Nationalism, Activism, and Moralism: The Atomized Politics of Frédéric Joliot-Curie

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To my parents

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List of Abbreviations

AEC	(American) Atomic Energy Commission
CEA	*Commissariat à l'énergie atomique* (French Atomic Energy Commission)
CNRSA	*Centre national de la recherche scientifique appliquée* (National Center for Applied Scientific Research)
EPCI	*École de physique et de chimie industrielles* (School of Industrial Physics and Chemistry)
HUAC	House Un-American Activities Committee
ICRC	International Committee of the Red Cross
GAC	General Advisory Committee
ONR	Office of Naval Research
PCF	*Parti communiste française* (French Communist Party)
RDB	Research and Development Board
STO	*Service du travail obligatoire* (Obligatory Work Service)
UNAEC	United Nations Atomic Energy Commission
WFSW	World Federation of Scientific Workers
WPC	World Peace Council

Chapter 1: Introduction

"There is no secret to the principle of the atom bomb," insisted Frédéric Joliot-Curie in 1947. "I could eventually make one, if France wanted an atom bomb. But we don't want any."[1] Joliot-Curie was arguably France's most decorated scientist at the time, and his research during the 1930s contributed directly to the field of nuclear physics and indirectly to the development of the atomic bomb. He was the co-winner of the 1935 Nobel Prize in Chemistry together with his wife Irène, the daughter of Marie and Pierre Curie.[2] Joliot-Curie was appointed as head of the postwar nuclear program in France. During the same era, he also served as the president of the following organizations: the World Federation of Scientific Workers, the French Association of Scientific Workers, the French-Polish Friendship Organization, the France-USSR Association, and the World Peace Council. He was also an active member of the French Communist Party, the National Union of Intellectuals, and the National Front (a French Resistance organization of no relation to the modern far-right political party). Evidently, Joliot-Curie had no issue with a nuclear scientist taking on a political role in the public sphere.

The atomic age had begun in the early hours of July 16th, 1945 when American government officials and scientists working on the top secret Manhattan Project detonated a device known as the "Gadget" in the New Mexico desert. The success of the Trinity Test, as it was called, handed the United States the most destructive weapon in human history. For the

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[1] David Schoenbrun, "Can France Make an Atom Bomb?," July 1947, Manuscripts BnF, NAF 28161, boite 14 conservée au Musée Curie. (Unless otherwise noted, all citations are from Manuscripts BnF, NAF 28161, conservées au Musée Curie.)

[2] Author's note: Irène Joliot-Curie is equally deserving of critical analysis for both her scientific and political activities and an entire archive at the Paris Institut Curie is devote to her papers. Due to time constraints and page limitation, however, this thesis will only concern Frédéric. I highly encourage other researchers to pursue further information on the life of Irène.

scientists who worked on the bomb, however, uneasiness with their role in its development was only growing stronger. “Now we are all sons of bitches,” said Manhattan Project physicist Kenneth Bainbridge.[3] This iconic quote would come to symbolize the dynamic change in the relationship between science and politics brought about by the atomic age. In many scholarly works of the last two decades, historians have observed the postwar phenomenon in which many scientists developed and acted on a sense of moral responsibility born from the bomb by taking on new political roles. To understand the politics of Joliot-Curie, it is first necessary to consider how other historians have used similar analysis to understand science in the age of the bomb.

An important issue for the new role of the scientist was the arena in which it took place: the public sphere. Had scientists kept their moral quandaries to themselves it would not have been as significant, but the fact that many made their opinions public altered both the perceptions and responsibilities of scientists everywhere. Historian Cathryn Carson, for example, evokes the model of philosopher Jürgen Habermas to explain this phenomenon: “The public sphere occupies a unique societal space located between individual particularity on the one hand and formal authority (read: the state) on the other…. It is a unifying rather than a disintegrating space, a truly public realm of intersubjectivity where private interests do not rule.”[4] While Carson applies this definition of the public sphere to West Germany, it can also help explain the changing role of the scientist elsewhere. Charles Thorpe, who wrote on J. Robert Oppenheimer, the head of the scientific division of the Manhattan Project, notes that “the fragmentation of cultural authority endemic to bureaucratic and industrial modernity and to the scientific vocation in the twentieth

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[3] Richard Rhodes, *The Making of the Atomic Bomb* (New York, NY: Simon & Schuster, 1986), 675.

[4] Cathryn Carson, *Heisenberg in the Atomic Age: Science and the Public Sphere* (New York, NY: Cambridge University Press, 2010), 5.

century" as well as "the crisis posed by the atomic bomb and forms of technoscientific power that break down the institutional boundaries of science as a distinct sphere" was a "predicament… general across Western societies."[5] While historians of the atomic age might differ in the scope and subject of their topics, the changing role of the scientist in the public sphere was a widely observed phenomenon.

In the United States, the secrecy of the Manhattan Project and the postwar atomic program had a big impact on the extent to which scientists could speak their minds. The Atomic Energy Act (alternately known as the McMahon Act), for example, classified all atomic knowledge as secret in 1946. In the 1950s, the House Un-American Activities Committee (HUAC) investigated people with suspected communist ties, such as Los Alamos director J. Robert Oppenheimer, revoking his security clearance in 1954. In her book *American Science in the Age of Anxiety*, historian Jessica Wang notes that an "atmosphere of fear" kept many scientists out of the public sphere.[6] Those who did seek to influence policy or at the very least express their opinions had to navigate an increasingly blurred line between science and politics, as they were forced to consider the moral implications of their work. As Wang explains, "Although physicists and scientists in related disciplines claimed and believed they were engaged in value-neutral basic research, the content and direction of their research agendas were swayed heavily by the technological needs of the Cold War, and their own political prominence and influence depended on their building close ties to the Cold War national security state."[7]

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[5] Charles Thorpe, *Oppenheimer: The Tragic Intellect*, (Chicago, IL: University of Chicago Press, 2008), 8.

[6] Jessica Wang, *American Science in an Age of Anxiety: Scientists, Anticommunism, and the Cold War* (Chapel Hill, NC: University of North Carolina Press, 1999),

[7] Ibid., 3.

Scientists such as Vannevar Bush, James Conant, and Oppenheimer thus served in a role that Wang calls the "scientist-administrator," for which they sought "internal negotiations within government agencies to achieve more limited policy goals."[8] The McMahon Act, for example, was heavily influenced by the input of scientists and it ultimately created a civilian agency for the control of the future nuclear program: the Atomic Energy Commission (AEC). Many scientists served on it, including Oppenheimer, who was the chair of the Commission's General Advisory Committee (GAC). At the same time, however, other scientists formed entirely new forums for scientific and political discourse, including the Atomic Scientists of Chicago, the Association of Oak Ridge Scientists, the Association of Los Alamos Scientists, and the Association of Manhattan Project Scientists. According to Wang, American scientists walked a fine line between science and politics as a result of the emergence of the national security state and thus were often very divided, even among themselves.

Herbert York, a nuclear physicist, also analyzes the general efforts of the scientific community in the postwar United States in his book *The Advisors*, but offers an approach focused specifically on the significance and failure of key scientific advisors during the development of the hydrogen "super" bomb. The development of the H-bomb was ordered by President Truman and was largely a reaction to the first Soviet atomic bomb test in 1949, which took the United States by surprise. It was developed over the wishes of the General Advisory Committee to the Atomic Energy Commission headed by Oppenheimer, who was later accused of resisting the H-bomb program. Oppenheimer certainly grappled with the moral difficulties of the hydrogen bomb, but as York points out, he also famously wrote to James Conant, "It would

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[8] Ibid., 9.

be folly to oppose the exploration of this weapon."[9] On the other side of this issue, physicist Edward Teller, often called the father of the hydrogen bomb, believed "it is *not* the scientist's job to determine whether a hydrogen bomb should be constructed, whether it should used, or how it should be used. This responsibility rests with the American people and with their chosen representatives."[10] York concludes that the predictions of the GAC were largely correct and that Oppenheimer was not a security threat, while the development of the hydrogen bomb exacerbated the Cold War arms race. His analysis clearly shows the divide in the scientific community cited by Wang and the limitations that a scientist in government faced.

Another iconic work of this genre is Silvan Schweber's *In the Shadow of the Bomb,* which contrasts Oppenheimer with fellow Manhattan Project physicist Hans Bethe. Unlike Wang and York, Schweber focuses closely on the moral responsibilities of the scientist, a relatively new idea in the atomic age. Schweber notes that Oppenheimer, often cast as a martyr for the era of "pure" science, "became the embodiment of a new scientific persona: the scientist who had created new knowledge and new technologies that affected all of mankind, and who addressed the impact of these new technologies in both political and *moral* terms."[11] Nevertheless, Schweber also argues that Oppenheimer was ultimately "too fractured an individual to be able to carry the burden of that new persona." Bethe, however, became "the embodiment of a new scientific persona: the scientist with exceptional technical expertise assuming the role of an

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9 Herbert York, *The Advisors: Oppenheimer, Teller, and the Superbomb* (San Francisco, CA: W.H. Freeman and Company, 1976), 55.

10 Ibid., 71

11 Silvan S. Schweber, *In the Shadow of the Bomb: Bethe, Oppenheimer, and the Moral Responsibility of the Scientist* (Princeton, NJ: Princeton University Press, 2000), xv.

intellectual."[12] For example, although Oppenheimer did offer some resistance to the crash development of the hydrogen "super" bomb as a member of the GAC (here Schweber calls him a "scientist-statesman," a similar notion to Wang's "scientist-administrator"), Bethe was not afraid to speak his mind in the public sphere and always thought in terms of his moral responsibilities. He worked on the Manhattan Project largely out of fear of Nazi Germany and he condemned the H-bomb as a danger to the world but later worked on it after it became clear that the Soviets would eventually develop it. Bethe believed in what Schweber terms a "contract with the state" whereby the scientist has a responsibility to voice his or her opinion but should not refuse to work on a project since "it would set the scientific community up as a super political body."[13] In this way, Schweber casts Oppenheimer and Bethe as different products of the same experience. Both had moral dilemmas regarding their respective roles in developing the bomb, but only Bethe was deliberate and effective in his postwar role in the public sphere.

In *Oppenheimer: The Tragic Intellect*, Charles Thorpe also concludes that Oppenheimer never fulfilled the critical role of a scientist in the public sphere. Thorpe looks at Oppenheimer through the lens of sociologist Max Weber, specifically the themes of "vocation, responsibility, cultivation and expertise, charisma, bureaucracy, instrumental reason, fact and value, means and ends."[14] He concludes that although Oppenheimer idealized the Weberian model in which science and politics are separate, he found it insufficient when it came to the moral difficulties of the bomb. At the same time, Oppenheimer failed "to develop a critical political perspective" and ironically, as Thorpe points out, "accommodated himself to and internalized the culture and

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[12] Ibid., xvi.
[13] Ibid., 170.
[14] Thorpe, *The Tragic Intellect*, xvi.

mentality of the national-security state."[15] He may have been a great scientist, but according to Thorpe, Oppenheimer ultimately failed to be the moral intellectual he aspired to despite the moral quandaries that tormented him.

Much of the literature on scientists in the atomic age focuses on the United States, and understandably so given that it was the birthplace of the bomb. The changing role of the postwar scientist was not, however, a uniquely American phenomenon. In *Heisenberg in the Atomic Age: Science and the Public Sphere*, Cathryn Carson focuses on the postwar scientist in West Germany. Werner Heisenberg is well known for his role in Nazi Germany as the head of its atomic bomb program. As Carson explains, he also helped rebuild German science after World War II, creating institutions to position science "as a public good under public supervision, yet with its own restless modicum of self-oversight."[16] Heisenberg went against the Weberian model that had long kept science and politics separate, particularly in Germany. According to Carson, he did so in large part to personally come to terms with his Nazi past. When West German Chancellor Konrad Adenauer considered unilaterally building nuclear weapons, for example, Heisenberg helped write and promote the Göttingen Manifesto, which asserted that "none of us would be prepared to participate in German production of atomic weapons."[17] In this way, although Heisenberg did not live in the same postwar security as the American scientists, he did experience similar moral dilemmas and felt a responsibility to express his beliefs in the public sphere. In doing so, Heisenberg went against the traditional role of the scientist.

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[15] Ibid., xv.
[16] Carson, *Heisenberg in the Atomic Age*, 7.
[17] Ibid., 321.

Frédéric Joliot-Curie was very much a product of the atomic age in the same mold as Bethe, Oppenheimer, and Heisenberg. To date, there has been limited historical work on Joliot-Curie which specifically examines the effect of the bomb and the atomic age as a whole on his political activities. Several authors have, however, written biographies of Joliot-Curie. Pierre Biquard was the first to write a notable work, publishing *Frédéric Joliot-Curie: The Man and His Theories* in 1962, only four years after the death of Joliot-Curie. Biquard was not a historian, however, but a physicist. He trained alongside Joliot-Curie, served under him in the administration of the French nuclear program, and was a member of many of the same organizations such as the French Communist Party and the World Federation of Scientific Workers. Biquard most likely did not intend for his book to be an objective analysis of Joliot-Curie, nor should it be treated as such. As Biquard wrote, "For me the name of Joliot means everything that is implied by the word 'friend'….The description of the life and work of Frédéric Joliot which I have attempted will have attained its objective if it has given a glimpse…of a man who was profoundly human and profoundly good."[18] Biquard provides useful primary source material, such as personal anecdotes and selections from Joliot-Curie's many writings, but overall he offers a thoroughly biased perspective.

Ten years after Biquard wrote the first biography of Joliot-Curie, historian Maurice Goldsmith published another work on the great French physicist. Goldsmith recognizes the flaws of Biquard's book, calling it a "song of love" that "glamorized" Joliot-Curie.[19] In addition to providing a more objective historical analysis, Goldsmith tackles Joliot-Curie's scientist-

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[18] Pierre Biquard, *Frédéric Joliot-Curie: The Man and His Theories*, Translated by Geoffrey Strachan (New York, NY: Paul S. Eriksson, 1966), 140.

[19] Maurice Goldsmith, *Frédéric Joliot-Curie: A Biography* (London: Lawrence and Wishart, 1976), 10.

politician identity. As he writes in an opening chapter titled "The Author to Joliot," "You [recognized] that science could change the world, and linked it with progressive political force. You did so at a time…when traditional science was becoming Big Science, and when it was clearly demonstrated the power came from the atom bomb."[20] Goldsmith thus recognizes Joliot-Curie's political ambitions when faced with the bomb. This biography, however, has a very narrow focus on Joliot-Curie, rarely giving the wider context needed to understand Joliot-Curie alongside his contemporaries as a product of the atomic age.

The most complete biography of Joliot-Curie was published by French historian Michel Pinault in 2000, but it has not been translated to English. More than twice the length of Goldsmith's work, *Frédéric Joliot-Curie* covers every aspect of Joliot-Curie's life with meticulous sourcing and analysis. Furthermore, Pinault addresses the changing role of the scientist from his opening chapter: "While they triumphed in the field of fundamental research, which they often call with mentors Jean Perrin and Paul Langevin 'pure research,' Irène Curie and Frédéric Joliot were immediately confronted with the applications of their discoveries."[21] Pinault explains that the Joliot-Curies' most notable discovery, artificial radiation, could have contributed to the advancement of medical research or used create nuclear chain reactions and that this crossroads represented something of a moral dilemma. Although Pinault provides a nuanced understanding of Joliot-Curie's role between science and politics, this book has its limitations because it does not attempt to frame Joliot-Curie as a product of his time. Pinault gives precise details on practically every facet of Joliot-Curie's life—his science, his politics, his

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[20] Ibid.

[21] Michel Pinault, *Frédéric Joliot-Curie* (Paris: Odile Jacob, 2000), 15.

personal affairs—but does not center his argument on any aspect in particular. Unlike the previously mentioned works by Thorpe, Carson, Schweber, and others, Pinault's *Frédéric Joliot-Curie* is at its core a biography, not an analysis of scientists in the atomic age.

This thesis will therefore analyze Joliot-Curie's politics in the public sphere after 1945 and its relationship to the development of atomic energy and the bomb. The structure is inspired by Thorpe's analysis of Oppenheimer, specifically three responsibilities that he grappled with: "To the state, to science itself, and to humanity."[22] Joliot-Curie was a product of the atomic age who tried to fulfill three complementary responsibilities (reordered from Thorpe's model to better fit the chronology): to France, to the world, and to science. Chapter 2 gives a summary of Joliot-Curie's upbringing and life prior to 1945 to understand his intellectual background and most influential experiences. Due to a dearth of archival sources, this chapter primarily uses evidence (but not analysis) from Biquard's and Goldsmith's biographies. Chapter 3 addresses Joliot-Curie's duty to France during his time in the French government as head of the nuclear program from 1945 to 1950. During this period, Joliot-Curie served a similar role to the "scientist-administrator" and "scientist-statesman" described by Wang and Schweber. Chapter 4 turns to Joliot-Curie's perceived responsibility to protect the world from the atomic bomb as a scientist-activist, as well as his efforts to reinvent his own identity following his dismissal from the French government. It also addresses his communist leanings, a major part of Joliot-Curie's world philosophy. Finally, chapter 5 analyzes his duty to science through the lens of Max Weber, who established the ideal of a separation between science and politics back in 1917. Intentionally or not, Frédéric Joliot-Curie pushed back against the traditional role of the scientist by asserting

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[22] Ibid., 162.

his right to speak and act on political issues in the public sphere. Analyzing his politics provides a window through which science in the atomic age can be better understood.

Chapter 2: The Making of the Atomic Scientist

Although this thesis primarily concerns the effect of the atomic bomb on science and politics after 1945, it is important to understand the journey that brought Frédéric Joliot-Curie to the eminent position from which he was able to create change as a French citizen, as an international activist, and as a scientist. His experiences shed light on the worldwide relationship between science and politics as well the dynamics of the international order, specifically the complicated relationship between France and the United States within the postwar Western Bloc. This chapter will explore Joliot-Curie's early life, rise to scientific stardom, and wartime experiences prior to 1945. It will also give a brief overview of the political realities in Europe during the immediate aftermath of World War II.

Early Career

Frédéric Joliot-Curie (née Frédéric Joliot) was born in Paris on March 19, 1900. His father, Henri, served in the French Army during the Franco-Prussian War of 1870 and was a participant in the Paris Commune, eventually fleeing to Belgium to avoid execution. Frédéric grew up hearing stories of the Communards who resisted foreign occupation in the face of defeat, a history that would become relevant again later in his life.

The young Joliot began his higher education at the *École de physique et de chimie industrielles* (School of Industrial Physics and Chemistry; EPCI) in Paris in 1920, the same place where Pierre and Marie Curie had discovered radium two decades before. He was mentored by the school's director of studies, physicist Paul Langevin, one of the few scientists at the time who worked closely on Einstein's theory of relativity. As Langevin told Joliot when he graduated in

1923, “To make an impact and to be accepted you will have to do absolutely remarkable work. And you must understand clearly, science demands you entirely, you must consecrate your life to her.”[23]

Langevin was one Joliot’s earliest and most important scientific mentors, but he also introduced him to the world of politics. During Joliot’s time at the EPCI, Langevin caused a small controversy when he supported amnesty for a group of French sailors who, sent to fight the new communist regime in Russia, had mutinied at Odessa.[24] The event closely linked Langevin to Communism, and his protégé Joliot would go on to join the French Communist Party two decades later. Langevin explained his philosophy to Joliot: “I must devote myself to these political activities. It is true that I could be doing my science, but the science I could do will be done by others, and this task comes to me because it is not being done by others.”[25] The link between politics and science would be a lifelong concern for Joliot.

