lie in gaining the interest of wealthy persons connected with them."[61] A decade later, industry assumed the pivotal role in the university's development plans.

Industry's interests, however, did not. Each of the meetings Chicago fundraisers conducted involved articulating their basic research vision, and Chicago's representatives did not withhold their judgments of anyone whose appreciation of this vision they found wanting. In October 1948, Hutchins and Hogness met with the president of the American Tobacco Company. Vincent Riggio was seventy years old and on the brink of leaving the presidency for a sinecure as chairman of the board of directors. Hutchins and Hogness found him aloof and disengaged during a conversation in which Riggio's aide did most of the talking. Hutchins scoffed that "he wished he had an assistant like that to make all his decisions for him." If they were unimpressed with Riggio,

their verdict on American Tobacco's research director, Hiram R. Hanmer, was even harsher. Hanmer gave them "the impression of not being too bright." Hogness recalled that he and Hutchins had wondered for some time why research directors tended to sit so low in corporate hierarchies. "If all research directors were like Mr. Hamner [*sic*]," he remarked, "the answer to that question would be apparent."[62] Despite Riggio's disinterest and Hanmer's failure to impress, American Tobacco and Chicago's IBRs signed a $50,000 per year sponsorship agreement.[63]

Similar derision flowed freely after meetings with any industry representative who did not share Chicago's basic research vision. The research director at the National Biscuit Company (better known as Nabisco) "gave the impression that he had been working so long with soda crackers that he had begun to look like one."[64] A manager at the Armco Steel Corporation, Anson Hayes, scandalized Cyril Stanley Smith by enumerating the qualities of a good industrial researcher as: "a) good appearance, b) an affable social nature, c) a realization that his own ideas were not always right, and d) (somewhat belatedly, some intellectual ability)." Smith concluded: "I do not believe that Dr. Hayes understands basic research or the University of Chicago. This is somewhat embarrassing since he took his Ph.D. at the University of Chicago."[65] Overt disdain for industrialists who refused to accept basic research as a shared responsibility of universities and industry reflects the uncompromising commitment the development campaign maintained to the founding principles of the IBRs.

Taken as a whole, the reports of individual fundraising meetings send a slightly different message than the manifesto potential sponsors received. Whereas the written rhetoric suggests that IBR research would be framed with some attention to future applications, the meeting reports demonstrate that any industrial sponsor would bear the responsibility not just for pursuing

applications, but also for identifying those aspects of IBR research ripe for industrial exploitation. The challenge this posed to corporate researchers was best expressed by Edward R. Gay, the vice president of St. Regis Paper Company, in a meeting with Hogness:

> He recognized the two sides of this question: (1) the support of basic research in this country by industry for its own sake—to keep government from monopolizing it; (2) to be in on something which might put St. Regis Paper in an advantageous position to cover its competitors. The first of these he could understand; the second one he thought was rather nebulous. He argued that if they were going to go into this plan with us and take full advantage of it, it would be necessary for the company to hire extra men who were capable of understanding our program.[66]

The work of translating basic research into applications was not straightforward and some corporations were unwilling to buy into to Chicago's ideological program unless they saw plausible prospects for commercialization, which often demanded considerable in-house research expertise.

When the IBRs solicited testimonials from existing sponsors in 1948, the responses reflected the link between amenability to a basic research ideology and expectations of future competitive advantages. The Pittsburgh Plate Glass company felt that "direct dividends in scientific knowledge and the indirect ultimate benefits to our country and mankind generally are certain to be of great value to the company, and we believe that close contact with the University program should result in earlier practical applications to industrial problems."[67] The Celanese Corporation of America was "happy to avail itself of the opportunity to participate for the potential impact [new basic knowledge in physics, chemistry and the peacetime uses of nuclear science] may exert on its products and processes."[68] These and other responses from 1948 were aspirational. They discussed

the influence of IBR programs on their development efforts in the abstract and although they expressed optimism about concrete payoffs in the future, they could point to none as of yet.

