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Basic Science and the Coproduction of American Hegemony

If we were a true empire, we would currently preside over a much greater piece of the earth's surface than we do. That's not the way we operate.
Vice President Dick Cheney, Davos, Switzerland, January 24, 2004

"The premise of this essay is that, given the basic inequality of resources [between the United States and Europe] after World War II, it would have been very difficult for any system of economic linkages or military alliance not to have generated an international structure analogous to empire. Hegemony was in the cards, which is not to say that Americans did not enjoy exercising it (once they had resolved to pay for it)."[1] Thus wrote Harvard historian of political economy Charles Maier in the late 1980s. For historians of science and technology his premise is striking, as it reveals the gulf between what diplomatic and economic historians take for granted about the capacity and behavior of the United States to build a world order aligned with its interests and our approach to such an issue (when it occurs to historians of science at all).[2] For there was not simply an imbalance in economic and military strength between the two sides of the Atlantic in 1945; there was also an imbalance in scientific and technological capability. The immense scientific and technological achievements in the United States during the war and the ongoing support for research in the country after 1945 contrasted sharply with the situation in postwar Europe. There, laboratories were ill-equipped, destroyed, pillaged, and (in the case of Germany) strictly controlled; researchers were poor, cold, hungry, and demoralized; and national governments had far more pressing concerns than scientific (and technological) reconstruction. The United States was not simply the mightiest

economic and military power in 1945; it was also the mightiest scientific (and technological) power. Given the "basic inequality of resources" for science between the two sides of the Atlantic (and indeed globally), is it not to be expected that any system of U.S.-European scientific and technological linkages established after the war were also part and parcel of an "international structure analogous to empire"? Were those in the United States who wanted to "reconstruct" or "rehabilitate" European science not also engaged in the American hegemonic enterprise? Should historians of science not also take it for granted, as Maier did, that American hegemony structured the rebuilding of scientific capabilities and institutions in Western Europe, just as it did the economic and military spheres? In this book I argue that in science too an enfeebled Europe became enrolled in a hegemonic postwar American project—and tease out "the degree to which the U.S. ascendancy allowed scope for European autonomy."[3]

The place of science in U.S. foreign relations has only recently begun to attract the attention of historians of science.[4] Much work has been done on the multifarious bonds that were established between science, notably physics, and the American state during and after World War II. We have detailed studies of how scientists and their laboratories were enrolled in the apparatus of the national security system as researchers, advisors, policymakers, and intelligence gatherers, making fundamental contributions to the consolidation of U.S. power in the postwar period and during the Cold War. We know a good deal about the role that scientists played in projecting that power abroad in line with aims of U.S. foreign policy, particularly in relationships with the Soviet Union.[5] This history, dominated as it was by superpower rivalry, largely ignores Western Europe, and indeed the rest of the world. Moreover, the intellectual framework that it provides for thinking about the relationship between science and foreign policy ignores the asymmetry of power in which it was embedded. Ronald Doel points out that, particularly after 1945, "international science" was used "as a vehicle to promote American values and interests in the post-war world."[6] Similarly, diplomatic historian Joseph Manzione tells us, "The United States shared science to strengthen the Western alliance against Communism and to preserve technical and scientific preeminence. It shared science to support doctri-

nal arguments about the superiority of liberal capitalism and democracy over Marxism-Leninism."[7] Doel and Manzione recognize that if internationalism could serve these purposes after the war, if it came to mean something more than simply the circulation of knowledge and ideas within the scientific community itself, it was partly because science had become an affair of state. But they do not emphasize sufficiently that internationalism could only be an effective instrument of foreign policy because of the massive scientific and technological imbalance in favor of the United States vis-à-vis its allies. Combining scientific advantage with economic and political leverage, scientific statesmen, officials in the U.S. administration, and officers in organizations like the Ford and Rockefeller foundations did more than simply "share" science or "promote" American values abroad; they tried to *reconfigure* the European scientific landscape, and to build an Atlantic community with common practices and values under U.S. leadership.