With the help of Langevin, Joliot became an assistant to physicist Marie Curie, who had developed the theory of radioactivity and twice won the Nobel Prize (1903 and 1911), at the Institut du Radium in 1925. It was there that he met Marie’s daughter, Irène, and the two married in October 1926, taking the surname Joliot-Curie. Frédéric made radioactivity a focus of his work from the start, and finished his doctoral thesis in 1930: “A Study of the Chemistry of the Radioactive Elements, Diverse Applications.”[26] He frequently collaborated with Irène, a physicist with an expertise in polonium (a byproduct of uranium), on a series of research projects

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[23] Maurice Goldsmith, *Frédéric Joliot-Curie: A Biography* (London: Lawrence and Wishart, 1976), 24.
[24] Ibid., 22.
[25] Ibid., 9.
[26] Ibid., 37.

and published papers. The couple was aided by Marie's stock of pure radium, an extremely rare element at the time. As Marie's friend Angèle Pompëi explained, "It was a pleasure to share their happiness in exploiting and enriching the heritage from Pierre and Marie Curie."[27] Scientific heritage, both from the Curie family and from the French scientific community as a whole, was another important factor that would influence Joliot-Curie in his later life.

An Era of Collaboration

Around this time, a friend joked to Joliot-Curie, "You've come too late to study radioactivity. The radioactive decay series of these substances are known and there is hardly anything left to do other than evaluate to the third or fourth decimal place the various quantities which characterize them."[28] Obviously, this was far from true—the atomic craze was only just beginning.

Frédéric and Irène's most important scientific achievement came in 1934 when they discovered artificial radiation. The Joliot-Curies soon published their findings in *Comptes Rendus*: "To summarize, for the first time is has been possible to make certain atomic nuclei radioactive using an external source. This radioactivity can persist for a measurable time in the absence of the source which excites it. Long-lived radioactivity… no doubt can be created by several nuclear reactions."[29] Frédéric and Irène were subsequently jointly awarded the 1935 Nobel Prize in Chemistry "for the synthesis of new radioactive elements."[30] They were

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[27] Ibid., 38.

[28] Pierre Biquard, *Frédéric Joliot-Curie: The Man and His Theories*, Translated by Geoffrey Strachan (New York, NY: Paul S. Eriksson, 1966), 25.

[29] Goldsmith, *Frédéric Joliot-Curie: A Biography*, 56.

[30] Ibid., 58.

personally congratulated by Ernest Rutherford, the physicist who had discovered radiation decades before, who said, “I have long thought that some such an effect should be observed under the right conditions. In the past I have tried a number of experiments using a sensitive electroscope to detect such effects but without any success.”[31] This experience must have imparted on Frédéric and Irène the utmost importance of scientific collaboration.

During this era, Frédéric also began to consider the impact of his work and thus became increasingly politically minded. At his Nobel Prize acceptance speech in Stockholm, for example, Joliot-Curie offered a warning on the possible implications of his research:

> If surveying the past, we look at the progress achieved by science at an ever increasing pace, we are right to think that researchers building up or breaking down the elements at will, will know how to bring about transmutations of an explosive character, like chemical chain reactions, one transmutation provoking many others. If such transmutation come to take place in matter, we can expect the release of enormous amounts of useful energy. But, alas, if all the elements on our planet are so infected, we can look forward with apprehension to the consequences of such cataclysm.[32]

His words foreshadowed the dangers of the atomic bomb, a reality that Joliot-Curie would come to loathe after the war. During this time, Joliot-Curie also began to consider the responsibilities of the scientist in general. “The man in the laboratory, the scientist, studies natural phenomena from a purely disinterested point of view,” he explained during a 1936 conference. “Before undertaking a piece of research he does not care whether it will be useful or not… it is at the moment of utilization that the grave errors are often committed… And everyone always makes science responsible, when it is in fact those who make bad use of it who should be blamed.”[33] As

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[31] Ibid, 57.

[32] Ibid., 60.

[33] Biquard, *Frédéric Joliot-Curie: The Man and His Theories*, 49.

scientists around the world further developed nuclear research, Joliot-Curie's philosophy would play an important role in how he approached his work and public responsibilities.

The discovery of artificial radiation also had an enormous impact on the scientific community. The Joliot-Curies' research sparked an interest in the study of radioactive chemistry with artificial elements. It built on the work of Pierre and Marie, who had popularized the study at the turn of the century but with naturally occurring elements, thus reinforcing the notion of scientific heritage. Furthermore, when American physicist Ernest O. Lawrence read their report, he altered the setup of his cyclotron (a particle accelerator often called an "atom smasher") to model the Joliot-Curies' hypothesis. He ultimately produced the first nitrogen-13, a radioisotope of nitrogen.[34] Italian physicist Enrico Fermi also conducted similar experiments, bombarding uranium with slow neutrons to discover new transuranic elements. After Joliot-Curie congratulated him on winning the 1938 Nobel Prize in Physics, Fermi replied, "I know full well that my work on neutrons has been the consequence of your basic research, and I must express to you my thanks for that."[35] This era of scientific collaboration would be unimaginable in a post-1945 world.

The Joliot-Curies' rise to stardom gave Frédéric new opportunities. In 1935 he was elected Maître de Conférences at the Sorbonne, and in 1937 he became a professor at the Collège de France in Paris. During his time there, Joliot-Curie went on to build the first cyclotron in Western Europe. He worked closely with E. O. Lawrence's Berkeley laboratory, even taking on an American research assistant and sending one of his own to Berkeley in order to facilitate

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[34] Goldsmith, *Frédéric Joliot-Curie: A Biography*, 56.
[35] Ibid., 68.

scientific exchange.[36] Meanwhile, German physicists Otto Hahn and Fritz Strassmann also repeated the experiments run by the Joliot-Curies, and the two predicted that the uranium nucleus could actually be split, a process known as fission. Soon after, together with French physicists Lew Kowarski and Hans Halban, Joliot-Curie also ran experiments that gave evidence of uranium fission. He submitted a paper in January 1939 to the French Academy of Sciences on "experimental proof of the explosive splitting of uranium and thorium nuclei under bombardment from neutrons."[37] Joliot-Curie's research showed the possibility of a nuclear chain reaction, the process used to build an atomic bomb.

In February 1939, however, Hungarian physicist Leo Szilard asked Joliot-Curie not to publish any additional research on fission. Fearful of Nazi Germany, Szilard had by this time fled his homeland and was living in the United States, where he would go on to work on the Manhattan Project. Szilard wrote to Joliot-Curie, "This letter is merely a precaution, and we hope an unnecessary precaution…. Obviously, if more than one neutron were liberated, a sort of chain reaction would be possible. In certain circumstances this might lead to the construction of bombs which would be extremely dangerous in general and particularly in the hands of certain governments."[38] Although likewise fearful of Germany, Joliot-Curie was undeterred by Szilard's warning and continued to publish. He firmly believed that doing otherwise would undermine future scientific collaboration. As his colleague Pierre Bicquard explained, "In principle the scientist is hostile to any kind of secrecy with regard to fundamental research. International scientific cooperation is an essential condition of scientific progress and cannot be reconciled

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[36] Ibid., 63.
[37] Ibid., 70.
[38] Ibid., 72.

with secrecy."[39] Unfortunately for Joliot-Curie, this was only the beginning of global scientific secrecy.

In general, Joliot-Curie chose not to patent his work so as to better facilitate and encourage collaboration. In this manner, he followed the intellectual tradition of Marie and Pierre Curie, who did not patent their discovery of radium in 1898. As Marie recalled, she and Pierre "renounced any attempt to reap material profit from our discovery… we gave anyone who was interested all the information he sought. This greatly benefitted the radium industry which was able to develop quite freely, first in France and then abroad, and to provide scientists and doctors with the products they required."[40] Nevertheless, faced with the threat of Germany, Joliot-Curie and his colleagues took out five patents on their atomic discoveries in order to protect French research. After the war, they transferred the patents to the *Commissariat à l'énergie atomique* (CEA). Robert Schuman, the President of the French *Conseil d'Etat* (Council of State), subsequently wrote to Joliot-Curie, "Your decision certainly represents a sacrifice: it testifies once more, and in a brilliant fashion, to the extent of your disinterestedness and the depth of your patriotism. It is therefore my agreeable duty to thank you in the name of France."[41] Scientific openness would remain a lifelong commitment and struggle for Frédéric Joliot-Curie.

War, Occupation, and Resistance

The prewar organization of French science was an early example of Joliot-Curie's ardent belief that science should exist for the benefit of France. As Nazi Germany grew more and more

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[39] Biquard, *Frédéric Joliot-Curie: The Man and His Theories*, 45.
[40] Ibid.
[41] Ibid., 49.

powerful in the late 1930s, Joliot-Curie became fearful for the future of his country. Because bureaucracies often promote competition rather than cooperation, an important piece of national defense was the effort to mobilize science and industry together. In May 1938, the *Centre national de la recherche scientifique appliquée* (National Center for Applied Scientific Research; CNRSA) was established. It was to be directed by a High Committee composed of the Minister of Education, the Minister of National Defense and War, the Minister of the Navy, and the Minister of the Air Force, as well as representatives from the commerce and agriculture industries.[42]

By July, the High Committee moved to directly involve science in the war effort, an effort that Joliot-Curie supported. As he would later explain, "A scientific war must be prepared before the outbreak of hostilities. One cannot, during a war, make great contributions from a research perspective to National Defense."[43] A letter to Joliot-Curie from his colleague Jean-Jacques Trillat, for example, described his "project of cooperation between Research and Industry."[44] During the same month, the High Committee issued a decree that declared necessary "a coordination of the technical services of the National Defense and a close liaison of these services with the scientific community."[45]

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[42] "Organisation du Centre National de Recherches Scientifiques Appliquées (conformément au décret-loi du 24 mai 1938)," Manuscripts BnF, NAF 28161, boite 14 conservée au Musée Curie. (All translations are the author's unless originally in English—these citations can be noted by their English titles. Unless otherwise noted, all citations are from Manuscripts BnF, NAF 28161, conservées au Musée Curie.)

[43] Frédéric Joliot-Curie, "l'Organisation de la Recherche en France," boîte 31.

[44] Jean-Jaques Trillat à Frédéric Joliot-Curie, 4 juillet 1938, boîte 14.

[45] "Haut Comité, Séance d'Ouverture: Discours de Monsieur Jean Zay," 16 janvier 1939, boîte 14.

This type of collaborative organization was by no means unique to France. In the United States, the Manhattan Project was the result of incredible collaboration between the government and the scientific and industrial communities. One representative of the 1938 High Committee even spoke of "the example provided to us by countries such as Great Britain and the United States, which have already organized applied research and financed it with considerable sums of money."[46] Nevertheless, the individual effort undertaken by Joliot-Curie to mobilize his scientific colleagues was considerable. In a 1938 speech to the Union of Intellectuals (an organization of scientists, engineers, lawyers, artists, and other highly trained professionals) Joliot-Curie affirmed, "In the particularly serious circumstances that our country finds itself, intellectual workers cannot rest impassive… These men are among the most effective defenders for our country."[47] Joliot-Curie considered himself no different, and would do everything in his power to defend France.

Upon the outbreak of World War II in September 1939, Joliot-Curie was called up to serve, officially as a Captain of Artillery. In secret, however, he headed Group 1 of Scientific Research, primarily to continue the study of nuclear chain reactions. Although fundamentally a pacifist, Joliot-Curie was warned by scientist Wendell Zimmerman, "The first use to which the uranium-fission process can be put usefully is in the field of explosives" and "the uranium fission explosives promise to be the most important, the most devastating, explosives ever made."[48] It was imperative to keep atomic secrets out of the hands of Nazi Germany.

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[46] Ibid.

[47] Frédéric Joliot-Curie, "Discours à l'Union des Intellectuels," 1938, boîte 29.

[48] Wendell Zimmerman to Frédéric Joliot-Curie, October 6, 1939, boîte 14.

One of the first steps towards building an atomic bomb was the creation of a self-sustaining nuclear chain reaction. The French and German models for a nuclear reactor at the time used heavy water as the "moderator" to control the fission process. The only heavy water plant in Europe was the Norsk-Hydro plant located in Vemork, Norway. In February 1940 Joliot-Curie and Armaments Minister Raoul Dautry sent banker Jaques Allier to Norway to purchase heavy water from the plant, the entire world's supply of heavy water at the time. As Allier later remembered, "M. Joliot-Curie pursued his work, of immense importance to the National Defense, in difficult conditions," noting that the German secret police were aware of the heavy water mission.[49] For this reason, Joliot Curie gave Allier a small tube of cadmium with the instructions, "Keep this with you always. If the containers of heavy water are in danger and you don't have time to empty them, pour a little in each one. The contents will immediately become unusable."[50] Allier successfully returned to Paris with 26 seven-liter canisters of heavy water. Within months, however, German forces were on the verge of conquering France. Once again determined to keep atomic secrets from the Nazis, Joliot-Curie sent the remaining heavy water to England with Kowarski and Halban aboard the SS *Broompark.* Even as the French government and military fell around him, Joliot-Curie recognized the importance of helping French allies. The heavy water would be used for vital experiments proving that a nuclear chain reaction was possible, and the world's first self-sustaining nuclear chain reaction would take place two years later at the University of Chicago under the direction of Italian physicist Enrico Fermi.

Although many prominent French scientists and other intellectuals fled the country in

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[49] Jaques Allier, "Affaire de l'Eau Lourde," février 1945, boîte 15.

[50] Pflaum, *Grand Obsession: Madame Curie and her World*, 353.

advance of German forces, Joliot-Curie decided to remain in France. There is some debate about why he chose to do so. French chemist Bertrand Goldschmidt suggested that it was because Joliot-Curie spoke little English, while British journalist J.G. Crowther affirmed that Irène was loathe to flee from the Nazis. Joliot-Curie's daughter Hélène Langevin (whose husband Michel Langevin was the grandson of physicist Paul Langevin) offered the most complete explanation, saying that he did not want to leave his family and, after hearing his father's stories of the Paris Commune during his youth, was determined not to abandon his country or French science during the Occupation.[51] Joliot-Curie himself reportedly mused, "I definitely ought to stay."[52]

This much was certain—Frédéric Joliot-Curie was a devoted French patriot. When the Germans took Paris, they were particularly interested in Joliot-Curie's laboratory and repeatedly interrogated him. Nevertheless, he did not reveal the location of the French uranium (by this time safely in Morocco) and when asked which ship took the heavy water to England, Joliot-Curie told his interrogators the name of ship that had already been sunk. Upon his return to his Paris laboratory, Joliot-Curie told his colleagues, "We have lost the military battle, but we must engage in another fight for our country. Despite all the difficulties, we must try to develop new researchers in nuclear physics, for whatever the final outcome of the war, France will need qualified physicists and chemists in this field to regain her independence."[53]

This was a significant battle, as French science under German occupation faced constant repression. As Joliot-Curie explained, "From the beginning, there was an explosion of hate

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[51] Goldsmith, *Frédéric Joliot-Curie: A Biography*, 96.
[52] Biquard, *Frédéric Joliot-Curie: The Man and His Theories*, 54.
[53] Ibid., 101.

against universities and the scientific spirit in particular."[54] Among the more difficult episodes for Joliot-Curie was the arrest of Paul Langevin in October 1940. With his mentor incarcerated in Santé Prison as a common criminal, Joliot decided to close his laboratory until Langevin was freed. In June 1941, The National Front (a Resistance organization) set up a committee at the University of Paris and elected Joliot-Curie as its president. After the 1942 execution of physicist Jaques Solomon, the son-in-law of Langevin, Joliot-Curie officially joined the French Communist Party (PCF). As he would later explain, "I became a Communist because I am a patriot."[55]

As a member of the Resistance, Joliot-Curie worked to organize French science against the German occupation. He was critical, however, of the effort against scientific repression, affirming, "Faced with the enemy's attacks against the universities and French culture… arbitrary arrests, the deportation of students, the expulsion of the Israelites, and revocations, the reaction was always too weak."[56] To counter this reality, Joliot-Curie helped raise money to employ French scientists and to obtain them work certificates so that they would not be sent to Germany in the *Service du travail obligatoire* (Obligatory Work Service; STO). He also facilitated the underground reorganization of a key prewar institution: the CNRSA. As he later explained, "All scientific research for national defense was prevented from 1940 to 1944, at least openly and on a large scale, by enemy occupation," but Resistance scientists were nevertheless able to organize "excellent elements and an adequate organization: the National Center for Scientific Research. Many of its members succeeded before the Liberation in using the resources of their laboratories

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54 Joliot-Curie, "Les Scientifiques et la Résistance (écrit pendant la clandestinité)," boîte 30.
55 Biquard, *Frédéric Joliot-Curie: The Man and His Theories*, 59.
56 Frédéric Joliot-Curie, "Nous ne céderons plus!," boîte 178.

to supply the various resistance movements with weapons and telecommunication apparatuses to which they largely contributed."[57] In his Paris laboratory, Joliot-Curie and his colleagues secretly made Molotov cocktails and radios. By means of an underground distribution system, they successfully blew up the air-liquefaction plant at Boulogne-Billancourt used by the Germans.[58] Even under the close watch of the Nazis, Joliot-Curie resisted the Occupation. As he quipped in a letter to his mother, "I hope to work to forget the stupidity of men."[59]

By 1944, however, his work for the Resistance had become too dangerous to continue openly. In June, Joliot-Curie moved to Belleville in northeast Paris and took the alias Jean Pierre Bumont. Although he had to be more careful, Joliot-Curie continued to help the Resistance where he was able. As he explained in a document written during the Occupation, "We can affirm that the majority of scientists take part in the grand resistance of the French people. They bring all their reason and faith to the common struggle of liberation for our country against all the forces of oppression."[60] Without a doubt, Joliot-Curie believed that science was firmly tied to the future of France, even during a time of great crisis.

Postwar Europe

France after World War II faced an economic catastrophe. Industries across the country were completely destroyed, while France was saddled with enormous war debts. To help rebuild, French economist Jean Monnet proposed a plan that would give France control of the Ruhr and

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[57] Joliot-Curie, "l'Organisation de la Recherche en France," boîte 31.
[58] Biquard, *Frédéric Joliot-Curie: The Man and His Theories*, 60.
[59] Goldsmith, *Frédéric Joliot-Curie: A Biography*, 76.
[60] Frédéric Joliot-Curie, "Les Scientifiques et la Résistance."

Saar in Germany, areas of enormous coal and steel production. As Monnet explained, "The French who are born today and those who were born in the times of our power are the same…. But in the times of our power we were the modern ones of the period. It is our task to become so again. Moreover, we do not have a choice. There is only one alternative to modernization: decadence."[61] Monnet also proposed a "Plan de modernization et d'équipement économique" that would mobilize the French economy in an effort to promote reconstruction and modernization. Joliot-Curie, for his part, was critical of this proposition and published a paper, "On an Omission from the Monnet Plan," objecting to the lack of funds for atomic research and the general reestablishment of French science.[62]

The United States, however, was not supportive of the Monnet Plan as it feared that the proposal would make France overly self-sufficient. American diplomat Livingston Merchant explained that the Monnet plan would "cut dependence" and "conformed to the desire for national accomplishment and strength" while countering the American goal of "liberalized, expanding world trade."[63] Instead, the US Congress authorized a plan devised by General George Marshall. Fearful that Communism could spread in a weakened Western Europe, in December 1947 the Marshall Plan allocated $600 million to France, Italy, and Austria to provide food and energy needs and by 1951 had authorized a total of $13 billion to countries across Europe.[64]

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[61] Robert Frank, "The French Dilemma: Moderation with Dependence or Independence and Decline," In *Great Britain, France, Italy and Germany in a Postwar World, 1945-1950* (Berlin: Walter de Gruyter, 1986), 266.

