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Duty and Distinction: Scientists as Intellectuals in Modern China

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Introduction

On October 1, 2019, the People's Republic of China celebrated its 70th anniversary under the leadership of the Chinese Communist Party (CCP). In Beijing's Tiananmen Square, hundreds of tanks and soldiers marched together at the National Day Parade in a grand display of the nation's military strength and prowess. Notably, a number of China's newly-designed ballistic missiles made their debut at the parade, showcasing the nation's increasing nuclear assault and defense capabilities. China's proud display of the achievements of its nuclear weapons program serves as a reminder to its citizens and to the rest of the world that the country is indeed a modern power, worthy of respect on the international stage. As a symbol of national achievement and pride, the nuclear weapons program also represents a successful partnership between state leaders and China's scientific community, who together are responsible for pushing scientific and technological research to new frontiers.

Since its inception in 1955, the Chinese nuclear weapons program has always been a potent symbol of nationalism. Within, Chinese experts were able to build a successful program from scratch and conduct the nation's first atomic bomb test in October of 1964.[1] The Chinese state celebrated the nuclear weapons program as a major success of "new China" (*xinzhongguo* 新中国) and promoted it as an indication of China's entrance into the modern atomic age.[2] Following the success of the first test, the program continued to develop, while simultaneously the nation descended into a decade of social and political chaos. The toll of the Mao's Cultural Revolution

[1] John Wilson Lewis and Xue Litai, *China Builds the Bomb* (Stanford: Stanford University Press, 1988), 1-2.
[2] "Statement of the Government of the People's Republic of China," October 16, 1964, History and Public Policy Program Digital Archive, PRC FMA 105-01262-01, 22-26. Obtained by Nicola Leveringhaus. https://digitalarchive.wilsoncenter.org/document/134359.

(1966-1976) on Chinese politics and society was immeasurable.[3] In particular, the systemic persecution of intellectuals remains one of the most poignant and horrible aspects of the Cultural Revolution. How, then, do we make sense of the successes of state projects such as the nuclear weapons program, given the chaos at the end of the Mao era? How did the state maintain scientific productivity in a time of such political volatility?

The experiences of Chinese scientists, who were both crucial laborers in the CCP's scientific projects and recipients of state oppression, give insight into how the state maintained political priorities and granted leniencies. This paper will explore some of these paradoxes of stability and chaos, of political agency and persecution, and of responsibility and distrust. Using a detailed case study as a window into the interactions between the Communist state and members of the scientific community, this paper will analyze how the state dealt with the problem of scientists, whose expertise was critically necessary but also threatening to the CCP's political legitimacy. I will argue that through the public presentation of Qian Xuesen 钱学森 (1911-2009), a uniquely authoritative scientist as a result of his historical and political circumstances, the state identified and shaped a new sociopolitical role for the scientific community as public experts tasked with legitimizing state policy. The new duties of the scientific community harnessed their specialized expertise to bolster the legitimacy of state policy and advance scientific modernity, as well as set an example for the rest of the intellectual community. The project of molding a politically supportive scientific community began in the Mao era and has continued to the present day through subsequent generations of CCP leadership.

[3] Roderick MacFarquhar and Michael Schoenhals, *Mao's Last Revolution* (Cambridge: Harvard University Press, 2006), 2.

Literature and Conceptual Framework

The identity and categorization of scientists as intellectuals is central to this paper's exploration of their political duties and unique relationship with the state. In Chinese, "intellectual" directly translates to *zhishifenzi* (知识分子), literally "educated people" or "people of knowledge." The term is used to broadly classify any modern individual with specialized knowledge, whether they be students, teachers, writers, scientists, researchers, or academics.[4] The study of intellectuals in modern Chinese history is robust, with most scholarly contributions from historical and sociological perspectives. The primary object of this paper is to expand on the existing framework about modern Chinese intellectuals by focusing on scientists as a particularly unique group of intellectuals. Due to CCP projects such as the development of the nuclear weapons program, the scientific community's political participation was critically tied to state interests.

One major contribution of this paper is to provide a more nuanced discussion of intellectuals in a historical context distinct from the West. The Western definition of intellectuals has distinct features particular to the historical and present day contexts of Western Europe and North America. As one salient definition, Noam Chomsky's 1967 essay "The Responsibility of Intellectuals" asserts that "it is the responsibility of the intellectual to speak the truth and expose the lies."[5] The essay argues that, given their social privileges as educated elites in Western democracies, intellectuals have a moral duty to speak out against abuses of government power.[6] Originally written as a speech for an anti-Vietnam war protest, Chomsky's concept positions intellectuals against the state and makes such opposition a necessary component of their identity.[7]

[4] Timothy Cheek, *The Intellectual in Modern Chinese History* (Cambridge: Cambridge University Press, 2016), 155.
[5] Noam Chomsky, "The Responsibility of Intellectuals," in Nicholas Allott, Chris Knight and Neil Smith, eds., *The Responsibility of Intellectuals: Reflections by Noam Chomsky and others after 50 years* (London: University College Press, 2019), 1.
[6] Chomsky, "The Responsibility of Intellectuals," 1.
[7] Chomsky, "The Responsibility of Intellectuals," 7.

Chomsky's definition of intellectuals certainly provides inspirations for the study of intellectuals in other parts of the world, but its lack of compatibility with the context of modern Chinese history is an issue for this paper. Specifically, the emphasis on clear-cut opposition between state and dissidents does not explain why most self-professed "intellectuals" worked in conjunction with the Chinese state. The association in the West of the inherently elitist and privileged qualities of intellectuals is not necessarily a connotation of the Chinese term *zhishifenzi*. Sociologist Eddy U argues that the use of *zhishifenzi* in the early 1920s was a social classification conceived and perpetuated by the CCP. This new broad social role as "intellectual" made it possible for modern thinkers to fulfill a specific duty to society through participation in public life, while also subjecting the group to state control and suppression.[8]

A widely accepted definition of the Chinese intellectual by He Baogang positions intellectuals at the center of public life, with the moral responsibility to act as the social and political conscience of their community.[9] Similar to the Western definition, He recognizes moral duty and visibility in the public sphere as central to the definition of intellectuals. Timothy Cheek echoes this emphasis on intellectual participation in public life and civil society, and further identifies nationalism as the overriding concern of modern Chinese intellectuals.[10] Cheek argues that in the Mao era, intellectuals worked with and sometimes against the state, but their primary focus was always on the greater service of building a new socialist system, and not necessarily working for or against any political authority. Zhidong Hao describes this work as "organic," as intellectuals endeavored to enact political and cultural change through advisory roles to those in

[8] Eddy U, *Creating the Intellectual* (Oakland: University of California Press, 2019), 161-163.
[9] He Baoyang, "Chinese Intellectuals Facing the Challenges of the New Century," in Edward Gu and Merle Goldman, eds., *Chinese Intellectuals between State and Market* (London: Routledge, 2004), 263.
[10] Cheek, *The Intellectual in Modern Chinese History*, 320.

power.[11] In the post-Mao era, Cheek argues that the primary role of intellectuals was to use their expertise to help China transition to a new political system, that retained distinct "Chinese characteristics."[12] My use of the term "intellectual" speaks to this broad categorization of people of knowledge particularly situated in modern China. In my analysis of scientists as a subcategory of intellectuals, I am particularly concerned about scientists' active duty to participate in politics and use scientific expertise to influence public opinion.

The work of scientists in modern China is fundamentally tied to scientific and technological achievement as measures of Chinese modernity. Scholarship on Chinese modernization is another rich field that has garnered much analysis by Chinese and Western scholars. Jing Tsu and Benjamin Elman have argued that scholars should analyze China's quest for modernity as a "complex process through which China sought to reboot itself in an unfamiliar global order."[13] For this pursuit, the "demonstrability and reproducibility" of scientific and technologic achievement were important signifiers of the state's successful modernization efforts.[14] Additionally, the role of Western states and Japan as aggressors and comparative agents of modernity have played a crucial role in Chinese formulations of a modern identity. As Chinese state builders in the late 1800s increasingly began to favor Western models of science and development, native approaches to reform were discarded in favor of ideals of modernity based on the adoption of Western science.[15]

Calls for radical reform and modernization came to a head in the 1919 May Fourth Movement, which was led by intellectuals who called for democracy and modern science as

[11] Zhidong Hao, *Intellectuals at a Crossroads: The Changing Politics of China's Knowledge Workers* (Albany: State University of New York Press, 2003), 10-11.
[12] Cheek, *The Intellectual in Modern Chinese History*, 321.
[13] Jing Tsu and Benjamin A. Elman, eds., *Science and Technology in Modern China, 1880s-1940s* (Boston: Brill, 2014), 6.
[14] Tsu and Elman, *Science and Technology in Modern China,* 6.
[15] Benjamin Elman, *On Their Own Terms* (Cambridge: Harvard University Press, 2005), 397.

remedies for continued Chinese subjugation at the hands of Western and Japanese imperial powers.[16] Though the May Fourth Movement has been traditionally characterized as the pivotal historical moment in which China decided to turn to modernity, many scholars have argued that Chinese modernization has been a much longer process with roots in the 1800s. As Tsu and Elman maintain, "China's plans to send expeditions to the moon and Mars in the twenty-first century are partly a response to the shock of heavy-handed Western and Japanese imperialism since 1850."[17] For Chinese leaders frustrated with the inadequacies of the Qing dynasty's reforms, the disastrous defeat in the Sino-Japanese War (1894-1895) demonstrated Meiji Japan's superior naval technology and general scientific and technologic capabilities.[18] While the Japanese Meiji restoration served as a model for "Asian modernity" that could be adopted in China,[19] ultimately continued encroachments of national sovereignty by Japanese and Western powers necessitated China's quest for modernity.[20]

This paper's exploration of Chinese scientific modernity through nuclear weapons development follows China's goals in the global context of the Cold War, when the atomic age posed another benchmark of state power and achievement. Under each generation of CCP leadership, from the Mao era to the post-Mao era, views and measures of modernization were modified as state goals, geopolitical conflicts, and domestic politics changed. Because the work of scientists was naturally pertinent to ideas of modernization, the scientific community underwent several phases in which the state defined and assigned social and political roles which were

[16] Zuoyue Wang, "Saving China Through Science: The Science Society of China, Scientific Nationalism, and Civil Society in Republican China," *Osiris* 17, (2002): 295.
[17] Tsu and Elman, *Science and Technology in Modern China,* 6.
[18] Benjamin Elman, "Toward a History of Modern Science in Republican China," in Tsu and Elman, *Science and Technology in Modern China*, 22-23.
[19] Ruth Rogaski, Hygienic Modernity: Meanings of Health and Disease in Treaty-Port China (Berkeley: University of California Press: 2004): 13.
[20] Wang, "Saving China Through Science," 295.

negotiated and renegotiated. The valuable expertise of scientists directly contributed to the state's efforts at modernization, which consequently positioned the scientific community as a unique group with the ability to reframe more broadly the public duties and responsibilities of modern intellectuals.

Sources, Methodology, and Organization

This paper includes a wide variety of sources, which is necessary to construct a coherent historical narrative that spans a century of historical and political change. To analyze the relationship between scientists and the state, I have included sources that demonstrate both the state's efforts at control and the voices of individual Chinese scientists. As neither side of the relationship has a completely monolithic perspective, I have chosen specific individuals as representatives of organizations and communities.

Most of this paper focuses on analyzing the actions and writings of Qian Xuesen 钱学森 (1911-2009), who is both a perfect and imperfect representative of the scientific community. From the state's perspective, Qian was the ideal model of a scientist who fulfilled his social and political duties, and I argue that the state continues to perpetuate a narrative of Qian as a national hero and model for the scientific and intellectual community. On the other hand, while Qian represented a particularly authoritative scientific voice in line with the state, many leaders of the scientific community used their distinct status to challenge the authority of the CCP and advocate for political reform. Fortunately, due in part to the state's publicization of Qian as a symbol of national pride, I was able to access extensive coverage of Qian in state media. The archives of *People's Daily* (*Renmin Ribao* 人民日报) and the CIA's Foreign Broadcast Information Service offer extraordinarily rich information on Qian. I also use memoirs and biographies to supply the voices

of other members of the scientific community who challenged the scientist-intellectual model perpetuated by the state through Qian. For these alternate perspectives, I have mostly relied on personal memoirs written by the scientists themselves.

In order to create a narrative of the creation and perpetuation of the state's scientist-intellectual model, I have divided my paper into three sections. The first chapter provides the necessary context and background on science as an institution in the People's Republic of China, in order to examine how the creation of the scientist-intellectual model fit into the state's understanding of the role of science. Central to this chapter is the nuclear weapons project and the national science development program. The chapter also provides background on Qian's life to set a clear narrative of how state policy and scientists converged in the nuclear weapons project. Iris Chang's biography on Qian provides important details into his life.[21] John Lewis and Xue Litai's *China Builds the Bomb* is the most authoritative work on the beginning of China's nuclear weapons program, which I reference as well. [22] Marshall Nie Rongzhen oversaw both the nuclear weapons project and the nationwide scientific development program, so I reference his autobiography for details regarding scientific institutions and hierarchies of authority. Additionally, the Wilson Center operates an extensive digital archive of primary sources on China's nuclear program, which I used to find English and Chinese transcriptions of speeches, meetings, and correspondence between top members of the CCP.

The second chapter of this paper examines the establishment of the CCP's scientist-intellectual model during the Mao era (1949-1976), using Qian's work with the state to examine the unique privileges and responsibilities of the scientific community. In modern Chinese history, a natural method of tracking change and continuity is to divide the modern period into a Mao and

[21] Iris Chang, *Thread of the Silkworm* (BasicBooks: New York, 1995).
[22] John Wilson Lewis and Xue Litai, *China Builds the Bomb* (Stanford: Stanford University Press, 1988).

post-Mao era (1976-present). I have used this organization in my paper to separate clearly the state's formulation of the scientist-intellectual model under the Mao era from the post-Mao era's renegotiation of the model. Furthermore, I analyze Qian as a critical player in the state's development of a scientist-intellectual model in line with the CCP's Mao-era policies and priorities. To do this, I have translated pieces from state media written by and about Qian, particularly articles that I found in archives of *People's Daily*, China's state newspaper.