This book is not simply about science and foreign policy, then, but about how science was embedded in, and instrumentalized for, the projection of American power in postwar continental Europe. More specifically, it is about how, in the first decade or two after 1945, the United States attempted to use its scientific and technological leadership, in conjunction with its economic, military, and industrial strength, to shape the research agendas, the institutions, and the allegiances of scientists in Western Europe in line with U.S. scientific, political, and ideological interests in the region.[8]

This chapter has two purposes. First, I introduce the notion of hegemony as used by economic and diplomatic historians to theorize U.S.-European relations in the postwar era.[9] Second, I suggest that basic science, or fundamental research, was the key node articulating American hegemony with the postwar reconstruction of science in Europe. The coupling of science and foreign policy was symptomatic of the new role that science, and basic science in particular, had in the postwar period, and of its presumed significance to economic growth, industrial strength, and national security. In the remainder of the book, I fill out that claim through a series of case studies that follow one another in roughly chronological order and that demonstrate how U.S. scientific statesmen, policymakers, and foundations, in collaboration with elites abroad, tried

to rebuild European science to reflect U.S. concerns in the early years of the Cold War.

The Coproduction of Hegemony

The concepts of hegemony and empire as developed by diplomatic and political historians are not bound by notions of territorial acquisition or local rule, hallmarks of the "formal" empires imposed by Europeans on much of the world from the fifteenth to the nineteenth centuries. Tony Judt, for example, deems it "irrelevant" (historically) that the United States "eschews territorial acquisitions." Like the British at the height of their imperial reign, the United States today "prefers to get its way by example, pressure and influence"—even if that does not always suffice.[10] In similar vein, John Lewis Gaddis defines empire as "a situation in which a single state shapes the behavior of others, whether directly or indirectly, partially or completely, by means that can range from the outright use of force through intimidation, dependency, inducements, and even inspiration."[11] Tracing the origins of this strategy back to John Quincy Adams in the nineteenth century, Gaddis remarks that since Adams's day the United States has sought to maintain a preponderance of power (the term is Leffler's)[12] as distinct from a balance of power, then on a continental, now on a global, scale.[13]

The construction of an "informal" American empire in Western Europe after the Second World War was undertaken in collusion and in collaboration with sympathetic elites on the Continent, and with a large measure of mass support. By and large the United States did not use force to impose its methods of industrial production and management, its economic system, its political preferences and models, its military ambitions, or its cultural products on supine European peoples who were too demoralized and disoriented to do anything but accept them (even if Washington sometimes toyed with the idea of armed intervention). Indeed, European leaders who shared the United States' political and ideological objectives asked, at times even begged, the country to remain involved, to be a major economic, political, and military presence. The American empire that emerged was the negotiated outcome of a complex process in which European partners selectively appropriated and

adapted features of the U.S. agenda and ambitions for the Continent and made them their own.[14] As Tony Smith points out, "Indirect imperialism of the American sort can only be effective when foreign peoples lend themselves root and branch, and for their own reasons, to the design of the imperial center."[15] To consolidate a liberal, democratic, capitalist regime abroad by resorting as little as possible to the use of force required a transnational elite that linked U.S. policymakers with a "team of partners" in Western Europe whose members "quickly became convinced that their countries' interests, and perhaps their own political fortunes, were best served by alignment in the new field of U.S. strength."[16] It is by virtue of that "alignment" that the United States "perfected the art of controlling foreign countries and their resources without going to the expense of actually owning them or ruling their subjects," as the British and other European powers previously had to do.[17] The specificity of American foreign policy is to be sought in the repertoire of instruments other than territorial expansion and direct subjugation that the United States could use to achieve influence and control after World War II—not in the illusory view that the United States, albeit a great power, "doesn't do empire."[18]

Building an informal (or "quasi") empire by consensus involves a gamble.[19] By eschewing force, and by resorting to threat and blackmail as a last resort, the United States accepted that it could not determine the course of postwar European reconstruction. It could only hope to shape its general trajectory and physiognomy in line with U.S. interests. And therein lay its strength. Europeans' relative freedom of action under the American umbrella, Maier writes, "did not weaken Washington's policies. On the contrary, it allowed the U.S. actions to seem less dominating and less constraining and thus probably made for a more broadly accepted policy. Precisely this possibility for national divergence made American policies more supple and more attractive than they might otherwise have been."[20] The United States, having left centrist European leaders the space to determine their own destiny, aided and abetted by Washington, constructed an "empire by consent,"[21] founded on "consensual hegemony,"[22] that is, a hegemony that was coproduced.[23]