In years immediately after World War II, Chicago's strategy was a success. By 1950 the IBRs had secured membership commitments from twenty-four industrial sponsors, including powerhouse corporations such as Standard Oil, DuPont, and US Steel.[69] The early 1950s brought trouble, however, as a number of sponsors failed to renew and enrolling new members proved more difficult. Standard Oil of New Jersey, the first IBR sponsor, withdrew its support in 1953.[70] The program faltered on two points. First, corporations that had been enrolled to $50,000-per-year memberships had difficulty convincing their boards to maintain such investment in the absence of specific returns. Because Chicago was unconcerned with articulating the applied relevance of their work, any corporation that had not made those connections on its own began to view its membership as less of an investment and more of a charitable donation.

Second, other universities began to develop similar programs, and many were less scrupulous about isolating their researchers from industrial interests. Change was also afoot at the Massachusetts Institute of Technology, which, like Chicago, saw the value of securing the resources wartime government investment had deposited on its campus. In the 1950s, MIT invested in a cooperative relationship with government and industry. Arthur von Hippel, longtime director of the Laboratory for Insulation Research (LIR) outlined MIT's approach in a report entitled "Universities in Transition," describing the essentials of what has come to be known as the "center model" of research.[71] He sketched a new reality in which: "Universities showed that research pays, and huge laboratories sprang up for profit; universities devised new weapons, and the country bristles with laboratories for defense. What an outcome of a search for understanding of nature

and for peace in our time!"[72] Autonomy was also central to von Hippel's vision, but as he understood it, that meant allowing universities researchers the institutional freedom to cluster themselves around pressing problems, irrespective of departmental boundaries, and supporting such clusters with physical space and financial resources. The "Center," in this formulation, consisted of "a cell structure of individually functioning laboratories, each with an inspiring program uniquely its own, but together creating a new spiritual entity."[73]

Although vaguely redolent of the developments underway at Chicago, von Hippel's vision rested on fundamentally different assumptions. It relied on the inherent purity of scientists' motivations and assumed that when permitted to choose their own research directions they would invariable blaze a trail in worthwhile directions. The boundaries between academic and industrial institutions should be fluid on this view, allowing researchers the freedom to respond dynamically to any unfulfilled needs they identified. Hutchins, predictably, was less sanguine about such a possibility. He regarded scientists as unscrupulous academic politicians, and as such was more deeply suspicious about the potential for scientific graft. Whereas von Hippel—and his allies in developing the interdepartmental laboratories at MIT, notably John C. Slater and Karl Compton—advocated a bottom-up approach to a research center's mission orientation, Hutchins preferred to impose an institutional ideology from the top down. Chicago therefore lost actual and potential patrons to institutions that were more willing to work directly toward applied ends.

Both the brief success and rapid decline of Chicago's funding model for its Institutes for Basic Research reveal much about patronage in early post–World War II America. First, industry exhibited new enthusiasm for funding university science, but the exact form the institutional relationship would take was still being negotiated. For a time, many corporations were content to

accept abstract promises of applied outcomes for the sake of participating in a cultural enterprise that aligned abstractly with their long-term interests. The slow failure of Chicago's program to work to the same extent as programs at other universities that cultivated closer ties with the interests of industry suggests that the corporate ethos that favored direct, short term benefits emerged slowly, and was not the default position after World War II. Both of these facets of this story indicate the extent to which the influence of money over research is negotiated, on the individual scale and the societal scale.

Conclusions

Chicago's approach to funding the Institutes for Basic Research echoed the fundraising strategies Frederick Taylor Gates outlined in 1890. Their development officers might have donned the garb they thought would impress their targets, but the goal was to convince potential patrons that the cause was a worthy one. This approach might have seemed old fashioned, and it was certainly out of step with the rise of mission-oriented research funding that would become more common throughout the Cold War, but it was also, in a way, prescient. The 1970s and 1980s would see a reaction within the physics community against funding that was increasingly tied to technical deliverables.[74] Chicago's approach need not be read as a quaint holdover from an earlier era. Rather, it can be seen as a measured attempt to frame a mode of financial support that could coexist with the large-scale trends toward applied research and to protect a brand of research it feared would be threatened by the militarization of the physical sciences.

