

# Transnational Science during the Cold War

## The Case of Chinese/American Scientists

*Zuoyue Wang\**

### ABSTRACT

This essay examines the experiences of about five thousand Chinese students/scientists in the United States after the Communist takeover of mainland China in 1949. These experiences illustrate the often hidden transnational movements of people, instruments, and ideas in science and technology across the Iron Curtain during the Cold War. I argue that those hundreds who returned to China represented a partial “Americanization” of Chinese science and technology, while the rest of the group staying in the United States contributed to a transnationalization of the American scientific community.

OVER THE LAST GENERATION OR SO, Cold War science has become a hotspot in the history of science, especially in the United States where it has both profited from and contributed to the remarkable growth of historical studies of American science. For the most part, these studies have remained national in focus and approach, and this has brought benefits in terms of the depth of examination and concentrated debates. Yet, as many historians have increasingly realized, a national focus, as useful as it is, has its limitations, especially in connection with the study of such intrinsically international phenomena as science and the Cold War. Despite the United States’ dominance in science during the Cold War, American scientists inevitably had to interact with the rest of the

\* Department of History, California State Polytechnic University, 3801 W. Temple Ave., Pomona, CA 91768; zywang@csupomona.edu.

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world of science in many different ways that are not always easy to capture in a national framework.<sup>1</sup>

In his pioneering study, *American Hegemony and the Postwar Reconstruction of Science in Europe*, John Krige has argued persuasively that in the postwar period, American scientists and science administrators, encouraged and guided by American Cold War policy, exerted enormous influence on the reconstruction of European science. It was a process of both “Americanization” and “co-production,” in the sense that the Americans were most effective when they worked in conjunction with local scientific elites.<sup>2</sup> With this work, Krige has both adopted a transnational historical approach and broadened the studies of Cold War science into Europe, beyond the traditional focus on the United States and the Soviet Union. But the Cold War of course involved more than these three players. How China, for example, fit into this picture is not at all clear.

It is well known that China was an early ally of the Soviet Union during the Cold War and therefore could be conveniently classified into the Soviet camp. But what happened once the Sino-Soviet split emerged in the late 1950s, and the relationship became so hostile in the 1960s that China considered the Soviets more of a threat than it did the United States? What took place when China eventually engaged in a process of rapprochement with the latter in the early 1970s? While diplomatic historians on China-U.S.-Soviet relations have made great inroads in uncovering the political dimensions of this most important triangular relationship during the Cold War, much remains to be done in the area of the history of science and technology.<sup>3</sup> In this essay, I propose to examine Cold War science and technology with China included in the picture.

In shifting the focus to China’s international scientific relations during the Cold War, one can of course ask questions about the Soviet influence in China as Krige has done regarding the American influence in Europe. How, for example, did the Soviets export their scientific and educational system into China in the early 1950s, and how was it received in China? Were the Soviet-Chinese interactions a case of unilateral imposition, or was there more of a parallel with the American-European collaboration that Krige analyzed? These are broad questions whose answers require access to archival materials that are not readily available at present and which I hope to address in a long-term research project on the transnational formulation of science and technology in modern China. Here, in this brief essay, I focus instead on a less obvious but no less intriguing question: What happened to U.S.-China scientific interactions at the height of the Cold War? This question is particularly significant given the profound American influence on pre-Communist China’s scientific and educational system, and given the domination of an American international science policy aimed at containing Communist China.

Specifically, I will use the case of a group of American-educated Chinese students and scientists to illustrate the often hidden transnational movements of people and instruments in science and technology during the early Cold War. Here I use the term “Chinese/

<sup>1</sup> For a useful survey of current literature on the transnational approach see Erik van der Vleuten, “Toward a Transnational History of Technology: Meanings, Promises, Pitfalls,” *Technology and Culture*, 2008, 49:974–994.

<sup>2</sup> John Krige, *American Hegemony and the Postwar Reconstruction of Science in Europe* (Cambridge, Mass.: MIT Press, 2006).

<sup>3</sup> See, for example, Gordon Chang, *Friends and Enemies: The United States, China, and the Soviet Union, 1948–1972* (Stanford, Calif.: Stanford Univ. Press, 1991); Harry Harding, *A Fragile Relationship: The United States and China since 1972* (Washington, D.C.: Brookings Institution, 1992); Chen Jian, *Mao’s China and the Cold War* (Chapel Hill, N.C.: Univ. North Carolina Press, 2000); and Lorenz M. Luthi, *The Sino-Soviet Split: Cold War in the Communist World* (Princeton, N.J.: Princeton Univ. Press, 2008).