The term *coproduction* is familiar to the science studies community.[24] It is covalent with Maier's consensual hegemony, but goes beyond that

term in drawing attention to the creativity of both partners and to the relative plasticity of U.S. policymakers. Coproduction also signals that the United States gave Europeans room to leave their imprint on the hegemonic regime and implies that empire building is a fluid process. As Ann Stoler stresses, imperial formations are states of becoming rather than ready-made, rounded, bounded objects; they are founded on ambitions that trade on fuzziness, ambiguity, and confusion.[25] These nuances are crucial, in my view, not simply because they permit us to grasp better the flow of historical events that I describe in subsequent chapters, but also because they add depth to the brief discussion of the "Americanization" of European science in the final chapter.

The postwar coproduction of an American empire cohered with a Wilsonian view of America's global role in the twentieth century. Its dominant leitmotiv was, in Woodrow Wilson's own words, "to make the world safe for democracy."[26] The view of American exceptionalism—the idea that the United States had a unique role and mission in history and that America's interests were not narrow and parochial but embodied the interests of all—predated Wilson himself. For two or three centuries those who built the New World believed that they were creating a "model, a light shining out to a wretched globe and inspiring it to lift itself up."[27] For them, though, that model would be diffused best by example, not by imposition or proactive promotion. World War II and its aftermath changed that. First German militarism and then the conviction that Soviet Communism was bent on world domination led to the view that the nation's security lay in the expansion of democracy worldwide. Now the United States could not simply watch "failed states" stumble along without leadership. Now economic misery, industrial backwardness, and political instability threatened to create a vacuum that could be filled by forces hostile to democracy and to the global vision that inspired America's leaders. As cooperation with Stalin's Soviet Union gave way to confrontation, and to the Manichean division of the world into two rival political and ideological systems, faith in the United Nations as an instrument for managing the new world order collapsed. Convinced that there was "a clear and present danger to national security,"[28] the United States took it upon itself to make the world safe for democracy. It decided to use "the nation's great power actively and often very aggres-

sively to spread the American model to other nations, at times through relatively benign encouragement, at other times through pressure and coercion, but almost always with a fervent and active intent."[29]

The idealistic fervor that inspired American interventionism is not to be underestimated. Robert Kagan correlates it with the determination to hold totalitarian expansion at bay:

> After Munich, after Pearl Harbor, and the onset of the Cold War, Americans increasingly embraced the conviction that their own well-being depended fundamentally on the well-being of others, that American prosperity could not occur in the absence of global prosperity, that American national security was impossible without a broad measure of international security. This was the doctrine of self-interest, but it was the most enlightened kind of self-interest—to the point where it was at times almost indistinguishable from idealism.[30]

The justification for "internationalism" thus lay not simply in the overwhelming military and economic power that the United States had at its disposal in 1945, though that obviously facilitated matters. It was inspired by a definition of America's mission and identity that was deliberately crafted, a definition with moralistic and evangelical overtones that had deep roots in the American psyche, a definition that identified the United States with freedom in a world menaced by totalitarianism. As Henry Luce, the founder and editor/publisher of *Time*, *Fortune,* and *Life* magazines and author of a classic book on the "American century" (1941), explained, "If we had to choose one word out of the whole vocabulary of human experience to associate with America—surely it would not be hard to choose that word. For surely the word is Freedom. . . . Without Freedom, America is untranslatable."[31] The American empire was built to defend national security by promoting democracy and resisting tyranny, and that noble mission implied that it must protect not only narrow U.S. interests but also the interests of all "free men." America shouldered the burden of world leadership not simply, or even predominantly, because it was a major power intent on defending itself from attack and maintaining world superiority. It did so because its global vision embodied the protection at home, and the promotion, or imposition, abroad, of "universal" "freedoms" that were exemplified in U.S. policies and practices and in the daily lives of the American people. As Dean Acheson, Harry Truman's Under Secretary of State, put it, "For the United States to take steps to strengthen countries threatened with

