CHAPTER 1

Introduction

In 1960, American scientists were *Time* magazine's "Men of the Year," described as superheroes whose powers and social contributions surpassed those of any other group in human history. The "true 20th century adventurers, the real intellectuals of the day," and the "leaders of mankind's greatest inquiries into life itself," scientists were "statesman and savants, builders and even priests" whose work shaped the "life of every human being on the planet."[1] In 1970, after a decade of criticism from environmentalists, antiwar activists, and members of the counterculture, *The Nation* declared that science had become a "war/space machine." As a result, some citizens had grown "hostile to science, identifying it with war, pollution, and every manner of evil."[2] Philip Abelson, the editor of *Science*, decried the growing "war on scientists," caused, he argued, by unrealistic demands for "relevant" scientific research.[3] Once lauded for their contributions to national security, scientists were now under fire for helping to perpetuate warfare. One of the most interesting aspects of the challenges to the relationship between scientists and the military was that these challenges were not simply waged by "outsiders." Scientists themselves filled the ranks of critics, charging their peers, the government, and industry with a failure to make good on the promise of science to improve human life. Although criticism of science and scientists and doubts about the benefits of technology have a long history in America, by 1970 the criticisms of science and of scientists were more vociferous and diverse than ever before.

Although it is tempting to treat scientists' self-criticism as an aberration, the historical record demonstrates quite the opposite. Throughout the twentieth century, American scientists were involved in varied and visible forms of public political action, especially in efforts against racism and war, often working closely with and inspired by activists who were not scientists. *Disrupting Science* examines the development of scientists' activism against the financial and political relationship between scientists and the military between 1945 and 1975. To do so, the book compares three episodes in which scientists formed organizations that articulated different public political roles for themselves and their peers. In the early 1950s, pacifist scientists formed the Society for Social Responsibility in

Science to convince other scientists to renounce all research that might contribute to war; in the late 1950s, scientists and citizens embroiled in the public debate over the wisdom of above-ground atomic testing developed a method of providing the public with information about the health effects of fallout through the formation of the Committee for Nuclear Information; and in the late 1960s, scientists formed Scientists for Social and Political Action (later known as Scientists and Engineers for Social and Political Action), which eventually came to call itself Science for the People. At first, Science for the People used direct action, public education, and other methods to call attention to and to discourage scientists' association with the military, racism, and sexism. Later, they used a variety of methods to put scientific knowledge into the hands of "the people." Each group represented a different vision of the place of science in public life, shaped by new arrangements between science and the state and by social movements of the day.

Scientists' roles in transforming the political meaning and uses of science raise three puzzles that are the central focus of *Disrupting Science*. Why did scientists engage in activism against the relationship between the military and science, the most radical of which undermined their privileged social position and the ideological foundation of their own work? What forms did their actions take, and why did they differ from one another? How did their efforts simultaneously contribute to buttressing the power of science in American political life and transforming it? The scientists who were involved in these debates grappled with the classical question Max Weber posed in "Science as a Vocation": "What is the value of science?"[4] In more specific form, they asked what the proper relationship between science and politics was and ought to be. None came up with the same answer, but all defined ideals and practices that they believed should govern the normative link between science and public politics.[5]

At the heart of this book are the vibrant efforts of scientists to redefine the relationships between fact and value, between politics and science, and between expert and citizen. Although the most active critics were a small minority of all scientists, they were drawn from many ranks, disciplines, and institutions. Some were highly visible members of prestigious universities and government agencies, and others worked in industry. They ranged in rank from graduate students to Nobel Prize winners. Their strategies for linking—and separating—were equally varied, including the disruption of scientific meetings, letter writing and public speaking, the provision of information to the public, and collaborating with like-minded groups of scientists and other activists. Whatever their tactics, scientists were above all engaged in thoughtful and earnest debates over how to best make good on the promise of science to provide the greatest benefit to the largest number of people. These efforts helped make one of

the most important changes in the place of science in public life in the twentieth century: the authority of *scientists* to make unchallenged claims about nature and about their relationship to public political life, and to mediate the relationship between scientific knowledge and political values, decreased. At the same time, however, the authority of *scientific knowledge* itself increased. In this chapter, I provide an overview of the central arguments in the book and of the structure and content of the chapters to come.