[62] John Krige, *American Hegemony and the Postwar Reconstruction of Science in Europe*, (Cambridge: MIT Press, 2006), 37.

[63] Andrew Hrycaj, *Challenging the United States: French Foreign Policy 1944 - 1948*, PhD diss., Concordia Univesity, 2000, 62.

[64] Krige, *American Hegemony and the Postwar Reconstruction of Science in Europe*, 24.

The Marshall Plan had a significant impact on the development of European science. Historian John Krige argues that science in Europe became "a hegemonic postwar American project" shaping "the agendas, the institutions, and the allegiances of scientists in Europe in line with U.S. scientific, political, and ideological interests in the region."[65] One reason for this fact was that, as with industrial capabilities, there was an enormous difference between American and European scientific abilities after the war. German forces had destroyed or shut down many French laboratories, while the United States had embarked on arguably the largest collaboration between science, industry, and government in history: the Manhattan Project.

The Americans did not want to support French military development, and especially not nuclear research. The Atomic Energy Act of 1946 (alternately known as the McMahon Act) classified all American atomic secrets, shutting out France completely from future scientific cooperation despite its contributions to the Manhattan Project in a clear effort to maintain the American nuclear monopoly. "With its superior technological potential the United States can expect to profit more quickly and more fully than any other nation from the exploitation of published findings," declared the Atomic Energy Commission.[66]

Additionally, the Office of Naval Research (ONR) expressed concern about scientists in "high positions in government" who "identified with extreme left wing groups in their countries," a clear reference to Joliot-Curie.[67] American concern over his communist beliefs would play a major role in Joliot-Curie's dismissal from his post at the CEA in 1950. Furthermore, in 1947 the National Security Act created a Research and Development Board

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[65] Ibid., 3.
[66] Ibid., 13.
[67] Ibid., 32.

(RDB) which "resolved, that in the implementation of the European Recovery Plan, careful consideration be given to the rehabilitation of European Science"[68] but that in France "only basic research should be fostered."[69] This intention ran counter to the efforts of Joliot-Curie, who had worked tirelessly to preserve French science under German occupation. In the years to come, Joliot-Curie would rebuild the French scientific effort and return its focus to atomic research despite the wishes of the United States.

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[68] Ibid., 31.

[69] Ibid., 38.

Chapter 3: Nuclear Nationalism

In the aftermath of World War II, the Provisional Government of the French Republic led by General Charles de Gaulle sought to rebuild France. Of special importance to this reconstruction was the development of science and technology. The military failure of France at the hands of Nazi Germany highlighted its shortcomings in this area, while the atomic bombings of Hiroshima and Nagasaki confirmed the possibilities of atomic energy and demonstrated to the world the newfound power of the United States. Countries such as the Soviet Union, the United Kingdom, and eventually France believed that the failure to work on the atomic bomb would result in falling behind in this new technological race. While Frédéric Joliot-Curie did not want France to build the bomb, he did feel a technological imperative to pursue nuclear research. In September 1945, de Gaulle asked Joliot-Curie if he would head a new institution devoted to the development of atomic energy. On October 18, the *Commissariat à l'énergie atomique* (CEA) was formally created with Joliot-Curie its first High Commissioner.[1]

Historian Gabrielle Hecht argues in her book, *The Radiance of France: Nuclear Power and National Identity after World War* II, that the development of the French nuclear program became a significant part of France's postwar national identity. More specifically, Hecht identifies how technological success gave France the "radiance" it lacked during the Second World War. As she points out, the French word *rayonnement* can mean either "radiance" or "radiation."[2] By building its nuclear program, according to Hecht, France was able to reestablish

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[1] Michel Pinault, *Frédéric Joliot-Curie* (Paris: Odile Jacob, 2000), 328.

[2] Gabrielle Hecht, *The Radiance of France: Nuclear Power and National Identity after World War II* (Cambridge, MA: MIT Press, 1998), 2.

its self-esteem and worldwide standing. This became even more apparent after France tested its first atomic bomb in 1960.

For the most part, Hecht looks at the development of the nuclear program in the context of the French state, meaning its government and bureaucratic institutions, including the CEA. She examines the role of "technocrats," or technological engineers who made their way into bureaucratic government positions, and the related concept of "technocracy" by which technocrats would move their "area[s] of expertise into the domain of political decision making.[3] By developing France's nuclear program, technocrats "would restore Frenchness to the nation in a way that made them—as men of action, as heroic male workers and militants, as representatives of their regions—central players."[4] Hecht examines briefly Joliot-Curie as "a ready-made hero" who supported the narrative of French radiance during his brief tenure in the French government (he was dismissed in 1950).[5] The 1947 film *La bataille de l'eau lourde*, for example, features Joliot-Curie as himself during the heavy water affair of 1940 when he helped to keep nuclear materials out of Nazi hands. She does not, however, examine his role as a scientist in the midst of atomic politics, a crucial part of Joliot-Curie's identity during his years with the CEA. Analyzing Joliot-Curie as a scientist-administrator sheds light on the experience of postwar nuclear scientists in France.

This chapter will therefore expand on Hecht's analysis by showing how Joliot-Curie was a French nationalist. The definition of nationalism has been a frequent topic of debate among historians and political scientists. It intersects with the definition of nation, which Benedict

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[3] Ibid., 28.
[4] Ibid., 330.
[5] Ibid., 204.

Anderson believes to be a socially constructed phenomenon, "an imagined political community —and imagined as both inherently limited and sovereign."[6] Nationalism also manifests differently among nations that already exist rather than within a group which aspires to create one. As philosopher Ernest Gellner explaines, "Nationalism is not the awakening of nations to self-consciousness: it *invents* nations where they do not exist."[7] Although the French people certainly did not invent a new nation after World War, their postwar recovery arguably *re*invented the French nation.

Additionally, Joliot-Curie was concerned not only with recovery but with French modernization. As John Breuilly explains in the introduction of Gellner's book *Nations and Nationalism*, "Gellner thought of modernity as a distinctive form of social organization and culture. He considered nationalism to be a function of modernity."[8] Joliot-Curie therefore aligned with Hecht's analysis because he saw nuclear energy not only as a way to reshape French national identity but to reinvent France itself. Joliot-Curie expressed his nationalism by promoting the domestic development of nuclear energy, emphasizing the global contributions of France, and rewriting the historical nuclear narrative to put France at its forefront.

The Renaissance of France

France's energy crisis after World War II was a pressing concern for Joliot-Curie and the entire French scientific community. Prior to the advanced development of nuclear energy, coal

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6 Benedict Anderson, *Imagined Communities: Reflections on the Origin and Spread of Nationalism* (London: Verso Books, 2016), 6.

7 Ibid.

8 Ernest Geller, *Nations and Nationalism* (Oxford: Blackwell Publishing, 2006), xx.

was the dominant source of domestic electricity in France. By the time it recovered in the late 1940s, coal accounted for 75% of French energy production.[9] For this reason, coal was a rallying cry among those pushing for German reparations in the immediate aftermath of World War II. The National Front, for example, headlined a 1947 newspaper, "Coal! Reparations! Security!" and "Germany is guilty and must pay!"[10] Joliot-Curie echoed these sentiments when he asserted, "It is a real catastrophe, an extremely troublesome thing, to see that the *renaissance* is slowed and restrained by this lack of coal. And it would be right that, as part of the reparations, a substantial portion of the coal in the Ruhr be given to France."[11] The message was clear: without coal—and more importantly, without energy—France could not modernize.

This last quotation also was a reference to an idea that would become the focal point of Joliot-Curie's postwar scientific efforts: *la renaissance de France*. Loosely translated as "recovery," "revival," or "rebirth," *renaissance* to Joliot-Curie would come to mean the development of nuclear energy. He ultimately recognized the truth that "France is a country which needs new sources of energy for its development.[12]" In addition to the French state's promotion of its nuclear program as *rayonnement* ("radiance"), which Gabrielle Hecht analyzed as a significant part of France's postwar national identity, Joliot-Curie's *renaissance* was an expression of French nationalism. *Renaissance* would not only rebuild France but also

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[9] D. Ian Scargill, "French Energy: The End of an Era for Coal," *Geography* 76, no. 2 (1991): 172, http://www.jstor.org/stable/40572069.

[10] *Journal du Front National*, janvier 1947, boîte 124, 5.

[11] Frédéric Joliot-Curie, "Response à Tout," Emission de M. André Gillois, 6 janvier 1947, boîte 33.

[12] Bertrand Goldschmidt and Frédéric Joliot-Curie, "Adventures in Science," Interview by Watson Davis, Columbia Broadcasting System, January 29, 1949, boîte 36.

modernize it, and Joliot-Curie wanted to ensure that France was keeping pace with other powerful nations around the world.

In the immediate aftermath of the war, Joliot-Curie's first efforts were focused on reorganizing the French scientific community. He did so largely by expressing his belief that scientists and other highly trained intellectuals had a duty to contribute to French *renaissance*. "The men of science know very well that they have a great role to play in the *renaissance* of the country," Joliot-Curie wrote in 1945. "Conscious of their responsibilities, still animated by the great patriotic impetus which advanced the country at the time of the liberation and which must always exist and continue to develop, they simply put all of their abilities at the service of the country."[13] Although the French nuclear program was not yet under way, Joliot-Curie's use of the term "patriotic impetus" also implied a technological imperative that he saw facing French scientists. A technological deficit had translated to a military defeat in World War II, and scientific mobilization could protect France in the future. Joliot-Curie likewise told the Union of Intellectuals, "The prestige of our art, our literature, our science, is known all over the world. If the influence of French intelligence is to continue after the war, intellectuals must help restore France to its role as a world power… The *renaissance* of our country requires a greater influence from men of intelligence."[14] Evidently, Joliot-Curie felt that highly trained professionals, and scientists in particular, had an obligation to help France recover from World War II.

Additionally, Joliot-Curie was concerned that France would lose its position as a powerful, technologically advanced nation without the advancement of its scientists and

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[13] *Sciences Revue*, l'Association Française pour l'Avancement des Sciences, 4è trimestre 1945, boîte 31.

[14] *Première Assemblée Nationale de l'Union Nationale des Intellectuels*, Paris: Georges Bruyère, 1945, boîte 143.

scientific institutions. Scientific progress and modernity were synonymous to Joliot-Curie, and the failure to mobilize science would therefore in his eyes result in the the failure of the French state. “It is the moment for us, and our duty, to intensify our efforts to bring together all the French who are concerned for the security and the independence of their country, and who are determined to unite for the *renaissance* of France,”[15] he explained. Joliot-Curie was focused on the mobilization of science not only for the technological benefit but also for the political benefit of France, a stance that clearly went beyond the traditional role of the scientist.

Joliot-Curie’s role as a nuclear physicist and government administrator at the CEA soon gave him the opportunity to achieve French *renaissance*. He imagined, for example, “the bomb as an ordinary explosive for construction projects”[16] and even using the bomb to create “transformations of terrains, soil and marine subsoil, or perhaps also to modify atmospheric conditions in order to reduce periods of drought.”[17] He was misguided in overestimating the prospects of atomic energy, but Joliot-Curie clearly recognized the potential that the atomic bomb held for French modernization. A more realistic proposal was Joliot-Curie’s suggestion and initiative that nuclear power could be the future energy source for France. “France will develop energy generators that will enable technicians to contribute to the industrial sector,”[18] Joliot-

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15 Frédéric Joliot-Curie, "Union Pour Renforcer la République et la Sauvegarde de la Paix,” *Bulletin d’Information et d’Organisation du Front National de Lutte pour la Renaissance et l’Indépendance de la France*, janvier-février 1947, boîte 34.

16 The United States’ “Project Plowshare” actually tested the feasibility of the atomic bomb for construction projects in the 1960s, although no bombs were ever used in an operational capacity for this purpose. Manhattan Project physicist Edward Teller even proposed using the bomb to widen the Panama Canal. For more information see: Edward Teller, *The Constructive Uses of Nuclear Explosives* (New York, NY: McGraw-Hill, 1968).

17 Frédéric Joliot-Curie, “Conférence à la Société Royale Belge des Ingénieurs & Industriels,” 13 mai 1946, boîte 32.

18 Frédéric Joliot-Curie, “La Libération de l’Energie Atomique et Ses Conséquences,” boîte 31.

Curie asserted. His administration of the CEA demonstrated a clear focus on the development of nuclear energy as a source of electricity. At its first meeting, the CEA outlined the following goals: (1) intense research of uranium and thorium; (2) the addition of mechanical and radio-electric equipment to create a stock of precious materials (such as uranium and heavy water) at the Fort de Chatillon; (3) the development and preparation of enriched uranium (3-5% enrichment was used in nuclear reactors); (4) the establishment of a center for nuclear research near Paris (it was built at Saclay), including the development of a cyclotron and the creation of two experimental chain-reacting "piles" (essentially small nuclear reactors); and (5) the creation of a larger "pile" capable of producing 100,000 kilowatts of electric energy.[19] These initiatives affirmed Joliot-Curie's belief that France should be focused on its reconstruction through modernity. The production of nuclear energy would help France recover from World War II, but would also lift it to a new era of sustained technological success.

Joliot-Curie also expressed the need for France to rebuild and modernize without the help international scientific cooperation. In doing so, he likely recognized the reality of the 1946 McMahon Act, which made all atomic research in the United States born secret. France was shut out of American atomic research, including access to nuclear materials. As Joliot-Curie therefore explained, France needed "atomic research for the development of a nuclear industry on its own territory."[20] He similarly stated at a 1947 press conference, "We must seek our uranium because the development of atomic energy in our country depends on what deposits we can find, either in

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[19] Frédéric Joliot-Curie, "Allocution Prononcée à la 1ère Réunion du Comité à l'Energie Atomique Présidée par M. Felix Gouin," 19 mars 1946, boîte 32.

[20] Frédéric Joliot-Curie, "Elements d'Information sur le Commissariat à l'Energie Atomique," 1946, boîte 71.

France or in the French Union [French territories overseas]."[21] Joliot-Curie was a strong proponent of scientific openness and collaboration, but absent this possibility he was determined that the modernization of France press forward nonetheless.

Interestingly enough, however, Joliot-Curie never directed the CEA to develop or even to research atomic bombs. He frequently went out of his way to assert the peaceful intentions of the French nuclear program. "All our atomic energy projects are directed toward peacetime applications," he insisted in 1947. "We are not manufacturing atomic bombs."[22] It would seem to follow logically that nuclear weapons give France a superior sense of security, given Joliot-Curie's expression of France's imperative technological development. Nevertheless, he affirmed, "France is directing her research in the atomic field, not to develop better instruments of mass killing, but to new means of enriching life."[23] Although he expressed nationalist sentiments in his desire to rebuild and modernize France, Joliot-Curie never saw the weaponization of nuclear energy as a viable path for French *renaissance*.

During Joliot-Curie's tenure, the French nuclear program began to produce results that showed the potential for nuclear energy as a source of electricity.[24] In this context, Joliot-Curie's rhetoric once again took a nationalist tone that promoted French modernity. He reported in 1947 to the American *Bulletin of the Atomic Scientists*, for example, "In a very short time we made substantial progress in the two main directions of our effort, viz., to build two atomic piles of

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[21] "Conférence de Presse à Paris," 25 juillet 1947, boîte 34.

[22] Robert Sturdevant, "Script for Broadcast," (American Broadcasting Company, March 24, 1947), boîte 32.

[23] Frédéric Joliot-Curie, "Atomic Power"*, United Nations World* (March 1947), boîte 34.

[24] The nuclear program did not, however, hold a significant share of France's domestic energy production until the 1980s, when it went from 27.3% to 75% by the end of the decade. For more information see: D. Ian Scargill, "French Energy: The End of an Era for Coal," *Geography* 76, no. 2 (1991): 174, http://www.jstor.org/stable/40572069.

medium power, as a research tool and as a pilot plant, respectively, and to train technicians who will specialize in the field of industrial applications."[25] While the accomplishments Joliot-Curie listed to the *Bulletin* were relatively insignificant, the fact that he actively promoted the French nuclear program to an international publication was evidence that he wanted French technological achievements to be known worldwide. In contrast to the Manhattan Project, which in principle was kept secret, Joliot-Curie's work at the CEA was to be broadcast as a successful example of French modernization.

By 1948, Joliot-Curie had completed his greatest accomplishment as the head of the French nuclear program: the development of France's first nuclear reactor. Built at the Fort de Chatillon, the reactor went critical at 12:12 PM on December 15, 1948. It was nicknamed Zoé, an acronym for *Zéro énergie* (zero energy—the reactor produced very little), *Oxyde* (uranium oxide), and *Eau lourde* (heavy water). Zoé was a major accomplishment and, as Hecht points out, it was touted by President Vincent Auriol as a milestone that "will add to the radiance of France."[26] For Joliot-Curie, it was "a key stage in the development of atomic energy in our country,"[27] a perspective which suggested that technological progress would continue. Joliot-Curie also believed that the success of Zoé enhanced French political legitimacy. British journalist E. J. Burford reported Joliot-Curie's belief that "the construction of the first atomic pile in France [Zoé] showed the independence of France and of French scientific thought."[28] It is debatable whether Zoé really legitimized France's postwar political identity, but it undoubtedly

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[25] Frédéric Joliot-Curie, "Statements on the Second Anniversary of Hiroshima," *Bulletin of the Atomic Scientists* 3, no. 9 (September 1947), boîte 34.
[26] Hecht, *The Radiance of France*, 2.
[27] Frédéric Joliot-Curie, "Conférence pour le personnel du CEA," 22 novembre 1949, boîte 37.
[28] E.J. Burford, "L'interview de Frédéric Joliot-Curie," *Democrat Monthly*, juillet 1949, boîte 37.

showed the power of the French nuclear program, literally and figuratively, under the direction of Joliot-Curie.

A Nuclear Laboratory Upon A Hill

Although the *renaissance* of France was certainly the most critical issue concerning Joliot-Curie, he was also determined that France should make a meaningful contribution to the world because he believed that doing so would legitimize France's new identity in the postwar world. On a 1946 trip to the United States, for example, he stated that "we in France are in a fairly good position to make a useful contribution to research in this field." As he furthermore professed,

> We in France have the very firm intention to see that France continues to live, continues to exists as an independent country, and every Frenchman realizes now, perhaps even more clearly than before, that it is by the *radiation* [emphasis added] of its ideas and its thoughts, by the export of these things that a country justifies an independent existence. A country which has nothing useful to contribute to the rest of the world has no right to be free.[29]

France had only recently regained its independence, and Joliot-Curie therefore wanted to reestablish France's status as a great power. Furthermore, although this text appeared in English rather than French, Joliot-Curie's use of the word "radiation" was striking. He stepped across the traditional boundaries of his role as a scientist and embraced those of a statesman, directly tying the development of France's nuclear program to its political legitimacy.