Finally, the third chapter of the paper analyzes the continued renegotiation of the duties and responsibilities of scientists in post-Mao China. This chapter shows how the second and third generations of CCP leadership used Qian's model scientist prototype to respond to widespread challenges to the party's legitimacy. The central event of this chapter is the 1989 Tiananmen Square Massacre, after which the state fully implemented a project to commit Qian to national memory. Like in Chapter 2, I utilize extensive state propaganda as primary sources to analyze the state's actions and motivations. The Chinese state's more recent memorialization of Qian is best displayed in the Qian Xuesen Library & Museum in Shanghai, which I personally visited. I conclude this chapter with an analysis of the spatial and ideological arrangements of the museum against the extensive history I relate in this paper.

Chapter 1

Organizing Systems and Labor: the Centralization of Science

To begin an analysis of the state's role in shaping the duties and responsibilities of scientists in modern China, this chapter will discuss the institutional background of scientific research when China officially launched its nuclear weapons project in 1955, focusing on the centrality of science to the state's political goals. In particular, the chapter will introduce and provide background on Qian Xuesen 钱学森 (1911-2009), a celebrated scientist and important political player in the nuclear weapons and national scientific development projects. Situating the nuclear project within the state's overall goal to strengthen its scientific capabilities in pursuit of modernity, a detailed analysis of Qian's personal circumstances will demonstrate how Qian became a critical player in the state's formulation of a new, productive relationship with China's scientific community.

Qian Xuesen and the Politics of Knowledge

As an accomplished physicist and aerospace engineer, the story of Qian Xuesen's rise to prominence provides insight into the privileges and power of scientists as central figures in the CCP's political endeavors. Qian's triumphs and misfortunes also demonstrate the profoundly political nature of science in the historical context of the Cold War, and particularly of scientific research in the service of state defense projects.

Qian Xuesen was born in 1911 as the only child of an affluent family of Chinese scholars.[23] As a child, he attended Beijing's most prestigious schools and excelled at a variety of subjects and disciplines. From the very beginning, people and institutions recognized Qian's intellectual abilities and allowed him access to exclusive opportunities throughout his lifetime.

[23] Chang, *Thread of the Silkworm,* 5.

This recurring theme of Qian as the object of special institutional attention began when he was an undergraduate student at Jiaotong University in Shanghai. For his undergraduate degree, Qian chose to study railway engineering at the top engineering school in China. In a country in the throes of ongoing domestic political conflict that would ultimately result in the Chinese Civil War (1945-1949), Qian's choice in study showed his awareness of the railways as a powerful military and political force.[24] His outstanding performance in his studies singled him out as a young scholar of immense potential. The Republic of China, then governed by the Nationalist Party, operated a prestigious scholarship program in conjunction with the United States government called the Boxer Rebellion Scholarship, which sent high-achieving Chinese college graduates to study science and engineering at renowned American higher education institutions.[25] The Chinese state expected these young scholars were expected to return to China to lead development of science and technology once they finished their degrees.[26] During the Republican period, Chinese scientists who studied abroad in Europe or the United States held high social status once they returned to China after their "academic pilgrimages to seek science and modernity."[27] In 1934, Qian was one of only twenty graduates selected for admission into the prestigious scholarship program.[28]

As a recipient of the Boxer Rebellion Scholarship, Qian entered into the beginning of what would become a robust and enduring working relationship with the state. The scholarship program retained control over Qian's studies abroad, and had the power to decide for him "which school he

[24] Chang, *Thread of the Silkworm,* 20.
[25] Hongshan Li, *U.S.-China Educational Exchange* (New Brunswick: Rutgers University Press, 2008), 59.
[26] Wang, "Saving China Through Science," 294-295.
[27] Fa-ti Fan, "The Controversy Over Spontaneous Generation in Republican China," in Tsu and Elman, eds., *Science and Technology in Modern China*, 216.
[28] Chang, *Thread of the Silkworm,* 38.

would attend, under which expert he would study, [and] in what field he would specialize."[29] The program was clear about its ultimate goal: to select and prepare the next generation of intellectual leaders who would become key engineers of the state's modern transformation. Qian was accepted into the program on the condition that he would study aeronautics, and his university and program advisors personally arranged for his acceptance into the aeronautic engineering program at the Massachusetts Institute of Technology (MIT).[30] Before his journey to the United States, the program arranged for Qian to spend a year touring the facilities of the Chinese aviation industry, which was still in its early development.[31] Now that Qian had seen where and how his scientific training would contribute to China's technological development, he left China in 1935 to begin a new chapter of his life.[32]

Over the next two decades in the United States, Qian established his intellectual expertise and experience in aeronautics and rocketry. Qian quickly finished his master's thesis on turbulence at MIT not last long.[33] In 1936, he accepted a spot as a graduate student of Theodore von Kármán's (1881-1963), then a professor at the California Institute of Technology (Caltech) and the director of the prominent Guggenheim Aeronautical Laboratory (GALCIT).[34] At Caltech, Qian thrived under Kármán's direction, and the two worked together on theoretical aerodynamics, using mathematical and physics concepts to solve engineering problems.[35] In 1938, Qian and Kármán published their first major project, "Boundary Layer in Compressible Fluids" in the flagship

[29] Chang, *Thread of the Silkworm,* 38.
[30] Lu Chengdong 吕成冬, "Tsinghua dang'an li de Qian Xuesen" 清华档案里的钱学森, *Dang'an chunqiu* 3 (2019): 22-23.
[31] Qian Xuesen, "Huigu yu zhanwang," *Shanghai Jiaotong daxue tangxun* (January, 1992), 4.
[32] Glen Peterson, *Overseas Chinese in the People's Republic of China* (New York: Routledge, 2012), 105. And Chengdong 吕成冬, "Tsinghua dang'an li de Qian Xuesen" 清华档案里的钱学森, 22-23.
[33] Qian Xuesen, "Study of the turbulent boundary layer," Massachusetts Institute of Technology, Department of Aeronautical Engineering, 1936.
[34] Kármán, *The Wind and Beyond*, 309.
[35] Chang, *Thread of the Silkworm,* 64-65.

journal of the field, the *Journal of the Aeronautical Sciences*.[36] From his first paper in 1938 until his departure from the United States in 1955, Qian published more than fifty articles in leading scientific journals, both individually and with collaborators.[37] In a letter to the president of Jiaotong University, his alma mater back in China, Qian stated with a palpable sense of accomplishment that he "started to have considerable confidence in conducting independent research" (始觉对独立研究有相当把握).[38] Over the next decade, as Qian's accomplishments in the U.S. grew, he had to apply to extend his scholarship from the Chinese government three times. Each extension was approved by administrators and advisors who maintained close contact with Qian throughout his years in America.[39] Though Qian's life abroad was beginning to seem permanent, the Chinese state and scientific community continued to monitor Qian as an important intellectual of immense value.

At Caltech, Qian soon began work on rocketry, joining a small group of other GALCIT graduate students by lending his mathematical and theoretical skills to their rocket experiments.[40] Soon, the group's work earned them publicity around campus and in the scientific community.[41] In June of 1939, Qian received his Ph.D., and began officially working as a research fellow for the aeronautics team at Caltech. As the United States became increasingly anxious about war, the rocket group's initially underfunded work became the object of U.S. state interest and funds.[42] Within a year, his government scholarship from China expired, but he successfully applied to extend it to stay in the U.S. for a few more years.[43] When Japanese forces bombed Pearl Harbor in

[36] Qian Xuesen, *Collected Works of H. S. Tsien (1938-1956)* (Shanghai: Jiao Tong University Press, 2012), 1.
[37] Qian Xuesen, *Collected Works of H. S. Tsien (1938-1956)*.
[38] Qian's letter to Mei, June 7, 1938, cited in Lu Chengdong, "Tsinghua dang'an zhong de Qian Xuesen," 24.
[39] Lu Chengdong 吕成冬, "Tsinghua dang'an li de Qian Xuesen" 清华档案里的钱学森, *Dang'an chunqiu* 3 (2019): 22-23.
[40] Chang, *Thread of the Silkworm,* 73.
[41] Marvin J. Wolfe, "From Rocketeers to Solar Sailors." *Los Angeles Times*, November 14, 1999.
[42] Wolfe, "From Rocketeers to Solar Sailors," *Los Angeles Times*.
[43] Chang, *Thread of the Silkworm,* 88-89.

December of 1941, the U.S. instantly revitalized the rocket project and Qian was given security clearance to work on projects with the U.S. military.[44] The rocket group became the Jet Propulsion Laboratory (JPL) and the government awarded JPL three million dollars to develop long-range rocket missiles.[45] Qian's expertise in rocketry became an increasingly useful asset for the U.S. government in its quest for innovative and superior defense technology.

In 1944, Qian's advisor Kármán left Caltech to become a consultant for the Army Air Force in Washington, D.C., bringing Qian with him to work as part of the Scientific Advisory Group.[46] Kármán and Qian worked as scientific consultants and researchers for the Air Force, gathering information to prepare for the next generation of military aircraft.[47] Their work also took them to Europe on a classified tour of German research facilities, where they met with the world's top rocket scientists who were working on wartime aeronautical projects.[48] Upon completion of the research project with the Air Force, Qian returned to Caltech to continue research and teaching. He was granted tenure and promoted to associate professor, and he continued to publish new work on jet propulsion.[49] In 1946, the *Journal of Aeronautical Sciences* published his paper "Superaerodynamics, Mechanics of Rarefied Gases," regarded as his most famous work in the U.S.[50] This paper sealed Qian's status as a leader and expert in the field of theoretical aerodynamics. In the midst of this success, Qian returned to MIT for an associate professorship, and he later received tenure in 1947.[51] That year, he also applied for and received permanent residency status in the United States.[52]

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[44] Chang, *Thread of the Silkworm,* 92.
[45] Chang, *Thread of the Silkworm,* 105.
[46] Kármán, *The Wind and Beyond*, 309.
[47] Chang, *Thread of the Silkworm,* 109.
[48] Kármán, *The Wind and Beyond*, 309-310.
[49] Chang, *Thread of the Silkworm,* 117.
[50] Qian Xuesen, *Collected Works of H. S. Tsien (1938-1956)*.
[51] Kármán, *The Wind and Beyond*, 310.
[52] "Caltech Scientist Accused as Red." *Los Angeles Times*, November 16, 1950.

While China was nearing the end of a civil war, Qian's life in the United States was beginning to become permanent. As he and his wife settled into family life with their newborn son, Qian applied for U.S. citizenship in 1949.[53] In the same year, Caltech offered him a job as the director of the Guggenheim Jet Propulsion Center.[54] Had Qian's life continued on this trajectory, he might have been heralded as a classic American immigrant success story. But unfortunately, Qian became embroiled in a political struggle that implicated him in the United States' broader geopolitical conflicts. In 1950, the stability of Qian's life was permanently disrupted when the Federal Bureau of Investigation (FBI) interrogated him for possible association with the Communist Party. Based on scanty evidence, the FBI had linked Qian to Sidney Weinbaum, a colleague from his graduate school days who had been found to be a Communist.[55] Distrustful of the foreign scientist, the U.S. government revoked Qian's security clearance, rendering him unable to work on most of his research projects at JPL.

Left with no viable alternatives, Qian began arranging his return to China, while the Caltech administration worked to amend the situation and convince him to stay.[56] Once U.S. government officials learned of his plans to return to China, they also worked to have him stay, deeming his scientific expertise too critical to lose to a competitor country.[57] Qian had already packed his belongings and was at the airport when he was stopped by an immigration agent and had his luggage seized and searched.[58] On September 7, 1950, Qian was arrested at his home on a deportation warrant under accusation of Communist Party membership.[59]

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[53] Chang, *Thread of the Silkworm,* 143.
[54] Kármán, *The Wind and Beyond*, 310.
[55] Kármán, *The Wind and Beyond*, 310.
[56] Kármán, *The Wind and Beyond*, 312.
[57] Chang, *Thread of the Silkworm,* 155.
[58] "Inspection to Begin on Seized Cases." *Los Angeles Times*, August 26, 1950.
[59] "Caltech Expert Held on U.S. Court." *Los Angeles Times*, September 8, 1950.

Qian stayed at an immigration detention facility for two weeks, while Caltech officials worked with lawyers and helped to secure his release from prison.[60] Nevertheless, after some deliberation, the U.S. government decided to pursue Qian's deportation. In an unusual manner, the tables had turned. While the government had initially stopped Qian's attempt to return to China, now Qian had to fight the government to let him stay.[61] The deportation hearings lacked clear evidence, and Qian repeatedly maintained that he was never a member of the Communist Party.[62] After almost half a year of hearings, the government decided in April of 1951 that Qian was indeed a member of the Communist Party, and thus was to be deported.[63] For the next few years, Qian lived under house arrest, and was continuously monitored by government authorities. His political nightmare concluded only after formal diplomatic negotiations between China and the United States. In 1955, an agreement allowed citizens from both countries to repatriate. Qian officially left the U.S. on September 17, 1955, traveling with his family by boat with other Chinese scholars and families who were all returning to their home country to contribute to the state's modernization efforts.[64] As part of the influx of skilled scientists returning to China, Qian's high level of expertise on rockets and his work on missile projects for the U.S. government singled him out as a particularly important and knowledgeable scientific figure for the state's defense projects.

Finally, the investment the Chinese state had put into this scientist would pay off. Two decades earlier, the Republic of China had sponsored Qian's initial journey abroad, under the assumption that he would return promptly with expertise in aeronautics to help build China's fledgling aviation industry. In the twenty years Qian had spent in the U.S., the Chinese Civil War

[60] "Deportation Fight Lost by Caltech Expert." *Los Angeles Times*, December 3, 1952.
[61] "Key Chinese Scientist." *New York Times*, October 28, 1966.
[62] "Deportation Fight Lost by Caltech Expert." *Los Angeles Times*, December 3, 1952.
[63] "Scientist Ordered Deported to China." *New York Times*, September 13, 1955.
[64] "Jet Propulsion Scientist Sailing to Red China: Dr. Hsue-Shen Tsien Ends Long, Honorable Career here to Help People of Own Nation." *Los Angeles Times*, September 18, 1955.

had consumed China, and Qian now returned to the newly established People's Republic of China under the leadership of the CCP. The patronage of the Chinese state and intellectual network was materializing, though under new state leadership. Qian would quickly rise to prominence and become the state's model scientist, representing the ideal balance of scientific expertise and political aptitude that would be necessary under the rule of the CCP.