The impetus to engineer patronage relationships so as to insulate scientists from pressures exerted by broader societal trends derived from Robert Maynard Hutchins's educational

philosophy. Hutchins had been concerned about the corrupting effects of money on educational institutions since arriving on the Midway. He perceived danger in links between football and alumni giving and applied the same caution when American industries regarded universities as sites of useful knowledge after World War II. Chicago, like other universities that had hosted war work, developed a plan to maintain the infrastructure the War Department had established on its campus; however, it implemented a plan that differed markedly from many of its peer institutions. Rather than seizing the opportunity to consolidate its objectives with the government and industry in order to better tackle the problems facing society, Hutchins perceived of consolidation itself as a threat to his educational vision and sought to differentiate his institution's scientific mission as best he could from that of its patrons.

That Chicago was able to pursue this course successfully during the years immediately following World War II betrays the flexibility of the context, and the latitude individuals and institutions enjoyed within it. Industry and academia had previously interacted comparatively little, and few protocols existed to govern their relationships other than those that had prevailed during wartime. Though some prominent institutions did choose to perpetuate the alignment of objectives that had marked war work, it was by no means the only option for universities or for industry in the mid- to late 1940s. Scientists themselves had become accustomed to supplementing their training with fellowships from the Rockefeller and Carnegie foundations in the first half of the twentieth century, and had good reason to believe, given the prominence basic scientific research had attained during the war, that a broader range of industries might be interested in supporting it for its own sake.[75] For a time, many were. Only gradually did a more rigid, quid pro quo ethos began to prevail.

It eventually did prevail not because this was the inevitable mode of interaction between academia and industry, but because that is the relationship that was negotiated on a national scale. The University of Chicago's scientists and administrators similarly recognized that the question of the extent to which money would influence research direction was an open one in the late 1940s. It is reasonable to extend this insight into the larger claim that other institutions, those that did permit external interests a greater role in shaping the investigations conducted on their campuses, saw this influence as a valuable bargaining chip and exercised their own agency in placing it on the table. Indeed, studies of both MIT and Caltech have suggested that university administrators exerted just as much agency as government and industry actors in crafting the alignment of their interests.[76] Individual funding arrangements are negotiated, but so are large-scale expectations for what is appropriate when two institutional contexts come into contact. As local patronage relationships were being hammered out in the wake of World War II, those more general expectations were also in flux. The representatives of the University of Chicago backed one vision for the basis upon which industry and academia should interact, drawn from its educational philosophy. It was not the vision that would come to characterize Cold War academia–industry interactions more broadly, but it was viable for a time and it was not unreasonable from the perspective of the time to suppose that it might prevail.

Despite the unusual stance Chicago struck within American higher education, the route its IBRs steered into the early Cold War era appeared viable and inviting to other institutions as well. The University of Michigan, which in 1948 launched its Phoenix Project, a sui generis peaceful-atom-project-*cum*-war-memorial, similarly eschewed federal support and viewed industry patronage as a likelier guarantor of academic freedom.[77] The Purdue Research Foundation, founded in 1930

to increase cooperation between academic and industrial science, articulated the freedoms it expected researchers it supported to enjoy, encompassing control over the subject matter and direction of their research, and envisioned post–World War II programs that would "develop sponsor interest in the support of basic research controlled by [these] freedoms."[78] These are but brief examples, but they demonstrate that Chicago's scientists and administrators were not alone in recognizing the opportunity they exploited to launch the IBRs. Skepticism of federal support for science, especially nuclear science, was widespread for some time after the establishment of the National Science Foundation in 1950.[79] And the federal policy of concentrating funding in already well-resourced, mostly coastal institutions continued to incentivize others to turn for their basic research needs to industry, which, for a time, was happy to oblige.[80] The full influence of these attitudes on American higher education in the early Cold War remains to be explored.

As the industrial funding model of the IBRs began to show its first cracks in 1950, Cyril Stanley Smith wrote to Walter Bartky:

> I believe that universities generally have already gone so far in the direction of being "useful" to industry and to government that they have come very near to failing in one of their most important functions, which is to provide a place for intellectual activity insulated from contemporary pressures, whether military, political, or social. I think it probable that in century-long perspective the greatest national service that the University of Chicago could provide would be to cultivate the sciences, the arts, and the humanities for their intrinsic values.