Soviet aggression or communist subversion . . . was to protect the security of the United States—it was to protect freedom itself."[32]

The evangelical idealism that infuses much of American thinking about its role in the world cuts across political party lines. Both Democratic and Republican presidents have seen the United States as unlike all other hegemons, as a nation that wields its power benignly and in the common good. If they differ at all, it is only in hyperbole. Jimmy Carter, suggesting that good governance was based on "ethics, honesty and morality," not Realpolitik, went on to affirm that, accordingly, "there is only one nation in the world which is capable of true leadership among the community of nations and that is the United States of America." Ronald Reagan felt that it was an "undeniable truth that America remains the greatest force for peace anywhere in the world today." In 2002 George W. Bush described America as "the greatest force for good in history."[33]

If the claim that the United States is a benign hegemon making the world safe for democracy is repeated so persistently and with crusading zeal by U.S. leaders, it is also because there is an underlying fear that democracies, free markets, and liberal values would be undermined unless their scope was constantly expanded. As Federico Romero puts it, "A positive confidence in the global reach of modernity is thus intertwined with a keen perception of its fragility, and therefore with a globalist notion of American security, interest and prosperity. . . . As on a bicycle, one either moves forward or collapses."[34] The fragility that stalks the American project arises from a lack of consensus, both at home and abroad, on the universal applicability of the model so avidly promoted by U.S. leaders. The identification of freedom with quintessentially American freedoms, the conviction that the American way is the one best way to organize civil society, and the belief that the United States has a moral obligation to build an empire enshrining its values, these tenets of foreign policy have been repeatedly contested by friend and foe alike. What is more, the soporific effects of the idealism and evangelistic zeal of those who promote them have left the same people bemused and confused when, as has happened so often, U.S. motives were distrusted and the country's claims to be acting in the general interest were dismissed as mere rhetoric. For those who were skeptical of U.S. motives, making the

world safe for democracy simply meant protecting social divisions and hierarchies at home and promoting narrow American interests abroad. "As a combination of high-noon sheriff and proselytizing missionary," writes Stanley Hoffmann, "the United States expects gratitude and affection. It was bound to be disappointed."[35]

The coproduction of hegemony has to be understood in this context. To speak of consensual hegemony is not to imply that the construction of a postwar order in Europe that the United States found acceptable was uncontested. America's was after all a hegemonic project that aimed to implant a particular set of practices and values among people who sometimes refused them. Consensus had to be won, and sometimes it was brokered against a backdrop of deep local and national divisions. In other words, consensual hegemony implies only that an influential fraction of a local elite, supplemented by U.S. overt and covert support, and operating in a particular local constellation of the balance of forces, was able to impose its vision of what kind of society should be built in continental Europe after the war. The consensus was circumscribed, and it needed to be consolidated if it was to endure. The intellectual fascination of the notion of coproduced hegemony, then, does not lie in using it as a blunt instrument to label the way in which the United States projected its power abroad in collaboration with local elites who shared its values. It lies rather in identifying the general parameters within which the United States tried to steer Western Europe, in exploring the relative plasticity in U.S. policymaking that empowered Europeans to adopt and reinterpret the United States' aims and ambitions, adjusting them to suit local conditions, and in unraveling the complex mechanisms by which a European life-world was built that was increasingly permeated with U.S. influence.

Hegemony and Basic Science

Hegemony is not a force that is deployed and that determines or dictates outcomes. The American empire, Maier reminds us, generally implied "power to" rather "power over."[36] Hegemony is a capacity, a state of being, a preponderance of power. It permits one, when one wishes, to intervene from a position of strength and to try to influence the course of events along lines of one's choosing. It requires instruments to achieve its

objectives and pressure points where they can be applied. Political support and scientific legitimation, supplemented by money for grants, fellowships, and training programs, were the main instruments used by the United States to reconfigure European science after the war. Basic research was the main pressure point to which they were applied. Of course, the distinction between basic and applied science was blurred, notably in a postwar techno-scientific world, in which so much basic research was funded by, and enrolled into, "applied," or "mission-oriented," research agendas. All the same, the distinction was imperative for key scientists and policymakers engaged in the American hegemonic enterprise on the Continent. Those who believed that it was important for the United States to help "rehabilitate" European science did not want to contribute directly to applied research, notably research that was evidently coupled to military rearmament, and above all to the acquisition of a nuclear capability. This was as true regarding a defeated country like Germany as for an ally like France: the fear of a resurgent nationalism and militarism in one was matched by the fear of a newly legitimated Communism, and then of a militantly independent Gaullism, in the other. To support science in Europe it was therefore essential to operationally distinguish between basic and applied research even though everyone knew that the one was inextricably interwoven with the other.