American scientists” to include both those who decided to stay in the United States and became Chinese American scientists proper, and those who returned to China and became American-returnee Chinese scientists. The experiences of both groups, I would argue, contributed to two broad, parallel transnational processes of Cold War science: the Americanization of international science and the transnationalization of American science, especially the transnationalization of the American scientific community. This experiment in transnational history of science further demonstrates that we need to pay attention not only to scientists’ physical movements across national boundaries, but also to the many ways in which they confronted and even challenged the authority of nation-states in both the United States and China. As the American historian David Thelen puts it, historians need to “explore how people and ideas and institutions and cultures moved above, below, through and around, as well as within, the nation-state.”<sup>4</sup>

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Tens of thousands of Chinese came to the United States to study science and engineering, especially after the beginning of the twentieth century. Their study in the United States had been encouraged by the Chinese and U.S. governments and by American missionary institutions in China as a way to modernize China and spread American influence. The end of World War II brought a new surge in the numbers of Chinese students and visiting Chinese scientists, with about 5,000 in the United States by 1949.<sup>5</sup> Up to that time, American-educated Chinese scientists had largely returned to China once they completed their studies due to a variety of factors, including family ties, a sense of national obligation to China, and perhaps most critically, the long-standing discriminatory immigration policy in the era of the “Chinese Exclusion Act.” Even after the CEA was repealed in 1943, the annual quota of only 105 Chinese immigrants made it nearly impossible for Chinese students to settle in the United States. The situation, however, changed dramatically in 1949 when the Chinese Communist forces swept the country and drove the ruling Nationalists to the island of Taiwan. What should these Chinese students and scientists do and what should the U.S. government do with them now that China and the United States were on opposite sides of the Cold War?

Surprisingly, at first the U.S. government seemed intent on not only allowing but actually encouraging Chinese students to return to China even as it came under Communist control; this was seen as a way to Americanize Chinese society through science and technology. For example, at an October 1949 conference at the State Department on

<sup>4</sup> David Thelen, “The Nation and Beyond: Transnational Perspectives on United States History,” *Journal of American History*, 1999, 86:965–975, on p. 967.

<sup>5</sup> On the movement of Chinese to the United States to study science see, for example, Stacey Bieler, “Patriots” or “Traitors”? *A History of American-Educated Chinese Students* (Armonk, N.Y.: M. E. Sharpe, 2004); and Zuoyue Wang, “Saving China through Science: The Science Society of China, Scientific Nationalism, and Civil Society in Republican China,” *Osiris*, N.S., 2002, 17:291–322. A study in 1954 concluded that 22,000 Chinese students had studied in the United States from 1854 to 1954. See “Centennial for Chinese Students,” *New York Times*, 31 October 1954, p. 9E. The exact number of Chinese students, scholars, and scientists in the United States in 1949 is difficult to find, but various estimates then and later indicate that 5,000 was a close approximation. For example, based on a U.S. State Department briefing, the *New York Times* reported in 1954 that there were “5000 Chinese students. . . in this country in 1949 when the Communists took control of the Chinese mainland”: Dana Adams Schmidt, “U.S. Bars Trading Chinese Students for Jailed Airmen,” *New York Times*, 15 December 1954, p. 1. One recent study concludes that there were 4,675 Chinese students in the United States: Ting Ni, “Cultural Journey: Experiences of Chinese Students of the 1930s and the 1940s” (Ph.D. diss., Indiana Univ., 1996), cited in Iris Chang, *The Chinese in America: A Narrative History* (New York: Viking, 2003), p. 243.

“Problems of U.S. Policy in China,” which included government officials and China scholars, Howland Sargent, deputy assistant secretary of state for public affairs, expressed the department’s view that such a move would be beneficial for both the United States and China. “There seems to be some general area of agreement,” he said, “that it will be desirable both for the peoples of China and the peoples of United States that as many of these students as possible will in fact return to China to interpret the skills that they have learned when they have been in this country.” The department further proposed to launch an outreach program so that the Chinese students would have “some understanding of the conditions that really obtain in China,” including those in “Communist-held areas.”<sup>6</sup>