Joliot-Curie made it abundantly clear from the start of his tenure at the CEA, however, that French contributions in the field of nuclear physics should only advance peaceful interests.

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[29] "Conférence de Presse aux Etats-Unis," 14 juin 1946, boîte 32.

As American journalist David Schoenbrun observed after interviewing Joliot-Curie, "It is only when the words 'atom bomb' are mentioned that he ceases to be the poet-scientist and becomes the political thinker and rationalist, the man who says 'We could eventually, but will not make an atom bomb.'" Schoenbrun was incorrect in his assessment that Joliot-Curie only expressed himself politically when it came to the atomic bomb, but he clearly noticed Joliot-Curie's political intentions nonetheless. As Joliot-Curie explained in the same interview, "Of course we could some day make an atom bomb, but what for? You have to make not one, not one hundred, not one thousand but thousands of atom bombs."[30] In his eyes, a nuclear arms race would not be beneficial to France. Throughout his time at the CEA, Joliot-Curie took every opportunity to reiterate this stance to as many different audiences as possible. He wrote in the American *Bulletin of the Atomic Scientists*, for example, "Faithful to their tradition of culture and freedom, the French atomic scientists do not spare their efforts in the task of developing the peaceful uses of atomic energy" so that France could "benefit, in its turn, from a discovery towards which she had contributed so much, and play her part in the industrial development of the peaceful applications of atomic energy."[31] In this way, he connected French scientific heritage to France's future development and worldwide contributions.

Joliot-Curie also extended his belief in the peaceful applications of nuclear research to the CEA personnel under his leadership. As he explained in 1946, "French scientists and experts work ardently, conscious of their contribution to the *renaissance* of their country. They firmly hope to soon participate, together with scientists of other countries, in maintaining peace in the

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[30] Schoenbrun, "Can France Make an Atom Bomb?"

[31] Joliot-Curie, "Statements on the Second Anniversary of Hiroshima," *Bulletin of the Atomic Scientists* (1947).

world."[32] Two years later, he reasserted this claim directly to CEA personnel. French nuclear development "was not a question of constructing atomic bombs but rather of peaceful applications. This was officially explained by the French delegate to the UN in June 1946. The will of the government is to direct scientists towards peaceful goals."[33] In this case, Joliot-Curie also alluded to French government policy, an indication that he was in a position to influence it. As a scientist-administrator, both part of the government and outside of it, Joliot-Curie was in a prime position to influence French scientific policy and its role in his vision for postwar France.

Not only did Joliot-Curie believe that his country could make significant scientific contributions to the world, but he was also convinced that it should be an example for other nations to follow. More specifically, Joliot-Curie affirmed that France could be a model for the peaceful applications of atomic energy. "My country has always sought to lead the way in respect for human liberties," he asserted. "France is directing her research in the atomic field, not to developing better instruments of mass killing, but to new means of enriching life. It is a viewpoint she is eager to see adopted universally."[34] Although he would later intensify his efforts for peace after his dismissal from the CEA, it was significant that Joliot-Curie wanted to influence the nuclear policy of other nations during his time as a government administrator. As he explained, "We hope that the atomic village of Saclay will contribute to the *renaissance* of France [emphasis added], but also by the lesson of its useful aims, to the peace of the world."[35] By tying the peaceful use of atomic energy to a more general effort for peace in the world, Joliot-

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[32] Frédéric Joliot-Curie, "Conférence à la Société Royale Belge des Ingénieurs & Industriels," 13 mai 1946, boîte 32.

[33] Frédéric Joliot-Curie, "Allocution au personnel du C.E.A.," mai 1948, boîte 35.

[34] Frédéric Joliot-Curie, "Atomic Power"*, United Nations World* (March 1947), boîte 34.

[35] Ibid.

Curie directly connected a technological development to a geopolitical one. Additionally, his reference to French *renaissance* alongside French contributions to the world reinforced the notion that both would contribute to France's modernity. For Joliot-Curie, Saclay would serve as a nuclear laboratory upon a hill, a shining beacon of peaceful scientific progress that could inspire nations across the world to follow France's example in the new atomic age.

We Did It Our Way

As he rebuilt France's domestic and international image, Frédéric Joliot-Curie also rewrote the narrative of atomic history to emphasize French contributions. He did so in three major ways. First, Joliot-Curie extended the timeframe of atomic history to before the 1930s, which was generally accepted as the first decade of significant nuclear research. According to Joliot-Curie, this history went back instead to the turn of the twentieth century, when French scientists Marie and Pierre Curie discovered radium—a radioactive element to be sure, but a far cry from the nuclear chain reactions necessary to build a nuclear reactor or an atomic bomb. "France can legitimately claim the knowledge of the secrets of atomic energy because she is the country which has given birth to and developed nuclear physics,"[36] explained Joliot-Curie. As he proudly told the Anglo-American press in 1949, "In January 1946, when the [French] Atomic Energy Commission was created, we started with almost nothing…. Fortunately, we have a strong tradition in France, started half a century ago by Henri Becquerel and Pierre and Marie Curie."[37] Scientific heritage was certainly something to be proud of, but Joliot-Curie took this

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[36] Frédéric Joliot-Curie, "French Views on Atomic Energy," *Science and the Welfare of Mankind* (London: Temple Fortune Press, 1946), boîte 32.

[37] Frédéric Joliot-Curie, "Allocution au déjeuner de la presse anglo-américaine," 5 janvier 1949, boîte 36.

pride a step further by suggesting that the Curies had started the development of nuclear physics. In the eyes of Joliot-Curie, this narrative gave strength to the "new" nation of France, and by looking to the past he sought to bring modernity to France through scientific legitimacy.

Second, Joliot-Curie emphasized France's accomplishments in atomic research prior to the Occupation. "We in France do not profess to know how to make an atomic bomb," Joliot-Curie explained in 1947. "However, the basic scientific principles were known to us here in France early in 1939 and we are familiar with all the published information on the subject." This was an overstatement. It was true that Joliot-Curie worked on uranium fission research prior to the German invasion, but the first nuclear chain reaction was not achieved until Enrico Fermi's team at the University Chicago successfully built and tested Chicago Pile-1 in late 1942 during the early stages of the Manhattan Project. The American atomic bomb was an enormous scientific and technological achievement, and its design was unknown to anyone in 1939. Joliot-Curie similarly wrote in 1949, "A small team of French scientists had succeeded, from the beginning of 1939 to June 1940, to place our country, in matters of atomic energy, in the first rank of the nations."[38] Again, this was an exaggeration. France was an important player in atomic research at the time, but was hardly the most important contributor. Joliot-Curie must have known that he was promoting an inaccurate narrative, and yet he continued to affirm the significance of French scientific accomplishments as he worked to build a new identity for France.

Lastly, Joliot-Curie emphasized French contributions to the Manhattan Project. As he explained, "After June 1940 [the fall of France], there was no question of continuing our work in

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[38] Frédéric Joliot-Curie, "Une étape dans le développement de l'Energie atomique," *Les Cahiers Français d'Information* 124 (15 janvier 1949), boîte 35.

France during the occupation. The French effort, however, continued even within the Allied research teams."[39] This claim was not unfounded. In 1940, French physicists Lew Kowarski and Hans Halban conducted atomic research in England that directly contributed to the British MAUD Committee Report (a project commissioned by Prime Minister Winston Churchill to determine the feasibility of building an atomic bomb), which in turn provided impetus for the establishment of the Manhattan Project. Kowarski and Halban were later part of a British delegation to the Manhattan Project at Chalk River, Ontario, where they worked on one of the world's first heavy water nuclear reactors. French physicist Bertrand Goldschmidt also worked on the Manhattan Project, at the University of Chicago's Metallurgical Laboratory.

Where Joliot-Curie's nationalist rhetoric frequently appeared, however, was in response to what he saw as inadequate international recognition for French contributions to the Manhattan Project. On August 12, 1945, three days after the bombing of Nagasaki, American physicist Henry DeWolf Smyth released the first official report of the Manhattan Project.[40] Commissioned by the American government, the Smyth Report made no mention of the small but crucial French contributions. It portrayed the Manhattan Project instead as an American achievement, and Joliot-Curie was quick to notice. "The United States avoids explicitly recognizing the French contributions, no doubt for nationalistic and economic reasons,"[41] he complained to his CEA colleagues during their first official meeting. Almost two years after the report was made public, the *New York Herald Tribune* further reported, "[Joliot-Curie] charged that professor Henry D.

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[39] Joliot-Curie, "Une étape dans le développement," *Les Cahiers Français d'Information* (1949).
[40] Henry DeWolf Smyth, *Atomic Energy for Military Purposes* (Princeton, NJ: Princeton University Press, 1945).
[41] Joliot-Curie, "Allocution Prononcée à la 1ère Réunion du Comité à l'Energie Atomique."

Smyth of Princeton University has made regrettable omissions in his 'Report on Atomic Energy for Military Purposes,' which have kept scientific and public opinion in the United States in ignorance of the vital contributions of French science to the discoveries leading to the making of atomic bombs."[42] In this way, Joliot-Curie took a political stance on French scientific accomplishments by countering the United States' narrative of the Manhattan Project.

He was not entirely wrong in his assessment—France did make important scientific contributions—but the urgency with which Joliot-Curie responded to the American claims suggested that he was concerned about France's international image. On the one hand, he affirmed, "I have neither the intention nor the pretense to claim that France has done everything and sits at the base of all research." On the other, he insisted that "we have played a very important part, which has sometimes been omitted in France and abroad."[43] Although France was a relatively minor player in the Manhattan Project, Smyth's omission of its contributions likely had political motivations. As the United States sought to preserve its nuclear monopoly, it was not in American interests to emphasize international scientific cooperation. Joliot-Curie, meanwhile, took personal issue with the idea that France made no contribution to the atomic bomb.

Ultimately, Joliot-Curie began to assert the uniquely French nature of his country's nuclear program, perhaps in response to the lackluster American acknowledgement of French scientific contributions. "Our achievements in the field of atomic energy are entirely French," he told the American press. "Its development, as well as the choices of the men responsible for it,

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[42] Vincent Bugeja, "Joliot-Curie Rips America for Atomic Energy Report," *New York Herald Tribune, European Edition*, June 15, 1947, boîte 87.

[43] "Conférence de Presse à Paris," 25 juillet 1947, boîte 34.

concerns only the French."[44] This claim was not entirely accurate. French scientists certainly made remarkable contributions to the development of atomic research, but the French nuclear program also had roots in the Manhattan Project. French scientists Kowarski, Goldschmidt, and Jules Guéron, all of whom worked in some capacity on the Manhattan Project, came to what historian Rosalynd Pflaum calls a "gentleman's agreement" with Washington by which the three would be allowed to work on the French nuclear program. They were only allowed to bring back materials that they themselves had worked on (a "packet of notes") and naturally whatever additional information they could remember.[45] As he continued to affirm the "Frenchness" of his nuclear program, it seemed that Joliot-Curie had a blind spot for this fact. Other French scientists expressed similar rhetoric. Biologist Louis Rapkine, for example, wrote following a scientific trip to the United Kingdom, "It is out of the question, of course, to imitate the English. The French scientific spirit has its own characteristics, which… have allowed it to make important contributions for science worldwide, a contribution recognized even by those who today denigrate this spirit."[46] American pressure against the advancement of science in Europe, it seems, had a lasting impact on Joliot-Curie and his colleagues. Just as he considered it his duty to rebuild and modernize France by developing nuclear energy and ensuring its global contributions, Joliot-Curie was determined that France forge its own path at a time when French nuclear science was increasingly isolated in the international community.

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[44] Joliot-Curie, "Allocution au déjeuner de la presse anglo-américaine," 1949.

[45] Rosalynd Pflaum, *Grand Obsession: Madame Curie and her World* (New York: Doubleday, 1989), 420.

[46] Louis Rapkine, "Rapport sur l'Activité de la Mission Scientifique Française en Grande-Bretagne," Août 1944 - Décembre 1945, boîte 15.

Tension in the Western Bloc

During Joliot-Curie's tenure with the CEA, tension existed between Joliot-Curie's vision for France and the United States' desire to control the political future of Western Europe. More specifically, the case of Joliot-Curie provides a window through which some of the political complexities within the Western Bloc can be better understood. The United States actively sought to undermine Joliot-Curie's efforts, but in doing so ultimately crippled its own efforts regarding nuclear non-proliferation.

One method by which the United States attempted to subvert Joliot-Curie's efforts was by spreading the idea that his work posed a threat to American national security. For example, *The New York Herald Tribune* reported in 1948 that "most of the research that the French will achieve is information that the United States considers among the most secret," thus suggesting that France was seeking to repeat American accomplishments in atomic research at the expense of the US. *The Tribune* further reported that while "such secrets cannot be made public if they are discovered by American, British or Canadian scientists…the French are not bound by any agreement of this kind—they are not required to ask permission from anyone to publish their discoveries" and therefore "the existence of the French pile is a real threat to the measures that the English-speaking nations have decided to adopt. For many, the threat is even greater because the French director of works, Dr. Frédéric Joliot-Curie is a devoted communist."[47] Although obviously this article was not a government source, it expressed several ideas that clearly showed tension between the United States and France in the context of the Cold War. The reference to "English-speaking nations," for example, was misleading. The McMahon Act not only shut out

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[47] "Pas de Science Atomique pour les Français," *New York Herald Tribune*, 27 décembre 1948, boîte 87.

France from atomic secrets but also excluded all Manhattan Project partners, including Canada and the United Kingdom. Nevertheless, this article drew specific attention to the threat of French nuclear development, ignoring the ongoing British nuclear program altogether.[48]

Additionally, the concern that *The Tribune* article raised over Joliot-Curie's communist beliefs was also indicative of Western tensions, not only with Joliot-Curie but with France as a whole. "You've heard about the Communist Party in France?" asked General Leslie Groves, the administrative head of the Manhattan Project. "I read the PCF is disconnected from the Russian one, but I notice they go to Moscow all the time."[49] After joining the French Communist Party (PCF) during World War II, Joliot-Curie maintained his commitment to the communist movement for the duration of his lifetime. His political rhetoric was frequently tinged with communist ideology. J. Robert Oppenheimer, the scientific head of the Manhattan Project, defended Joliot-Curie, however. "The most important—one could say the only—peaceful use of atomic energy at present is based on the use of artificial radioactive particles, which were discovered by Joliot-Curie, who is communist, and by his wife, who is a communist sympathizer," Oppenheimer wrote to Senator McMahon in 1949. Nevertheless, Oppenheimer also recognized, "We have a strong interest in not overstimulating the development of atomic energy in other countries."[50] Oppenheimer himself was accused of communist ties and stripped

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[48] As was the case in the French nuclear program, British scientists who worked on the Manhattan Project (including James Chadwick, William Penney, and even Klaus Fuchs—a Soviet spy) returned to the United Kingdom to work on the British bomb project. The UK tested its first atomic bomb in 1952. For more information see: Graham Farmelo, *Churchill's Bomb: How the United States Overtook Britain in the First Nuclear Arms Race* (New York: Basic Books, 2013).

[49] Pflaum, *Grand Obsession: Madame Curie and her World,* 419.

[50] J. Robert Oppenheimer, "Extrait de la note adressée au sénateur McMahon," 17 mai 1949, boîte 87.

of his security clearance in 1954. Joliot-Curie was only a footnote in a larger era of communist hysteria, but his case was a prime example of the tension that communist fears caused between the United States and its allies.

Furthermore, American anti-communist sentiment in the context of Cold War tensions with the Soviet Union was likely a contributing factor to a larger purge of communists in the French scientific elite, including Joliot-Curie. Henri Monnet, a high ranking official in France's Defense Committee, asserted in 1948, "You [the French government] have not put at the head of your great committees a Communist president. You have not put at the head of your army a Communist general-staff. I ask you not to put at the head of scientific research, which interests in the first instance the national defense, Communist operators."[51] Furthermore, prior to Joliot-Curie's dismissal, other prominent communists were expelled from their positions in the French government. Georges Tessier for example, the director of the National Center of Scientific Research, was also dismissed in early 1950.[52]

The breaking point with Joliot-Curie, however, came after a speech he delivered before the Communist National Congress in April 1950. "Never will progressive scientists, never will communist scientists give a particle of their knowledge for a war against the Soviet Union," he affirmed. "And we will stand fast, upheld by our conviction that by so doing we are serving France and all humanity."[53] In May, the National Assembly approved the dismissal of Joliot-Curie by a vote of 399 to 179. An official government statement pronounced, "The Premier

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[51] Lawrence Scheinman, *Atomic Energy Policy in France under the Fourth Republic* (Princeton, NJ: Princeton University Press, 1965), 39.

[52] Ibid., 45.

[53] "News in Brief," *Bulletin of the Atomic Scientists* 6, no. 6 (June 1950), 191.

[Georges Bidault] explained that whatever may be the scientific ability of this scientist, his public pronouncements and his acceptance without reserve of the resolution voted at the last national congress of the Communist Party made it impossible for him to retain his position."[54] Joliot-Curie had made no secret of his communist sympathies when he was hired to run the CEA in 1945. Although he may have grown more provocative in his public commentary, it was the changing position of the French government that led to his dismissal, a position clearly influenced by the United States.

Even if the American government did not directly order the dismissal of Joliot-Curie, its influence did not go unnoticed in France. An association of scientists and technicians from the Collège de France, for example, accused "the current government of France" of attempting "to eliminate the French atomic program by the request of the American [nuclear] monopoly."[55] The National Front likewise affirmed, "By revoking Joliot-Curie the government sacrifices the scientific future of France and attacks our national heritage… By revoking the peaceful scientist, the government demonstrates its intent to use atomic research to serve the political interests of war."[56] American interference in French politics evidently caused at least some degree of political backlash.

Furthermore, the dismissal of Joliot-Curie actually ran contrary to the American interest in nuclear non-proliferation. It is debatable whether a French bomb was in the works during Joliot-Curie's tenure. He insisted that France was not building a bomb, but the uranium rods

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[54] Ibid.

[55] "Résolution Adoptée par une Assemblée des Travailleurs Scientifiques et des Techniciens du Collège de France," 29 Avril 1950, boîte 87.

[56] "Qui est Joliot-Curie?" l'Union Française Universitaire (Front national universitaire dans la Résistance), boîte 124.

produced by the Zoé reactor were used in a subsequent pilot plant built in 1954 at Chatillon, which in turn produced weapons-grade plutonium.[57] Although Joliot-Curie did not intend for his work to contribute to nuclear weapons, he must have known that it was a possibility. Without Joliot-Curie, however, France began to openly build the bomb against the wishes of the United States.[58] This development can also be attributed in part to the return of French President Charles de Gaulle in 1958 and the declaration of the Fifth French Republic. De Gaulle promoted his "politics of grandeur," which in his eyes would restore France as major player on the global stage independent of other countries like the United States. This effort included the construction of nuclear weapons. As de Gaulle explained, "A great State which does not possess them, while others have them, does not command its own destiny."[59] In 1960, two years after the death of Joliot-Curie, France tested its first atomic bomb in the Algerian desert.

Frédéric Joliot-Curie certainly stood in contrast to the American vision of Europe, but by opposing him, the United States removed a powerful restraint to nuclear proliferation. It also encouraged the increasing political disconnect between the United States and France, a factor which ultimately made the Western bloc weaker. This tension reached its zenith when France withdrew from the NATO strategic command in 1966—a decision made possible in part by the

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[57] United States, Central Intelligence Agency, Office of Scientific Intelligence, *The French Nuclear Weapons Program* (1959), 3.