"New China:" Creating a Centralized Scientific Authority

While Qian had been studying and working in the U.S., science as an institution underwent significant change in the People's Republic of China. The poorly funded and heavily understaffed research institutions that characterized Qian's early experiences were now the subject of centralized state funding and organization. Simultaneous to the CCP's decision to develop nuclear weapons based on growing threats to national security, the state launched a large-scale national project to bring the country's overall scientific and technical innovation up to international levels. From 1956 to 1966, immediately following the formal decision to begin work on nuclear weapons, Marshall Nie Rongzhen was assigned to direct the CCP's national scientific and technological development project.[65] As one of the most prominent Chinese military leaders of the time, Marshall Nie's close familiarity with the nation's military and executive branches, as well as his personal interest in science, gave him authority to make significant changes and improvements. In his memoir, Marshall Nie explains his motivations for leading the project, both on a personal and national level, remembering, "I had loved science and technology since my youth and wished to use them to transform the poor and backward conditions of China."[66] Marshall Nie saw China's

[65] Nie Rongzhen, *Inside the Red Star* (Beijing: New World Press, 1988), 659.
[66] Rongzhen, *Inside the Red Star*, 660.

future entry into the "atomic and jet age" as proof that the nation had reached modernity.[67] The belief that modernity could be measured in scientific achievement gave Chinese leadership specific targets to work towards. Closely tied to national pride and identity, the CCP viewed scientific development as central to the nation's continued prosperity, both on a domestic and international level. This conflation of science and modernity spurred rigorous institutional change, and gave rise to scientists as central figures in the state's quest for modernity.

As the leader of the newly established Scientific Planning Committee, Marshall Nie developed a twelve-year program that outlined specific goals and steps needed to achieve the state's scientific and technological priorities. In his memoir, Marshall Nie asserted that "the crux of the national long-range science program was how to chart a course that would enable the country to catch up with advanced international levels in science and technology more rapidly."[68] This involved a significant amount of work on improving the foundations of scientific development, namely expanding the number of research institutions to prepare a critical mass of skilled researchers.[69] To create an environment conducive to developing scientific expertise, the state focused resources on institutions and labor. When the twelve-year program began in 1956, the state had only 380 research institutes, whereas by 1962, the state counted well over 1,300 specialized research institutions. The number of scientific researchers employed in these institutions likewise increased dramatically in just a matter of years.[70]

Speaking specifically in terms of institutions, a centralized hierarchy of authority ensured efficiency and coordination among China's various research systems. The State Science and Technology Commission, the Science and Technology Commission for National Defense, and the

[67] Rongzhen, *Inside the Red Star*, 661.
[68] Rongzhen, *Inside the Red Star*, 668.
[69] Rongzhen, *Inside the Red Star*, 663.
[70] Rongzhen, *Inside the Red Star*, 680.

Chinese Academy of Sciences became the three designated leading organizations, representing distinct branches of civilian, military and intellectual streams of expertise. These three organizations formed the central government system for science and "had control of all work in this field, from formulating programs and plans, submitting them to higher authorities for approval, supervising their implementation, endorsing research projects, to the management and distribution of research personnel, funds and materials."[71] Scientific research in universities, industrial departments, designated commissions (like the Atomic Energy Commission), and in defense technology were all under the governing authority of this triad.

In short, scientific research across China was directed and overseen by this highly centralized, target-based system. While the system "promoted an effective synergism among leadership, organization and technology"[72] to achieve specific state goals such as the creation and detonation of the atomic bomb, many scientists were displeased with the rigidity of the system, and especially with the pre-set priorities and timelines.[73] This issue will be revisited in Chapter 2 when I discuss the relationship between scientists and the state. Now with a centralized system and labor force, the CCP was ready to embark on an ambitious undertaking: to build the nation's first nuclear weapons.

The Nuclear Weapons Project

In the global context of nuclear proliferation during the Cold War, security concerns drove Chinese state leaders to consider developing their own nuclear weapons program. John Lewis and Xue Litai detail how, after the end of the Korean War in 1953, the United States and its nuclear

[71] Rongzhen, *Inside the Red Star*, 679.
[72] Lewis and Litai, *China Builds the Bomb*, 220.
[73] Rongzhen, *Inside the Red Star*, 670.

arsenal became increasingly threatening to China's security.[74] China paid close attention to America's new defense policy, which increasingly emphasized the primacy of atomic power under President Eisenhower.[75] In a book on Cold War competition between the United States and the Soviet Union, Audra Wolfe details how, in the aftermath of WWII, America significantly increased defense-oriented funding at universities, think tanks, and industrial and military labs to swiftly build a defense program centered around the atomic bomb "as a symbol of destruction."[76] The Taiwan Strait crisis, an armed conflict between China and Taiwan over two islands in the South China Sea, further escalated tensions between China and the United States. The United States supported Taiwan in the conflict through military action and engaged in minor direct combat, demonstrating a willingness to risk war with China.[77] In this increasingly hostile geopolitical climate, Chinese leaders ultimately decided to develop their own nuclear weapons as a protective measure against the growing threat of possible nuclear attack by the United States.[78]

On January 31, 1955, Chinese Communist Party (CCP) leadership officially announced to China's State Council its intention to develop its first nuclear weapons. At the announcement, Premier Zhou Enlai spoke to members of his government with an awareness of the gravity of the decision, stating, "This is a new issue for China. We are now in the atomic age. We have to understand atomic energy whether used for peace or for war" (对中国来说，这是个新问题。现在是原子时代，原子能不论用于和平或者用于战争，都必须懂得才行).[79] With this decision, the Chinese state began years of serious planning and development that involved tremendous

[74] Lewis and Litai, *China Builds the Bomb*, 10.
[75] Lewis and Litai, *China Builds the Bomb*, 17.
[76] Audra J. Wolfe, *Competing With the Soviets* (Baltimore: The Johns Hopkins University Press, 2013), 21- 23.
[77] Lewis and Litai, *China Builds the Bomb*, 25.
[78] Lewis and Litai, *China Builds the Bomb*, 34.
[79] "Address by Zhou Enlai at the Plenary Session of the Fourth Meeting of the State Council (Excerpt)," January 31, 1955, History and Public Policy Program Digital Archive, Dang de wenxian (Party Historical Documents), no. 3 (1994): 16-19. Translated by Neil Silver. https://digitalarchive.wilsoncenter.org/document/114333.

resources, labor, and organization to build a nuclear weapons program from scratch. Simultaneously, the country embarked on a series of social and political reforms instituted by CCP Chairman Mao Zedong. In a remarkable feat, China announced its entrance into the global nuclear age with the successful testing of its first atomic bomb in October of 1964.[80] In less than a decade, Chinese state leaders were able to organize the state's civilian and military expertise to develop a military industrial system to support the new nuclear and missile programs.[81] Situated at the intersection of science and politics, the nuclear weapons project represented a pivotal moment that established the fundamental importance of scientific expertise to the CCP's political agenda. Now as central players in the state's political goals, the scientific community became the recipient of an influx of state resources and attention from political leadership.

The CCP was aware that the technical and organizational requirements of the nuclear weapons program would require a highly skilled labor force of scientists and technicians. In Premier Zhou Enlai's 1955 announcement to begin the nuclear weapons program, he specifically emphasized the educational aspect of the project that involved informing the masses on the peaceful uses of atomic energy and identifying and training the next generation of scientific leaders. Particularly interesting are his remarks that "in the past students assigned to study physics were of neither good scientific or political quality" (过去给的学生不懂科学质量不好，政治质量也不好).[82] Acknowledging the confidential and potentially controversial nature of the nuclear weapons project, Zhou's statement shows the CCP's understanding that the work of scientists would not only be technical, but also inherently political, and thus it was in their best interest to

[80] "Statement of the Government of the People's Republic of China," October 16, 1964, History and Public Policy Program Digital Archive, PRC FMA 105-01262-01, 22-26. Obtained by Nicola Leveringhaus. https://digitalarchive.wilsoncenter.org/document/134359.
[81] Lewis and Xue, *China Builds the Bomb*.
[82] "Address by Zhou Enlai at the Plenary Session of the Fourth Meeting of the State Council (Excerpt)," History and Public Policy Program Digital Archive.

be strategic about the scientists they choose. To recruit the most talented and politically loyal scientists, the state spent significant effort expanding and improving university programs in science, math, and engineering to recruit and train a new generation of skilled laborers.[83] They also invested much effort into persuading scientists working and studying abroad to return to China.[84]

As with any country's nuclear weapons development, though China claimed its eventual successes as its own, in reality the highly secretive work of producing atomic weapons and ballistic missiles relied upon shared resources and expertise within the international scientific community. From 1956-1960, China worked in close collaboration with officials and experts from the Soviet Union to replicate how the Soviets centralized research, labor, and resources into a productive military-industrial network. In the first few years of the project before Sino-Soviet political tensions brought the collaboration to an end,[85] the Soviet Union provided the Chinese program with valuable equipment, raw materials, and blueprints. The Soviet Union also sent specialists and advisors to China to develop and construct an entirely new atomic energy industry.[86] To build a self-sufficient industry, the Soviet Union trained and guided Chinese experts to develop and expand its uranium mining and processing capabilities,[87] an integral step in the quest for an atomic bomb.[88]

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[83] "Address by Zhou Enlai at the Plenary Session of the Fourth Meeting of the State Council (Excerpt)," History and Public Policy Program Digital Archive.
[84] Rongzhen, *Inside the Red Star*, 688.
[85] Lewis and Xue, *China Builds the Bomb*, 72.
[86] "Request by the Chinese leadership to the Soviet Leadership for Help in Establishing a Chinese Nuclear Program," January 15, 1956, History and Public Policy Program Digital Archive, TsKhSD (Center for the Storage of Contemporary Documentation), f.5, op.30, d.164, ll. 7a, 48-9. Obtained by Tatiana Zazerskaia and translated by David Wolff. https://digitalarchive.wilsoncenter.org/document/110398.
[87] "Chinese Communist Party Central Committee Circular concerning the Transfer of Cadres and Workers to Participate in Atomic Energy Development Work (Excerpt)," April 23, 1956, History and Public Policy Program Digital Archive, Dang de wenxian (Party Historical Documents), no. 3 (1994): 20-21. Translated by Neil Silver. https://digitalarchive.wilsoncenter.org/document/114335.
[88] Lewis and Xue, *China Builds the Bomb*, 73.

Beyond the establishment of an atomic energy industry, the nuclear weapons project also required a reorganization of the nation's military and defense bureaucracy. In 1956, Marshall Nie Rongzhen's scientific planning committee directed the division of China's military industry and bureaucracy into multiple machine-building ministries, each charged with developing specialized components of nuclear weapons.[89] These ministries oversaw a combination of civilian and military programs but were all under the direction of the Ministry of National Defense.[90] The design and creation of the atomic bomb was led by the Second Ministry of Machine Building, while the nuclear industry was overseen by the Third Ministry.[91] Meanwhile, the Fifth Academy, which later in 1965 became the Seventh Ministry of Machine Building, oversaw the development of missiles and rockets to transport and launch the nuclear warheads.

As a scientist deemed to have the proper balance of political and scientific judgement, Qian Xuesen was heavily involved in the nuclear weapons and missile program immediately upon his return to China. In the early years of the project, Qian was highly involved in meetings and negotiations with Soviet officials, particularly educating and training a new generation of Chinese experts to work in the new industry. Qian's scientific experience allowed him into the high ranks of the CCP, where he successfully advocated for the development of China's aeronautical industry.[92] As the most respected aerospace scientist of the time, Qian became the first director of the newly established Fifth Academy, which specialized in his area of expertise - missiles and rockets.[93] First using existing Soviet models of short-range missiles, Qian directed engineers to copy successfully copy the models. Once this was achieved, Qian oversaw new work towards the

[89] Lewis and Xue, *China Builds the Bomb,* 48
[90] Lewis and Xue, *China Builds the Bomb,* 48.
[91] Lewis and Xue, *China Builds the Bomb,* 48.
[92] Rongzhen, *Inside the Red Star*, 677.
[93] Rongzhen, *Inside the Red Star*, 677.

development of medium and longer-range missiles, which Chinese scientists and technicians developed independently. While the Fifth Academy was occupied with developing missiles, Chinese nuclear physicists built and tested the state's first atomic bomb in 1964. After this initial success, the defense weapons program continued as a state priority. The next phase was to combine nuclear and thermonuclear bombs with the ballistic missiles engineered under Qian's direction, which produced China's first launchable nuclear weapons.[94]

Conclusion

The expansion of Qian Xuesen's persona from devoted aeronautical scientist to patriotic state idol and symbol of Chinese nationalism reflects the highly political contexts of his experiences. The historical narrative also highlights the recurring theme of Qian's scientific expertise as central to the state's political goals, beginning with his scholarship to study at MIT and continuing throughout his return to China and work on the nuclear weapons program. Throughout his lifetime, an association with science always brought deeply political consequences. On the eve of McCarthyism in the U.S., Qian's scientific expertise secured him prestigious positions and success, but it also eventually led to his humiliating demise. Qian returned to China and remade his life, presumably extremely conscious of the importance of political patriotism. Deemed as a national hero by the CCP, Qian maintained close connections with political leaders in China and remained in the state's favor through generations of leadership change. In return for his enduring loyalty, the CCP promoted Qian as a scientific hero, as a symbol of nationalism and progress, and as an example for all scientists, intellectuals, and citizens to emulate. As the CCP's ultimate example of an outspoken political supporter and respected scientific expert, Qian became

[94] Lewis and Litai, *China Builds the Bomb*, 244-245.

a key ally in the state's undertaking to define a new relationship with the scientific and intellectual community. It is with this legacy that Qian passed away in October 2009.[95]

[95] Michael Wines, "Qian Xuesen, Father of China's Space Program, Dies at 98." *New York Times*, November 3, 2009.