The Military, Science, and Social Movements, 1945–1975

After World War II and increasingly through the 1960s, the idea that science and scientists were uniform forces for progress came under fire. Although criticism of science and scientists and doubts about the benefits of technology have a long history in America, the criticisms during this period were far more vociferous and diverse than ever before. Many were centered around the relationship between scientists and the military. As we will see, those who criticized science drew force from the social movements of the time. Although early challenges took the relatively genteel form of written and verbal debate, by the late 1960s radical critics of scientists and science were targeting the places where scientists worked and lived. They had gone beyond cool professional discourse and cerebral argument to personally identify, ridicule, and in some cases physically attack individual scientists. Some elite scientists fared the worst: jeered and heckled at meetings and forced to walk gauntlets of protestors in front of their homes and workplaces, scientists who considered their military-sponsored research a patriotic act were accused of being as responsible for the war in Vietnam as the generals who directed it. Other critics lambasted scientists for producing racist and sexist research under the guise of scientific objectivity.

That scientists attempted to reorganize their relationships with the public and the state in the period between 1945 and 1975 was not idiosyncratic. Other professionals have organized themselves to include public problems and concerns within their jurisdiction while still leaving a special set of tasks, skills, and responsibilities for themselves. For example, Kristen Luker showed that American physicians in the mid-nineteenth century removed women from decision making about abortion to establish their own professional jurisdiction.[6] Other professionals have taken on new research subjects as a result of their engagement with public political debates, as Lily Hoffman demonstrated in her study of the mobilization of physicians and urban planners in the 1970s, and Scott Frickel has shown in his study of the formation of the field of environmental

toxicology.[7] Still other professions have expanded their jurisdictions to include service to new groups, as Christian Smith's study of the development of liberation theology among Central American Catholic priests and nuns showed.[8] More generally, in the late 1960s, professionals in most Western countries were rethinking their relationships with public political issues and considering how to better use their skills and authority to address immediate social and political concerns.

Before World War II, American scientists were no strangers to political engagement, of course. Engineers in the early twentieth century organized and advocated for "social responsibility" among their peers. In the late 1920s, some scientists who favored teaching evolution over creationism lectured and published to advocate using evolutionary theory and science as a basis for personal and public morality. Many eugenics scientists were active members of a broad movement to "purify" the American "race," working closely with politicians and citizen groups around the nation.[9] In the 1930s, scientists organized groups to fight fascism and racism and to seek ways to use science to end poverty and war.[10]

Yet the mid-twentieth century presents a special case. Some scientists wanted to continue with some of their prewar political activities and, more broadly, to develop a New Deal–style system for science funding that would be based on regional need rather than federal military priorities. Their hopes would not be fulfilled, however, because the promilitary sponsorship of science forces won out in the battles over who would control atomic power production and on what basis federal funding would be delivered.[11] The intensification of scientists' efforts to define the proper relationship among knowledge creation, war, and the public was not simply a philosophic or epistemological dispute, or a matter of intellectual positions. It was a response to the changing material conditions of science and to the political mobilization of Americans from many different political communities and walks of life.

The close association between scientific research and the military began after World War II. Government and military leaders, and some scientists, realized the importance of scientific talent and ideas in maintaining atomic and other forms of military supremacy. As a result, federal funding for scientific research and education swelled dramatically, from fifty million dollars in 1939 to nearly fifteen billion dollars in 1970.[12] Between 1947 and 1960, most federal funding for science came from the Department of Defense. Funding was distributed to a decentralized network of recipients that included universities and federally funded laboratories. New knowledge proliferated and more disciplines and subdisciplines formed, increasing the intellectual diversity of the field of science.