[58] A five-year plan for atomic development was announced in 1952 to build three plutonium plants at Marcoule in the south of France. The first was operational by 1956. Serious reorganization of the nuclear program also began in 1956, when the government established a liaison between the CEA and the Ministry of Defense and created the *Comité des Applications de l'Energie Atomique* (Committee for the Applications of Atomic Energy). For more information see: United States, Central Intelligence Agency, Office of Scientific Intelligence, *The French Nuclear Weapons Program* (1959); Constantine A. Pagedas, *Anglo-American Strategic Relations and the French Problem, 1960-1963* (London: Frank Cass, 2000).

[59] Nicholas Atkin, *The Fifth French Republic* (London: Macmillan, 2004), 87.

French possession of the atomic bomb—and it would not rejoin until 2009.[60] Despite Joliot-Curie's nationalist rhetoric and communist sympathies, American opposition to him actually ran contrary to the interests of the United States because he was a moderating force who opposed France's development of nuclear weapons.

Conclusion

This chapter examined Frédéric Joliot-Curie's political activities specific to his role as a scientist-administrator in France. During this time, Joliot-Curie promoted French nationalism by working to reinvent postwar France through the development of its nuclear program. For example, he sought to achieve French *renaissance* by developing nuclear power plants as a source of electrical energy for France's postwar recovery and modernization. These efforts were largely successful—today, nuclear power accounts for 75% of France's electricity production.[61] He also believed that France should contribute to global scientific development to ensure its political legitimacy. Nevertheless, Joliot-Curie never received the worldwide recognition of French scientific accomplishments that he desired. For this reason, he frequently offered an alternative narrative to the history of nuclear research that put the discoveries of French scientists such as Marie and Pierre Curie at its nativity.

The United States, however, did not approve of Joliot-Curie's efforts to develop the French nuclear program and it was suspicious of his communist ideology. The Americans actively undermined Joliot-Curie's efforts and Western anti-communist sentiment played a

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[60] Pagedas, *Anglo-American Strategic Relations and the French Problem,* 2.

[61] "Nuclear Power in France," World Nuclear Association, January 2018, http://www.world-nuclear.org/information-library/country-profiles/countries-a-f/france.aspx.

significant role in his dismissal from the CEA. In doing so, however, the United States impaired its own efforts to prevent nuclear proliferation. These complexities exposed tension within the Western Bloc.

This chapter is not intended to glorify Joliot-Curie, and in fact his very glorification of French science revealed weakness in his efforts to advance French interests through domestic development and worldwide contribution. It does, however, show how Joliot-Curie's duty to France as a scientist in the atomic age brought him into the world of politics. Chapter four will examine how Joliot-Curie's sense of duty changed during the 1950s to focus primarily on the interests of the entire world.

Chapter 4: Citoyen du Monde

Although Frédéric Joliot-Curie felt that his first responsibility in the aftermath of World War II was the reconstruction and modernization of France, he also felt an additional obligation to protect the international community from the atomic bomb. Joliot-Curie was not alone among scientists in this effort. A group of Manhattan Project scientists established *The Bulletin of the Atomic Scientists of Chicago* in 1945, a journal that analyzed nuclear policy and offered warnings such as its famous "Doomsday Clock" (introduced in 1947), which measured how close the world was to nuclear catastrophe.[1]

Both during his time as the head of the CEA and after his dismissal, Joliot-Curie pushed for the international control of the atomic bomb and the pursuit of global peace. After 1950, however, his efforts for peace became considerably more pronounced. Rejected by the country he had worked to rebuild (or at the very least by the French government he once served), Joliot-Curie tried to reinvent himself as a scientist-activist. He no longer saw himself merely as a citizen of France, but instead as a citizen of the world.

Joliot-Curie's international outlook was complicated by a factor other than an aspiration for peace: communism. In his eyes, communism and science were natural complements because they used the same methods to analyze and understand the world. Joliot-Curie therefore defended communist ideology in both scientific and political terms. Furthermore, he was so enraptured by his belief in communism that he refused to hear any criticism of the Soviet Union, despite its numerous human rights violations. Joliot-Curie inadvertently undermined his goal of eliminating

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[1] Now known as *The Bulletin of the Atomic Scientists*, the organization still exists today. For more information, see: "Overview," *Bulletin of the Atomic Scientists*, Taylor & Francis, Accessed February 27, 2018, https://thebulletin.org/.

the atomic bomb because his international efforts for peace were tinged with communist ideology.

A Scientific Communist

Joliot-Curie regarded Marxist ideology as fundamentally intertwined with the advancement of the natural sciences. He believed that the scientific method was applicable to both the hard sciences and Marxist sociology. In response to criticism that Marxism and physics were contradictory, Joliot-Curie argued, "Marx was a specialist of the social sciences who used the scientific method to study social phenomena; it is common sense that we should use his methods in all other science. To speak of a 'conflict between Marxism and physics' is simply absurd."[2] Evidently, this justification was one reason why Joliot-Curie was so attached to his communist beliefs. Science was his lifelong devotion, so he tried to connect scientific concepts to his political ideology. He similarly wrote in a message to an American conference on "Marxism and the Sciences" at the Jefferson School of Social Science (a New York institution run by the Communist Party USA) in 1950, "The fruitfulness of the teachings which we find in Marxism is due precisely to the fact that it applies, with the utmost strictness, the scientific method to the study of social phenomena. For Marx is a man of science."[3] Here he once again referenced the scientific method in its relationship to communism, and the fact that it was in a speech to an American audience gave additional evidence that Joliot-Curie was committed to the international spread of communism for political, not scientific, gain. He similarly added, "It is

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2 E.J. Burford, "L'interview de Frédéric Joliot-Curie," *Democrat Monthly* (juillet 1949), boîte 37.
3 Frédéric Joliot-Curie, "Translation of Message," boîte 127.

the great value of Marxism, the new domain of science, that guides us with certainty in this struggle which has as its goal the construction of a society where justice will reign in the common good."[4] While Marx can debatably be called a sociologist,[5] Joliot-Curie's application of Marxist ideology was political precisely because Marx did not address the natural sciences beyond their utility for economic development.[6] Since the scientific method was theoretically objective and apolitical, Joliot-Curie naively believed that it was infinitely applicable—even to human politics.

Joliot-Curie also frequently cited the Soviet Union as an example of how science and communism could function together in harmony. As previously discussed, Joliot-Curie joined the French Communist Party in the context of wartime resistance to the Nazi Occupation. Towards the end of the war, he wrote in the pamphlet *Science in the USSR*, "Scientific research develops in a collective spirit; the role of the community and that of the scientist who directs it in a given field work together in harmony. Science must be active and not only have a descriptive and contemplative character."[7] Science in and for the collective was not a new idea in France; its

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[4] Ibid.

[5] Philosopher Isaiah Berlin called Marx "the true father of modern sociology, in so far as anyone can claim the title." See: Isaiah Berlin, *Karl Marx: His Life and Environment* (New York, NY: Time Inc., 1967), 130.

[6] See, for example, Michael Perelman, "Karl Marx's Theory of Science," *Journal of Economic Issues* 12, no. 4 (1978): 859-70, http://www.jstor.org.proxy.library.georgetown.edu/stable/4224749.

[7] Frédéric Joliot-Curie, *Les Sciences en URSS* (Paris: France-URSS Centre Culturel et Economique, 1944), 5, boîte 30.

direct association with the French government can arguably be traced all the way back to 1795.[8] Nevertheless, Joliot-Curie's admiration for Soviet science was evidence of his implicit support for the Soviet government, where under communism the collective supposedly ruled supreme. Joliot-Curie's belief in the fortitude of Soviet science was confirmed when he took a trip to the Soviet Union in 1945. "The immense vitality of Soviet science dominates there," he asserted. "And not only are Soviet scientists researching pure science, but they are actively concerned with the problems posed by the reconstruction and economic development of their country."[9] This remark was of course an overstatement. Not only was science in the Soviet Union at times poorly organized, but outside of the nuclear program it was often actively repressed.[10]

This fact did not stop Joliot-Curie from continuing to promote Soviet science as an example for the international community. At the PCF Congress in April 1950, Joliot-Curie affirmed, "Yes, Soviet atomic scientists work with enthusiasm! They know well that their government, which expresses its ardent desire for world peace, has solemnly and repeatedly proposed a prohibition of atomic weapons to the governments of the other nations of the

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8 The French Directory brought together five learned societies, including the Royal Academy of Sciences, to establish the Institut de France (where Joliot-Curie would later work). For more information see: "Institut de France," In *The Columbia Encyclopedia*, by Paul Lagasse, and Columbia University, 7th ed (NY: Columbia University Press, 2017), https://proxy.library.georgetown.edu/login?url=https://search.credoreference.com/content/entry/columency/institut_de_france/0?institutionId=702.

9 Frédéric Joliot-Curie, "Déclaration à la Sorbonne sur impressions de voyage en URSS," août 1945, boîte 31.

10 The "scientific" campaign led by Soviet agrobiologist Trofim Lysenko, for example, rejected the Darwinian notions of genetics and natural selection. Dubbed "Lysenkoism," the movement gained the support of Joseph Stalin and purged many dissenting scientists, continuing into the 1960s. For more information, see: Loren Graham, *Lysenko's Ghost: Epigenetics and Russia*. (Cambridge, MA: Harvard University Press, 2016). One critic of Joliot-Curie's scientific-communist ideology later accused him of failing to "warn the Russian government of the danger of its curtailing science as e.g. shown in the Lysenko affair." See: Niels Arley to Frédéric Joliot-Curie, December 19, 1951, boîte 119.

world."[11] His willingness to make these statements publicly in the context of a political party left no doubt to Joliot-Curie's intentions, namely to align his scientific goals with his political ones. After a 1949 trip to the USSR during which he was surprised by the significant progress of Soviet scientists, Joliot-Curie told the PCF, "This may mean that I was unconsciously influenced by those [presumably the United States] we are fighting. We must be extremely vigilant on this subject."[12] Joliot-Curie expressed similar sentiments at another PCF Congress in 1953, citing the Soviet Union and China as specific examples of how science succeeded under communism. "The scientists [in these countries] benefit from conditions very favorable to the development of science, and they take pride and joy of seeing their work associated with the efforts of all the people, with the results used to benefit the happiness of everyone," he explained. "The scientists work with enthusiasm and the number of students and laboratories is constantly growing."[13] The political systems in the USSR and China supported their scientific efforts according to Joliot-Curie, and he thus tied the worldwide scientific cause to the political communist movement. The PCF eventually adopted some of Joliot-Curie's rhetoric, explaining in 1954 that it must "show that the Party acts in accordance with the scientific method,"[14] thus echoing Joliot-Curie's insistence that Marxist ideology was applicable to the natural sciences. The fact that a political party was embracing a scientist's beliefs was significant, as it clearly showed that the line between science and politics had become blurred.

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[11] Frédéric Joliot-Curie, "Discours devant le XIIè Congrès du Parti Communiste Français à Gennevilliers," 2-5 avril 1950, boîte 38.

[12] Ibid.

[13] Frédéric Joliot-Curie, "Message au XIIIè Congrès," *La Nouvelle Critique: Interventions au XIIIe Congrès du PC* (juin 1954), 31, boîte 141.

[14] "Conférence de Section du P.C.F. du 5è Arrondissement," 8 avril 1951, boîte 38.

Over time, Joliot-Curie expressed his political leanings in an increasingly open manner, often without reference to his scientific efforts at all. He served as the president of the France-USSR Association (an organization that worked to improve the Franco-Soviet relationship through cultural and political means) from 1945-1954, albeit in a largely symbolic role. He wrote to Stalin on behalf of the Association in 1947, for example, to express "the feelings of deep gratitude that millions of French patriots have for the eminent part that the brave Soviet army and the peoples of the Soviet Union have taken under your great direction in the liberation of our country from racist [Nazi] yoke."[15] Here Joliot-Curie once again offered an alternative historical narrative for political gain. Although the Soviets certainly played a crucial role the defeat of Nazi Germany on the Eastern Front, it was American, British, French, and African soldiers who liberated France in 1944.[16]

It was also not the last time that Joliot-Curie praised Stalin, a man responsible for the death of millions of his own citizens.[17] At a Paris homage to Stalin in 1949, Joliot-Curie affirmed, "All of these gifts are the testimony of the feelings of affection the people of France have for the man [Stalin] who carries our will for peace, our aspirations for freedom, our desire for democracy and our hopes for happiness."[18] Admiration for the wartime alliance with the Soviet Union was perhaps understandable, but such unequivocal praise for Stalin was not. For a

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[15] Frédéric Joliot-Curie à Généralissime Staline, 18 décembre 1947, boîte 123.

[16] "Liberation of Paris: The hidden truth." *The Independent*, January 31, 2007. https://www.independent.co.uk/news/world/europe/liberation-of-paris-the-hidden-truth-434403.html

[17] The exact number of victims is unknown, with factors such as mass famine debated by historians. For an example of historiographical discourse on victims under the rule of Stalin, see: Stephen G. Wheatcroft, "Victims of Stalinism and the Soviet Secret Police: The Comparability and Reliability of the Archival Data—Not the Last Word," *Europe-Asia Studies* 51, no. 2 (1999): 315–45.

[18] Frédéric Joliot-Cuire, "Discours d'Ouverture de l'Exposition Staline," 6 décembre 1949, boîte 37.

man so critical of global oppression, Joliot-Curie ultimately had a blind spot for the many faults of the Soviet Union. In 1954, only a year after the Soviets tested their first hydrogen bomb,[19] Joliot-Curie published an article in the Soviet newspaper *Pravda* in which he asserted, "For more than 30 years, through the voice of its leaders, the Soviet Union has expressed its ardent desire for peace and, on every occasion, has given clear and precise evidence of its intentions."[20] The fact that the Soviet government was willing to let Joliot-Curie publish in *Pravda* at all was a testament to his political support for the USSR, but once again his naiveté was striking. Joliot-Curie's support for the Soviet Union did not go unnoticed; he had been awarded the USSR's Stalin Prize in 1951.

In the end, communism and its connection to political support for the Soviet Union was both a character strength and flaw for Joliot-Curie. It clearly inspired his scientific and political efforts, such as the connection he saw between the Marxist scientific method in sociology and the natural sciences, as well as the idea of scientific contributions by and for the collective. Nevertheless, he also overlooked the ongoing scientific repression and nuclear proliferation in the Soviet Union, not to mention its human rights abuses. Even though he was a scientist, communism ultimately pushed Joliot-Curie towards politics.

International Control

Frédéric Joliot-Curie used his position as High Commissioner of the CEA to promote and dictate the development of the French nuclear program for peaceful purposes. During this time,

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[19] For more information, see: David Holloway, Stalin and the Bomb: *The Soviet Union and Atomic Energy, 1939-1956* (New Haven, CT: Yale University Press, 1994).

[20] Frédéric Joliot-Curie, "Article." *Pravda*, Moscow: 1954, boîte 137.

however, he was also concerned about the international policy for atomic bombs. Joliot-Curie was particularly concerned about the danger that nuclear secrecy posed to global peace, and he therefore pushed for an international order that could prevent or at the very least control the advancement of nuclear weapons.

The metaphor of Prometheus, a figure of Greek mythology whose gift of fire to mankind was both a blessing and a curse, has been applied by historians to the American physicist J. Robert Oppenheimer,[21] but it also pertained to Joliot-Curie's perspective on atomic energy. As he told a Belgian society of engineers in 1946, "I am convinced that the atomic bomb can be used for peaceful purposes. Fire can destroy, but it also serves to improve our living conditions. The bomb can be used for the well-being of men, like fire."[22] Although Joliot-Curie did not work directly on the Manhattan Project, he was part of a generation of scientists whose work contributed to the development of nuclear physics. He certainly worked to promote the peaceful applications of atomic energy, but Joliot-Curie also believed it was his responsibility to protect the international community from the bomb.

In 1946, Joliot-Curie saw atomic secrecy as the greatest peril that could potentially cause a nuclear arms race. "The secret of the [atomic] fortress would result in a race for scientific armaments," he wrote. "Nuclear Energy would no longer be the servant of civilisation [*sic*] but only its destroyer. If the impossible happened and two great powers found themselves to be the sole possessors of the monopoly of this secret armament, other countries in self defense would

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[21] See, for example: Kai Bird and Martin J. Sherwin, *American Prometheus: The Triumph and Tragedy of J. Robert Oppenheimer* (New York, NY: Vintage Books, 2005).

[22] Frédéric Joliot-Curie, "Conférence à la Société Royale Belge des Ingénieurs & Industriels," 13 mai 1946, boîte 32.

hasten to discover and use more secret and more terrible arms."[23] As it turned out, Joliot-Curie's assessment was quite accurate. His warning of "two great powers" possessing the bomb became reality when the Soviet Union conducted its first nuclear test in 1949, setting the stage for 40 years of Cold War brinkmanship and mutually assured destruction. As Joliot-Curie predicted, nuclear proliferation developed quickly in other countries as well, with the United Kingdom testing its first bomb in 1952, France in 1960, and China in 1964.[24]

It is debatable whether nuclear secrecy was the most critical factor in the spread of the atomic bomb given that the Soviet nuclear program was well underway by the time the United States passed the McMahon Act, but secrecy was certainly the most pressing concern to Joliot-Curie. He affirmed the need to fight "against the maintenance of secrecy and the prohibition of mutual information in the field of nuclear physics," warning that "if this point of view does not triumph, which would be unthinkable, all the countries of the world would be forced to live in a perpetual state of siege, and there would be a scientific arms race."[25] These were not the words of a French scientist trying to set the policy of his own country. With regards to the bomb, Joliot-Curie was concerned with international, not domestic, politics. It is interesting to note, however, that at this time he did not yet believe that the worldwide interdiction of nuclear weapons was necessary. "There is no need to insist on the elimination of the atomic bomb, but I would like to

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[23] Frédéric Joliot-Curie, "Science and the Welfare of Mankind," *The Association of Scientific Workers* (London: Temple Fortune Press, 1946).

[24] Israel, India, Pakistan, and North Korea also developed nuclear weapons in the years to come. For more information on the nuclear arms race, see: Richard Dean Burns and Joseph M. Siracusa, *A Global History of the Nuclear Arms Race* (Santa Barbara: CA, Praeger, 2013).

[25] Frédéric Joliot-Curie, "La Libération de l'Energie Atomique et Ses Conséquences," *Journal de l'Université des Annales* 9 (15 septembre 1946), boîte 31.

insist that the dangers of secrecy be taken seriously," he told a 1946 UNESCO conference.[26] Joliot-Curie's perspective on this matter changed considerably by the time he was dismissed from the CEA in 1950.