Supporting basic science through grants, fellowships, and education and training programs had several advantages. I mention just a few of the most important at this stage; others will emerge as the narrative unfolds. First, one could capitalize on the tradition of scientific internationalism to enroll national scientific elites on both sides of the Atlantic in the project of postwar European reconstruction. "Internationalism" was intrinsic to the scientific ethos, and international scientific exchange and collaboration was a well-established mode of communication between scientists in different countries. It was an already existing tissue of social relations that could be mobilized as an instrument of foreign policy since it encouraged the circulation of people and ideas in nonclassified areas of research. The Europeans welcomed international scientific exchange, for it helped them close the gap, not to say chasm, in fundamental scientific knowledge that had opened up between the two sides of

the Atlantic after the war. The Americans welcomed it because it enabled them to lend a helping hand to a Europe that was down-and-out scientifically, and for whose scientific tradition they had an immense professional respect.

Basic science could also contribute to European economic growth, social well-being, and, eventually, military strength. This broad social role for science was canonized by Vannevar Bush in his famous *Science—The Endless Frontier,* first released in July 1945. New scientific knowledge, he said in his letter of transmittal to President Roosevelt, was "one essential key to our security as a nation, to our better health, to more jobs, to a higher standard of living, and to our cultural progress." Bush's argument was a contribution to the debate in the United States immediately after the war over the proper relationship between science and the political order.[37] It was enthusiastically embraced both by an American "scientific elite who sought to achieve the permanent support for science that they had been trying to garner since the middle of the nineteenth century" and by U.S. industry, which increasingly established R&D programs in the postwar period.[38] It was also a popular theme among those concerned with U.S. foreign policy. Strengthening basic science in Europe was essential to the long-term economic prosperity of the Continent, they insisted, and was the only sure antidote to Communism that flourished wherever poverty and social unrest prevailed.

Strengthening basic, unclassified research in Europe could also make an important contribution to the scientific capital, the stockpile of knowledge, of the U.S. scientists. With the reconfiguration of the relationship between the civilian and the military in the United States after the war, it became increasingly important for U.S. scientists, if only in the interest of efficiency, to collaborate with colleagues in friendly nations whose classificatory regimes were less restrictive.[39] The advantage to the United States of access to science produced abroad cannot be overestimated. Security was not an imposition on U.S. scientific laboratories but a constitutive component of the postwar technical order. As Michael Dennis has put it, "Looking at the civilian in postwar America is much like looking at a map of an archipelago composed of discrete islands of civilian life connected by a larger, largely invisible military framework."[40] Peter Galison has attempted to quantify the extent of that hidden infra-

structure. He estimates that the classified universe is now five to ten times larger than the open literature that gets into U.S. libraries. In his equally graphic terms, "The closed world is not a small strongbox in the corner of our collective house of codified and stored knowledge. It is we in the open world—we who study the world lodged in our libraries . . . *we* who are living in a modest information booth facing outwards, our unseeing backs to a vast and classified empire we barely know."[41] Access to basic unclassified research in Europe compensated for the restrictions on publication prevailing in the United States.

International scientific exchange gained further urgency in a postwar world that was dedicated to the elimination of racism, nationalism, and xenophobia in Europe. Science was seen as having a key cultural role to play as a bearer of liberal democratic values. Its epistemological hostility to authority, its putative celebration of organized skepticism, and its critical approach made it an ally in the struggle to de-legitimate and to eliminate authoritarian systems of government.[42] Science and scientists could play a constructive role in combating the twin evils of nationalism and totalitarianism by forging bonds of support and solidarity that cut across political and ideological boundaries. Basic, nonclassified research was an invaluable platform for building a transatlantic scientific community that put the shared pursuit of truth ahead of ideology. It was an apolitical instrument with major political effects: it catalyzed mutual understanding and respect among scientific elites in countries that in some cases had only recently been at war, and so contributed to peace.