Scientists became important political advisors during the mid-twentieth century, too, providing recommendations on everything from which

weapons to build to what students should learn in school.[13] In the 1940s and 1950s, scientists' contributions to defense were often lauded as contributions to democracy. Scientists were thought to provide the know-how to keep the nation safe, and to contribute to an "informed public," which was considered an important feature of a healthy democracy.[14] As Gerard Piel and Dennis Flanagan, the publisher and editor of *Scientific American* in the late 1940s, wrote, without information about science, "modern man has only the haziest idea of how to act in behalf of his own welfare, or that of his own family and community."[15]

Yet lavish funding, access to the highest levels of government, and association with national defense were not uniformly welcomed by all scientists, nor by the public, intellectuals, or political authorities. The new state-science relationship posed threats to scientists' ability to act on their political beliefs, and shifted funding toward a limited range of subjects. Above all, it raised questions about the extent to which science was an independent community and a force for the improvement rather than the destruction of society.

In the 1940s and 1950s, it was difficult for scientists to speak out on these issues. The national security system, which was intensified in 1947, swept up scientists in high-profile and routine investigations. As Jessica Wang has shown, scientists made up more than half of those investigated by the federal government between 1947 and 1954. The security frenzy included extensive surveillance of scientists who were peace activists, including Albert Einstein, and repeated public investigations of leading scientists such as Robert Oppenheimer and Edward U. Condon, whose reputations were damaged despite the failure of loyalty committees to find them guilty of security breaches. Restrictions on travel and security clearances for federal grants and contracts added to the atmosphere of suspicion and fear.[16] As a result, many scientists—but by no means all—were wary of taking explicit political positions that might be construed as contrary to the military goals of the United States or in any way "political." Part of the story I tell in *Disrupting Science* is of a small group of dedicated pacifist scientists who personally refused military funding and who urged their peers to find ways to use science for "productive" ends, even though they were at great risk for asserting their perspective.

By the late 1950s, as repression had eased, scientists began to raise new questions about the politics of science, this time about the extent to which democratic procedures were being subverted by the failure of scientists to provide the public with facts and information sufficient to allow their full participation in political debates about the wisdom of atomic testing. In the late 1960s, radical scientists went beyond calls to reform the behavior of scientists or democratic procedures; they called for the wholesale restructuring of society.

Yet scientists were not the only ones who questioned the new military-science relationship. In the early 1960s, members of Congress began to raise questions about the wisdom of using the majority of federal research funds for military purposes. They called instead for more spending on health and social problems. President Eisenhower's last presidential speech famously warned of the dangers of a "military-industrial complex," and of the dangers to the freedom of university research presented by massive federal funding. Politicians and presidents, however, played a relatively small role in generating the moral outrage that drove scientists to rearticulate their place in American public life. The social movements of the 1950s, 1960s, and 1970s provided some of the pressure and much of the moral argumentation and camaraderie that led to the creation of new means of organizing the relationship between knowledge production and power. The scientists who are featured in this book often considered themselves part of these broader political movements. The intersection of social movements and changes in the organizational, moral, political, and economic organization of science offers a window through which we can observe how scientists created new understandings of the place of science in American public life.

The critiques of science and scientists that scientists and other activists made in the three episodes I examine can best be understood as arguments stemming from two established and dominant American political traditions, liberalism and moral individualism, and one emergent perspective, that of a Marxian-inspired New Left. By political traditions, I do not mean static tools strategically identified and mechanically applied. Traditions are full of currents and countercurrents that people endlessly reconfigure as they creatively integrate them with real political problems. Even as the protagonists in this book drew on political traditions to formulate criticisms of science, they also transformed them in powerful ways. By the late 1960s, scientists' efforts to forge a new relationship with the public and the government were informed by the political analyses of the New Left and by Marxists. Both had roots in earlier American political thought, but compared to moral individualism and liberalism, they were more fertile ground for the development of novel ways of articulating how scientists could use their skills in the service of the public.

The least well known, but earliest, tradition on which critiques of science were based in the thirty years following World War II was moral individualism. In this tradition, transformation of the individual moral conscience is the source of broader social change.[17] Those who drew on this tradition argued that scientists had failed to take personal moral responsibility for the development and use of scientific ideas and products. Unlike liberal scientists and commentators, scientists drawing on this tradition did not turn to the government for solutions to what they saw as

the moral corruption of science and scientists through association with the military. These scientists were inspired by religiously based activists and leaders such as Martin Luther King Jr. and the Fellowship of Reconciliation leaders Brad Lyttle and A. J. Muste. Those scientists who espoused this tradition had little confidence in either the government or organized political groups to effect real transformations in the science-military relationship. They believed that the relationship between science and the military could be decoupled only through the personal commitment and choice of individual scientists to refuse military work.