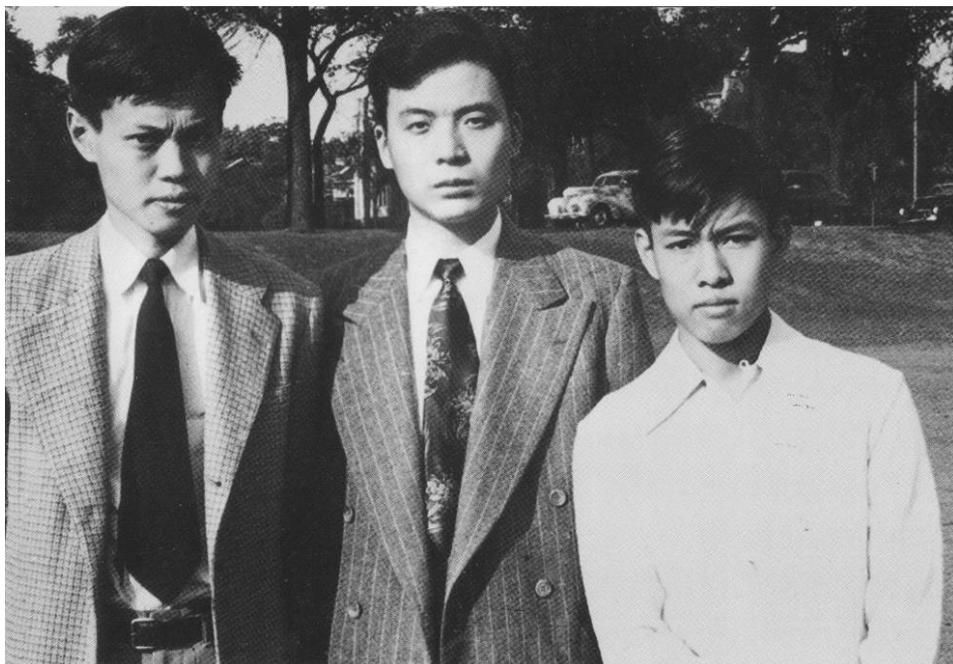
As the discussion on Chinese students continued within the U.S. government, the first wave of those who came to the United States in the immediate post–World War II years began to complete their study and graduate. Most, including Chen Ning Yang and Tsung Dao Lee, who received their Ph.D.’s in physics from the University of Chicago in 1948 and 1949 respectively, and who would later become the first Chinese to win Nobel prizes in 1957, decided to take advantage of the new possibility to stay in the United States and find suitable jobs while waiting for the political situations in China to settle. Others, numbering in the hundreds, returned to China from late 1949 to autumn 1951. These included Deng Jiaxian, Yang’s boyhood friend who had received his Ph.D. in nuclear physics from Purdue in 1950, returning to China the same year; he later became a major architect of the Chinese nuclear weapons program. (See Figure 1.)

As before, some of them were drawn back by a sense of patriotic attachment to the homeland, a sentiment often reinforced by personal experiences of discrimination in the United States. They saw the possibility of both professional development and national reconstruction in China under the Communists who were given the benefit of the doubt, especially in view of the corrupt Nationalist government the students had earlier known. Often these students and scientists were also pulled by strong family ties and feared a permanent separation from spouses, children, and parents in China if they waited any longer. Remarkably, even the outbreak of the Korean War in late June 1950 and the Chinese entry into the war later in the year, did not immediately result in a U.S. ban of students returning to China. Actually, these events may have pushed those undecided students and scientists to make up their minds to return for fear of subsequent permanent separation between the two countries.

The Korean War did, however, intensify American domestic anticommunism, with profound impact on the Chinese students. It led to the high profile arrest, in the summer of 1950, of Qian Xuesen (Hsue Shen Tsien), a prominent Chinese American aerodynamic scientist at Caltech who had planned to return to China after his security clearance was revoked on charges of Communist Party membership. He was later released but forbidden to leave the country under “suspended” deportation. Three other Chinese scientists from Caltech, including the nuclear physicist Zhao Zhongyao, were detained on their way to China as their boat reached Hokoyama, Japan; they were allowed to continue their journey several months later when it was determined that their luggage did not carry classified documents as initially suspected.<sup>7</sup>

<sup>6</sup> Transcript of proceedings of meeting on “Problems of U.S. Policy in China,” 6–8 October 1949, available in “Declassified Documents Reference System,” an online subscription database accessed in August 2008 at the University of California, Santa Barbara, Library: (<http://infotrac.galegroup.com/itweb/ucsbantabarbara?db=DDRS>), p. 364.

<sup>7</sup> On the plight of Qian Xuesen see Iris Chang, *Thread of the Silkworm* (New York: Basic Books, 1995), pp.



**Figure 1.** Chinese students/scientists C. N. Yang, Deng Jiaxian, and C. P. Yang (C. N. Yang's younger brother) in Chicago in 1949. Courtesy of Professor C. N. Yang.