Following this clean, aspirational statement of the Institutes' identity, Smith wrote: "Though this would be the simplest course, it is also the most courageous."[81] At the close of World War II

scientists and humanists alike felt that courage was required to face the challenges of a nuclear world. In this sense, the University of Chicago's educational reforms and approach to funding science, which were in many ways idiosyncratic and out of step with national trends, were very much of their time.

Contributor Biography

Joseph D. Martin is Assistant Professor of the History of Science and Technology at Durham University. He is the author of *Solid State Insurrection: How the Science of Substance Made American Physics Matter* (Pittsburgh, 2018). Durham University, Department of History, 43 North Bailey, Durham, DH1 3EX, United Kingdom; joseph.d.martin@durham.ac.uk.

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[1] Quoted in Robert M. Hutchins, letter to members of the Committee on Development of the Board of Trustees, 3 March 1937, University of Chicago, Office of the President, Hutchins

Administration Records (hereafter HAR), University of Chicago Special Collections Research Center (hereafter UCSC), Box 57, Folder 6.

[2] Guy Martin and Arthur Feltes, confidential report of an interview with Mr. Leonard Smith, Acting Director of Utilization Research, National Cotton Council of America, Washington, DC, 19 August 1948, University of Chicago. Division of Physical Sciences Records, UCSC (hereafter DPSR), Box 8, Folder 15.

[3] Martin and Feltes, interview with Smith.

[4] For a focused treatment of the Institute for Radiobiology and Biophysics, and biophysics at the University of Chicago, see Phillip R. Sloan, "Molecularizing Chicago—1945–1965: The Rise, Fall, and Rebirth of the University of Chicago Biophysics Program," *Historical Studies in the Natural Sciences*, 2014, *44*:364–412. On the early days of the Institute for Nuclear Studies, see Matthew Shindell, "From the End of the World to the Age of the Earth: The Cold War Development of Isotope Geochemistry at the University of Chicago," in Naomi Oreskes and John Krige, eds., *Science and Technology in the Global Cold War* (Cambridge, M.A.: MIT Press, 2014), on pp. 107–139.

[5] Eyewitnesses describe the scene as tense and solemn, but report that "a quiet ripple of applause" did punctuate Chicago Pile 1's success. Corbin Allardice and Edward R. Trapnell, "The First Pile," U.S. Atomic Energy Commission, TID-292, 13 December 1949.

[6] Stuart W. Leslie refers to this alignment as the "golden triangle." Stuart W. Leslie, *The Cold War and American Science: The Military-Industrial-Academic Complex at MIT and Stanford* (New York: Columbia Univ. Press, 1993).

[7] The foundations and proliferation of the center model are explored in Cyrus C. M. Mody and Hyungsub Choi, "From Materials Science to Nanotechnology: Interdisciplinary Center Programs at Cornell University, 1960–2000," *Historical Studies in the Natural Sciences*, 2013, *43*:121–161.

[8] See esp.: Paul Forman, "Behind Quantum Electronics: National Security as Basis for Physical Research in the United States, 1940–1960," *Historical Studies in the Physical and Biological Sciences*, 1987, *18*:149–229; Leslie, *Cold War and American Science*; Rebecca Lowen, *Creating the Cold War University* (Berkeley: Univ. California Press, 1997); and Rebecca Slayton, "From a 'Dead Albatross' to Lincoln Labs: Applied Research and the Making of a Normal Cold War University," *Historical Studies in the Natural Sciences*, 2012, *42*:255–282.

[9] Leslie, *Cold War and American Science*; Lowen, *Creating the Cold War University*; David Kaiser, ed., *Becoming MIT: Moments of Decision* (Cambridge, M.A.: MIT Press, 2010).

[10] Dewey's influence on American higher education is explored in Andrew Jewett, *Science, Democracy, and the American University: From the Civil War to the Cold War* (Cambridge, M.A.: Harvard Univ. Press, 2012).

[11] See John R. Thelin, *A History of American Higher Education*, 2nd ed. (Baltimore: Johns Hopkins Univ. Press, 2019), ch. 7.