Chapter 2

Scientists Under Mao: A New Type of Intellectual in the Making

When Qian Xuesen returned to China in 1955, the country was in the midst of its grand socialist project. Under the leadership of Mao Zedong (1893-1976), China would experience a series of social and economic reforms that would cause great upheavals to society. During the Mao era, intellectuals as a group suffered through a chaotic relationship with the state. But despite the relentless persecution of intellectuals, some like Qian were able to wield considerable political authority and negotiate civic roles and responsibilities. During this period, Chinese scientists emerged as a new and unique subcategory of intellectuals with an extended responsibility to participate in politics and engage in policy-making. Scientists were expected to perform their research to further state development projects, but also actively draw on their specialized knowledge to legitimize and propagandize state policy through the lens of science. This double duty that demanded active engagement of policy in the public realm distinguished the role of scientists from other intellectuals. The molding of this new scientist-intellectual identity developed while Mao transitioned from a stance of appeasing intellectuals to active oppression. In this context, Qian stood out as a compelling prototype of the new scientist-intellectual identity. Qian's work as a leading expert in the nuclear weapons project embodied the state's prioritization of national scientific development. He became a loyal spokesperson for the CCP and actively exploited his credibility as a scientist to support and legitimize Mao's policies. In addition to modeling the new scientist-intellectual identity, Qian also used his status as a leading scientist to promote this new role and rally the scientific community behind the state.

Status and Visibility in the Public Sphere

From the very beginning of his ascent to scientific leadership, Qian's status as a scientist was inextricably tied to his obligation to participate in politics. Having been identified as a young scholar in his undergraduate days, the state - back then the Republic of China (1912-1942) - had invested significant resources in the form of financial scholarships to cultivate Qian's expertise abroad. His long-awaited return to the new People's Republic of China materialized a highly anticipated collaboration between a talented scientist and a state in pursuit of modernization. Qian's scientific expertise in aerospace and engineering, as well as his general reputation as a respected physicist in the U.S., was identified and publicized by the Chinese state even before his return to China. Beginning in 1950, *Renmin Ribao* (人民日报), the CCP-run official state newspaper, began regularly detailing the arrest and then trial of Qian at the hands of the United States government.[96] At a time of increasing political tension between the United States and China, cases of American-educated Chinese scientists detained by the U.S. government were common, but Qian's story was unique in the level of attention it attracted from both governments involved.[97] From the perspective of the Chinese media, Qian was an unfortunate, hard-working scientist whose work and identity had been wrongly scrutinized by the hostile U.S. government. Chinese journalists thoroughly described the humiliating treatment he was forced to endure, and recounted the Chinese government's to facilitate Qian's return.[98] Clearly, Qian was no ordinary Chinese professional who had fallen victim to xenophobic behavior from the U.S. government. The Chinese state understood what was at stake, and successfully negotiated Qian's return to China,

[96] "美帝非法拘捕我科学家钱学森等," *Renmin Ribao*, September 26, 1950.
[97] Zuoyue Wang, "Transnational Science during the Cold War: The Case of Chinese/American Scientists." *Isis* 101, no. 2 (2010): 370.
[98] "热爱祖国的科学家钱学森," *Renmin Ribao*, November 3, 1955.

knowing that the knowledge and expertise he would bring would be fully advantageous to the state's evolving socialist project.

When Qian was finally able to return to China after intense international negotiations, state media coverage made clear that this was a victory not just for the country's pride, but also for the Chinese scientific community. Newspapers described Qian as a "famous scientist" (著名科学家钱学森) who had just returned from the United States, and listed the "vice president of the Chinese Academy of Sciences and more than twenty famous scientists" as personnel who had been sent by the state to greet Qian upon arrival(中国科学院副院长吴有训和首都著名科学家华罗庚, 周培源, 钱伟长, 赵忠尧等二十多人曾到车站欢迎).[99] Having hand-selected a prestigious delegation to ceremoniously welcome Qian back to China, the state seamlessly secured Qian's status as a scientific expert and respected public intellectual. The gathering of top scientists also implies the CCP's expectation that Qian would become not just an integrated member, but a leader of the scientific community. Having recognized and celebrated the repatriation of this "famous scientist," the CCP secured Qian's new status, placing him at the top positions of power within the state's scientific research institutions.[100]

Media coverage on Qian also emphasized his patriotism and devotion to helping the Chinese state achieve scientific progress. Although Qian granted very few interviews to the press over his lifetime, he sat for one interview with a reporter from *Renmin Ribao*, who published an article one month after his return to China. As the article's title "The Scientist Who Loves His Motherland" (热爱祖国的科学家钱学森) suggests, the piece profiled Qian as a patriotic scientist,

[99] "钱学森到达北京," *Renmin Ribao*, October 30, 1955.
[100] "热爱祖国的科学家钱学森," *Renmin Ribao*, November 3, 1955.

keen to use his expertise to contribute to China's scientific development.[101] Before his work had even begun, the state connected his personal story to larger themes of national pride. The article expresses that Qian was "proud to be able to serve his country" (能为祖国服务他感到光荣和骄傲) and had "already accepted an offer from the Chinese Academy of Sciences to lead research on mechanics" (现在他已经接受了中国科学院的聘请, 准备主持和领导中国科学院力学方面的研究工作).[102] Having secured Qian as a symbolic representation of Chinese scientific excellence, both current and future, Qian's relationship to the state seemed poised to offer a great deal of productivity and achievement.

For his part, Qian seemed to fully embrace the status the state had given him as a public scientific expert. A month after his return, a newspaper article quoted his observation that "the Chinese Communist Party and the people's government respect and pay attention to scientists and scientific development"(使他感到了中国共产党和人民政府对科学事业和科学家的关怀和重视).[103] Qian's endorsement reflects the CCP's efforts to establish a closer relationship with scientists, who in their view held the ability and responsibility of helping to advance Chinese science and technology to new levels. These observations also foreshadow Qian's evolution into a mouthpiece for the CCP as he began to model and promote a new scientist-intellectual identity. Given his experience of persecution by the U.S. government, Qian might have been particularly drawn to the idea of a mutually beneficial and cooperative relationship between scientists and the state. Whatever his motivations were, this insight frames the beginning of a new formulation of the roles and responsibilities of scientists in modern China. As an accomplished scientist, Qian wished for the CCP to value his specialized expertise. Simultaneously, the CCP was looking to form a

[101] "热爱祖国的科学家钱学森," *Renmin Ribao*, November 3, 1955.
[102] "热爱祖国的科学家钱学森," *Renmin Ribao*, November 3, 1955.
[103] "热爱祖国的科学家钱学森," *Renmin Ribao*, November 3, 1955.

consistent and nationalized vision for scientific and socio-political development through control of scientists and their public roles. These two desires merged in the state's promotion of the new scientist-intellectual role, perpetuated through the example and leadership of Qian.

Critiques of the State from Scientists and Intellectuals

In 1956, Mao made an unprecedented move to encourage a spirit of openness, motivated by the need to de-Stalinize in response to increasing criticisms of the socialist bloc.[104] In what became known as the Hundred Flowers Campaign, the CCP expressed receptiveness to critical feedback from the public on how policies were working and could be improved. The resulting "crescendo of complaint that seemed to repudiate the party's ideology and dictatorial style of rule" led to organized retaliation from the CCP, effectively ending the brief period of tolerance.[105] A few months after asking for criticism, Mao launched the Anti-Rightist Campaign to systematically target all intellectual critics as enemies of the state. With punishment including public denunciation, formed labor on collective farms, imprisonment, and even execution, the CCP's actions were effective at terminating open intellectual dissent.[106] Timothy Cheek describes intellectuals as "completely beholden to the party-state" by the mid-1950s.[107]

During the Hundred Flowers Campaign, many scientists stood out as active critics of the CCP's policies, expressing dissatisfaction with the state's control over the nation's scientific development and research institutions. The state's science development plans had significantly increased funding to scientific research, but it also expanded the CCP's authority to plan and

[104] Andrew G. Walder, *China Under Mao* (Cambridge: Harvard University Press, 2015), 133-135.
[105] Walder, *China Under Mao*, 9.
[106] Walder, *China Under Mao*, 9-10.
[107] Cheek, *The Intellectual in Modern Chinese History*, 165.

oversee scientists in their work. In the face of increasing political oversight, many members of the scientific community stood out as forceful critics.

An example of one of these critiques comes from Qian Sanqiang, a fellow nuclear physicist (unrelated to Qian Xuesen) who was a similarly accomplished and respected trailblazer in the scientific community. Having studied and worked abroad in France under the Joliot-Curies, Qian Sanqiang had returned to China with specialized expertise in nuclear fission, an instrumental process in developing nuclear weapons.[108] Qian Sanqiang had been part of the influx of Chinese intellectuals who had returned to the country en masse in the 1940s and 50s after the establishment of the People's Republic of China to contribute to the rejuvenated state building project.[109]

In terms of being a representative of the scientific community, Qian Sanqiang held almost equal authority to Qian Xuesen, and his expertise in the early phases of exploratory research to inform and persuade the CCP to begin the nuclear weapons program proved his legitimacy as an authoritative voice within the scientific community.[110] Qian Sanqiang, who at the time was helping to lead the design of the nation's first atomic bomb, recommended that the CCP allow scientists to lead their own scientific projects and initiatives, instead of having political leaders make all of the important decisions in terms of planning and funding. Drawing on the examples of the French and Soviet systems, Qian Sanqiang made the following proposal:

> [The CCP should] fully trust intellectuals and give them positions and authority, so business and administrative work can be carried out by the scientists themselves, while the party can focus on ideological education to facilitate

[108] Wang Chunjiang 王春江, *The Light of Fission* (*Liebian zhi guang* 裂变之光) (Beijing: Zhongguo qingnian chubanshe, 1990).
[109] Wang, "Transnational Science during the Cold War," 373.
[110] Lewis and Xue, *China Builds the* Bomb, 36.

> scientists with their work. "充分信任知识分子，让他们有职有权，业务和行政工作可以由科学家自己来负责，党的工作可以抓思想教育，协助科学家搞好工作."[111]

Qian Sanqiang's diplomatic suggestion represented the view of many scientists and intellectuals who were dissatisfied with the overbearing governing authority of the state. Instead, they advocated for a working relationship that allowed scientists and intellectuals more freedom and kept the CCP's authority at a distance.

Despite the participation of his colleagues in the Hundred Flowers Campaign, Qian Xuesen refrained from criticizing the CCP's policies. Instead of using his platform as a leader of the scientific community to champion the rights of scientists to have authority over their own work, Qian legitimized the state's authority over science and scientists. A newspaper article from 1957 quotes Qian's words:

> As mechanical researchers in a less developed country, we must pay attention to the needs of our developing country's national economy and national defense system. "作为一个正在赶上世界水平的后进国家的力学研究工作者，也必须注意结合我国目前国民经济和国防建设的发展需要."[112]

Qian reasons that research should address the needs of the economy and defense system, which on the surface did not directly connect to his area of expertise as a physicist and aerospace engineer. He goes on to say:

> We must also pay attention to the needs of the further development of the discipline of mechanics in all aspects, in order to be able to adapt to the future development requirements of national defense and national economic development. "我们也要注意力学这门学科本身

[111] Wang, *The Light of Fission*.
[112] "钱学森谈参加力学学术报告会的感想，" *Renmin Ribao,* February 10, 1957.

各方面进一步发展的需要，以便能适应将来国防建设和国民经济日新月异的发展对力学所提出的要求."[113]

Speaking as a leader of the nation's scientific institutions, and in the face of calls from his colleagues that the CCP withdraw some of its authority in research, Qian attempts to strike a conciliatory tone to make the case as to why state interference in science is necessary. His reasoning seems to suggest that national needs, or specifically the political development goals of the CCP, should guide the research performed by mechanics and scientists. This understanding would integrate the needs of the state into the process of scientific development, closely aligning the work of scientists with the political ambitions of the CCP. Though Qian had yet to differentiate scientists as a group with separate privileges and responsibilities from the larger category of Chinese intellectuals, already Qian had begun to act as an intermediary voice to align the scientific community with the CCP's political agenda.

Beginnings of the Scientist-Intellectual

The characteristics of the emerging scientist-intellectual identity as unique from the rest of the intellectual class became most visible in the late 1950s, when Mao's policies took an ill turn. After the outpouring of criticism from the Hundred Flowers Movement, Mao and the CCP felt their authority was threatened. Mao quickly launched the Anti-Rightist Movement in the second half of 1957 to oppress those who had spoken out against the CCP. This began a decade of suffering for intellectuals, as the purification campaign "not only silenced independent critics but

[113] "钱学森谈参加力学学术报告会的感想，" *Renmin Ribao*, February 10, 1957.

terrorized professionals who saw the potential dangers of contradicting their local Party leaders."[114]

As the Anti-Rightist Campaign began in full force in the latter half of 1957, Qian's previously mild views in state media were replaced with staunch defense of the CCP's policies. Not only did he maintain his loyalty to the CCP, Qian actively denounced his colleagues from the scientific community who sought to preserve their scientific autonomy. A *Renmin Ribao* article titled "We Must Resolutely Safeguard the Party's Leadership Over Scientific Work" ("坚决维护党对科学工作的领导权") from July 1957 details the public condemnation of two "reactionary" scientists who were both colleagues of Qian.[115] At the public condemnation, Qian and other prominent colleagues criticized the two scientists for seeking to take personal control of scientific research. They were accused of conspiring and advocating for greater rights over scientific research in the interest of pursuing their own goals, and attempting to erode the CCP science-socialist line.[116] As before, Qian cited the developmental needs of the nation as evidence that science had to be carried out with government leadership. He declared, "Scientific research must be carried out with a plan. It is impossible to achieve modern scientific development without proper planning" ("科学研究必须要有计划地进行。如果说不要计划能进行现代科学研究，那完全是不可能的").[117] Qian mentions "planning" as a direct reference to the role the CCP intended to continue playing as the "planners" of science. From the state's (and Qian's) perspective, scientists were not capable of and should not be given the responsibility of integrating their work and research with state modernization goals. Instead, the state maintained absolute authority over planning, meaning

[114] Cheek, *The Intellectual in Modern Chinese History,* 169.
[115] "坚决维护党对科学工作的领导权," *Renmin Ribao*, July 17, 1957.
[116] "坚决维护党对科学工作的领导权," *Renmin Ribao,* July 17, 1957.
[117] "坚决维护党对科学工作的领导权," *Renmin Ribao,* July 17, 1957.

decisions to fund, organize, and prioritize areas of scientific development were at the discretion of the nation's political leaders, not the scientific experts.