A second tradition from which ideas were drawn about the proper arrangements among science, the military, and citizens was liberalism. Scientists and other activists working in this tradition assumed that an educated and informed citizenry was the major means for making decisions about the proper role of science in public life. From scientists who called for scientific rather than government control of science after World War II to critics of "technocracy," those who argued from a liberal perspective believed that scientists' proper role was to inform the public of facts that citizens could use to rationally decide among alternatives.

These two traditions were the basis for the criticisms of the science-military connection through the middle of the 1960s. In the mid-1960s new voices were added. Marxists and New Left activists and intellectuals became critical of the relationship between capitalism and science, and feminists and antiracists associated science with the domination of women and blacks. College students were especially important in generating activism among scientists. In 1966, they began to gather information about how the facilities and faculties on their campuses contributed to weapons production. Some who were influenced by Marxism argued that science had been captured by the needs of the upper classes and by what they saw as imperialist goals of the United States bent on the material and military domination of its citizens and those of other nations. Many New Left activists, inspired in part by the ideas of Frankfurt School philosopher Herbert Marcuse, were critical of the ways in which capitalism and instrumental rationality left people bereft of the ability to imagine and create.[18]

In practice, few of the scientists whose activities I examine in this book called themselves "moral individualists," "liberals," or "radicals" when they engaged in challenges and defenses of science. In the episodes in which contradictions in the professed and actual relationships between science and politics were variously uprooted and exposed or vehemently defended, activists, intellectuals, and journalists often wove together elements of different traditions and perspectives. Moreover, the volatile intersections of science and politics were not abstract debates, but involved concrete political events. The arms race, the development of nuclear,

chemical, and biological weapons, and the war in Vietnam were the substantive issues around which scientists struggled to make good on the promise of science to serve all people.

Scientists were ultimately trying to steer a course between two potentially contradictory positions. On the one hand, many asserted that the public political authority of science was based on the strong distinction between scientific knowledge and practices, and the messy world of values and moral concerns. On the other hand, some claimed that the value of science lay in its affinities with and beneficial effects on aspects of social life, including democracy, moral progress, and the economy. Both of these bases would be fundamentally shaken by the close ties between scientists and the military that characterized the mid-twentieth century and by the social movements that condemned that relationship.

After sixty years of building a professional field that increasingly centralized the power to make uncontested claims about nature in the hands of scientists, the two decades following World War II at first seemed to continue that pattern, given the lavish funding and the centrality of scientific ideas to the military and security projects of the cold war. Yet the cumulative pattern of scientists' political organizing against this new relationship helped to contribute, ironically, to a weakening of their political authority. The organizations they formed linked science to moral and political projects that called for more citizen and scientist involvement in technopolitical issues. In turn, this call led to a weakening of scientists' political authority, but also led to the greater importance of scientific claims and technologies in structuring and adjudicating political debate. Of course, this was not the only source of the disruption of scientific authority. The growth of the regulatory state beginning in the mid-1960s, especially the regulation of research on human and animal subjects, highly visible problems resulting from scientific technologies (thalidomide, atomic fallout, pollution), intellectual critiques of science, and the growing importance of the market also contributed to these shifts. *Disrupting Science* is an effort to demonstrate the role of scientists in contributing to the "unbounding" of scientific authority from scientists and its "binding" to other decision makers through social movement activity on the part of scientists.[19] In the next section, I turn to a theoretical elaboration of some of the main sociological claims of this book.

Although this book considers three key episodes separately, it will show that each group built on or responded to those that came before it, so that over time different visions of how scientists should act in a moral fashion proliferated and contended. This variation in itself helped to undermine the idea that science was a socially or morally unified field built on facts that could be used to constitute political or social life. Although