[12] Historians of the Cold War social sciences have explored the implications of this point the most extensively. See: Mark Solovey, *Shaky Foundations: The Politics-Patronage-Social Science Nexus in Cold War America* (New Brunswick, N.J.: Rutgers Univ. Press, 2013), and "Project Camelot and the 1960s Epistemological Revolution: Rethinking the Politics–Patronage–Social Science Nexus," *Social Studies of Science*, 2001, *31*:171–206; Hunter Heyck, *Age of System: Understanding the Development of Modern Social Science* (Baltimore: Johns Hopkins Univ. Press, 2015), esp. ch. 2, and

Hunter Crowther-Heyck, "Patrons of the Revolution: Ideals and Institutions in Postwar Behavioral Science," *Isis*, 2006, *97*:420–446; Joy Rohde, *Armed with Expertise: The Militarization of American Social Research during the Cold War* (Ithaca, N.Y.: Cornell Univ. Press, 2013), and "Gray Matters: Social Scientists, Military Patronage, and Democracy in the Cold War," *Journal of American History* 2009, *96*:99–122.

[13] See David Edgerton, "Time, Money, History," *Isis*, 2012, *103*:316–327, and Casper Andersen, Jakob Bek-Thomsen, and Peter C. Kjærgaard, "The Money Trail: A New Historiography for Networks, Patronage, and Scientific Careers," *Isis*, 2012, *103*:310–315.

[14] Chicago was naturally not the only university to value basic research, but the immediacy and virulence of its basic research ideology sets it apart from its peers. Slayton, "From a 'Dead Albatross,'" pp. 281–282, for example, discusses the influence of basic research ideals at MIT, but notes that they had to find a "neurotic" equilibrium with MIT's efforts to capitalize on government resources and frame research programs to complement to industrial objectives.

[15] The cultural gulf between academic and industrial scientists is explored in Steven Shapin, *The Scientific Life: A Moral History of a Late Modern Vocation* (Chicago: Univ. Chicago Press, 2008).

[16] Adler's influence on Hutchins is explored in detail by Hutchins's biographer: Harry S. Ashmore, *Unseasonable Truths: The Life of Robert Maynard Hutchins* (New York: Little, Brown & Co., 1989).

[17] Robin Lester, *Stagg's University: The Rise, Decline, and Fall of Big-Time Football at Chicago* (Urbana: Univ. Illinois Press, 1999).

[18] Both William McNeill and Robin Lester point to Chicago's prowess in the 1920s as key to the professionalization of football programs at other campuses and the accompanying centrality of the sport to student life and alumni identity. Chicago, however, quickly fell behind when it proved

unwilling to relax its academic standards for the sake of fielding a competitive team. William H. McNeill, *Hutchins' University: A Memoir of the University of Chicago* (Chicago: Univ. Chicago Press, 1991); Lester, *Stagg's University*.

[19] Quoted in Harry S. Ashmore, "Introduction," in Robert Maynard Hutchins, *The Higher Learning in America*, 4th printing (1936; New Brunswick, N.J.: Transaction Publishers, 2009), on p. x.

[20] Larry Owens, "Pure and Sound Government: Laboratories, Playing Fields, and Gymnasia in the Nineteenth-Century Search for Order," *Isis*, 1985, 76:182–194, considers the attitudes that shaped the post–Civil War growth of collegiate athletics and physical education. For a discussion of the mind-body ideal at the University of Cambridge in the 1800s see Andrew Warwick, "Exercising the Student Body: Mathematics, Manliness, and Athleticism," in *Masters of Theory: Cambridge and the Rise of Mathematical Physics* (Chicago: Univ. Chicago Press, 2005), on pp. 176–226.

[21] Robert Maynard Hutchins, "Gate Receipts and Glory," *The Saturday Evening Post*, 3 December 1938, 23. The nod to the Duke of Wellington references a remark attributed to Arthur Wellesley, the 1st Duke of Wellington, to the effect that the Battle of Waterloo was won on Eton's playing fields. The story, likely apocryphal, was commonly invoked in the late nineteenth and early twentieth centuries by defenders of school sport as a source of manly virtue.