Joliot-Curie believed that the danger of nuclear weapons could be alleviated by international control of the bomb and its secrets. As he explained in early 1946, "Faced with the terrible threat of the bomb, there must be no hesitation: it is essential that international measures be taken to make the use of atomic weapons impossible."[27] Joliot-Curie was not alone in this effort. In January 1946, the United Nations established an Atomic Energy Commission (UNAEC) to "deal with the problems raised by the discovery of atomic energy and other matters," including proposals "for control of atomic energy to the extent necessary to ensure its use only for peaceful purposes" and "for the elimination from national armaments of atomic weapons and of all other major weapons adaptable to mass destruction."[28] It was created by a resolution of the United Nations General Assembly but was subject to the UN Security Council, whose five permanent members (US, USSR, UK, France, and China) had the power to veto any policy that the UNAEC put forward. Joliot-Curie was acutely aware of the UNAEC's limited power during its fledgling stages. "An extended inspection, which would have to be carried out by a large number of personnel, would be difficult for anyone to accept since it would quickly become a source of conflict because of the dangers of military, economic and political espionage

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[26] Frédéric Joliot-Curie, "Introduction à la Partie Sciences [conférence de l'UNESCO]," 13 novembre 1946, boîte 32.

[27] Joliot-Curie, "Conférence à la Société Royale Belge," mai 1946.

[28] U.N. General Assembly, 1st Session, *Establishment of a Commission to Deal with the Problems Raised by the Discovery of Atomic Energy* (A/RES/1), 24 January 1946, http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/1(I).

it would allow," he wrote.[29] Joliot-Curie was also concerned that the UNAEC could become construed as an effort to stop the development of atomic energy entirely, rather than simply establishing international control of the bomb. As he explained, "It is out of the question to ban all countries of the world from activities relating to the development of peaceful applications of atomic energy." Ultimately, persistent disagreements between the United States and the Soviet Union prevented the UNAEC from taking action. Although it was not technically dissolved until 1952, the UNAEC's function was largely concluded by the end of 1947.[30] With the failure to establish an international safeguard against widespread development of the bomb, Joliot-Curie looked elsewhere for answers.

World Peace by Council

As the French government began to reconsider Joliot-Curie's employment given his outspoken communist beliefs, Joliot-Curie embraced a communist-led peace movement as the answer to the threat of the atomic bomb. In 1948, the Soviet Cominform held a meeting of "Intellectuals for Peace" in Poland.[31] It was the precursor to the first *Congrès Mondiale des Partisans de la Paix* (World Congress of Partisans for Peace), which took place in Paris in April 1949. Eventually known as the World Peace Council (WPC), the organization named Joliot-Curie, by this time an internationally renowned scientist and activist, as its first president. In the preparations for its first assembly, the WPC outlined three goals: (1) an end to the ongoing wars

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29 Frédéric Joliot-Curie, "Note sur les travaux de la Commission de l'Energie Atomique des Nations Unies," 20 juillet 1946, boîte 119.

30 Edward Shils, "The Failure of the United Nations Atomic Energy Commission: An Interpretation," *The University of Chicago Law Review* 15, no. 4 (1948): 855.

31 Milorad Popov, "The World Council of Peace," In *World Communism: A Handbook, 1918-1965* (Stanford, CA: Hoover Institution Press, 1973), 488.

in Greece, Vietnam, Indonesia and Malaysia; (2) the worldwide reduction of arms, including the atomic bomb; and (3) a United Nations "Peace Pact" among the five the great powers (US, USSR, UK, France, and China).[32] The list of invitees included many scientists who worked on or influenced the Manhattan Project, including Albert Einstein, Leo Szilard, Arthur Compton, J. Robert Oppenheimer, Glenn Seaborg, and Niels Bohr, although it is unclear if any of them attended.[33]

Joliot-Curie, for his part, recruited for the WPC's conference at a meeting of his Franco-Polish Friendship Association, explaining, "Today, the goal of the Congress of the Partisans for Peace is to study new methods to avoid war…Everyone who returns from the United States affirms their amazement that over there they expect a war, in a year, in a month."[34] Joliot-Curie was trying to depict the United States as the chief perpetrator of nuclear tensions and as the aggressor in any hypothetical war. During his first speech in April 1949 at the WPC Congress itself, Joliot-Curie insisted, "We must launch a great peaceful offensive against all forces of war. And this offensive is peaceful, as opposed to those who declare themselves able to assure peace in the world by means of the atomic bomb."[35] This remark was clearly a reference to the United States, and devoid of any scientific rhetoric. By this point, Joliot-Curie was immersed in politics, having stepped into his new role as an activist. During another speech at the same conference he likewise affirmed, "I am here to support a peaceful offensive, as opposed to the threat that is

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[32] *Actes et Resolutions: le Mouvement Mondial de la Paix* (Paris, 1950), 16, boîte 127.

[33] "Liste des invités," 1949, boîte 127.

[34] Frédéric Joliot-Curie, "Procès-Verbal de la Réunion de l'Amitié Franco Polonaises," 7 avril 1949, boîte 118.

[35] Frédéric Joliot-Curie, "Texte Integral du Discours au Congrès des Partisans de la Paix," 20 avril 1949, boîte 36.

placed on our heads, the use of the atomic bomb to defend peace!"[36] This message essentially framed the entire WPC as a paradoxically aggressive peace movement, while also indirectly denouncing the United States.

The World Peace Council's most significant accomplishment under the leadership of Joliot-Curie came in 1950 when he initiated the Stockholm Appeal, a worldwide petition calling for the complete ban of nuclear weapons. It read as follows:

> We demand the outlawing of atomic weapons as instruments of intimidation and mass murder of peoples. We demand strict international control to enforce this measure. We believe that any government which first uses atomic weapons against any other country whatsoever will be committing a crime against humanity and should be dealt with as a war criminal. We call on all men and women of good will throughout the world to sign this appeal.[37]

The Stockholm Appeal was reportedly signed by 273,470,566 people worldwide, although, as the American House Committee on Un-American Activities noted, 80% of that number came from "Communist-dominated countries."[38] Despite the mention of "international control," the complete ban of nuclear weapons was a far cry from Joliot-Curie's suggestion only a few years before that an international organization could regulate the bomb. During a speech at the Stockholm conference itself, he affirmed, "A new power has been born, capable of important political acts in the international arena: that of those who want to face the threat of war and

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[36] Frédéric Joliot-Curie, "Congrès des Partisans de la Paix," 24 Avril 1949, boîte 127.

[37] "65th Anniversary of Stockholm's Appeal," The World Peace Council, March 20, 2015, http://www.wpc-in.org/statements/65th-anniversary-stockholm%E2%80%99s-appeal.

[38] United States, House of Representatives, Committee on Un-American Activities, *Report on the Communist "Peace" Offensive: A Campaign to Disarm and Defeat the United* States, (Washington, DC, 1951), 34.

demand peace."[39] Once again, he suggested that pacifist convictions alone would not suffice. For Joliot-Curie, the struggle for peace was a kind of war in itself.

Furthermore, Joliot-Curie directly aligned his rhetoric with that of the Soviet Union by suggesting that United States was the principal obstacle to any kind of lasting peace. "Considerable sums in the budgets of imperialist states have been devoted either to the manufacture of weapons or to buying corrupt rulers," he insisted. "Our most fundamental duty is perhaps to persuade American citizens that a peaceful coexistence is possible and that it is desirable because it would immediately bring great material benefits to everyone."[40] The abolition of nuclear weapons was an idea that alone would have had mass appeal, but Joliot-Curie framed it in the context of the Cold War struggle between the United States and the Soviet Union, with a clear bias towards the latter.

In November of the same year, the World Peace Council held its Second Congress (the Stockholm Appeal technically took place in a conference, not a congress), this time in Warsaw. Its goals were focused well beyond the scope of nuclear weapons, as Joliot-Curie's call for convening the conference included a demand for the end of the Korean War, and more specifically the "immediate cessation of civilian bombing; cessation of hostilities; withdrawal of all foreign troops; and opportunity for both parties to be heard."[41] The inclusion of the Korean War as a major issue had significant implications for Joliot-Curie's role as a scientist-turned-activist. Like other physicists at the time, he felt that his work on the development of nuclear

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[39] Frédéric Joliot-Curie, "Session du Comité du Congrès Mondial des Partisans de la Paix à Stockholm," 15-19 mars 1950, boîte 38.

[40] Ibid.

[41] *Actes et Resolutions: le Mouvement Mondial de la Paix* (Paris, 1950), 24.

energy gave him a responsibility to consider the dangers of the atomic bomb. The Korean War, however, clearly fell out of this purview. At the Warsaw Congress itself, the WPC called for the "absolute prohibition of all types of atomic, bacteriological, chemical, poisonous, radioactive and all other means of mass destruction" and the "denunciation of any government that is the first to use these weapons as a war criminal."[42] This declaration did not differ significantly from the Stockholm Appeal, but it did expand the scope of concern to include all weapons of mass destruction rather than only the atomic bomb.

Joliot-Curie's speeches at the Congress were very telling of his ambitions for the WPC. In one instance, Joliot-Curie quoted J. Robert Oppenheimer: "The general plan for the use of atomic weapons has been established in Hiroshima. They are weapons of aggression, surprise, and terror."[43] By drawing attention to an American scientist, Joliot-Curie's intention was clearly to highlight how the pursuit of peace and the effort against nuclear proliferation should be an international issue of great importance regardless of ideological allegiances. He similarly explained, "[British] Prime Minister Attlee, like many others, has criticized that we demand a control of the bomb that 'would operate only in free countries, but would not bring any restriction in totalitarian states.' I refuse here to comment on the use of the terms 'totalitarian countries' and 'free states.'" This remark, however, exposed the contradictory nature of Joliot-Curie's struggle for world peace. Even as he tried to distance himself from politics, his unwillingness to offer any criticism of communist totalitarianism was in itself a political statement.

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[42] Ibid., 25.

[43] Frédéric Joliot-Curie, "Discours D'Ouverture et Rapport au Deuxième Congrès Mondial des Partisans de la Paix," 16-22 Novembre 1950, boîte 127.

In his attempts to gain international appeal for the WPC, Joliot-Curie reached out to the International Committee of the Red Cross (ICRC) for support. "World public opinion, particularly in its overwhelming endorsement of the Stockholm Appeal, has helped to limit the atomic threat," he wrote in a letter to ICRC president Paul Ruegger. "It seems obvious to us that any humanitarian effort today must work to safeguard and restore peace, particularly where there are situations of war, such as in Vietnam and Korea."[44] Joliot-Curie's reference once again to ongoing Cold War military conflicts left little doubt as to his political intentions. Although Joliot-Curie did go to meet Ruegger in Geneva, the ICRC's reaction to his overture was lukewarm at best. Furthermore, the ICRC was also campaigning for the worldwide abolition of nuclear weapons, having announced in April 1950 "an agreement on the prohibition of atomic weapons, and in a general way, of all non-directed missiles." It warned, however, that "the International Committee, once again, must keep itself apart from all political and military considerations."[45] Politics was evidently a key difference between the WPC and the ICRC in their efforts to alleviate the dangers of the atomic bomb. Unlike Joliot-Curie, the ICRC saw a political line that it was unwilling to cross. Similarly, Albert Einstein expressed his uneasiness with the political inclinations of the World Peace Council when they offered him a prize. "In consideration of the fact that this is a quasi political affair I would have to decline such an offer," he wrote to Joliot-Curie.[46] Even if Joliot-Curie insisted that the WPC was not politically motivated, its communist origins and political rhetoric were clearly limiting factors.

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[44] Frédéric Joliot-Curie à Paul Ruegger, 19 juin 1951, boîte 126.

[45] "Atomic weapons and non-directed missiles: ICRC statement, 1950," International Committee of the Red Cross, April 5, 1950, https://www.icrc.org/eng/resources/documents/article/other/5kylur.htm.

[46] Albert Einstein to Frédéric Joliot-Curie, April 3, 1954, boîte 137.

The United States' response to the Stockholm Appeal was predictably negative. American physicist Philip Morrison,[47] one of the few Manhattan Project scientists to sign the petition, explained this pushback in a letter to Joliot-Curie. "The American State Department, and the entire pressure of the newspapers and other organs of opinion here, have carried on a campaign against the appeal of almost unprecedented vigor, fit to meet the crisis not of a petition but of a general strike," wrote Morrison. "The only arguments against the appeal, and they are powerfully spread, are that it is supported by the 'wrong people'—meaning of course the Soviet government and many related and friendly groups."[48] Morrison's concern over the Stockholm Appeal's association with communism was not unfounded. The petition was initiated during the era of McCarthyism in the United States, when anyone or anything believed to have communist ties was instantly suspect. The House Un-American Activities Committee (HUAC), for example, called "the current world-wide 'peace' offensive" the "most dangerous hoax ever devised by the international Communist conspiracy."[49] In its specific analysis of the Stockholm Appeal, HUAC affirmed, "Well aware that the United States, for its own protection against Soviet aggression, has established superiority in the development of atomic weapons, the Communists hope to weaken American defenses by demanding the outlawing of atomic weapons."[50] Even if the petition was intended to promote peace rather than communism, its connection to the Soviet Union was difficult to escape.

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[47] During the McCarthy era, administrators at Cornell University pressured Morrison to disassociate himself from known Communists. He was later investigated by HUAC and called before the Senate Internal Security Subcommittee in 1953. For more information see: Silvan S. Schweber, *In the Shadow of the Bomb: Bethe, Oppenheimer, and the Moral Responsibility of the Scientist* (Princeton, NJ: Princeton University Press, 2000), 130-146.

[48] Philip Morrison to Frédéric Joliot-Curie, August 10, 1950, boîte 127.

[49] House Committee on Un-American Activities, *Report on the Communist "Peace" Offensive*, 1.

[50] Ibid., 32.

The United States also used its influence in the United Nations to undermine Joliot-Curie's efforts. "The Soviet Union had once again presented a proposal for a peace pact by adding a new point, notably the proposition of the so-called Peace Appeal of Stockholm, which intended to confuse public opinion with regards to the control of atomic energy," an American representative to the UN wrote to Joliot-Curie. "I do not doubt that many of the people you claim to be sympathizers sincerely seek—as we do—a just peace, but they do not realize that they are being used to advance the interests of the Soviet imperialist power."[51] This trade of "imperialist" barbs, each side accusing the other of being the aggressor, was typical of the era and Joliot-Curie was evidently unafraid to engage. The United States even denied visas to delegates from the World Peace Council to come to a United Nations meeting in 1951, a decision that the Soviet ambassador to the UN insisted "cannot be justified" and "grossly violates the right of the President of the Security Council and prevents the normal performance of the President's duties."[52] In this way, Joliot-Curie's politicized efforts for peace were a concern for the United States.

The most compelling argument against Joliot-Curie's work with the WPC came from Nobel Prize-winning physicist Otto Hahn, who called into question his world philosophy regarding freedom rather than the intrinsic danger of communism. Joliot-Curie was particularly keen to enlist Hahn's support, writing him a long letter in which he explained, "We must first create conditions of détente between the nations by proceeding in stages. First of all, we must try with all of our might to avert the greatest danger, a danger that threatens the fate of all mankind:

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[51] Représentant des Etats-Unis à l'O.U.N. à Frédéric Joliot-Curie, 25 mai 1951, boîte 128.
[52] Yakov Malik à Frédéric Joliot-Curie, 30 juin 1951, boîte 128.

the atomic bomb."[53] Hahn, however, was very critical of Joliot-Curie. "I consider individual liberty and the freedom of all peoples as the most important issue, and I cannot imagine any peace as bearable if this freedom was not granted without fear, without constraint, and without pre-established opinions," he wrote to Joliot-Curie. "I am not persuaded that the gentlemen who have their domicile in the eastern part of Germany would dare to express another thought than that which is dictated to them."[54] In Joliot-Curie's defense, the crimes of Joseph Stalin's regime were far from transparent and the Soviet Union would not even begin to acknowledge the suffering of its people until Nikita Khrushchev came to power in the late 1950s.[55] Nevertheless, Joliot-Curie never seemed capable of recognizing the political faults of the Eastern Bloc, while other scientists such as Hahn clearly did. His devotion to communism and to the Soviet Union blinded Joliot-Curie to real human rights concerns, and ultimately undermined his goals of world peace and abolition of the atomic bomb.

Conclusion

Since the bombings of Hiroshima and Nagasaki, Frédéric Joliot-Curie felt a responsibility to protect the world from the atomic bomb. His efforts were, however, intertwined with communism, which he believed could provide an answer to both scientific and political problems. Marxist support for science, which according to Joliot-Curie was thriving in the Soviet Union, was ironclad because Karl Marx had applied the scientific method to his study of

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53 Frédéric Joliot-Curie à Niels Bohr, 20 septembre 1950, boîte 127.

54 Otto Hahn à Frédéric Joliot-Curie, 5 février 1951, boîte 128.

55 For more information, see: William Taubman, *Khrushchev: The Man and His Era* (New York, NY: W. W. Norton & Company, 2004).

sociology. Joliot-Curie therefore offered his full support to the Soviet Union, and defended it in scientific and political terms.

Joliot-Curie refused to see any contradiction between his support for the Soviet Union and his efforts for international peace. As head of the CEA, Joliot-Curie denounced atomic secrecy as a contributing factor to nuclear proliferation and called for the international control of the atomic bomb. After it became clear that the United Nations was incapable of establishing any limitations on the development of the bomb, Joliot-Curie shifted his international efforts to the World Peace Council, an organization supposedly devoted to peace but with deep communist roots. Through the WPC, Joliot-Curie initiated the Stockholm Appeal, which called for the complete abolition of nuclear weapons. He continued to fight against the development of the atomic bomb and later the hydrogen bomb after his dismissal from the CEA in 1950. Under the leadership of Joliot-Curie, however, the WPC was also highly critical of American-led foreign policy, and it never became the objective, apolitical movement for peace that he so aspired it to be. Ultimately, Joliot-Curie's communist convictions had repercussions for his larger efforts to control the atomic bomb because it was clearly politically motivated.

Although Joliot-Curie's politically complicated peace movement was certainly significant, his overall transition from scientist-administrator to scientist-activist also deserves close attention. This transformation can best be explained by examining it in the context of scientific personae, a concept discussed extensively by Lorraine Daston and H. Otto Sibum in their article "Scientific Personae and Their Histories." Daston and Sibum explain that a persona is not an individual nor a social role, but instead goes back to the Latin word *persona*, meaning "mask." They note, however, that *persona* is not the modern notion of a mask, which is

associated with insincerity, but rather the "mask in ancient Greek and Roman theatre" as "transformative, to attain rather than to suppress genuine selfhood" with "masks as makers, not destroyers of true identities."[56]

Furthermore, a new persona according to Daston and Sibum must incorporate a balance between the old and the new. J. Robert Oppenheimer, for example, "successively and successfully became the very model of the modern theoretical physicist by combining elements of the theorist, the teacher, the administrator, and the advisor."[57] Frédéric Joliot-Curie served an administrative role in the French government after World War II, as Oppenheimer did. Also like Oppenheimer, he was dismissed by his own government because of communist sympathies, and forged a new scientific persona as a result. Caught between science and politics, Joliot-Curie was like his contemporaries very much a product of the atomic age.

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[56] Lorraine Daston and H. Otto Sibum, "Introduction: Scientific Personae and Their Histories," *Science in Context* 16, no. 1-2 (2003): 3.

[57] Ibid., 5.

Chapter 5: Vocational Science

The complicated relationship between science and politics was not a unique phenomenon of the atomic age. Many governments had historically employed science in the service of the state, particularly in the context of war. World War I, for example, was ostensibly a chemists' war, with commonplace weapons such as phosgene, chlorine, and mustard gas. Wartime had a strong impact against the notion of science as a "pure," objective, cooperative discipline which existed for the benefit of the collective. Scientists, for their part, faced a responsibility because their work was being used for violence. This reality became even more pronounced during World War II, which could conceivably be called a physicists' war. Scientists who worked on the bomb had to consider the implications of a weapon that caused death, injury, and destruction on a scale that the world had never seen before.