As a nationally respected scientist who held top leadership positions within China's scientific research institutions, Qian was well poised to speak directly on the authority of the CCP over science and scientists. In this capacity, Qian was able to speak in support of the CCP's tight control over scientists and scientific planning. He invokes a moral argument, calling on scientists to abandon their personal goals in order to help China reach its national developmental goals. Interestingly, Qian also conflates the so-called "personal" goals of scientists with their worries about protecting the institution of science from misguided political rule. Whether intentional or not, Qian distorts an epistemological argument over scientific authority into a moral argument. He also makes clear that the ultimate goal of scientists is to serve the state, not to serve the field of science. Acting as a biased intermediary between the CCP and the scientific community, Qian used his status as a scientific expert to legitimize the CCP's authority over science. In this way, he fulfilled the duties of an ideal scientist-intellectual.

By examining Qian's writings in state media from around the time of the Anti-Rightist Campaign, it becomes clear just how central his identity as a scientist-intellectual was in his ability to participate in political discussions in the public sphere. His frequent contributions to *Renmin Ribao* also demonstrate the state's continued interest in him as a useful public figure, at a time when most other intellectual voices were highly policed and suppressed. Once the CCP's denouncement of intellectual dissidents became widespread, Qian increased his public support of the state. A piece he published in *Renmin Ribao* called "Intellectuals Need Constant Reform" ("知识分子需要不断的改造") is his most outspoken and thorough critique of the role of intellectuals in relation to the Chinese state. In the piece, Qian uses historical and moral arguments to describe

the longstanding issues of intellectuals. He describes the historically selfish work of intellectuals in the old imperial elite as a "professional sickness" ("职业病"), writing that it will be "difficult to cure this sickness completely" ("把这病完全治好也不是容易的").[118] This historical connection makes clear that Qian wishes to break away from the problems of the past, in particular, the problems of intellectuals from humanities and social sciences fields who made up the "literati." For scientists like himself, he set out to define a completely new path that placed his duties and work in close collaboration with the state. Qian's proposed new model for intellectuals serves two purposes. First, it separates scientists from the broader group of intellectuals, specifically intellectuals engaged in humanities and social sciences fields. This way, scientists would no longer bear the historical problems of intellectuals and instead would establish a new socio-cultural category. Second, the model solidifies the importance of scientists to the state, and vice versa.

In Qian's rhetoric about separating scientists from other intellectuals, it becomes clear that due to the nature of their work and area of expertise, scientists occupied a favored status with the state, which granted more political leniency and privileges than intellectuals in humanities fields. The relatively privileged experiences of other scientists during this period help to illustrate this point. Fang Lizhi (1936-2012), a respected physicist who worked in the Chinese Academy of Sciences (under the leadership of Qian) spoke up in the Hundred Flowers Movement and subsequently was dismissed from the Communist Party.[119] However, unlike his less fortunate humanities colleagues who were sent away to labor camps, Fang continued his work in the Chinese Academy of Sciences. Like Qian and other physicists at the time, he had been working on the state's nuclear weapons project, so as punishment his security clearance for the classified portions

[118] "知识分子需要不断的改造," *Renmin Ribao*, August 19, 1957.
[119] Cheek, *The Intellectual in Modern Chinese History*, 195.

of the project were revoked. Though some scientists still experienced persecution during the Anti-Rightist Campaign, Fang's experience demonstrate the state's lenient approach towards scientists, even those who were critical.[120] This tolerance directly served the goals of the state, in its quest to develop areas in military science critical to its national security and defense interests. Thinking of scientists as a separate subgroup of intellectuals allowed scientists like Qian and Fang to maintain productivity and political importance, despite intellectual oppression elsewhere.

Integration of Science and State Power

As a respected figurehead of science, Qian's experience demonstrates how science was an integral piece of state power and development. The CCP recognized his specialized expertise in aerospace engineering and gave him authority to make administrative and research decisions for high-priority national security projects. At the Anti-Rightist Movement, Qian was involved in meetings with the highest-level politicians in the CCP as China prepared to partner with the Soviet Union to develop its nuclear missiles capabilities.[121] Though it was an unprecedented move to include a scientist, and not a career CCP politician, as the lead on these confidential political negotiations, the subject of nuclear weapons demanded expertise that only scientists like Qian could provide. Over the course of four meetings with Soviet officials in September 1957, Qian was the lead Chinese representative as both sides discussed a variety of topics including "the organization of a scientific research institute for the development of an armed rocket" and the transfer of specific models of rockets from Soviet to Chinese institutes.[122] The transcript of another

[120] Cheek, *The Intellectual in Modern Chinese History*, 196.
[121] "Report on Meetings Between Chinese and Soviet Representatives on Rocket Production," September 23, 1957, History and Public Policy Program Digital Archive, RGAE f. 8157, op. 1, 1957, d. 1991, l. 77-80. Obtained and translated for CWIHP by Austin Jersild. https://digitalarchive.wilsoncenter.org/document/116821.
[122] "Report on Meetings Between Chinese and Soviet Representatives on Rocket Production," History and Public Policy Digital Archive.

meeting had Qian listed as the "Leader of the delegation" for the Chinese representatives, and records Qian's significant contributions in the proceedings.[123] In these circumstances, when issues of science had become a critical national priority, Qian's specialized expertise was the source of immense political power.

Not only was Qian involved in vital political negotiations, he also had a clear role in directing, planning, and overseeing Chinese scientific research. In meetings with Soviet officials, he reviewed China's research institutions in detail, analyzing the organization of the institutions as well as the skill levels of researchers and how to prepare the specialists for further training.[124] Though Qian's public writings and speeches steadfastly supported the state's leadership over science and scientists, his own position as an accomplished scientist and trusted expert allowed him special access to contribute to key decisions that involved Chinese foreign relations and defense projects. Due to the confidential nature of these projects, Qian's participation remained outside of the public view and did not interfere with his loyal celebrity scientist persona portrayed by the state media. But Qian's extensive participation and leadership in building the Chinese rocket and missile program add a further layer of complexity around his identity as an authoritative scientist. Although Qian was adamant that state officials - and not scientists themselves - direct research, his own role in the nuclear bomb project was an exception to the rule. Just as the state was lenient towards scientists (even those who were critical) in order to benefit from their contributions to the state's development projects, the state showed leniency towards top scientists like Qian to allow him to make important scientific and political decisions among the highest ranks

[123] "Protocol No. 1 of the Joint Meeting of the Delegations of the Soviet Ministry of Defense Industry and Representatives of the Chinese People's Republic," September 11, 1957, History and Public Policy Program Digital Archive, RGAE f. 8157, op. 1, 1957, d. 1991, l. 100-116. Obtained and translated by Austin Jersild. https://digitalarchive.wilsoncenter.org/document/116820.
[124] "Protocol No. 1 of the Joint Meeting of the Delegations of the Soviet Ministry of Defense Industry and Representatives of the Chinese People's Republic," History and Public Policy Program Digital Archive.

of the CCP. He was afforded this leniency despite, yet also because of, his status as a trusted scientist with specialized expertise.

Not only did Qian attend these meetings and make decisions when asked, but the CCP considered him an authority worthy of suggesting areas of expansion in military defense operations. While his articles published in *Renmin Ribao* usually identified him as a researcher affiliated with the Chinese Academy of Sciences, when working behind the scenes on confidential defense projects, Qian was a highly respected political figure who directed work in science, military affairs, and occasionally even in foreign relations. In the memoir of Marshall Nie Rongzhen, the highest-ranking leader of the People's Liberation Army and leader of China's strategic weapons program,[125] the military leader remembers Qian's high level of involvement in the early establishment of the weapons development program. As he remembers, "In 1956, we first set up a Guided Missile Research Academy. Fortunately, China had a number of high-calibre scientists in this field, including Comrade Qian Xuesen [and others]...their guidance enabled it [the Research Academy] to advance without detours."[126] While it is probable that the Chinese state reached out to solicit Qian's input throughout the project, he seems to have enjoyed a level of authority based on his technical expertise from the very start, and his authority and involvement only grew as the project continued. Marshall Nie recounts, "Comrade Qian Xuesen in February 1956 wrote a 'Suggestion on the Establishment of China's Defence Aeronautical Industry,' which aroused widespread attention... it was decided that a Commission of Aeronautical Industry (CAI) be set up to supervise scientific research in guided missiles and aeronautics, and Comrades Zhou Enlai and Qian Xuesen and I were assigned to make preparations for it."[127] Qian provided guidance

[125] Lewis and Litai, *China Builds the Bomb*, 247.
[126] Nie, *Inside the Red Star*, 683.
[127] Nie, *Inside the Red Star*, 678.

to the state's new research institutions, and he also had the political influence to submit formal suggestions to the CCP, which were taken seriously and acted upon. Additionally, assigning Qian to prepare for the Commission in collaboration with Foreign Secretary Zhou Enlai and Marshall Nie Rongzhen is reflects Qian's authority within the CCP. As two of the most senior members of the CCP from both the military and civilian branches, it is clear that state leaders trusted Qian's political ability, as well as his scientific and technical training.

The Great Leap Forward: Science for Propaganda, Not Policy

Qian's embodiment of the state's ideal scientist-intellectual role was on full display when he actively created scientific propaganda to legitimize Mao's Great Leap Forward (1958-60). Immediately following the Anti-Rightist Campaign, Mao launched yet another project to revolutionize the country and propel the socialist project forward, this time through an intensive economic production drive. The CCP set implausibly high production quotas of grain and steel, turning the economic project into a "politically charged pledge campaign" to motivate and pressure local CCP officials to meet impossible production targets.[128] Ultimately, the weak economic and scientific planning of the project, along with the "cycle of bureaucratic self-deception" it generated rendered The Great Leap Forward a disaster.[129] By 1961, the campaign "contributed to at least 30 million deaths - mostly attributed to avoidable famine."[130]

The planning and failure of the Great Leap Forward reveals some of the complexities of the CCP's attitudes towards science that were integral to establishing the duties of the scientist-intellectual. While science was recognized to be essential to some aspects of the state's

[128] Walder, *China Under Mao*, 156.
[129] Walder, *China Under Mao*, 159.
[130] Cheek, *The Intellectual in Modern Chinese History*, 169.

modernization project, as evidenced by the resources invested in the nuclear weapons program, the CCP ultimately viewed science as in the service of and inferior to politics. Though scientists such as biologists or crop and agricultural specialists could have played a significant role in designing the policies of the Great Leap, Mao did not encourage or seek out specialized scientific expertise that could have mitigated the ensuing economic catastrophe. Compared to the development of the atomic bomb and ballistic missiles, which were in operation concurrently to the Great Leap, scientific expertise was neither fully consulted nor recognized as fundamental to the goals of the project. Part of the difference could be due to the sheer technological complexity of the nuclear weapons project, which the average CCP member with no background in physics or engineering would simply not understand. But the two projects also operated in distinctly different spheres of society. As defense projects require, the nuclear weapons project remained highly secretive and its existence was not revealed to the Chinese public until a decade after its beginning, when the People's Republic of China formally announced to the world and to its citizens the successful testing of the country's first atomic bomb. The Great Leap Forward, however, was a domestic economic project thoroughly propagandized by the CCP throughout the state. The CCP simply did not believe scientific expertise was necessary to launch an agricultural revolution, nor did they think scientists had the political competence to execute such a policy. As Andrew Walder writes, Mao "ultimately rejected the claim that modern science and technology and highly trained experts and professional administrators were an essential part of socialist development."[131]

However, where scientists could play a role in the Great Leap was in propagandizing and legitimizing the CCP's shoddy policies. As a figure already known to the public for his scientific expertise and leadership, Qian became the most authoritative voice from the scientific community

[131] Walder, *China Under Mao*, 338.

to support and legitimize the policies of the Great Leap in state media. His most famous and controversial piece of writing from this time period was an article that appeared in the June 1958 edition of *Kexue Dazhong* (Sciences for the Masses) magazine that attempted to explain the "scientific" reasoning of the Great Leap's production goals through charts and yield models. He reasoned, "We only need necessary water conservation, manure, and labor for the yield of the fields to rise ceaselessly."[132] Qian's article clearly exploited his credibility as a scientific expert to manipulate scientific theory to align with state policy. Essentially Qian had become a writer of state propaganda. His status as a trusted scientist allowed him to speak on behalf of science to justify and legitimize irresponsible state policy. The CCP had found a trusted ally in Qian who was ready to defend their policies at any cost.

Though Qian was successful in throwing his public support behind the CCP, his article was received incredulously by his colleagues in the scientific community. But even as they acknowledged his wrongdoing, the experiences of persecution that had repeatedly plagued the intellectual community posed an urgent reminder to keep their mouths shut. Unbeknownst to the Chinese public, members of the scientific community were alarmed but remained silent, recognizing Qian's political power even as he exploited the institution of science. Fang Lizhi, a physicist who worked on the nuclear weapons program under Qian's direction, remembers the reaction of the scientific community to Qian's article. In his memoir, he writes:

> When Qian's ridiculous article came out, Chinese physicists could see it for what it was, but no one had the freedom to say so. Not even purely scientific criticisms were possible, because this author was a favorite of Mao Zedong and this article's conclusions supported the Great Leap Forward.[133]

[132] Chang, *Thread of the Silkworm*, 240.
[133] Fang Lizhi, *The Most Wanted Man in China* (New York: Henry Holt and Company, 2016) 100-101.