[22] Hutchins, uncowed by the rise of football's popularity after the war, reiterated this point in a 1954 *Sports Illustrated* piece. Robert Maynard Hutchins, "College Football Is an Infernal Nuisance," *Sports Illustrated*, 18 October 1954.

[23] These remarks, read by Jerome Nathanson on Dewey's behalf before the Conference on the Scientific Spirit and Democratic Faith at the Society for Ethical Culture in New York, were quoted in "Educators Attack Hutchins Theories," *The New York Times,* 28 May 1944, on p. 35.

[24] Robert Maynard Hutchins, *The Higher Learning in America* (New Haven: Yale Univ. Press, 1936).

[25] Thorstein Veblen, *The Higher Learning in America* (New York: B. W. Huebsch, 1918), on p. 224.

[26] Hutchins, *Higher Learning*, on pp. 4–5.

[27] This innovation did not last, in part because of the stigma of a two-year degree attached itself to Chicago graduates. In the 1940s, the College returned to a four-year BA.

[28] For a personal account of the undergraduate environment at Chicago under the Hutchins administration see McNeill, *Hutchins' University*.

[29] For a discussion of Erskine's formulation of the Great Books course see Katherine Elise Chaddock, *The Multi-Talented Mr. Erskine: Shaping Mass Culture through Great Books and Fine Music* (New York: Palgrave Macmillan, 2012).

[30] Hutchins, *Higher Learning*, on p. 89.

[31] Robert Maynard Hutchins, *The University of Utopia* (Chicago: Univ. Chicago Press, 1953), on p. 25. This volume reprinted the text of four lectures Hutchins delivered in the spring of 1953.

[32] Robert M. Hutchins, "Science, Scientists, and Politics," in Robert M. Hutchins, Scott Buchanan, Donald N. Michael, Chalmers Sherwin, James Real, and Lynn White, Jr., eds., *Science, Scientists, and Politics: An Occasional Paper on the Role of Science and Technology in the Free Society* (Santa Barbara, C.A.: Center for the Study of Democratic Institutions, 1963), on pp. 1–4.

[33] The name was chosen both as an act of camouflage, and as a reference to the longtime desire among some physical sciences faculty to establish a laboratory devoted to physical metallurgy.

[34] Robert M. Hutchins, "Atomic Force: Its Meaning for Mankind," in *The University of Chicago Round Table: America in the Atomic Age*, Special Twentieth Anniversary Pamphlet, February 1931 to February 1951, on p. 4.

[35] Hutchins, "American in the Atomic Age," on p. 11. After the war, Hutchins became an advocate of a world government charged with controlling atomic energy and joined an effort to frame a world constitution. His views were influential. William Benton, a Democratic Senator from Connecticut, for instance, entered his remarks from the Chicago Round Table into the Congressional Record. "American and the Atomic Age: Extension of Remarks of Hon. William Benton," 82nd Cong., 1st sess., *Congressional Record* 97, pt. 12: A1664–A1671.

[36] The positivist philosopher and charter member of the Vienna Circle Rudolf Carnap joined the Chicago faculty in 1936.

[37] "Tasks Ahead: Draft of an Illustrated Brochure Addressed to the Public," 1 August 1946, HAR, Box 67, Folder 3.

[38] "Chicago: Scientific Center of the World," *Chicago Daily Tribune*, 13 August 1945, on p. 12.

[39] Robert Maynard Hutchins, letter to Leslie Groves, 3 October 1945, DPSR, Box 3, Folder 3.

[40] *Tribune*, "Chicago: Scientific Center," on p. 12.

[41] Leslie Groves, letter to Robert Maynard Hutchins, 23 August 1945, DPSR, Box 3, Folder 3.

[42] Robert Maynard Hutchins, letter to Leslie Groves, 3 October 1945, DPSR, Box 3, Folder 3.

[43] Leslie Groves, letter to Robert Maynard Hutchins, 24 October 1945, DPSR, Box 3, Folder 3.

[44] Walter Bartky, Division of Physical Sciences Memorandum, 1946, DPSR, Box 5, Folder 1.