For the United States to strengthen science in Europe was not without risks: the more successful the policy, the more Europe threatened to emerge as an independent pole capable of challenging U.S. leadership. To meet that challenge, it was essential to maintain that leadership even as partners abroad gained in strength. In the immediate postwar period, at least, senior officials were reassured that their position was secure by virtue of the immense technological, managerial, and industrial head start that the United States had over Western Europe. Even if major scientific discoveries of economic or military importance were made there, America would be far more capable of taking advantage of them. For example, Lieutenant General Lucius Clay, deputy military governor for the American zone in Germany in 1946, was satisfied that there was no great risk in

making information on "German trade processes and advanced scientific thought" available to U.S. allies. For, as he pointed out, "While we are making this information available to all, our own industrial advancement makes it of greater value to us than to the others."[43] Similarly, U.S. Atomic Energy Commissioners who favored the foreign distribution of radioisotopes for medicinal and research purposes in 1947 reassured a security-conscious Lewis Strauss that they could exploit any scientific findings abroad far more rapidly than the foreign recipients of the isotopes. "With its superior technological potential," they pointed out, "the United States can expect to profit more quickly and more fully than any other nation from the exploitation of published findings" in the field.[44] Put differently, many U.S. policymakers in the postwar period were well aware that there was a middle term in the "linear model" between basic research and applied technological development. They realized that none of the new technologies and products developed during the war "could have emerged without the enormous engineering and manufacturing know-how and capabilities of [U.S.] corporations"[45] Therein lay the country's enduring capacity to maintain its hegemonic regime without resort to force. While basic research would benefit European economic growth and stability, it would also enhance U.S. leadership.

It must be stressed again that European scientists and their governments supported the steps taken in the United States to strengthen basic science on the Continent. They needed to close the gap that separated the two sides of the Atlantic and to become once again able and respected members of the international, that is, U.S.-led, scientific community. Desperately starved of resources, lagging seriously behind the research frontier, and aware of the enormous technological and industrial, economic, and military potential of some fields of science, both scientists and their governments welcomed U.S. support with open arms. If they did not catch up quickly, they would trail behind indefinitely. American hegemony, we have stressed, was thus coproduced. Europeans willingly cooperated in the reconstruction of their scientific capacity: they had little choice, and they were given enough latitude to adapt the American model to local circumstances, or even to reject it altogether.

My argument does not deny that U.S. scientists, science administrators, and foundation officers genuinely wanted to rebuild European

research and were sincere in their wish to reconstruct science in Europe. But it also recognizes that, while the situation that they confronted was distressing, it also provided them with an opportunity. The reconstruction of Europe was a project that they could share in and shape in line with the values they held dear. And they had the means to do it, thanks to the structural asymmetry in power between the United States and the rest of the world. This lead was in the making before the war, accelerated during it, and was consolidated after 1945 by the mobilization of increasingly important financial resources for scientific research and technological innovation in academic, government, and industrial laboratories. The preconditions for American hegemony were there in 1945, and it was exercised in science and technology as it was in the economic, political, industrial, and military spheres.

This book is not "anti-American." My argument is permeated not with hostility to the United States but with a sense of Realpolitik and its meaning in the Cold War.[46] I reject as morally arrogant and self-deceptive that view of American exceptionalism that holds that whereas "other states had interests, the United States had responsibilities": all great powers have both.[47] Accordingly, I refuse to reduce the motives of key American actors who were promoting science in Europe to personal sentiment or to accept that they behaved simply out of "decency" and in the interests of their friends and allies abroad. I argue instead that the United States, through its formal or informal representatives, used its immense power after World War II to pursue not only its political and economic but also its scientific and technological interests in the European theater, working closely with European elites who shared its overall objectives. This is a study in the coproduction of hegemony in the scientific realm in the interests of rebuilding Europe, but also of maintaining U.S. leadership, of promoting "freedom," and of "making the world safe for democracy."