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Chinese American Scientists and U.S.–China Scientific Relations

From Richard Nixon to Wen Ho Lee

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When President Richard Nixon embarked on his historic journey to Beijing in February 1972, the trip not only opened a new era in U.S.–China relations, but also began an exciting process of mutual rediscovery among the two peoples. The end of the schism brought forth unprecedented exchanges in many walks of life—especially in academia.[1] Perhaps more than any other group, Chinese American scientists helped facilitate these post-Nixon interactions as contacts flourished and expanded in the 1970s and the 1980s. This intellectual "open door" proved to have profound social and political, as well as scientific, impacts as China emerged from the devastating Cultural Revolution (1966–1976).

Curiously, there has been little scholarly work on the role of Chinese American scientists in U.S.–China relations either in English or Chinese. Several excellent studies examine U.S.–China academic and educational exchanges, but they barely touch on the scientific components or the role of Chinese American scientists—thus obscuring the part they play in the developing relationship. Further, most studies focus on the effects of academic exchanges in the United States and leave the political, social, and cultural impact of such exchanges on Chinese society and on U.S.–China relations unexamined.[2] In the late 1990s and early 2000s, the case involving Wen Ho Lee, accused of passing nuclear secrets to China, did focus national media attention on U.S.–China scientific exchange and Chinese American scientists, but few in-depth historical studies have emerged among the numerous reports on the controversy.

In this chapter, I argue that Chinese American scientists and academics have played an important, but often neglected, role in re-opening the

relationship and in the subsequent development of U.S.–China relations. In addition, the ensuing exchanges transformed Chinese American scientists from a secluded elite group within a marginalized "model minority" in U.S. society into agents of transnational technoscience possessing cultural and even political import in both societies—especially in China.

I aim to ground the experiences of Chinese American scientists in the context of the history of Chinese Americans and U.S.–China relations—exploring the influence of Chinese cultural nationalism, the Asian American civil-rights movement, and state-sponsored internationalism during and after the Cold War on the formation and identity of a distinct Chinese American scientific community. As members, if not representatives, of their respective generations, five Chinese American scientists figure prominently in this account of the community's evolution. In chronological order of arrival in the United States, these are Qian Xuesen (Hsue-shen Tsien), an aerodynamic scientist who came before World War II; Chen Ning Yang (C.N. Yang) and Tsung Dao Lee (T.D. Lee), physicists who arrived after World War II and rose to international academic prominence in the 1950s–1980s; Chang-Lin Tien, a mechanical engineer who came via Taiwan and gained influence in the 1990s as chancellor of the University of California–Berkeley; and finally, Wen Ho Lee, a computer scientist who arrived in 1965 and has been at the center of national controversy over alleged Chinese espionage of U.S. nuclear secrets in the 1990s and early 2000s. Although the discussion in this chapter concentrates on physics, extensive exchanges took place in other scientific and technological areas—such as biology, mathematics, geology, and agriculture—and Chinese American scientists and engineers also played active roles in those fields.

My definition of a Chinese American scientist is intentionally broad due to the remarkable mobility these scientists enjoy or were forced to follow in the network of the Chinese Diaspora—which includes the United States, China, Hong Kong, and Taiwan. Qian, for instance, spent two decades of his scientifically most productive years in the United States, with plans for permanent settlement, until forced to return to China in the 1950s during the McCarthy period. He is included here as a Chinese American scientist because many of those who came after him view his academic success in the United States as trail-blazing. Another indication of the ease with which prominent Chinese American scientists crossed national boundaries in this diasporic network is the phenomenon of Chinese American scientists serving in top academic posts in Hong Kong, Taiwan, and, increasingly, in the China Mainland. Yuan Tze Lee, a Nobel laureate in chemistry and long-time professor at the University of California–Berkeley, for example, returned to Taiwan in 1994 to head its Academia Sinica.[3] In 2000, Paul

Ching-wu Chu, a Chinese American physicist at the University of Houston known for his breakthroughs in superconductivity, agreed to become president of the Hong Kong University of Science and Technology, replacing Chia-Wei Woo, another Chinese American physicist who formerly headed San Francisco State University.[4] Some of these Chinese American scientists later returned to the United States. Eugene Wong, a pioneer in database design and another long-time U.C. Berkeley faculty member who served as associate director of the White House Office of Science and Technology Policy from 1990 to 1993, for instance, moved to Hong Kong to become vice chancellor for research and development at Woo's university in 1994. Four years later, however, the National Science Foundation summoned Wong back to Washington to head the engineering directorate.[5]