At the height of World War I, however, German sociologist Max Weber established an ideal for the separation of science and politics in the public sphere that would protect the scientific discipline. "Only by strict specialization can the scientific worker become fully conscious, for once and perhaps never again in his lifetime, that he has achieved something that will endure,"[1] Weber asserted in his 1918 lecture, "Science as a Vocation." Dabbling in politics according to Weber would detract from the vocational ethic of the scientist. Political arguments "are not plowshares to loosen the soil of contemplative thought; they are swords against the enemies: such words are weapons."[2] In the eyes of Weber, politics had no place in science.

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[1] Max Weber, "Science as a Vocation," Translated by H. H. Gerth and C. Wright Mills, In *From Max Weber: Essays in Sociology* (New York, NY: Oxford University Press, 1946), 5.

[2] Ibid., 13.

Weber furthermore believed that the vocational expertise of scientists, the training that qualified them as scientific scholars, did not translate to politics. “The qualities that make a man an excellent scholar and academic teacher are not the qualities that make him a leader to give directions in practical life or, more specifically, in politics,” he affirmed.[3] Scientists in government positions, as wartime demanded, were therefore acting irresponsibly. From Weber’s perspective, science could offer “methods of thinking…to gain clarity,”[4] but not any perspective on the political applications of scientific results.

Above all else, Weber believed that scientists and politicians concerned themselves with fundamentally different questions. Science was a question of means; politics of ends. Since scientific discovery is never concluded, scientists according to Weber were forever engaged in means. In the same vein, Weber believed that it was for scientists to consider fact and for politicians to consider value. “Science today is a 'vocation' organized in special disciplines in the service of self-clarification and knowledge of interrelated facts,” wrote Weber.[5] By this model, questions of moral responsibility were not relevant to scientists.

In the age of Weber and the decades to come, many scientists aspired to his ideal of a separation between science and politics. The development of the atomic bomb, however, created a greater urgency among the scientists who worked on it to consider the implications of their work. For this reason, historians like Charles Thorpe and Cathryn Carson have analyzed and judged scientists such as J. Robert Oppenheimer and Werner Heisenberg against the Weberian

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[3] Ibid., 16.
[4] Ibid., 17.
[5] Ibid., 18.

ideal.[6] This chapter will attempt a similar analysis of Frédéric Joliot-Curie, who likewise experienced a disconnect between Weber's notion of keeping science separate from politics and the responsibilities of the scientist in the atomic age. Joliot-Curie both fought for the objective treatment of science and promoted the notion that scientists had a responsibility to consider the moral implications of their work. In this way, he both aligned himself with and differed from Weber.

The World Federation of Scientific Workers

The primary outlet through which Joliot-Curie fulfilled his perceived responsibility to science was the World Federation of Scientific Workers (WFSW). The organization was founded at a 1946 conference in London and was intended to bring together different national organizations of scientists, such as the French Association for Scientific Workers. Joliot-Curie was soon elected as its first president, and would hold this position until 1957.

The WFSW differed from other non-governmental organizations with which Joliot-Curie was involved in its exclusivity as an organization for scientists. As the WFSW charter stated in its preamble, "The evil results of the neglect of science on the one hand and of its irresponsible use on the other have in recent years been only too plainly felt. One way of preventing them in the future is to ensure that scientific workers have a responsible and recognised [*sic*] place in the community."[7] It was intended only for scientists because, according to the WFSW and Joliot-

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6 For more information see: Charles Thorpe, *Oppenheimer: The Tragic Intellect*, (Chicago, IL: University of Chicago Press, 2008); and Cathryn Carson, *Heisenberg in the Atomic Age: Science and the Public Sphere* (New York, NY: Cambridge University Press, 2010).

7 "World Federation of Scientific Workers: Charter for Scientific Workers," July 1946, boîte 119.

Curie, scientists held a different set of responsibilities from average citizens. This aspect of political as well as vocational exclusivity was a direct result of the atomic age.

Although exclusive to an extent, the WFSW took a broad definition of what qualified its members as "scientists." As the well-known British physicist P. M. S. Blackett explained in the opening conference of the WFSW, "The Association of Scientific Workers differs…in not being restricted to one Science, and we include Social Scientists also, and cover all grades of workers in the Laboratory from the young to the old, and the semi-skilled to the very highly-skilled."[8] The WFSW clearly wanted to attract as many members as possible, and by 1948 it had expanded to approximately 24,000 worldwide.[9] Joliot-Curie was likewise adamant that the WFSW not become an organization of reclusive elites. In a speech to the British Association of Scientific Workers, for example, Joliot-Curie asserted that WFSW scientists "make contact with workers in other professions and not regard themselves as belonging to an elite, apart from others, but as standing shoulder to shoulder with them."[10] While he believed that scientists held a special responsibility, Joliot-Curie evidently did not believe that this role gave scientists special privileges. They belonged to and served the same world as everyone else. As he similarly stated at a WFSW General Assembly in 1948, "Not wanting to be part of an elite detached from the issues, we are concerned with our work in the critical situation where scientists worldwide face the serious problems of peace and the use of science for the benefit of humanity." Becoming part of an elite would in his eyes have detracted from the application of science for global prosperity.

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8 "Report of the International Conference to Inaugurate the World Federation of Scientific Workers," 1946, boîte 119.

9 J.G. Crowther, "Report by the Secretary-General Designate to the First General Assembly of the World Federation of Scientific Workers," September 21, 1948, boîte 119.

10 Frédéric Joliot-Curie, "Fraternal Address by Professor Joliot-Curie to the British A.Sc.W," May 1947, boîte 119.

His decision to include this belief in speeches to members of the WFSW, as opposed to the international press or a government organization, enforced the notion that Joliot-Curie genuinely wanted to shape the global scientific community as a force that would be active but not aloof.

Although like the World Peace Council (WPC) the WFSW did have some communist ties, namely the affiliation of leaders like Joliot-Curie, many of its members were non-communists and the organization was not as overt in its support of communist ideology as the WPC. From its inception, however, WFSW leaders were acutely aware that simply creating an organization of scientists would be interpreted by some as a taking a political stance. P. M. S. Blackett, for example, asserted the right of WFSW members "to take sides and express views on matters of practical importance, even though they have a political tinge."[11] At the same conference, British physicist W. A. Wooster similarly declared, "The A.Sc.W. [Association of Scientific Workers, the predecessor of the WFSW] is not attached to any political party, but with regard to many social questions, especially where Science is involved, the Association has…tried to put forward proposals."[12] Thus while it clearly did not define itself politically, the WFSW was willing to take a political stance on issues that pertained to the development of science. The fact that the issue of political involvement was such an important topic of discussion at the WFSW's founding conference was evidence that its leaders always intended for the organization to take on a political role, at least in some respects. The WFSW Constitution, for example, acknowledged "the likelihood that the existence of such a Federation will stimulate the formation of national organizations in those countries where there is currently no way for scientists to collectively

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[11] "Report of the International Conference to Inaugurate," 1946.

[12] Ibid.

express their point of view on the politics of their government."[13] This statement elucidated the limited political aspirations of the WFSW. It was not intended to act as a political party with an agenda supported by like-minded individuals, but rather as a method of giving voice to a group of specialized professionals who did not have a venue for expressing their views as scientists.

Despite the obviously political qualities of the WFSW as an organization of scientists in the public sphere, Joliot-Curie went out of his way to assert the apolitical nature of the WFSW. This contradiction was evidence that Joliot-Curie struggled to retain the old Weberian vision of a world with science separate from politics while also trying to make sense of the atomic age. His efforts in this respect were especially pronounced after his dismissal from the French Atomic Energy Commission (CEA) in 1950. "I would like to face here an accusation that is most frequently and most unjustly made against our organisations [*sic*]: this accusation is that of 'dabbling in politics' and, almost always, implies by its very statement, complete condemnation without the right of appeal," he said at a WFSW General Assembly in 1951. "Contrary to a too-widely held opinion, I see no pejorative sense—just the opposite— in the actions of those who concern themselves with the government of the City."[14] In this way, Joliot-Curie both affirmed the right of the WFSW to be political and protested the notion of it being political in the first place. He considered the WFSW's involvement in politics to be a matter of giving scientists a voice, not of political interference. He also maintained, however, that the WFSW "does not have to champion a particular social or political regime. Based on the principle of peaceful coexistence in a world of different regimes, it must not interfere in the internal affairs nor the

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[13] "Constitution de la Federation Mondiale des Travailleurs Scientifiques," 1946, boîte 119.
[14] Frédéric Joliot-Curie, "Speech to the General Assembly of the W.F.S.W.," April 10, 1951, boîte 119.

way of life in other countries."[15] He wrote this in a letter to leaders of the local scientific organizations who made up the WFSW worldwide, so clearly it was Joliot-Curie's intention to prevent any factions of the organization from becoming overtly political. It also served the purpose of indirectly criticizing countries like the United States who did choose to interfere in the internal politics of other countries. The atomic bomb, however, had far reaching implications that were to Joliot-Curie simply too dangerous for the scientists of the world to ignore.

Despite his efforts to keep the WFSW politically neutral, Joliot-Curie again faced criticism for his political bias. "What the WFSW has done has in our eyes hitherto only consisted in sending us extremely one-sided appeals to protest to governments in only the western parts of the world against claimed persecutions of people of political opinions exclusively oriented towards the eastern parts of the world," criticized a representative of the Danish Society for the Protection of Scientific Work. "The fact that we have been able in the 8 years of our existence to unite within our organization an estimated number of 76% of all Danish scientists has only been possible, because we have kept away from all political questions."[16] Whether it was truly Joliot-Curie's intention to run an exclusive, politically neutral organization is unclear, but it was certainly his intention that the WFSW should appear as such. This type of criticism clearly showed the limitations of his politics, even as Joliot-Curie sought to encourage the political (or at the very least social) involvement of scientists worldwide.

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[15] Frédéric Joliot-Curie, "Lettre adressée à tous les Présidents d'Associations Scientifiques membres de la Fédération mondiale des Travailleurs Scientifique," Décembre 1951, boîte 119.

[16] Niels Arley to Frédéric Joliot-Curie, December 19, 1951, boîte 119.

Defending Science

From Joliot-Curie's perspective, science after 1946 was under a constant state of siege. The McMahon Act of 1946 ensured that all nuclear research in the United States was born secret, a reality that Joliot-Curie would come to call "America's uranium curtain."[17] Secrecy made Joliot-Curie fearful of increased nuclear proliferation, but he also saw it as an affront on the scientific profession itself. "It would thereafter be impossible to visit laboratories of our speciality, to keep going normal relationships with colleagues who are friends," he wrote in a WFSW periodical. "Once this principle of secrecy is accepted, there is no reason why it should not be extended to all fields of science."[18] Being involved in politics might very well change science as a vocation, but from Joliot-Curie's perspective it was secrecy that presented the greatest threat to his profession. To this end, he made an effort to warn the United States of the potential consequences for nuclear secrecy. "To keep secret discoveries in any one field of science for economic or military reasons may lead to secrets being kept in other fields which could possibly have special military importance and in this way we shall greatly diminish the productivity of scientific investigation," he said at a press conference in the United States. "We shall slow down scientific progress and ultimately stop scientific production altogether."[19] Joliot-Curie must have known that his words would have little effect on the policy of the American government, but his goal in this case was rather to spread his message of open science internationally.

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[17] David Schoenbrun, "Can France Make an Atom Bomb?" July 1947, boîte 71.

[18] Frédéric Joliot-Curie, "French Views on Atomic Energy," *Science and the Welfare of Mankind* (London: Temple Fortune Press, 1946), boîte 32.

[19] "Conférence de Presse aux Etats-Unis," 14 juin 1946, boîte 32.

As an alternative to nuclear secrecy, Joliot-Curie promoted a policy of scientific openness and cooperation. The charter of the WFSW, for example, established ethical responsibilities for scientists such as "resistance to the suppression or distortion of scientific knowledge," the "full publication of scientific results," and the "immediate abolition of secrecy in all fundamental science and its progressive diminution in industry and national affairs."[20] These principles of scientific openness suggested a sense of nostalgia for the pre-atomic age. Joliot-Curie had made his greatest scientific discoveries with the full benefit of scientific cooperation ("Men like Lord Rutherford would certainly not have approved of the doctrines of scientific secrecy that we often hear in our time and which are true heresies," he quipped).[21] In this way, the WFSW constituted an effort to bring back the cooperative principles of a previous era but, unfortunately for Joliot-Curie, scientific openness in the realm of nuclear physics would never return. He expressed a similar message in other publications as well, such as the American *Bulletin of the Atomic Scientists.* Joliot-Curie wrote, "We must make sure that the coming years will see new victories over mystery and ignorance, victories which can only come from international cooperation in the atmosphere of freedom and mutual confidence which once was and must again become the atmosphere of our cherished Science."[22] Here Joliot-Curie again expressed his nostalgia for a past era of cooperation.

Furthermore, Joliot-Curie saw the vast benefits of scientific cooperation to advance international interests. "Scientific discoveries are the material of human progress," he wrote.

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[20] "World Federation of Scientific Workers: Charter for Scientific Workers," July 1946, boîte 119.

[21] Jean Vidal, "L'interview de Frédéric Joliot-Curie," *Ce Soir en France*, 3 novembre 1947, boîte 34.

[22] Frédéric Joliot-Curie, "Statements on the Second Anniversary of Hiroshima," *Bulletin of the Atomic Scientists* 3, no. 9, September 1947, boîte 34.

"Since modern times, scientific research has been a common patrimony at the disposal of scholars and technicians. This common property created a solidarity throughout the world and kept going a spirit of international mutual help."[23] Not only could science benefit mankind, but here Joliot-Curie alluded to the exclusive community of scientists, an appropriate reference given that it appeared in a WFSW journal. Scientific secrecy would make it impossible for scientists to have "solidarity," and would instead divide them.

In addition to support for scientific openness, Joliot-Curie was adamant that the international community recognize science as a fundamentally objective discipline but in doing so took an ideological stance himself. In this context, Joliot-Curie's beliefs largely aligned with Max Weber's vocational ethic for the scientist. Despite his near constant insistence that scientists consider the moral implications of their work, Joliot-Curie agreed with Weber that the intrinsic value or detriment of scientific results should not be judged. "Depending on its applications, science is considered in itself as moral or immoral," he wrote in 1946. "These judgments obviously have no meaning, for it is the men who make use of the results of science alone who should be judged."[24] Although Joliot-Curie did not explicitly say so, this statement was really a reference to the development of the atomic bomb. The bomb fundamentally changed the notion of "objective" science, particularly in the United States, where many Manhattan Project scientists called for limitations on the use of the bomb in the months leading up to the bombings of

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[23] Joliot-Curie, "French Views on Atomic Energy," *Science and the Welfare of Mankind*.

[24] Frédéric Joliot-Curie, "Science Soviétique et Science Française," *Le Courrier Diplomatique* 3, 18 mars 1946, boîte 33.

Hiroshima and Nagasaki.[25] The aftermath of the bombings saw the creation of the *Bulletin of the Atomic Scientists* as well as similar counterparts such as Joliot-Curie's World Federation of Scientific Workers.

Joliot-Curie therefore used the WFSW to promote objective science, a Weberian notion, over what he saw as a dangerous trend that judged the morality of scientific results. For example, he opened a general assembly in Czechoslovakia by asserting, "We must, in the name of reason, fight with energy against the widespread ideas about the harmful effects of science and the responsibilities that it would carry for the difficulties that humanity currently faces."[26] By making the question of scientific results an issue of "reason," he implied that those who would doubt its objectivity did not understand the scientific process to begin with. Furthermore, by his line of reasoning, the development of atomic research should not be considered a fault, problem, or threat to humanity. As Weber wrote, "In contrast with these preconditions which scientific work shares with art, science has a fate that profoundly distinguishes it from artistic work. Scientific work is chained to the course of progress; whereas in the realm of art there is no progress in the same sense."[27] Following Weber's logic, the study of nuclear physics to Joliot-Curie represented "progress," a fact that in his eyes should be recognized for its potential.

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[25] The Franck Report, primarily written by biophysicist Eugene Rabinowitch but with the input of several scientists from the Chicago Met Lab, called for the demonstration of the bomb in an uninhabited area prior to a civilian attack. Its failure to convince American government leaders was a contributing factor to creation of the Szilard Petition, which likewise protested any potential use of the bomb against Japan. The Szilard Petition was signed by as many as 150 Manhattan Project scientists. For more information see: Richard Rhodes, *The Making of the Atomic Bomb* (New York, NY: Simon & Schuster, 1986).

[26] Frédéric Joliot-Curie, "Discours d'Ouverture de la Premiere Assemblée Générale de la Fédération Mondiale des Travailleurs Scientifiques en Tchécoslovaquie," Septembre 1948, boîte 35.

[27] Weber, "Science as a Vocation," 7.

Even as his career and life goals changed during the following decade, Joliot-Curie's stance on the objectivity of science saw virtually no change at all. "To judge science as being moral or immoral has no sense," he wrote in a WFSW publication in 1955. "Science is neither moral nor immoral and it is the men who exploit the results of science for good or bad ends who are the only ones to be judged."[28] These words were practically identical to those in the article Joliot-Curie published in *Le Courrier Diplomatique* back in 1946. He had transformed himself completely by this point from a scientist-administrator to a scientist-activist (and in fact was now writing in a journal published by the World Peace Council), and yet this notion of scientific objectivity was so central to his philosophy that it carried through this transition. As he did back in 1946, however, Joliot-Curie hinted that just because science itself was pure did not mean that no one was to blame for how it was used. He was certainly not unwilling to assign moral responsibility, particularly in the age of the atomic bomb.

The Moral Responsibility of the Scientist

Although Joliot-Curie clearly believed in the objective treatment of science as Weber did, the Weberian ideal did not hold for him in the age of the bomb when it came to the responsibility of the scientist. The 1946 charter of the WFSW included numerous responsibilities for scientists, but three were particularly significant: responsibility "to science," responsibility "to the community" and responsibility "to the world."[29] This was very consequential because it was the very same duties that Joliot-Curie worked to fulfill throughout his life (presented in this thesis as

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[28] Frédéric Joliot-Curie, "Un Discours du Président," *Bulletin du Conseil Mondial de la Paix* 6 (25 mai 1955), boîte 137.

[29] Ibid.

responsibilities to France, to the world, and to science). Joliot-Curie's sense of duty to science was not only to the discipline but to the social role of the scientist, hence his diversion from Weber.

In contrast to the vocational ethic put forth by Weber, who said that science and politics should not mix, Joliot-Curie believed that scientists had a moral responsibility to consider the political and social implications of their work. In all probability, Joliot-Curie did not see the contradiction between asking scientists to consider the implications of their work and insisting that science be treated as objective. More likely, he wavered between the old and the new, between the generation of scientists who believed in the Weberian ideal for science as a vocation and the new generation who worked in the shadow of the bomb. At the most fundamental level, Joliot-Curie maintained that scientists had a responsibility to see that their work was being used for the betterment of humanity. The WFSW Constitution, for example, stated the organization's intent "to use science correctly to reduce or even eradicate poverty, disease and ignorance, which constitute some of the constant causes of war."[30] Rarely before had there ever been a need to define what constituted "good" science; for the most part, scientific progress of any kind was beneficial for everyone. The destructive power of the atomic bomb, however, was the factor that prompted the creation of scientist-led organizations like the WFSW.