In 1951, a gradual change in U.S. policy began to make it increasingly difficult for Chinese students and scientists to return to China. Against the backdrop of the Chinese entry into the Korean War and the rising McCarthyism at home, a battle raged within the U.S. government over what to do with the Chinese students. Apparently, the Department of Justice, especially its Immigration and Naturalization Service (INS), treated the Chinese students as potential troublemakers and wanted to get rid of them, while the State Department hoped to make them feel comfortable in the United States, granting scholarships and permissions to work, thereby dissuading them from returning to China.<sup>8</sup>

The first clear and dramatic signal that the U.S. government finally decided to stop Chinese students and scientists from returning to China came in the fall of 1951. On 20 September, twenty-one Chinese students boarded the *President Cleveland* for China; when the boat reached Honolulu, nine of them, including Xie Jialin, who had just completed his Ph.D. at Stanford in particle physics, were prevented from re-boarding after an excursion on land. They were forced to return to the U.S. mainland. An INS letter that was handed to them stated that laws and regulations passed during the World Wars authorized the president to order certain aliens “not to depart or attempt to depart from the United States” under threat of \$5,000 fines or up to five years in prison. Soon many

149–174. See Zuoyue Wang, “Zhao Zhongyao,” in *The New Dictionary of Scientific Biography*, ed. Noretta Koertge, 7 vols. (New York: Charles Scribner’s Sons, 2007), Vol. 7, pp. 397–402.

<sup>8</sup> James Reston, “Chinese Students in Country Stir Fight of U.S. Agencies,” *New York Times*, 9 March 1951, p. 3. Indeed, there were reports of the INS forcing some students belonging to left-leaning organizations to return to China at this point. See Arthur Hamilton (foreign-student adviser, Univ. Illinois), “Students’ Return Queries,” (letter to the editor), *New York Times*, 30 March 1951, p. 28.



**Figure 2.** Chinese students/scientists Shi Changshu, Lin Zhengxian, and Zhang Xingqian in Boston in 1954, after they signed an appeal to President Eisenhower. From *Jianguo chuqi liuxuesheng guiguo jishi* [Chronicles of Journeys Home by Students Studying Abroad during the Early Years of the People's Republic of China] (Beijing: China Culture and History Press, 1999).

Chinese students and scholars, especially those specializing in science, technology, agriculture, and medicine, who had applied for permission to exit the country, received a similar letter from the INS. The long-standing desire to Americanize China via science and technology gave way to immediate Cold War concerns.<sup>9</sup>

Reactions to this turn of events from those would-be Chinese returnees ranged from anger to frustration, to resignation. With accompanying relaxation on employment restrictions, most of them were able to find jobs in universities or industrial firms. As time went on, some changed their minds and decided to stay in the United States while others kept looking for a change of policy, especially after the signing of the Korean War armistice in July 1953. Some of them carefully organized themselves in a public relations campaign to win sympathy from the American public and media for their right to return to China. (See Figure 2.)

In August 1954, for example, a group of Chinese students sent an appeal to President

<sup>9</sup> On the Chinese students detained in Hawaii see “Woguo liumei xuesheng guiguo tuzhong jing zao meiguo zhengfu wuli kouliu [The U.S. Government Unjustly Detained Our Students Who Had Studied in the U.S. on Their Way Home],” *Kexue Tongbao* [Science Bulletin], 1951, no. 11, p. 1162. See also Xie Jialin, *Meiyou zhongdian de lücheng* [A Journey without Destination] (Beijing: Science Press, 2008), pp. 43–44. A copy of the INS letter to Chinese students and scientists is reprinted in *Jianguo chuqi liuxuesheng guiguo jishi* [Chronicles of Journeys Home by Students Studying Abroad during the Early Years of the People's Republic of China] (Beijing: China Culture and History Press, 1999), p. 478.

Dwight Eisenhower on humanitarian grounds and on account of the American ideal of scientific internationalism:

Having been well received by various people we have met in the United States and having observed at first-hand a democracy at work, under which human beings are held sacred, we feel all the more that preventing us from leaving this country can at best be attributed to a temporary expediency, especially when the persons concerned are guilty of no crime and the sole reason for restraining their departure is their acquisition of technical training. We would respectfully point out that the technical training we have received here involved no codes of secrecy, indeed the spreading of scientific knowledge and technical know-how has been the very spirit of a great tradition of this country ever since its establishment. . . . We sincerely appeal to you, Mr. President, to make it possible for any Chinese student to leave the United States whenever he chooses and we petition you to revoke this restraining order.<sup>10</sup>