It is as difficult to demarcate the boundary of Chinese American scientists by citizenship as it is by position. While Yuan Tze Lee gave up his U.S. citizenship when he returned to Taiwan in 1994, others, like Wong, kept theirs. Many other Chinese American scientists spent most of their careers in the United States, but remained Chinese citizens. In view of the ambiguity and fluidity that characterize key aspects in the identity of Chinese American scientists, I find it advisable to adopt an inclusive and functional definition. Thus, instead of relying on positions and citizenship, I use the term "Chinese American scientists" to denote all those scientists and engineers of Chinese ethnic origin who spent a significant portion of their careers in the United States. I also limit the subject of this study to those who have had an impact on the formation of the Chinese American scientific community and its role in U.S.–China relations. While much of the chapter is concerned with the Cold War years, the Wen Ho Lee case is included for what it reveals about the role of Chinese American scientists in post–Cold War U.S.–China relations.

Throughout this account, I use the experiences of individual scientists to gain a sense of the evolution of the role of Chinese American scientists in U.S.–China relations both before and after Nixon's trip in 1972. The chapter also looks at how the Cold War affected their status in U.S. society. This analysis provides important background to understanding the role of Chinese American scientists during the post-Nixon exchanges of the 1970s and 1980s and in the more recent era. The central question addressed is: how do Chinese American scientists affect U.S.–China relations by their actions as a unique subnational and transnational scientific community? In addition, the chapter examines the impact of the scientific exchanges on Chinese science and educational policy and on Chinese scientists—many of whom suffered persecution during the Cultural Revolution in China.

Chinese Scientists in the United States

When C.N. Yang, then at the Princeton Institute of Advanced Study, and T.D. Lee, at Columbia University, won the Nobel Prize in Physics in late 1957, they not only brought pride to Chinese all over the world; they also gave some relief to Americans who worried that the West was losing the Cold War with the communist bloc in science and technology. Just days before, the Soviet Union had launched *Sputnik*, the first artificial satellite, touching off mass hysteria in the United States about a "missile gap" imperiling U.S. national security. *Sputnik*-inspired reforms led to the massive National Defense Education Act program to beef up U.S. science and education and to numerous measures aimed at expediting the immigration of foreign technical manpower.[6]

As science became a weapon in the Cold War, both for its military applications and for its symbolic importance as a measure of national prestige, Yang and Lee found themselves wooed on both sides of the iron curtain. The fact that they were not U.S. citizens (both traveled on Kuomintang Chinese passports) led U.S. government officials to keep "an anxious eye" on them when they flew to Sweden in December 1957 to receive their Nobel awards. The watchful officials breathed a collective sigh of relief when Yang announced in a speech at the Nobel banquet that "I am as proud of my Chinese heritage and background as I am devoted to modern science—a part of human civilization of Western origin." In the end, they were happy to see both prize winners return promptly to the States.[7]

The Nobel Prize celebration and media attention, however, only masked the deep social, cultural, and political tensions felt by Yang and Lee and many other Chinese scientists and engineers at the time. What first drew Chinese students to study science and technology in the United States, around the turn of the century, was their dream of building a strong, modern, and democratic China. The U.S. government encouraged such tendencies in an effort to influence the future direction of China. It stipulated in the early 1900s, for instance, that the United States would return part of the indemnity it received from China for the Boxer Rebellion of 1900 against foreigners only if the Chinese government used the funds to send students to the United States. The resulting Boxer fellowship program brought hundreds of elite Chinese students and scientists to the United States from the 1910s to the 1940s. Yang was one of these so-called Boxer scholars and, indeed, made the history of the Boxer program a central part of his address at the Nobel banquet in 1957. Recounting his ambivalent feelings about the Boxer program, Yang said, "I am in more than one sense a product of both the Chinese and Western cultures, in harmony and in conflict."[8]

Racial discrimination marked Chinese scientists' social experiences in the United States during the era of the Chinese Exclusion Act (1882–1943). Until the repeal of the last exclusion act in 1943, the U.S. government denied students from China rights to become permanent residents or citizens. Racism against Asian Americans persisted in the postwar period. Even as late as 1954, a developer refused to sell a house to Yang—then a member of the prestigious Institute of Advanced Studies at Princeton. The developer feared that "our being Chinese might affect his sales," Yang recalled.[9] Chang-Lin Tien recalled being "confused and scared" by drinking fountains labeled "white only" and "colored" when he arrived in Louisville, Kentucky, in 1956. At the University of Louisville, one of his professors called him "Chinaman"—supposedly due to difficulties pronouncing Chinese names. When Tien learned that it was a derogatory term, he confronted the professor and made him stop the practice: "If you can't remember my name, don't call on me anymore."[10]