[45] On the effects of anti-nepotism rules on women's scientific careers, see Margaret Rossiter, *Women Scientists in America*, vol. 2, *Before Affirmative Action, 1940–1972* (Baltimore: Johns Hopkins Univ. Press, 1995), ch. 6.

[46] William H. Zachariasen, letter to Walter Bartky, 9 November 1945, DPSR, Box 5, Folder 1.

[47] William H. Zachariasen, letter to Walter Bartky, 9 November 1945, DPSR, Box 5, Folder 1.

[48] Barney Brantingham, "The Mystery of the *Marie*," *Santa Barbara Independent*, 10 June 2010 <https://www.independent.com/2010/06/10/mystery-marie/> (accessed 9 October 2019). Because of the classified nature of Raytheon's research, reportedly testing underwater communications using infrared frequencies, few details of the accident have emerged. Beardsley's body was never recovered.

[49] Thorfin Hogness, confidential report of an interview with Edwin H. Brown, Vice President, Allis Chambers Manufacturing Group, et al., Chicago, IL, 13 February 1948, DPSR, Box 8, Folder 16.

[50] "Research in Atomic Structure and Energy at the University of Chicago," June 1946, DPSR, Box 3, Folder 4, on p. 29.

[51] Officially titled "Report of the Committee on Political and Social Problems," the Franck Report was reprinted, with some redactions, as "A Report to the Secretary of War," *Bulletin of the Atomic Scientists*, 1 May 1946, *1*:2–4. An unredacted version of the report, and commentary on the same, can be found in Alex Wellerstein, "The Uncensored Franck Report (1945–1946)," Restricted Data: The Nuclear Secrecy Blog, http://blog.nuclearsecrecy.com/2012/01/11/weekly-document-9-the-uncensored-franck-report-1945-1946/ (accessed 4 February 2020).

[52] Board of Trustees Minutes, Vol. 35, UCSC, on p. 138.

[53] Cyril Stanley Smith, ISM memo, 4 March 1946, DPSR, Box 3, Folder 5.

[54] Cyril Stanley Smith, letter to Robert M. Hutchins, 11 September 1947, HAR, Box 90, Folder 10.

[55] "Chicago Committee for Civilian Control of Atomic Energy Statement of Purpose," Robert M. Hutchins Papers, UCSC, Box 81, Folder 4.

[56] Helen Anne Curry, "Atoms in Agriculture," *Historical Studies in the Natural Sciences*, 2016, 46:119–153; *Evolution Made to Order: Plant Breeding and Technological Innovation in Twentieth Century America* (Univ. Chicago Press, 2016), esp. pt. 3; and Angela N. H. Creager, *Life Atomic: A History of Radioisotopes in Science and Medicine* (Univ. Chicago Press, 2013), esp. ch. 6, document enthusiasm for nuclear research in industrial circles in the Cold War, especially relating to agricultural applications.

[57] "Research in Atomic Structure and Energy at the University of Chicago," DPSR, Box 3, Folder 4, on pp. 30–31.

[58] The university's affiliation with the Baptist church was short lived. The denomination differed sharply with William Rainey Harper, the university's first president, over his liberal approach to biblical exegesis and cut ties. The university subsequently developed a closer relationship with John D. Rockefeller. For a concise summary of the university's early years see: McNeill, *Hutchins' University*.

[59] Quoted in Hutchins, Letter to Committee on Development.

[60] Quoted in Hutchins, Letter to Committee on Development.

[61] "Survey, Analysis and Plan of Fund-Raising for the University of Chicago," HAR, Box 68, Folder 9.

[62] Robert M. Hutchins and Thorfin Hogness, confidential report of an interview with Vincent Riggio, President, American Tobacco Company, New York City, 7 October 1948, DPSR, Box 8, Folder 15.

[63] American Tobacco's reasons for joining the Institutes are unclear. They never sent a representative to the annual meetings for industrial members. The timing, however, does coincide

with blossoming awareness within the tobacco industry of the connection between tobacco and lung cancer. It is a reasonable conjecture that American Tobacco saw value in keeping tabs on any research that might expose that link. Robert Proctor discusses American Tobacco's efforts to monitor the research community in *Golden Holocaust: Origins of the Cigarette Catastrophe and the Case for Abolition* (Berkeley: Univ. California Press, 2011).