Though other scientists saw through the article as Qian's attempt to give the Great Leap Forward scientific backing, nobody was in a position to respond publicly. Timothy Cheek describes that "intellectuals and scientists were not about to speak up. Nearly every professional had a colleague languishing in "reform through labor" from the Anti-Rightist Movement."[134] Thus, Qian was able to carry out his duty to promote state policy using his status as a scientific expert. Fulfilling his fundamental role as a scientist-intellectual, Qian exploited his expertise to benefit the state, in exchange for political protection and authority. Publicly, Qian bolstered the state's authority in his writings and patriotic language, while behind the scenes he worked to direct the building of the nation's nuclear weapons program. His unique ability to speak not just as an expert in physics or aeronautics, but as a representative of science, made him an influential figure in the CCP's quest for political legitimacy. As Sigrid Schmalzer describes, the politicization of science in the Mao era revealed the CCP's efforts to resolve tensions between elite, professional science and the state's promotion of revolutionary "mass science."[135] As a product of this politicization, Qian represents an attempt to match science to state policy. With science (personified by Qian) on their side, the CCP could embark on any political project without scrutiny of their planning or process.

Conclusion

The complex nature of Qian Xuesen's identity as a media sensation, respected aerospace scientist, vocal supporter of the CCP, and trusted inside organizer of the state's national defense projects allowed Qian a public platform to command respect and establish legitimacy in a variety of circles. In a political environment where the Chinese state was simultaneously trying to harness

[134] Cheek, *The Intellectual in Modern Chinese History*, 169.
[135] Sigrid Schmalzer, *Red Revolution, Green Revolution* (Chicago: University of Chicago Press, 2016), 43.

the expertise of scientists and researchers to rapidly develop its defense technology and suppress political dissent from intellectuals, Qian used his unique status to redefine the duties of scientists as intellectuals. For the scientific community, Qian served as an example of a new model of intellectualism that positioned scientists as separate from the rest of the historically elitist intellectual community. Members of the new scientist-intellectual group could expect to work productively in close partnership with the state's highly prioritized development projects so long as they understood that science should always serve politics. Scientific expertise and research would only be conducted when and where the state deemed necessary. Scientists were expected to fit their work into the state's political goals at all times, and it was not acceptable to prioritize science for the sake of science. Perhaps most importantly, the state expected scientists to use their specialized expertise and status as trusted intellectuals to legitimize the CCP's policies in the public sphere.

Qian's success in operating in this new identity might be attributed to a variety of factors. As Evan Feigenbaum points out, in the Mao era, "the only consistently stable scientific research and engineering environments in China existed in the high-priority military facilities attached to the strategic weapons programs and their research and experimentation apparatus."[136] Using this line of thinking, the unique circumstances and priorities of the CCP's development strategy allowed Qian to command authority and direct research at a time when it was otherwise forbidden. The question of the relationship between Qian's own self-presentation and the CCP's construction of his identity might also give insight into the discrepancies of Qian's unique experiences. On this topic, Ning Wang argues that "Qian was one of the scientific elites in contemporary China who was good at striking a balance between science and politics, and thereby enjoyed the advantages

[136] Evan A. Feigenbaum, "Soldiers, Weapons and Chinese Development Strategy: The Mao Era Military in China's Economic and Institutional Debate." *The China Quarterly*, no. 158 (1999): 311.

brought by this amphibious strategy."[137] Qian's unwavering loyalty to the CCP was likely a combination of authentic allegiance and self-preservation. Although Qian never reveals his true intentions, his story illustrates how, in a time of unrest and oppression, one scientist was able to succeed at a careful balancing act to serve himself, his state, and his people. While we will never be sure what Qian's motives were, his public persona reveals the state's motivations in shaping a new sociopolitical role for the scientific community. With science and politics closely intertwined, the model Qian had defined would continue to influence negotiations of power between scientists and the state.

[137] Ning Wang, "The Making of an Intellectual Hero: Chinese Narratives of Qian Xuesen," *The China Quarterly*, no. 206 (2011): 371.

Chapter 3

A Model of Consistency in Times of Transition

After the death of Mao Zedong in 1976, the next generation of CCP leadership instituted a variety of new political priorities and goals. Under the leadership of Deng Xiaoping (1904-1997), China entered into a period of transition, reconciliation, and socioeconomic reform. This included efforts to rehabilitate many intellectuals and CCP members who had been purged during the Cultural Revolution.[138] From this period on, as the Chinese state's reform efforts reinvigorated investment into scientific development, the state also defined and publicized the duties of the scientific community as a highly politicized category of intellectuals. The connection between science and modernization continued to form a primary piece of the Chinese state's authority, both domestically and internationally.

The trajectory of Qian Xuesen's public persona from the post-Mao period into the present day represents the CCP's efforts at shaping the scientific community into dutiful employees of the state whose expertise can be exploited for political gain. During China's new push toward modernization, the scientific community has continually worked to redefine themselves as a new standard of intellectuals, who recognize and harness their elevated sociopolitical status for the public good. In this way, Chinese scientists have challenged the state's legitimate authority over intellectuals and broader Chinese society. Using Qian Xuesen as a counterargument, the state has sought to establish an ideal of a patriotic model for the scientific community, whose political and social status can be used to reinforce the legitimacy of the CCP's policies and ideology. In negotiations between scientists and the state, Qian's consistent prominence as the state's point of

[138] Cheek, *The Intellectual in Modern Chinese History*, 218.

reference reveals the challenges and triumphs of the state's modernization project, as well as the role of the scientific and intellectual community in shaping the China of today.

Reform and Opportunities for Renegotiation

In the reform era, amidst growing government effort and societal pressure for socioeconomic and political change, scientists and intellectuals participated in renegotiating their political roles as knowledgeable experts in Chinese society. Once again, Chinese modernity became the focus of intellectual and state attention. A new framework for modernization emerged in this era that contrasted with previous frameworks grounded in the Marxist approach of revolution and class struggle. In the context of the 1980s, the Chinese term *xiandaihua* (现代化) referred to modernization as a top-down development process of several phases led by societal elites.[139] Deng's signature "Four Modernizations" policy (四个现代化) aimed to systemically modernize China's agriculture, industry, defense, and science and technology.[140] The CCP's new policy to increase the "productive forces" of science freed scientists from political and ideological restraint and permitted much greater intellectual autonomy than the Mao era.[141]

As a privileged group of intellectuals whose knowledge and expertise were critical to China's modernization reforms, members of the scientific community were able to leverage their status to advocate for increasingly radical reforms, both for their own intellectual freedom and for Chinese society as a whole. During this period of ongoing negotiation between scientists and the state, Qian Xuesen continued his unwavering support of the state. Instead of joining the intellectual

[139] Huaiyin Li, "From Revolution to Modernization: The Paradigmatic Transition in Chinese Historiography in the Reform Era," *History and Theory* 49, no. 3 (2010), 346-348.
[140] Richard Baum, ed., *China's Four Modernizations: The New Technological Review* (New York: Routledge, 2018), 3.
[141] Richard Baum, *Burying Mao* (Princeton: Princeton University Press, 1994), 57.

and scientific community's renegotiations with the state, Qian maintained strict loyalty to the CCP and denounced his colleagues' efforts to redefine their roles in society. As the scientific community became increasingly outspoken in the public sphere against CCP authority, political stakes reached new heights for scientists and the state.

Of the various voices within the scientific community, Fang Lizhi's calls for intellectual freedom and democracy emerged as the antithesis to Qian Xuesen's staunch support of the CCP. As a respected astrophysicist, Fang represented a different side of the scientific community. He recognized the social and political influence of the scientific community in China's new search for modernity, and sought to use his platform and status to promote a more democratic society for both intellectuals and regular Chinese citizens. Most importantly, Fang endeavored to connect science to democracy and human rights. In a famous speech later regarded as a catalyst for the student protests in Tiananmen Square, Fang addressed an audience of Jiaotong University students in 1986 to make the case for political reform. Acknowledging the importance of his identity as a scientist in leading these reforms, he says, "Our goal at the present moment is the thorough modernization of China… None feel this more strongly than those of us in science and technology."[142] He goes on to explain the fundamental connection between science and democracy, declaring "In a democratic society, democracy and science - and most of us here are scientists - run parallel… in this domain, within the sphere of science and the intellect, we make our own judgements based on our own independent criteria."[143] Fang sees the scientific community as well-suited and responsible for leading sweeping societal and political reforms. He clearly defends the right of the scientific and intellectual community to resist state control and CCP oversight, claiming:

[142] Fang, *Bringing Down the Great Wall*, 157.
[143] Fang, *Bringing Down the Great Wall*, 171.

> When it comes to our fields of knowledge, we must think for ourselves and exercise our own judgement about what's right and wrong, and about truth, goodness, and beauty as well. We must refuse to cater to power. Only when we do this will Chinese intellectuals be transformed into genuine intellectuals, and our country have a chance to modernize and attain real democracy."[144]

Aware of the CCP's manipulation of science and use of scientists like Qian as political propaganda, Fang urges students and colleagues to maintain the institution of science as a model of independent critical thinking.

In the early years of reform, outspoken scientists like Fang posed a significant ideological challenge to the CCP's political authority and control of China's scientific development. As Timothy Cheek describes, Fang's ideas were "a clarion call to the vocation of the intellectual as the conscience of society, the defenders of truth."[145] Fang's public commentary and criticisms of the state reflected the intellectual community's challenge to the CCP's legitimacy in the reform era.[146] Specifically, Fang's explicit calls for democracy posed a fundamental challenge to the political authority of the CCP. Grounded in his scientific expertise and his belief in critical thinking and individual freedoms, Fang's ability to build a persuasive argument for political democratic reform shows the legitimate threat posed by authoritative members of the scientific community in their critiques of the state.

In the context of Fang's calls for reform, Qian's actions or lack thereof show the gulf between the progressive generation of politically-minded scientists and conservatives like Qian who continued to believe that science should cater to state-determined priorities. As a senior

[144] Fang, *Bringing Down the Great Wall*, 174-175.
[145] Cheek, *The Intellectual in Modern Chinese History*, 234.
[146] Cheek, *The Intellectual in Modern Chinese History*, 239.

member of the scientific community, Qian maintained his role as a defender of the CCP and stepped up his public loyalty as necessary.[147] Despite the opportunity to help negotiate a new sociopolitical role for the scientist-intellectual, Qian stayed away from any calls for reform. As tensions began to rise between the state and the increasingly critical intellectual community, Qian continued to prioritize productivity over political reform, ultimately succeeding in guaranteeing that his status, security, and privileges would not be compromised.

Although the political progression in the 1980s toward Tiananmen Square represented more than the mere political grievances of students and intellectuals, the scientific community played a significant role in challenging the authority and legitimacy of the CCP. Fang never directly participated in or called for the student demonstrations, but his actions reflected the desires of scientists and intellectuals to exert political pressure on the state in the face of mounting public criticism. Beginning in 1986, university students staged protests and demonstrations in major Chinese cities, voicing various demands for democracy, economic liberalization, and greater government accountability.[148] In January 1989, as pressure continued to grow from student protestors and reform-minded intellectuals, Fang wrote and signed a personal letter to Deng Xiaoping, requesting the release of political prisoners based on human rights and political amnesty.[149] Fang's letter became famous and garnered widespread support as it circulated throughout the intellectual community. In February, thirty-three prominent intellectuals from the humanities fields signed an open letter to the CCP, expressing support for Fang's call for political amnesty.[150] One week later, the intellectual community penned another public letter, this time signed by forty-two prominent intellectuals, including twenty-seven scientists. The letter requested

[147] Cheek, *The Intellectual in Modern Chinese History*, 230.
[148] Wang Hui, *China's New Order* (Cambridge: Harvard University Press, 2003), 56.
[149] Fang, *Bringing Down the Great Wall*, 242.
[150] Fang, *Bringing Down the Great Wall*, 305.

political democratization, freedom of speech, freedom of the press, decriminalization of political crimes, and increased government investment in science and education. The letter ends with the promise that with proper government reform and support, "science and democracy, as advocated by the pioneers of the May Fourth Movement seventy years ago, will truly flourish in our great land."[151] Led by Fang and other passionate liberal reformists, intellectuals and respected scientists made use of their elevated status and the openness of Deng's reform era to demand that the CCP institute extensive political change to progress society to what they deemed to be true modernity.

As political pressure and demonstrations in Tiananmen Square escalated, CCP leadership decided to use military force to bring the Beijing student demonstrations to an end. Richard Baum describes the CCP decision as an effort "to preempt what they viewed, not without reason, as a rapidly deteriorating, deeply threatening situation."[152] The world was shocked to learn that on June 4, 1989, the CCP ordered military tanks to move into Tiananmen Square and forcibly evacuate the student demonstrations. Unknown numbers of demonstrators, innocent civilians and military personnel were killed and wounded in the operation.[153] The crackdown extended beyond the square as well. In the days following the massacre, intellectuals like Fang who were seen as instigators and supporters of the student movement were compiled onto government arrest warrants. Fang and his wife quickly sought refuge in the United States embassy in Beijing, where they stayed in secrecy for thirteen months while the U.S. government negotiated their asylum with authorities.[154] Clearly, the CCP took the threat of political dissidence seriously, including the participation of the scientific community in calls for change and reform.

[151] Lizhi, *Bringing Down the Great Wall*, 306-308.
[152] Baum, *Burying Mao*, 276.
[153] Baum, *Burying Mao*, 287.
[154] Baum, *Burying Mao*, 289.