International politics also complicated the lives and careers of Chinese American scientists. When the Chinese Communists won the civil war in 1949, many Chinese students decided to return to China. Having detested the corrupt Kuomintang government and experienced humiliating discrimination in the United States, these students placed great hope in a new China—whose government appeared to focus on national reconstruction and appreciate the role of science and scientists in the endeavor. The Korean War that broke out in the summer of 1950, however, soon closed the window of opportunity for Chinese students and scholars who wanted to return to their homeland. The U.S. government forbade Chinese nationals, especially those studying or specializing in science and engineering, from returning to China. The ensuing McCarthyist "Red Scare" targeted, among others, Chinese scientists suspected of left-wing activities and associations. These measures greatly alienated many Chinese scientists and engineers.

The best-known example of the disillusioned Chinese scientist is Qian Xuesen, an aerodynamic scientist at the California Institute of Technology. As a favorite student of Theodore von Karmen, Qian rose to the top of the profession in the 1940s, helped found the Jet Propulsion Laboratory, and contributed to U.S. weapons development during World War II. In the postwar period, Qian became a member of the influential Air Force Scientific Advisory Board—in spite of the fact that he retained his Chinese citizenship. He applied for U.S. citizenship in 1949.[11] Trust turned into suspicion during the McCarthy era, however, when he lost his security clearance. Humiliated, Qian decided to return to China, but the U.S. government charged him as a Communist Party member and spy for China and placed him under house arrest for five years—effectively prohibiting him from leaving the country.

At a dramatic hearing on Qian's case, an official asked him: "In the event of conflict between the United States and Communist China, would you fight for the United States?' " Qian, after a long pause, answered "my essential allegiance is to the people of China. If a war were to start between the United States and China, and if the United States war aim was for the good of the Chinese people, and I think it will be, then, of course, I will fight on the side of the United States."[12]

As a result of the Geneva Conference between the United States and China, the U.S. government eventually allowed Qian and hundreds of other Chinese scientists and engineers to return to China in the mid-1950s—in exchange for U.S. prisoners of war held in China.[13] However, Qian's experience, especially his treatment at the hands of the U.S. government, had a lasting impact on Chinese American scientists. Specifically, the persecution of Qian during the McCarthy era caused many Chinese American scientists to avoid political issues. To stay out of trouble, many in the Chinese American community, including scientists, adopted a strategy of striving for achievement in professional fields while shunning politics.[14] They fell silent and fearful, as Chang-Lin Tien put it, "as cicadas in cold weather" (*jinruo hanchan*). "When I came in the 1950s," Tien continued, "many (Chinese American) professors avoided meeting or talking to Chinese students. They dared not even speak Chinese."[15]

Among the thousands of Chinese American scientists who stayed, many, including C.N. Yang and T.D. Lee, became U.S. citizens in the 1950s and 1960s.[16] In the 1960s, the civil rights and anti–Vietnam War movements stirred Asian Americans to activism; they began to fight for their rights in mainstream society and culture.[17] The Asian American movement of the late 1960s and early 1970s, according to one commentator, "made Asian Americans more American and less Asian."[18] Chinese American scientists did not play a prominent role in the movement, but many began to change their earlier, conservative political stand and participated in the civil rights and, especially, the anti-war movements.[19] The emotional soul-searching that accompanied their decision to become U.S. citizens also led many of these scientists to discover the early, bitter history of Chinese Americans in the United States. They began to identify with the plights not only of early Chinese immigrants, but also of contemporary Chinese American communities cloistered in the different world of the Chinatowns in urban centers throughout the United States.[20] They often drew inspiration from examples of community solidarity by other ethnic groups, especially the African American civil rights struggle and Jewish American fight to remember the Holocaust.[21]

By all indications, prominent members of the nascent Chinese American scientific community grew active politically when the U.S.–China rapproche-

ment took place in the early 1970s. A new generation of Chinese American scientists, such as Chang-Lin Tien, who left the China Mainland for Taiwan in 1949 and came to study in the United States in the 1950s, became politically active in the 1960s. They began to organize themselves during the *Baodiao* (Defending Diaoyutai Islands) Movement during the late 1960s and early 1970s. Diaoyutai, a group of islets near Taiwan and Okinawa that traditionally belonged to China, had been ceded, together with Taiwan itself, to Japan in the aftermath of the 1895 Sino-Japanese war. The U.S. military kept the islets as a training site instead of returning them to China as scheduled in 1945. In the late 1960s, Japan asserted ownership after the discovery of oil in the area. The U.S. government acquiesced to the Japanese claim when it turned over Diaoyutai (Senkaku in Japanese), along with Okinawa, to Japan. This action enraged Chinese Americans. In 1971, dozens of prominent scientists and scholars, including C.N. Yang and Chang-Lin Tien, signed an open letter to President Nixon and members of Congress asking them to "recognize Chinese sovereignty over these islands."[22]

The *Baodiao* Movement played a crucial role in the political activism of Chinese American scientists of Tien's generation. It stirred their Chinese nationalism and prompted them to organize themselves. During the movement, Tien and his fellow *Baodiao* activists became disillusioned with the weak response of the Kuomintang government in Taiwan. As a result, they looked favorably toward the Mainland government—which took a stronger stand against Japan's claim. Tien made his first visit back to China in 1973—shortly after Nixon's trip.