Even though the students did not receive any official responses, their efforts in this period began to win them increasing public sympathy. For example, a group of China/East Asia scholars argued the following in a letter to the editor of the *New York Times*: “The detention in America of foreign students who have not been charged with any crime is incompatible with American principles of justice. We are convinced that the technical knowledge they may take back to China will do America less harm than the ill-will created, here and abroad, by keeping them in this country against their wishes.”<sup>11</sup>

Eventually, what won the students, and Qian, freedom to return to China was less their humanitarian or technical arguments than the U.S. desire to exchange them for Chinese-held American POWs and civilians. Nevertheless, the students and scientists were welcomed back in China with open arms, and many of the returnees took key positions in the Chinese research, development, and educational systems, especially in the defense sector. The cutting edge science and technology they brought back gave the Chinese leaders growing confidence that China could indeed launch its modernization drive. It may also have encouraged the Chinese leadership to pursue increasing independence from the Soviet Union.<sup>12</sup>

Altogether, from 1949 to 1956, 129 of these returned students went to work in the elite Chinese Academy of Sciences (CAS), and 109 of them achieved the senior status of associate research fellow (equivalent to associate professor), accounting for one quarter of all such positions in the academy. Qian Xuesen became the director of the Institute of Mechanics of the academy and later organized the Chinese rocket and missile programs. In fact, the Chinese government decided to launch its missile program in large part due to the return of Qian. Both individually and as a group, it is difficult to overestimate the importance of these returned students and scientists to the Chinese nuclear weapons and space programs. Among the twenty-three scientists

<sup>10</sup> Letter from Chia Hua Chang and others to President Eisenhower, 5 August 1954, reprinted in *Jianguo chuqi* (cit. n. 9), pp. 480–481.

<sup>11</sup> Hans H. Frankel, *et al.*, “Exchange of Prisoners in China,” (letter to the editor), *New York Times*, 14 June 1954, p. 20.

<sup>12</sup> On the return of the students and scientists to China see Chang, *Thread of the Silkworm* (cit. n. 7). Once again, the INS acted in a heavy-handed manner, arresting and deporting those who failed to depart the United States immediately: Harrison Salisbury, “U.S. Is Criticized on China Students,” *New York Times*, 3 June 1955, p. 1. In the late 1960s, the Soviets claimed that the return of Qian and others was part of China’s “clandestine bargaining with the [American] imperialists” at the expense of the Soviet Union: William L. Ryan and Sam Summerlin, *The China Cloud: America’s Tragic Blunder and China’s Rise to Nuclear Power* (Boston: Little, Brown, 1968), p. 269.

who were given national medals in 1999 for their contributions to the nuclear, missile, and satellite projects, nine returned to China between 1949 and 1957.<sup>13</sup>

The U.S.-China transnational scientific movement during the Cold War included not only people, but instruments and materials as well. The nuclear physicist Zhao Zhongyao, for example, returned to China in 1950 with about \$50,000 worth of accelerator parts (after passing extensive FBI inspection) that became the basis for some of the earliest research and teaching tools in high energy physics in China. Similarly, an oscilloscope made and brought back by the neuroscientist Zhang Xiangtong (Ph.D., Yale University, 1946) in 1956 was so advanced that it attracted the interest of scientists not only within China but also from Eastern Europe, even into the 1960s.<sup>14</sup> While these instruments carried no direct military significance, they were clearly useful in Chinese scientific and technological development in general.

More subtle but no less important were the general ideas about scientific research, education, and organization that these American-trained scientists brought with them to China. For example, shortly before his death in 2009, Qian, though bitter about his official treatment in the United States, advocated the American model of innovative scientific education in preference to the rigid Soviet one that still plagues Chinese universities today. In 1958, shortly after his return to China, he had helped found the elite University of Science and Technology of China (as part of the CAS), which was reportedly based on the model of Caltech. Also, while Nie Rongzhen, the military-administrative head of the Chinese nuclear weapons complex during the Cold War, has been widely credited with the creation of a flexible research and development management system, it is conceivable that Qian and other American-returnee Chinese scientists played a key part in its conception and certainly in its implementation.<sup>15</sup>

Yet, as influential as these American-educated scientists were in China, it would be a mistake, as Krige has rightly pointed out in his study of the Europe case, to call what happened in China a simple process of Americanization, or for that matter, Sovietization. What took place was a fascinating conflation of American, Soviet, European, and Japanese, as well as indigenous Chinese styles of scientific research and education within a highly political environment that still needs to be untangled and understood. Indeed, the honeymoon between the returned students and scientists and Mao Zedong's party-state did not last long. Returned scientists soon found themselves targets of ideological campaigns and political purges that became more strident and dangerous in the late 1950s. During the radical Cultural Revolution of 1966–1976, many of the U.S. returnees were accused of