[64] Robert M. Hutchins and Thorfin Hogness, confidential report of an interview with R. M. Shultz, Vice President, National Biscuit Company, New York City, 30 June 1948, DPSR, Box 8, Folder 16.

[65] Filby, Smith, Lawson, Burke, and Huck, confidential report of an interview with Dr. Anson Hayes and Mr. T. F. Olt of the Armco Steel Corporation, 11 October 1948, DPSR, Box 8, Folder 15.

[66] Thorfin Hogness and staff, confidential report of an interview with Edward R. Gay, Vice President, St. Regis Paper Company, University Campus, 13 May 1948, DPSR, Box 8, Folder 16.

[67] H. B. Higgins, letter to Lynn A. Williams, 29 June 1948, Harold H. Swift Papers, UCSC, Box 171, Folder 1.

[68] Dr. Camille Dreyfus (Chairman), letter to Lynn A. Williams, 24 June 1948, Harold H. Swift Papers, UCSC, Box 171, Folder 1.

[69] The full membership list as of 1950 was: Standard Oil of New Jersey, DuPont, US Steel, Standard Oil of Indiana, Union Carbide, Shell Oil, Bethlehem Steel, International Harvester, Westinghouse, American Tobacco, Proctor & Gamble, Aluminum Company of America, Celanese Corporation of America, Goodyear, Inland Steel, Pittsburgh Plate Glass Company, Sun Oil, Crane, Reynolds Consumer Products, Beechnut Packing Company, Fairchild Air Force Base,

Edison, the Lilly Endowment, and the Copper and Brass Research Association. Theodore M. Switz, "Prospects for Increasing Institute Income," 31 March 1950, HAR, Box 181, Folder 1.

[70] University of Chicago Board of Trustees Minutes, UCSC, vol. 43, on p. 203.

[71] Mody and Choi, "From Materials Science to Nanotechnology."

[72] Arthur von Hippel, "Universities in Transition," Technical Report 132, Laboratory for Insulation Research, MIT, December 1958, John C. Slater Papers, American Philosophical Society, Philadelphia, PA, Folder MIT. Dept. of Physics #14.

[73] Von Hippel, "Universities in Transition."

[74] See Joseph D. Martin, *Solid State Insurrection: How the Science of Substance Made American Physics Matter* (Pittsburgh: Univ. Pittsburgh Press, 2018).

[75] Robert E. Kohler, *Partners in Science: Foundations and Natural Scientists, 1900–1945* (Chicago: Univ. Chicago Press, 1991).

[76] Christophe Lecuyer, "The Making of a Science Based Technological University: Karl Compton, James Killian, and the Reform of MIT, 1930–1957," *Historical Studies in the Physical and Biological Sciences*, 1992, *23*:153–180; W. Patrick McCray, "Project Vista, Caltech, and the Dilemmas of Lee DuBridge," *Historical Studies in the Physical and Biological Sciences*, 2004, *34*:339–270.

[77] Joseph D. Martin, "The Peaceful Atom Comes to Campus," *Physics Today*, February 2016, *69*:40–46; "Nuclearity in the Age of Invincible Surmise: Optimism and Agency in the Michigan Memorial–Phoenix Project," *Historical Studies in the Natural Sciences* (forthcoming).

[78] Minutes of the Meeting of the Board of Directors, Purdue Research Foundation, 12 May 1942, Purdue Research Foundation Records, Purdue University Archives, UA 5, Box 2.

[79] J. Merton England, *A Patron for Pure Science: The National Science Foundation's Formative Years, 1945–1957* (Washington, D.C.: National Science Foundation, 1982).

[80] On the triumph of "best-science elitism" in federal science funding after World War II, see Daniel J. Kevles, *The Physicists: The History of a Scientific Community in America*, rev. ed. (Cambridge, M.A.: Harvard Univ. Press, 1995), esp. chs. 21–22.

[81] Cyril Stanley Smith, letter to Walter Bartky, 4 December 1950, HAR, Box 90, Folder 10.