The events and aftermath of the 1989 Tiananmen Square massacre brought about a significant change in the relationship between Chinese intellectuals and the state. Baum describes how the CCP "suffered a profound loss of popular legitimacy and credibility as a result of the Beijing massacre."[155] The extensive participation of respected intellectuals such as Fang was critical to delegitimizing the CCP, and helped to expose the lack of unity between the Chinese state and society. Intellectuals' sustained effort to enact political change played a significant role in the political and social tensions displayed before and after the Tiananmen Square massacre.[156] In the face of public loss of confidence, the CCP instituted new strategies to regain public approval. This included both official condemnation of the "rebellion," along with promises to combat corruption and other issues within the CCP.[157]

In the uneasy peace after June 4, Qian reemerged in official political discourse to condemn the student protestors and their supporters among the intellectual community. In a speech to the China Association for Science and Technology, and subsequently published in the state paper *Renmin Ribao*, Qian reiterates the need to strengthen ideological faith in the CCP, blaming the Tiananmen Square massacre on students and their ideological weakness. He supports Chairman Deng's call for strengthened ideological work, observing, "In recent years, we have been ideologically confused, and all aspects in our life have been affected."[158] Qian specifically characterizes young scientists as ideologically weak, claiming that "in our scientific, technical and intelligentsia fields, I believe that people of around 20 need help most urgently in the turmoil. They are most deeply affected by bourgeois liberalization."[159] Attributing the calls for reform to

[155] Baum, *Burying Mao*, 310.
[156] Cheek, *The Intellectual in Modern Chinese History*, 244.
[157] Baum, *Burying Mao*, 298.
[158] "Fang Lizhi Criticized at Technology Meeting," *Renmin Ribao* (Beijing), June 28, 1989, Newsbank Daily Report China.
[159] "Fang Lizhi Criticized at Technology Meeting."

improper political indoctrination, he goes on to ask the older generations of scientists to help the younger generations gain experience in society and learn right from wrong, presumably to prevent further disturbances in the future.[160] While Fang wished for intellectuals and especially scientists to lead the charge for political change, Qian called on scientists to quell dissent and indoctrinate younger generations to work diligently for the state.

Qian recognized the social and political responsibilities of scientists and intellectuals, just as Fang did, but he saw their role as best used to support the state and maintain scientific productivity. In his speech, Qian promises that scientific institutions will continue to combat the improper ideologies that gave rise to the student demonstrations, declaring that "the Chinese Association for Science and Technology will conscientiously study Comrade Deng Xiaoping's speech, unite as one… and make our share of contributions toward building our socialist China."[161] He ends his speech with a personal critique of Fang in an attempt to undermine his authority and status as a respected member of the scientific community. Qian alleges that at a CCP meeting two years earlier, "I criticized Fang Lizhi by name, saying his idea on wholesale modernization is an out-and-out fallacy."[162] Qian demonstrates his awareness of the political stances of his fellow colleagues in the scientific community. As he has always done, Qian defaults to upholding CCP authority, which in this instance required acknowledging the "ideological weaknesses" of the scientific community and figuring out how to prevent future missteps.

The events surrounding the 1989 Tiananmen Square protests brought the scientific and intellectual community more broadly into a highly publicized political battle between student protestors and CCP officials. In the 1970s and 80s, the "thaw" of CCP rule had restored much

[160] "Fang Lizhi Criticized at Technology Meeting."
[161] "Fang Lizhi Criticized at Technology Meeting,"
[162] "Fang Lizhi Criticized at Technology Meeting,"

productivity into Chinese society, and many intellectuals resumed their work under the new generation of CCP leadership. As the new party secretary, Deng Xiaoping championed the "opening of China" to foreign, and particularly Western, influence. In the pursuit of modernization of Chinese society and economy, intellectuals once again became vital contributors to the state-building project. In particular, intellectuals such as Fang Lizhi used their privileged status to renegotiate structures of power and demand greater rights and freedom from the CCP. Unfortunately, the crackdown after Tiananmen Square led CCP leadership to "order a merciless repression of the public demonstrations and hunt down and punish anyone associated with them."[163] While Deng had previously championed the productivity of scientists to allow for greater intellectual autonomy, the strength of the intellectual community's threat to destabilize and delegitimize the state's authority caused CCP leadership to reevaluate.

With China's continued "opening up" and transition to a market economy in the coming years, the CCP would need to find ways to continue to reinforce the CCP's legitimacy. Fang's calls for reform before Tiananmen Square, and Qian's condemnation in response, show the influence of the scientific community in the CCP's pursuit of legitimacy and sociopolitical stability. As a respected scientist and public intellectual, Qian showed significant loyalty to the CCP amidst increasingly vocal calls for change. In the years after Tiananmen Square, as the hopeful reform period came to an end, the state began to see the significance and potential of Qian's legacy against a new political backdrop. His allegiance throughout the years would be rewarded by the state, which would begin to use his staunch patriotism as an example for future generations of Chinese scientists and citizens.

[163] Cheek, *The Intellectual in Modern Chinese History*, 244.

"Learn From Qian"

The Chinese state's campaign to celebrate and publicize Qian as a national hero began in earnest two years after the Tiananmen Square massacre and has continued to this day. The "Learn from Qian" movement, developed and implemented after the Tiananmen crackdown, reflected a new effort by the CCP to foster better public relations with the intellectual community. As Timothy Cheek describes, when the crackdown on Tiananmen Square abruptly ended the campaigns for democracy, reform, and modernization, intellectuals were left "looking for a new social role."[164] As a well-known scientific leader who had remained unequivocally loyal to the state, the CCP used Qian as a bridge to reach the scientific and larger intellectual community to show that good relations were possible and desirable. As Ning Wang writes, "picking out an individual from the intellectual community to praise and reward was helpful to the Party to improve its relations with the intelligentsia and to prevent their further alienation from the state."[165] After the chaos of the reform period had subsided and the most vocal intellectual critics were silenced, the third generation of CCP leadership sought to use Qian's loyalty and status to set a new moral and political example for the rest of the scientific community.

Having maintained a relevant distance from the political activism of the reform period, Qian had largely remained out of the public spotlight for most of the 1970s and 80s, but renewed state interest in the 1990s would direct public attention to Qian once again, this time in a more sustained and coordinated manner. Just before his 80th birthday, Chinese President Jiang Zemin honored Qian at a ceremony to confer him the title "Scientist of Outstanding National Contribution" (国家杰出贡献科学家).[166] The bestowal of this honor began the CCP's "Learn from

[164] Cheek, *The Intellectual in Modern Chinese History*, 261.
[165] Wang, "The Making of an Intellectual Hero," 359.
[166] "钱学森(人民英模·庆祝新中国成立60周年)," *Renmin Ribao*, February 25, 2010.

Qian" movement that would continue for decades. At the award ceremony, which was recounted in national Chinese newspapers, President Jiang bestowed countless compliments upon Qian. The President repeatedly emphasized Qian's "noble patriotic spirit"[167] as characteristic of the accomplished scientist. The state did not only recognize Qian's accomplishments as a leader in science and technology as the success of an individual scientist. Rather, his achievements painted a historical narrative of seamless collaboration between scientists and the state. His accomplishments were also successes for the CCP and for China as a nation. In celebrating the "Scientist of Outstanding National Contribution," state and scientist were both recipients of the honor.

In addition to clearly linking Qian's accomplishments with national pride, the CCP used Qian as a model scientist and citizen. Qian's position as a representative of the scientific and intellectual community was especially emphasized. At the ceremony, President Jiang praises Qian as "a model for the patriotic intellectuals of China. His experience represents the correct path for Chinese intellectuals in their pursuit of progress."[168] It is clear that the CCP wished to use Qian as a shining example to appeal specifically to the intellectual community. In particular, Qian's accomplishments could teach a moral lesson to younger generations, especially the younger and politically active members of the Chinese scientific community. Clearly, the CCP had identified a new interest in publicly mending its relationship with Chinese scientists and its wider perception by society. President Jiang uses Qian to make a direct appeal to the scientific community, saying, "I hope that scientists and technicians, especially the younger ones, would of their own accord enhance their national self-esteem and sense of pride, strengthen their socialist beliefs, and

[167] "Scientist Honored for 'Outstanding Contribution,'" *Xinhua* (Beijing), October 16, 1991, Newsbank Daily Report China.
[168] "Scientist Honored for 'Outstanding Contribution.'"

contribute all their energy to the motherland's socialist modernization drive."[169] In a time of "growing marginalization of establishment intellectuals,"[170] the CCP saw an opportunity to highlight Qian's symbiotic relationship with the state. President Jiang's speech makes clear what being a successful Chinese scientist means. Instead of criticizing the state, scientists should follow the example of Qian and diligently work to further the nation's scientific and technological development in line with CCP orders. In this way, their scientific achievements can help them achieve success both for themselves on a personal level, and for the state on a national level. The goal of modernization remained, but in the CCP's ideal arrangement, the state would decide what was necessary for modernization and scientists would unquestioningly provide the expertise to achieve it.

The CCP's efforts to publicize Qian's moralistic and patriotic accomplishments required the selective politicization of aspects of his life story, which emphasized his moments of selfless political action. At Qian's award ceremony, President Jiang recalls that Qian "overcame one obstacle after another and returned to China to take part in nation-building."[171] This telling of Qian's early experiences purposely glosses over the complex geopolitical struggles that pitted Qian in the middle of international tensions between the United States and China. Instead, the CCP advances a narrative of Qian's life only as it relates to the modernization and development of the Chinese state. Though Qian's individual life story is inspiring, ultimately it is about much more than just him. The CCP uses his story to illustrate the importance of science to Chinese modernization, in both the past and future. President Jiang struck an optimistic tone at Qian's ceremony, declaring:

[169] "Scientist Honored for 'Outstanding Contribution.'"
[170] Cheek, *The Intellectual in Modern Chinese History*, 259.
[171] "Scientist Honored for 'Outstanding Contribution.'"

> China's science and technology, as well as national defense science and technology, will certainly achieve new developments and have a bright future if we continue to carry forward the spirit of independence, self-reliance, arduous struggle, selfless dedication, and firm cooperation.[172]

To appeal to the scientific community, the CCP crafted a selectively politicized version of Qian's life story that established a strong link between his accomplishments and leadership in science to the overall improvement and modernization of China. The state maintained its position as the architect of Chinese modernization, but Qian's model showed that scientists could fulfil a noble role as patriotic builders, so long as they carefully followed the blueprint set by the state.

After Qian's award ceremony in 1991, the CCP gave clear orders to implement the "Learn from Qian" campaign in China's scientific research institutions. The CCP's intentions were clear: by ceremoniously recognizing Qian as a model from and for the scientific community, they were sending the message that "the party and the state attach great importance to science and technology and highly respect talent."[173] As a plan to build legitimacy and better relations with scientists, the CCP required the active participation of China's scientific research organizations in this initiative. A few days after Qian's high-profile award ceremony, the China Association for Science and Technology issued notice to initiate the "Learn from Qian" campaign throughout scientific research associations nationwide. The notice stated, "Science and technology associations at various levels… should encourage the broad masses of members and scientific and technological workers to learn from comrade Qian Xuesen and to publicize comrade Qian Xuesen's outstanding achievements and noble character."[174] The CCP was serious about using Qian to set an example

[172] "Scientist Honored for 'Outstanding Contribution.'"
[173] "Circular Issued," *Xinhua* (Beijing), October 18, 1991, Newsbank Daily Broadcast China.
[174] "Circular Issued."

and improve relations with scientists and this systemic educational approach ensured their goal would be met. The notice ends with a hopeful message that instructs the scientific community to publicize Qian's achievements, with the ultimate goal to "inspire them to foster lofty aspirations of fighting for a lifetime for the rejuvenation for the motherland by studying science, loving science, and applying science."[175]

The initiation of the "Learn from Qian" campaign in 1991 marked the CCP's official endorsement of Qian as China's model scientist. As China entered the twenty-first century, the CCP had a growing interest in redefining the relationship between intellectuals and the state as political leaders continued pursuing the state's modernization project. Recognizing the importance of continued scientific and technological development, the CCP targeted the scientific community as one group of intellectuals that could bridge the divide. Using Qian Xuesen as a model to publicize an image of the ideal scientist as patriotic, hardworking, and unflinchingly supportive of the state, the CCP found its ideal figure to inspire younger generations of Chinese scientists to contribute faithfully to the nation's quest for scientific excellence. As the third generation of CCP leadership, President Jiang's official endorsement of Qian also sheds light on Qian's longevity as a respected public figure. The "Learn from Qian" movement represented the coalescence of Qian's decades of unwavering faith in the state and the CCP's recognition that Qian's status as a scientist and intellectual was a useful political tool to help achieve new state priorities. The CCP's construction and publicization of Qian as a national hero would continue into the twenty-first century, as Qian's narrative became officially memorialized and institutionalized.

[175] "Circular Issued."

Memorialization of a National Hero

With roots in the 1990s "Learn from Qian" campaign, Qian Xuesen's legacy as a national hero has persisted in modern day China through official memorialization. Now led by its fifth generation of leadership, the CCP's continued publicization of Qian as a model scientist is significant just by the sheer endurance of his public persona. Modern day China has seen unprecedented societal and economic growth in recent decades, and Chinese political leadership has also shifted personnel and policy to accommodate and support new political strategies. And yet, despite the tremendous changes, the Chinese state continues to construct and propagandize Qian's legacy, even after his passing in 2009. The role of Chinese intellectuals continues to be important to the state, as intellectuals possess expertise relevant to state projects and are able to influence public opinion. In the modern day context, the state still plays an active role in directing and overseeing the public sphere where intellectuals operate, because "the Party believes that what intellectuals say is influential."[176]

The Qian Xuesen Library & Museum, officially opened in 2011 on what would have been the one-hundredth birthday of Qian Xuesen, provides the most compelling example of the CCP's official memorialization of Qian in present day China.[177] The museum's presentation of Qian as a valuable contributor to Chinese society and scientific modernity reveals how the Chinese state continues to connect Qian's official memorialization to state priorities and concerns. The historical narrative presented in the CCP's memorialization creates a unified national memory of the scientific community's successes and the state's technologic achievements, in order to generate a model for future cooperation between the state and China's scientific community.

[176] Cheek, *The Intellectual in Modern Chinese History*, 279.
[177] Qian Xuesen Library & Museum, "About Us" (web page), Qian Xuesen Library & Museum (website), http://www.qianxslib.sjtu.edu.cn/en/intro/intro07.php.