<sup>13</sup> On the occupations of the returned scientists see Yao and others, *Zhongguo kexueyuan [Chinese Academy of Sciences]*, 3 vols. (Beijing: Contemporary China Press, 1994), Vol. 1, p. 63. On Qian Xuesen see Zhou Junlun, ed., *Nie Rongzhen nianpu [A Chronicle of Nie Rongzhen]*, 2 vols. (Beijing: People's Press, 1999), Vol. 2, p. 765; and Chang, *Thread of the Silkworm* (cit. n. 7). For the list of the national medal winners see "Zhonggong zhongyang guowuyuan zhongyang junwei zai jing juxing dahui longzhong biao Zhang wei yanzhi 'liangdan yixing' zuochu tuchu gongxian keji zhuanjia [The Chinese Communist Party Central Committee, the State Council, and the Central Military Commission Held a Conference in Beijing to Honor Those Scientific and Technical Experts Who Made Outstanding Contributions to the Nuclear Bomb, Missile, and Satellite Programs]," *Renmin Ribao [People's Daily]*, 19 September 1999, p. 1.

<sup>14</sup> Wang, "Zhao Zhongyao" (cit. n. 7); and Zhang Wei, *Zhang Xiangtong zhuan [A Biography of Zhang Xiangtong]* (Shanghai: Shanghai Scientific and Technological Education Press, 2003), p. 226.

<sup>15</sup> Sun Wen, "Qian Xuesen de rencai yousi [Qian Xuesen's Concern over Talent]," 2 Nov. 2009, available from [http://news.xinhuanet.com/edu/2009-11/03/content\\_12375592.htm](http://news.xinhuanet.com/edu/2009-11/03/content_12375592.htm). See also an online interview with Qian's secretary Ji Yuanji at <http://scitech.people.com.cn/GB/10368107.html>. (Both accessed Nov. 2009.) On Nie and the Chinese nuclear program see Evan A. Feigenbaum, *China's Techno-Warriors: National Security and Strategic Competition from the Nuclear to the Information Age* (Stanford, Calif.: Stanford Univ. Press, 2003).

being American agents and were severely punished; this was ironic in view of the earlier American charges of some of them as Chinese Communist agents. Those who worked in the defense sectors were sheltered to some degree but even they could not always escape trouble. In many ways, the story of the American-educated Chinese scientists was a good illustration of what the historian Gabrielle Spiegel calls the “losses experienced in the process of migration, exile, and diasporic movement” that have been much less heralded in view of “the rather triumphalist tone of current work on transnationalism.”<sup>16</sup>

The political status of the returned scientists did not improve significantly until Mao’s death, and with him the end of the Cultural Revolution in 1976. Deng Xiaoping, the pragmatic leader, reemerged to lead China toward economic reform and an opening up to the world. In the 1980s and 1990s, many of the returnees resumed scientific leadership positions and were, for the first time, able to visit the United States after more than a quarter of a century. They were happy to meet with their old mentors and classmates, and also used these opportunities to open new connections so their own students could come to the United States and follow in their footsteps. Thus a new wave of studying in the United States was launched in the 1980s which has, by now, far surpassed even that in the first half of the twentieth century. Interestingly enough, in promoting U.S.-China scientific and educational cooperation and exchange, the returnees found their best allies to be the Chinese American scientists—those Chinese scientists in the United States who had chosen to stay.