In this same vein, Joliot-Curie believed that scientists had a responsibility not only to use their work for the greater good but to see that it was not misused by anyone else. "Many scientists feel that they are involuntary accomplices of bad laws and bad political systems that are allowed to exploit the results of their work for self-seeking and harmful ends," he wrote in

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[30] "Constitution de la Federation Mondiale des Travailleurs Scientifiques," 1946.

1946. “As a result, these researchers experience a crisis of conscience that naturally leads them to join the ranks of workers who believe in the liberating role of science and who are struggling to create a better society.”[31] Joliot-Curie once again described the attack he saw on science in its use for political gain rather than international progress, but in this instance he implied that scientists had a responsibility to not let themselves be used in such a way. By introducing the notion of a moral conscience for scientists, Joliot-Curie was actually pushing back against a generational belief that scientists should focus only on producing results and pay little attention to how those results were used.

As an example of concrete action that could fulfill their moral responsibility, Joliot-Curie suggested that should politicians not propose international cooperation in nuclear research, then scientists should refuse to cooperate with the governments in question and even threaten to boycott their posts. Joliot-Curie introduced the idea at a press conference in the United States, an indication that it was American scientists who would be facing such a decision. “In the idea that I put forward of scientists refusing to continue their researches, there was this element: that a scientist has a responsibility towards society in view of the economic and social results of his work,” affirmed Joliot-Curie. “My purpose was to bring out this idea of the responsibility that rests with the scientists, and suggest how their consciences, the consciences of the scientists, might lead them to act in certain circumstances.”[32] He once again drew on the notion of moral conscience. American scientists according to Joliot-Curie could no longer claim to be advancing the interests of scientific progress. If they continued without considering and acting upon the

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[31] Joliot-Curie, “Science Soviétique et Science Française,” *Le Courrier Diplomatique*, 1946.
[32] “Conférence de Presse aux Etats-Unis,” 14 juin 1946, boîte 32.

moral implications of their work, they would be supporting a government that had already shown its intentions to develop nuclear weapons in secret and its willingness to use the atomic bomb in warfare.

Joliot-Curie seemed to believe, however, that scientists in the West would ultimately make the right choice. "Most American and British scientists and engineers, as well as from other countries, who, like us, have contributed to the development of this scientific field, are not satisfied to see leaders or government representatives discussing these issues in secret without regard to it seems, to their opinions," he wrote. "Scientists are aware of their responsibility in this case and claim less and less that they are out of the loop when it comes to making decisions about the use of their discoveries and inventions."[33] In this instance Joliot-Curie singled out not only American but British scientists as well, an indication that he was likewise concerned about the development of the British nuclear program. Since professional politicians were failing to take what he deemed appropriate action, Joliot-Curie was determined that scientists in every country should consider the implications of their work.

As he did with the French nuclear program's peaceful applications of atomic energy, Joliot-Curie cited French scientists as an example for how scientists everywhere should consider their moral responsibilities. He wrote in a UN magazine, for example, "The scientists and technicians of France, who have looked with the mind's eye on the death at Hiroshima, even as they have suffered the ravages of war on their own territory, believe that the atomic age must be accompanied by a world-wide intensification of the sense of social responsibility."[34] There is

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[33] Frédéric Joliot-Curie, "La Libération de l'Energie Atomique et Ses Conséquences," *Journal de l'Université des Annales* 9 (15 septembre 1946), boîte 31.

[34] Frédéric Joliot-Curie, "Atomic Power," *United Nations World* (March 1947), boîte 34.

little evidence to suggest that French scientists were any more aware of their responsibilities in the atomic age than scientists elsewhere, and it should be remembered that at the time he made this statement Joliot-Curie was serving as High Commissioner of the CEA. He may have been using the supposedly peaceful direction of the French nuclear program to imply that all scientists who worked for the CEA were somehow fulfilling this responsibility, an obvious oversimplification.

Joliot-Curie's reference to the bombings of Hiroshima and Nagasaki also marked a change in WFSW rhetoric regarding the moral responsibility of the scientist because it began to draw more attention to the danger of the bomb. The WFSW charter called on its scientists "to work against diversion of scientific effort to war preparations: in particular to the use of science in providing methods of mass destruction."[35] Nowhere in the charter, constitution, or speeches from its opening conference in 1946, however, was the bomb specifically mentioned as the singular threat that had prompted a reevaluation of scientists' moral responsibilities. Most likely, Joliot-Curie and the WFSW wanted to present the bomb merely as one part of its larger goals for scientific responsibility.

Joliot-Curie soon abandoned all pretense that the bomb was not the only motivating factor, perhaps realizing that doing otherwise would contradict his message of protecting "objective" science. WFSW Secretary-General J. G. Crowther explained, for example, how the bomb had made it unavoidable that scientists become involved in politics. "The release of nuclear energy…has had the effect of making many scientists think about the social significance of science for the first time, and has led those especially who had a part in the making of the first

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[35] "World Federation of Scientific Workers: Charter for Scientific Workers," July 1946, boîte 119.

atomic bombs into various kinds of political action," he affirmed at a 1948 General Assembly. "There is no way in which scientists can evade the political implications of their work. Scientists must [concern] themselves with the progressive political control of atomic energy."[36] Crowther's words were both a tacit acknowledgement of the realities which prompted the creation of the WFSW as well as a clear directive for scientists everywhere: to fight nuclear proliferation and push for the international control of the bomb. To Crowther and to Joliot-Curie, doing nothing still constituted a political stance. During a 1950 speech in Bombay (later quoted in an obituary), Joliot-Curie again singled out the atomic bomb as the primary factor for scientists' moral responsibility:

> History proves without question what civilization owes to science—victorious struggles against disease, against famine, against the enslavement by men of natural forces—but it also gives us examples of misuse…for example, the use of the atomic bomb as a weapon of mass destruction…. The man of science cannot remain passive in light of these facts; whether he likes it or not, he has a responsibility in this case.[37]

By Joliot-Curie's argument, scientists did not have a choice in their political involvement. As he explained, science in virtually every other case represented progress no matter how its results were used. The atomic bomb, however, changed the circumstances that in Weber's time had allowed scientists to disregard the political implications of their work.

As the years wore on, another outlet through which Joliot-Curie expressed his belief in the moral responsibility of the scientist was the World Peace Council (WPC). Although the WFSW arguably had communist sympathies, the WPC added an additional political flare to Joliot-Curie's argument for the moral responsibility of the scientist. "It is the duty of scientists to

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[36] Crowther, "Report by the Secretary-General Designate," 1948.

[37] "Adieu à Frédéric Joliot-Curie," *Peuples Amis* 109 (Octobre 1958), boîte 118.

sincerely inform public opinion of these immense dangers, and it is their duty to lead the movement of those who are determined to dispel these dangers forever," wrote Joliot-Curie in a WPC pamphlet. "Scientists know all that science has already accomplished for humanity; they also know all that it could provide for a world restored to peace."[38] This was not a new idea, and the significance of this statement was therefore not its content but its context. Joliot-Curie's choice to affirm the duties of scientists through the WPC, an organization that was intended to promote worldwide peace, as opposed to WFSW, which was designed to exclusively represent the interests of scientists, was a noticeable change. The implication was that this responsibility was directly correlated to world peace.

The decision to make scientific accountability an issue for the WPC was not an isolated choice. Two years later at a WPC conference in Helsinki, Joliot-Curie affirmed, "It would be pointless to say that scholars have no responsibility simply because their work is the source of many different practical applications. But it is precisely the sense of this responsibility that must lead them not to remain indifferent, not to become accomplices of those who would not hesitate to use the results of science for the most dangerous ends."[39] Although once again the context of Joliot-Curie's words was more significant than the content, it is worth noting that in this instance he countered Weber's notion of means and ends. According to Weber, scientific results constituted means for scientists and ends for politicians. According to Joliot-Curie, however, scientists had a responsibility to see that they were not irresponsibly providing the means to an end that would result in the destruction of humanity, like the atomic bomb. In other words,

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[38] Frédéric Joliot-Curie, *Le Professeur Frederic Joliot-Curie appelle à l'interdiction de la Bomb «H»* (Paris: Bureau du Conseil Mondial de la Paix, 1953), boîte 137.

[39] Frédéric Joliot-Curie, "Un Discours du Président," *Bulletin du Conseil Mondial de la Paix* 6 (25 mai 1955), boîte 137.

Joliot-Curie believed that scientists had a moral responsibility to take stock of ends, a clear break from Weber.

Conclusion

In 1918, Max Weber described a line between science and politics that he believed was representative of the state of affairs at the time. Science according to Weber was a "pure" discipline, untarnished by politics. It was for scientists to consider means, whereas politicians should concern themselves with ends. Scientists in the Weberian ideal were likewise focused on facts but not the purposes to which their work was put, while only politicians could judge the value of scientific results.

The atomic bomb forever changed this reality. Scientists across the globe suddenly faced the heavy responsibility that came with working on such a weapon. Frédéric Joliot-Curie was one of the most vocal advocates for this responsibility. In 1946 he was named president of the newly founded World Federation of Scientific Workers, an organization of scientists acutely aware of its political role in the atomic age. By giving voice to scientists, the WFSW could provide a service to the international community, namely the fulfillment of their ethical responsibilities. Joliot-Curie, however, struggled with the idea that the WFSW was in fact political. In doing so he revealed a personal conundrum, namely whether he should abandon the Weberian ideal completely.

This was not the only instance in which Joliot-Curie supported Weberian values. He likewise believed that science was an objective discipline that should not be judged as moral or immoral. Scientific secrecy, for example, posed a direct threat to the advancement of science as a

tool for global progress. The WFSW was thus intended to fight back against what Joliot-Curie saw as an affront against science as a vocation.

Unlike Weber, however, Joliot Curie believed that scientists had a moral responsibility to consider the implications of their work. At the most basic level, scientists according to Joliot-Curie should use their work for the betterment of humanity and take action should their work be abused. Over time, Joliot-Curie and other WFSW officials singled out the atomic bomb as the principle factor motivating this responsibility. In his later years, Joliot-Curie used similar rhetoric in the World Peace Council, a statement to the priority that he gave to the moral responsibility of the scientist in his larger struggle for world peace.

While Joliot-Curie certainly pushed back against a generational belief between science and politics, it is important to remember that he was by no means unique. Other scientists, like J. Robert Oppenheimer, Hans Bethe, and even Werner Heisenberg, to name a few, were likewise concerned with the practical implications that the further development of nuclear physics could have. Frédéric Joliot-Curie was a product of his time, a testament to the considerable impact of the atomic bomb on the Weberian ideal for vocational science.

Chapter 6: Conclusion

The relationship between science and politics in the public sphere was fundamentally changed by the atomic bomb. In recent years, historians have observed how the bomb affected scientists like J. Robert Oppenheimer, Hans Bethe, and Werner Heisenberg as they struggled with the political and moral responsibilities of their work. The politics of Frédéric Joliot-Curie were likewise born from the atomic age. Despite growing up in a generation of scientists who for the most part kept their political beliefs out of the public sphere, the discovery of nuclear energy and the development of the atomic bomb prompted Joliot-Curie's desire to fulfill three complementary responsibilities: to France, to the world, and to science.

As High Commissioner of the CEA after World War II, Joliot-Curie saw an opportunity for nuclear energy to rebuild France in the postwar world. He used scientific development for his nationalist ambitions to reinvent France following its humiliating wartime defeat at the hands of Nazi Germany. Nuclear energy to Joliot-Curie could accomplish French *renaissance*, and by rebuilding French industries it would regain its place among the most technologically advanced nations in the world. He was determined, however, that France never pursue the atomic bomb, believing it to be a dangerous path that could only lead to a nuclear arms race that would put France's national security at risk. Furthermore, Joliot-Curie was adamant that France should provide contributions to the international development of science and in doing so serve as an example that other nations could follow for the peaceful applications of atomic energy. In his eyes, France would gain political legitimacy as a contributing and leading member of the international scientific community.

To this end, Joliot-Curie also propagated an alternative narrative of atomic history with France at its forefront. While French scientists certainly advanced the field of nuclear physics, they were far from its only contributors. Joliot-Curie similarly expressed the unique nature of France's nuclear program in that French scientists developed it on their own, again stretching the truth given the program's roots in the American Manhattan Project. Ultimately, Joliot-Curie's role in the French government created tension within the Western bloc, largely due to his communist beliefs. While the United States sought to keep all nuclear research a secret, Joliot-Curie wanted to share atomic research internationally. Pressure from the United States was a contributing factor to Joliot-Curie's dismissal from the CEA in 1950. Without Joliot-Curie, however, France went on to develop nuclear weapons, testing its first bomb in 1960.

In addition to his nationalistic aspirations for France, Joliot-Curie also felt a responsibility to protect the world from the atomic bomb. This effort was closely related to his communist allegiances. Joliot-Curie believed that Marxism and physics both used the scientific method, and that they were therefore complementary. He also asserted that the Soviet Union exemplified scientific development for the good of the collective, while ignoring its many human rights violations and thus leaving himself open to criticism. Joliot-Curie also used communist rhetoric in his international campaign against the bomb, undermining his efforts in the process. During his time as head of the CEA, for example, Joliot-Curie pushed for the international control of the bomb. He saw nuclear secrecy as a threat to the international community because he believed (correctly) that it would encourage further nuclear proliferation. In the end, world leaders failed to create a capable organization for nuclear control, and Joliot-Curie was dismissed from the CEA in 1950. After his dismissal, Joliot-Curie turned to non-governmental activism to

fulfill his duty to the world. In doing so, he tried to reinvent his own identity by expressing his political beliefs as a scientist-activist rather than as a scientist-administrator. Joliot-Curie devoted himself to the World Peace Council, an organization dedicated to international peace but with deep communist roots. The 1950 Stockholm Appeal, for example, called for the worldwide abolition of the atomic bomb but was criticized for its bias towards the Soviet Union and its allies.

Finally, Joliot-Curie was devoted throughout his life to the scientific discipline. In 1917, Max Weber established an ideal that many in the scientific community aspired to, namely the separation of science and politics. Science according to Weber should concern only means and facts; politics was a matter of ends and value. Joliot-Curie pushed back against this notion by founding the World Federation of Scientific Workers, an organization intended to give voice to scientists in the public sphere. Like Weber, however, Joliot-Curie believed that science should be a fundamentally objective discipline, free from the burdens of political morality. At the same time, he affirmed the responsibility of scientists to consider the moral responsibility of their work. He eventually acknowledged that it was the bomb that caused him to believe in this responsibility. While these efforts might seem contradictory in the context of Weber, it was really evidence that Joliot-Curie was caught between the old the new. He wanted to preserve the past separation of science and politics, but also sought to make sense of the atomic age.

Epilogue

During the final years leading up to his death in 1958, Joliot-Curie struggled to maintain his active lifestyle amid a series of health problems. He was also heartbroken by the death of

Irène in 1956, and authored an essay, "The Human Value of Science," shortly after. "My own preoccupation in the face of death very early came down to a purely human and terrestrial problem," he wrote. "Does not eternity lie in the living and perceptible chain which links us with the things which have been done and the beings that have lived on this earth?"[1] A lifelong atheist, Joliot-Curie evidently felt that it was his actions which gave meaning to his life.

Joliot-Curie spent his last years as he did the rest of his life—diligently working in both the scientific and political arenas. In addition to his teaching post at the Collège de France, Joliot-Curie became the new Chair of Nuclear Physics at the Sorbonne, a position previously held by Irène.[2] In May 1958, Joliot-Curie made one final voyage to Moscow, where he met with Nikita Khrushchev at the Kremlin for the better part of two hours. The two reportedly discussed the future of nuclear non-proliferation and agreed, "The blood of humanity flows: it is not only French or Russian blood. Atomic bombs involve the whole of humanity."[3] This statement echoed Joliot-Curie's lifelong commitment to internationalism. Not long after his Soviet Union trip, Joliot-Curie was involved in another political movement when he protested at the Sorbonne against the coup of May 13, 1958, which saw the return of President Charles de Gaulle to power in France.[4] Although the French atomic bomb program was already underway by this point, de Gaulle accelerated its development and France had the bomb within two years.

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[1] Pierre Biquard, *Frédéric Joliot-Curie: The Man and His Theories*, Translated by Geoffrey Strachan (New York, NY: Paul S. Eriksson, 1966), 118.

[2] "Frédéric Joliot - Biographical," *Nobelprize.org*, 2014, https://www.nobelprize.org/nobel_prizes/chemistry/laureates/1935/joliot-fred-bio.html.

[3] Maurice Goldsmith, *Frédéric Joliot-Curie: A Biography* (London: Lawrence and Wishart, 1976), 225.

[4] Ibid.; For more information on the May 1958 crisis in France see: Jonathan Fenby, *The General: Charles de Gaulle and the France He Saved* (New York, NY: Skyhorse Publishing, 2012).

Throughout this last period of his life, Joliot-Curie also continued his publications. Of particular interest was one of the final pieces he wrote in July 1958 (although published posthumously) for *Le Monde Scientifique*, a journal of the World Federation of Scientific Workers. Joliot-Curie called for the end of nuclear weapons, citing his efforts with the World Peace Council. He also wrote once more about precarious situation of the scientist in the atomic age:

> More than the average person, scientists have the ability to calculate the exact consequences of atomic and thermonuclear bombs…. On the one hand, their very knowledge of this danger pushes them to convince the public by giving an objective analysis of the threat to humanity…. On the other hand, scientists suffer from seeing their work thus perverted and they would like to see the threat of the bomb gone from the world and leave only the humanitarian applications of scientific research to which they dedicate their lives.[5]

Joliot-Curie's political beliefs never changed during his final years. In this article, he referenced the unique position of scientists and offered a defense of scientific objectivity as well as the moral responsibility scientists faced to consider the implications of their work.

Frédéric Joliot-Curie died in Paris on August 10, 1958. He spent his final days in the Saint-Antoine hospital finishing his written lectures on radioactivity as he planned his future teaching.[6] Over a thousand people attended a ceremony honoring Joliot-Curie in the Sorbonne courtyard, including French government representatives of the President, the National Assembly, and the Prime Minister, as well as the leaders of the French Communist Party and the World

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[5] Frédéric Joliot-Curie, "La campagne mondiale contre le péril atomique," *Le Monde Scientifique* 2, no. 4 (Septembre 1958): 39, boîte 122.

[6] Pierre Biquard, *Frédéric Joliot-Curie: The Man and His Theories*, Translated by Geoffrey Strachan (New York, NY: Paul S. Eriksson, 1966), 124.

Peace Council.[7] Thousands more followed the funeral procession to the Sceaux cemetery, where he was laid to rest beside Irène.

Joliot-Curie, like other scientists of this period, was a product of the atomic age. While there is much scholarship on nuclear physicists in the United States, there is comparatively less on the international scene, and further studies are needed. Furthermore, the politicization of scientists in the public sphere has since expanded beyond the realm of nuclear energy and the bomb. Climate change scientists, for example, face political challenges in their work, as do scientists in the Environmental Protection Agency. The case of Joliot-Curie was therefore not unique, but part of a broader trend. By and examining and analyzing the politics of Frédéric Joliot-Curie, we can better understand and judge scientists in the public sphere today.

7

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