Located on a major road in Shanghai's central Xuhui district, the Qian Xuesen Library & Museum is placed strategically next to the campus of Jiaotong University, Qian's alma mater. Even from first glance, it is clear the Chinese government spared no expense in the construction of the museum. The large building occupies prime real estate in the center of Shanghai, and the structure stands regally amidst tall apartment complexes and office buildings. From the outside, the building's sleek modern architecture that mixes blocky structure and reflective glass paneling foreshadows the museum's emphasis on science and technology. On the front of the building, a subtle impression of Qian's face is integrated seamlessly into the brick pattern, a symbol of the state's tribute to the late scientist. In a recent book about modern Chinese museums, Marzia Varutti claims that an increasing awareness of modern aesthetics has permeated the construction of new museums in China. She contends that these museums are constructed with the idea that "a bold architectural style can significantly enhance the visibility of a museum in the urban context and help to draw audiences."[178] The design of the Qian Xuesen museum reflects this objective and shows the desire of the CCP to memorialize Qian in a way that is alluring to a modern audience. The museum also represents a modern reimagination of Chinese national success in scientific and technological innovation. These national successes are encapsulated in the patriotic life of Qian Xuesen, a story which the Chinese state has determined to have continued relevance to the lives of modern day Chinese citizens. The state's construction and operation of the museum sustains a triumphant historical narrative that showcases the state's achievements in scientific modernization, and presents Qian Xuesen as an example that success and scientific glory is possible under the guidance of the CCP.

[178] Marzia Varutti, *Museums in China* (Woodbridge: The Boydell Press, 2014), 160.

The inside of the museum is divided into four exhibits, which together are designed as a "platform for cultural education to advocate the spirit of Qian Xuesen and to promote patriotism and scientific spirit."[179] The first exhibition "Founder of China's Aerospace Industry" focuses on Qian's key contributions to China's guided missile and space programs. This section tells museum visitors about Qian's leadership and personal involvement in educating and training young Chinese scientists and engineers which helped to build a strong foundation for the country's emerging aerospace industry. The exhibit includes photographs of Qian lecturing during his "missile training technology sessions," along with copies of the textbook that Qian wrote to teach the courses. A wall panel in the exhibit reads, "He enlightened and inspired the first generation of space science and technology professionals." (钱学森举办导弹技术培训班, 亲自撰写教材, 向刚刚分配来一百多名大学生和其他技术人员讲授导弹的基础知识, 为中国第一代航天人启蒙.)[180] The museum's labeling of Qian as a "founder" of modern Chinese science helps to advance a clean historical narrative of success and cooperation between scientists and the state from the beginnings of the scientific community to the present day. By emphasizing Qian's role as an educator who played an instrumental role in establishing China's aerospace industry, the state can claim that Qian is a legitimate representative of the scientific community. This narrative presents Qian as an example of the longstanding cohesion between the scientific community and the CCP and purposefully blurs the line between scientists and state.

The second exhibit in the museum also focuses on Qian's contributions to Chinese modern science by highlighting Qian's personal scientific achievements in theoretical research. Titled "Pioneer in Frontiers of Science and Technology," this exhibit presents Qian's research work from his time as a graduate student in the United States. His original manuscripts from his theses at MIT

[179] Qian Xuesen Library & Museum, "About Us" (web page).
[180] Wall text, *Founder of China's Aerospace Industry*, Qian Xuesen Library & Museum, Shanghai, China.

and Caltech are on display, with brief descriptions that inform visitors of the significance of his findings. Also included in the exhibit are examples from Qian's later work on systems engineering after he returned to China. The exhibit presents original manuscripts and papers to show how, "under the guidance of Marxist Philosophy, [Qian] utilized ideas drawn from the theory of practice and system theory to put forward a modern science technology system."[181] This slightly disjointed exhibit seems to attempt to connect Qian's ideological beliefs to his success in scientific research, as well as present him as a modernizing "pioneer." By emphasizing his time at prestigious research institutions in the U.S., the museum is also able to bolster Qian's image of scientific prestige. Together with the first exhibit, this half of the museum seeks to establish Qian as a legitimate leader from the scientific community who played a key contributing role in the advancement of modern Chinese science.

By selectively including Qian's research and contributions to the aerospace industry, the museum creates a narrative of Qian as a general leader in science, whose technical and social credibility allow him to lend legitimacy to concepts and subjects outside of his field of expertise. Notably, his contribution to the nuclear weapons and missile project is barely included. The museum's portrayal of Qian as a scientific luminary leaves out his significant involvement in China's national security defense technologies, which played a significant role in his relationship to the state. When the Chinese state was in the midst of developing its first nuclear weapons and missiles, Qian became an important collaborator because of his political aptitude and specialized expertise in rocketry. Instead of focusing on Qian's significant involvement and contribution to national defense industries, the museum highlights Qian's credibility as a founder of modern Chinese science through evidence of his individual intellectual capabilities.

[181] Qian Xuesen Library & Museum, "No. 2 Exhibition Hall" (web page), Qian Xuesen Library & Museum (website), http://www.qianxslib.sjtu.edu.cn/en/exhibit/exhibit02.php?type=013001003.

Having already covered Qian's technical and scientific background, the museum's third exhibit "Demeanor of the People's Scientist" focuses on Qian's patriotism and moral character. Much of the exhibit is dedicated to explaining Qian's political troubles during his time in the United States. Newspaper clippings and Qian's documents and notices from the United States government are all on display to show how Qian was unfairly targeted and disgraced. Interestingly, this aspect of Qian's life was absent in the narrative of the "Learn from Qian" movement from the 1990s. The state's decision to highlight this conflict again may point to China's shifting international priorities as it has emerged as a global power to challenge the United States. The state's narrative of Qian shows how he remained resolute and patriotic while subject to the United States government's merciless charges. The exhibit also displays copies of books on Marxist philosophy that Qian allegedly read while preparing for his return to China in the 1950s. A wall panel reads, "The combination of philosophy and science and the integration of theory and practice ran through Qian Xuesen's entire life, enabling him to cope with hardship and achieve success" (哲学与科学结合, 理论与实践结合, 贯穿于钱学森奋斗的一生, 使他在遇到困难时能从容应对, 在成功的道路上如虎添翼.)[182]

Though the attention on conflict with the United States is new, other moralistic messages originally from the "Learn from Qian" campaign resurface in this exhibit. The museum portrays Qian as a humble and diligent scientist who held himself to the highest moral standards despite the obstacles he encountered. "Facing power, status and material honour, he constantly led a simple and gentle life,"[183] and thus he is worthy of praise from the Chinese state and admiration from the Chinese public. The decision to dedicate an entire museum exhibit to highlighting Qian's

[182] Wall text, *Demeanor of People's Scientist*, Qian Xuesen Library & Museum, Shanghai, China.
[183] Qian Xuesen Library & Museum, "No. 3 Exhibition Hall" (web page), Qian Xuesen Library & Museum (website), http://www.qianxslib.sjtu.edu.cn/en/exhibit/exhibit02.php?type=013001004.

personality and moral strength is indicative of the state's goals in this memorialization project beyond simply highlighting the achievements of a famous scientist. Though Qian was faced with numerous obstacles throughout his life, the museum narrative shows how he was able to overcome difficulties by focusing on his duties to his country. The museum strives to show how Qian's ideology and morality, in conjunction with his scientific intellect and expertise, are what helped him succeed.

The fourth and final exhibit "The Road to Success as a Strategic Scientist" reveals how Qian's relationship to the state was integral to his scientific achievements. Continuing many of the ideas from the "Learn from Qian" movement, this exhibit makes a clear and direct connection between Qian' scientific accomplishments and the CCP's support of the scientific community. A wall panel conveys this point decisively:

> During the course of Qian's dedication to China's scientific and technological development, the Party and people showed tremendous trust in and support for him. This enabled him to make full use of his wisdom and talents to achieve his ambition. The trust and care from the Party and people were instrumental in Qian Xuesen achieving his goals in life (在钱学森献身祖国科技事业的历程中, 党和人民对他高度信任, 深切关怀, 使他能够更好地发挥自己的聪明才智, 实现人生抱负. 党和人民的信任与关爱钱学森成就辉煌人生的重要保障).[184]

As an example for the scientific community to emulate, the exhibit highlights the positive relationship between Qian and the CCP as a productive model to aspire to. The message here is clear: the scientific community needs the help and support of the state in order to achieve success. The narrative presented by the museum reaffirms Qian's personal achievements as a reflection of

[184] Wall text, *The Road to Success as a Strategic Scientist*, Qian Xuesen Library & Museum, Shanghai, China.

the state's successful steps towards modernity. Hence, the CCP's active influence in helping Qian shows how the prosperity of the Chinese scientific community has and always will be dependent on state support. Science in the service of the state should be the guiding principle, not science for the sake of science.

As a state project of memorialization and cultural education, the Qian Xuesen Library & Museum reflects both changes and continuity in the CCP's construction of Qian Xuesen as a national hero in modern day China. Marzia Varutti argues that Chinese "museums have played a crucial role in rooting political authority, instilling a sense of unity, creating a common identity and developing images of the national self."[185] As a symbol of the scientific community's past and enduring loyalty to the state, the CCP's memorialization of Qian preserves a continued productive relationship between scientists and state officials. The museum's presentation of Qian and of the scientific community advances an official historical narrative of successful past cooperation and future unity and success. As Kirk Denton claims, "past, present and future are intimately intertwined in exhibitionary culture in China."[186] The Chinese state's official memorialization of Qian uses cultural education to promote nationalism and civic pride, by connecting Qian's individual achievements to the state's development towards modernity since the establishment of the People's Republic of China. This clean, constructed narrative downplays the ability of scientists to challenge the authority of the CCP, and instead paints the scientific community as having always been dutiful workers at the service of the state.

[185] Varutti, *Museums in China*, 159.
[186] Kirk A. Denton, Exhibiting the Past (Honolulu: University of Hawai'i Press, 2014), 265.

Conclusion

Since the beginning of the post-Mao period, the scientific community and the Chinese state have continually attempted to negotiate their relationship by challenging and redefining the roles and responsibilities of scientists as respected public intellectuals in Chinese society. As a figurehead of the scientific community, Qian Xuesen's involvement in these negotiations reflect various strategies employed by the state to hold and wield authority over intellectuals. The Chinese scientific community, whose expertise has historically been inextricably tied to the state's development and modernization projects, has held a privileged position that has allowed members to challenge and repudiate the legitimate authority of the CCP. When challenges have occurred, such as the calls for democracy championed by Fang Lizhi, the state has used Qian as a representative of the scientific community to reestablish legitimacy. The CCP's "Learn from Qian" movement, as well as the Qian Xuesen Library & Museum, reflect the ways in which Qian's constructed legacy as a national scientific hero continues to support the CCP's politics and priorities in modern day China. Science and technology remain a priority for the Chinese state, and it is likely that Qian Xuesen's legacy will live on as official remembrance of the moral and ideological foundations of modern Chinese scientific achievements.

Conclusion and Epilogue

In 2010, the Chinese Academy of Sciences released a report of over one-hundred pages detailing the state's scientific research priorities for the coming decades. Titled *Science and Technology in China: A Roadmap to 2050*, the report lays out a detailed state strategy to prepare for "an impending S&T revolution."[187] The report clearly establishes the primacy of science to China's international status as the incentive for continued investment in scientific institutions and research. The attitudes presented in the report reveal the state's prioritization of science as central to the ongoing projects of modernization and international power. Notably, the report includes a section of historical background detailing Chinese scientific triumphs and defeats in modern history, and indicates how those successes and losses have affected the state's status in the international order. The dependence of state power on science is apparent:

> With an impending S&T revolution ahead, China can no longer be satisfied itself with the traditional mode of development, but must be fully prepared for this historic opportunity.[188]

As the state's historic and recent glorification of the nuclear weapons program has shown, scientific and technological successes remain a central pillar of national identity. Of course, the Chinese state cannot achieve these successes alone. Scientific achievements require a strong network of skilled experts who possess the necessary resources to push development to new frontiers. Thus, as agents in the state's quest for modernity and power, scientists play a crucial role in the state's political wins and losses.

[187] Yongxiang Lu, ed., *Science & Technology in China: A Roadmap to 2050* (Berlin: Springer, 2010), 28.
[188] Yongxiang Lu, ed., *Science & Technology in China: A Roadmap to 2050* (Berlin: Springer, 2010), 29.

Given the undeniable and enduring connection between state development and the work of scientists, the Chinese state's attempts to manage and secure a productive working relationship with scientists has been the focus of this paper. I have argued that because the work of scientists was inherently tied to projects of paramount national interest, the state conferred distinct political duties to scientists that differentiated the group from other intellectuals. Through a detailed case study of Qian Xuesen, a figurehead from the scientific community who embodied the state's desire for scientists to legitimize policy using their specialized expertise, I have shown how the state has used science as a form of propaganda. The state's continued memorialization and promotion of Qian as a national scientific hero also demonstrates how legacies of the scientific community have outlived decades of leadership and political change.

Ultimately, Qian's legacy represents the ideals and motivations behind the state's endorsement of new roles and responsibilities for the scientist-intellectual. The state's depiction of Qian as a representation of the scientific community reveals the significance of scientific knowledge as a form of political power. In the particular context of the Cold War, scientific experts such as Qian derived political authority from the alignment of their expertise to state needs. More importantly, with the incorporation of influential scientists into political projects and propaganda, the state was able to exercise authority and legitimacy more effectively to undertake challenging political projects.

Scholars have documented the consequences of the Chinese state's strategic use of scientific authority in other cases as well. Qian's missile scientist protégé Song Jian went on to become one of the state's most trusted designers of population policy.[189] In a book about the CCP's

[189] Susan Greenhalgh, *Just One Child* (Berkeley: University of California Press, 2008), 243.

development of population science and restrictive birth policies, Susan Greenhalgh and Edwin Winckler describe how the state employed science as a political tool:

> Because modern science was the new reform-era ideology, science became the authority in whose name everything had to be done. As a result, use of the term "science" began to lose its moorings in science-like activities and attach itself to ever more ideas and practices.[190]

The ability of the state to harness scientific authority through collaborations with the scientific community affects the duties and status of scientists. When the state substantiates policies through scientific expertise, whether genuine or not, the effects also have immense consequences on Chinese society and the lives of ordinary citizens. Undoubtedly, scientists will continue to play a pivotal role in the future of China. As the CCP renegotiates its relationship with the scientific community, Qian's legacy will remain as the state's ideal embodiment of the duties and responsibilities of Chinese scientists.

[190] Susan Greenhalgh and Edwin A. Winckler, *Governing China's Population: From Leninist to Neoliberal Policies* (Stanford: Stanford University Press, 2005): 289-290.

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