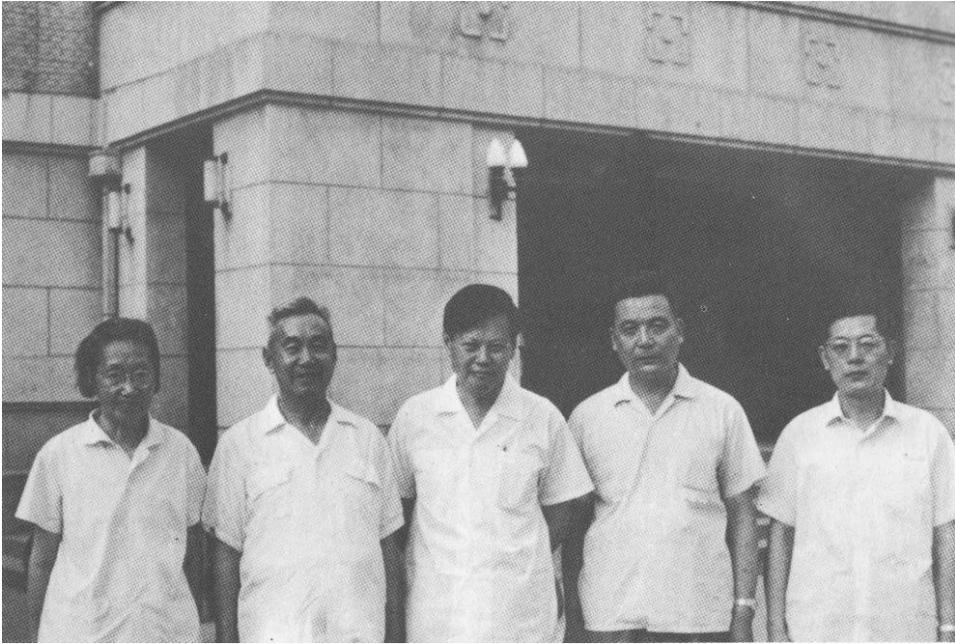
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If the Chinese students and scientists who returned to China from the United States in the early Cold War represented a qualified “Americanization” of Chinese science, the decision of about 4,000 of their peers who decided to stay in the United States after 1949 marked one of the most dramatic developments in the transnationalization of the American scientific community. Joining them in the United States in the next decade or so were several thousand more Chinese intellectuals, including many scientists and engineers, often with American training, who had first fled the Chinese mainland in 1949; they had gone to Hong Kong before entering the United States under a series of measures designed to strengthen American Cold War manpower. A third group of Chinese scientists and engineers migrated to the United States in the post-World War II period as students from Taiwan and Hong Kong, a process that was facilitated by the 1965 U.S. immigration reform.<sup>17</sup>

Thus, although McCarthyism did take its toll on international scientific communication in the 1950s and 1960s, the transnationalization of the American scientific community via the immigration of scientists from China and elsewhere, continued apace in the postwar decades. According to one study, thirty-six of the 114 (or 32 percent) of American citizens who won Nobel prizes between 1945 and 1984 were foreign-born. While Yang and Lee

<sup>16</sup> See Zuoyue Wang, “Physics in China in the Context of the Cold War, 1949–1976,” in *Physics and Politics*, ed. Helmuth Trischler and Mark Walker (Berlin: Sterner Verlag, 2010), pp. 251–276; and Gabrielle M. Spiegel, “The Task of the Historian,” *American Historical Review*, 2009, 114:1–15, on pp. 11–12.

<sup>17</sup> Benjamin Zulueta, “Forging the Model Minority: Chinese Immigrant Intellectuals, American Science, and the Cold War” (Ph.D. diss., Univ. of California, Santa Barbara, 2003). See also Zulueta, “Master of the Master Gland: Choh Hao Li, the University of California, and Science, Migration, and Race,” *Historical Studies in the Natural Sciences*, 2009, 39:129–170; and Zuoyue Wang, “Chinese American Scientists and U.S.-China Scientific Relations: From Richard Nixon to Wen Ho Lee,” in *The Expanding Roles of Chinese Americans in U.S.-China Relations: Transnational Networks and Trans-Pacific Interactions*, ed. Peter H. Koehn and Xiaohuang Yin (New York: M. E. Sharpe, 2002), pp. 207–334.



**Figure 3.** C. N. Yang (center) meets with Chinese nuclear physicists Wang Chengshu, Zhang Wenyu, Deng Jiaxian, and Zhou Guangzhou in Beijing in 1972. Wang, Zhang, and Deng had returned from the U.S. in the 1950s. From C. N. Yang, *Dushu jiaoxue sishi nian [Studying and Teaching for Forty Years]* (Hong Kong: Sanlian Shudian, 1985).

were Chinese citizens in 1957, six other ethnic Chinese science laureates claimed U.S. citizenship at the time of their awards: Samuel Ting in physics in 1976, Yuan T. Lee in chemistry in 1986, Steven Chu in physics in 1997, Daniel Tsui in physics in 1998, Roger Tsien in chemistry in 2008, and Charles Kao in physics in 2009. Among them, Tsien and Chu were born in the United States to parents who were from the generation of the stranded students.<sup>18</sup>

The reopening of U.S.-China relations in the early 1970s, and especially the establishment of diplomatic relations in 1979, brought the two strands of Chinese/American scientists—both those who returned to China and those who stayed in the United States—together again. One can only imagine the emotional encounter in August 1971 when Yang, who became the first prominent Chinese American scientist to visit China after President Richard Nixon had relaxed the restrictions on travel to China, met in Beijing with Deng Jiaxian. (See Figure 3.)

As the two groups joined hands in promoting U.S.-China scientific exchange and

<sup>18</sup> See, for example, Roli Varma, *Harbinger of Global Change: India's Techno-Immigrants in the United States* (Lanham, Md.: Lexington Books, 2006). For the number of foreign-born Nobel Prize winners with U.S. citizenship see Congressional Research Service of the Library of Congress, *The Nobel-Prize Awards in Science as a Measure of National Strength in Science*, Science Policy Study Background Report No. 3 (Washington, D.C.: U.S. Government Printing Office, 1986), p. 16. See also information, including autobiographies, on the website of the Nobel Foundation: [nobelprize.org](http://nobelprize.org), accessed Nov. 2009. Roger Tsien's father was a first cousin of Qian Xuesen. Yuan T. Lee renounced his U.S. citizenship in 1994 when he returned to Taiwan to become president of its Academia Sinica. At the time of his Nobel in 2009, Charles Kao had a dual British-U.S. citizenship.

collaboration, one of their most enthusiastic efforts was to facilitate Chinese students studying mostly science and engineering subjects in U.S. universities. Thus, the cycle was completed. By 2003, their efforts had brought 326,000 Chinese scientists and engineers to the United States, including 35,321 who would receive their Ph.D.'s from American universities, accounting for one out of every ten Ph.D.'s in science and engineering granted by these institutions from 1983 to 2003. Remarkably, like their 1949 cohort, most (about 90 percent) of the newcomers decided to stay in the United States following their education.<sup>19</sup> Finally, perhaps the ultimate irony in the story of the 1949 generation of Chinese/American scientists is how a number of them actually traded places after retirement in the 1990s and 2000s: some of those who had stayed in the United States moved to Chinese universities where they were welcomed as world-renowned scientists, while some of the returnees came back to the United States to live with their scientist children who had moved there as students in the 1980s and 1990s.

How does this examination of Chinese/American scientists change our view of Cold War science? For one, I hope it has helped to make clear that the “Americanization” of Cold War science went beyond the Iron Curtain and into unsuspected areas such as China, although perhaps not as the result of an intentional American policy as in the case of western Europe. In its own way, the post-1949 return of hundreds of American-trained scientists to China played just as significant a role in spreading American science and technology as did the Atoms-for-Peace programs and other American Cold War measures.<sup>20</sup> At the same time, the decision by thousands more Chinese scientists to stay in the United States or to leave China for the United States helped to change dramatically the ethnic makeup of the American scientific community during the Cold War, contributing to its steady transnationalization that has continued in the post-Cold War period and into the twenty-first century.

Indeed, one can argue that Americanization of international science and the transnationalization of the American scientific community were intimately connected: it was the rise of American science, especially in the post-World War II period, that made the United States the most attractive place for students and scientists all over the world, including those in China, to come to study and work. In turn, the rich international and ethnic diversity of the American scientific community both encouraged a synergistic fusion of scientific styles due to the interactions of immigrant and native scientists, and helped further the process of Americanization as these scientists played influential roles in the science and education policy of their countries of origin. This dynamic would have probably existed even without the Cold War, but the longstanding, worldwide conflict clearly intensified both trends as it brought science and the states closer together than otherwise possible. In the end, what shaped the experiences of Chinese/American and other scientists during the Cold War was a combination of international politics, national policy, and individual choices that made them truly transnational subjects.

<sup>19</sup> Yang Zhenning (C. N. Yang), “Deng Jiaxian,” *Ershi Yi Shiji* [Twenty First Century], June 1993, pp. 56–62. See Wang, “Chinese American Scientists” (cit. n. 17); Wang, “‘Xuehao shulihua. . .’: 1978 nian hou dalu liumei kexuejia yanjiu [‘If You Learn Your Math, Physics, and Chemistry. . .’: A Study of Scientists from Mainland China in the U.S. Since 1978],” in *Beimei huaqiao huaren xin shijiao: huaqiao huaren yanjiu Shanghai luntan wenji* [New Perspectives on Chinese in North America: Proceedings of the Shanghai Forum on the Studies of Overseas Chinese] (Beijing: Overseas Chinese Press, 2008), pp. 134–148.

<sup>20</sup> Zuoyue Wang, “Ristrutturazione [Restructuring],” in *Storia della Scienza*, ed. Sandro Petruccioli, 10 vols. (Rome: Istituto della Enciclopedia Italiana, 2005), Vol. 8, pp. 553–560.