Chinese American Scientists and U.S.–China Scientific Exchanges

The normalization of the U.S.–China relationship provided Chinese American scientists with a golden opportunity to satisfy their impulse to help their ancestral land and to assert their voice in U.S. society. The door for scientific and cultural exchange finally opened with Nixon's visit to China in 1972.[23] In the famous Shanghai Communiqué, science and technology figured prominently in the new bilateral relationship:

> The two sides agreed that it is desirable to broaden the understanding between the two peoples. To this end, they discussed specific areas in such fields as science, technology, culture, sports, and journalism, in which people-to-people contacts and exchanges would be mutually beneficial. Each side undertakes to facilitate the further development of such contacts and exchange.[24]

Both the United States and China saw scientific exchange as a neutral, nonideological route to mutual understanding after so many years of isolation. Of course, the U.S. government was aware of the military implications of technology transfer and its counterintelligence officials always kept their eyes on visiting Chinese scientists.[25] In the context of the heightened Cold War, however, the Nixon administration decided to take a calculated risk in the hope that a modernized China would provide balance against the Soviet Union and, thus, work in the U.S. national interest. In 1973, for example, Secretary of State Henry Kissinger secretly proposed to Premier Zhou Enlai that the United States would provide China with early-warning-intelligence information (satellite images) on Soviet missile launchings through a hotline. "We could also give you the technology for certain kinds of radars," Kissinger told Zhou, "but you would have to build them yourselves."[26]

Scientific exchanges carried great significance for Chinese leaders concerned with economic development—especially Premier Zhou and Deng Xiaoping. In many ways, Zhou became the gatekeeper in scientific exchange with the United States in the early 1970s. He personally negotiated the first formal academic exchange agreement with the U.S. Committee on Scholarly Communication with the People's Republic of China (CSCPRC) in 1973. The CSCPRC, a semi-official group formed in 1966 by the National Academy of Sciences, American Council of Learned Societies, and the Social Science Research Council, often worked through Chinese American scientists who were visiting China and meeting with Zhou Enlai or other Chinese science-policy makers to facilitate scientific exchanges.[27] In a 1973 meeting with Zhou, the CSCPRC presented a list of twelve items of exchange, and Zhou gave his blessing to nine of them—all in natural sciences. He excluded three social science projects (China studies, urban studies, and science and technology in China's development) as requiring further preparation.[28] Nevertheless, Zhou took great personal interest in scientific exchange with the United States and sought to ensure that the framework of exchange would survive personnel changes at the top of both governments—especially in view of Nixon's domestic political troubles.[29]

Interestingly, remarkably few Chinese American scientists exhibited much loyalty to Taiwan. Instead, they decided to travel to the China Mainland in spite of explicit expressions of displeasure by the Taiwan government. Some scientists even visited in the face of anonymous threats attributed to pro-Taiwan forces in the 1970s and 1980s.[30] Taiwan blacklisted Chang-Lin Tien, at the time professor of mechanical engineering at UC–Berkeley, for several years because of his trip to the Mainland in 1973.[31]

C.N. Yang and T.D. Lee

Among Chinese American scientists, Yang and Lee were the earliest and most active in the U.S.–China scientific exchange. Yang was the first prominent Chinese American scientist to visit China in summer 1971, right after the Nixon administration lifted the ban on U.S. citizens' travel to China. In many ways Yang's trip set the precedent for other Chinese American scientists. Yang's father, Yang Wuzhi, was a U.S.-trained mathematician and professor in Shanghai. When he learned of his son's intention to come back for a visit, he was uncertain how the Chinese government would react. Therefore, he sent an inquiry to the State Council under Zhou Enlai. The State Council promptly approved the visit and asked the Chinese Academy of Sciences to host Yang in Beijing—hoping to attract other Chinese American scientists to return for visits as well.[32] Indeed, many Chinese American scientists, including T.D. Lee in 1972, followed Yang's footsteps.

As Yang and Lee visited China, each in his own way sought to revitalize Chinese science and society in the aftermath of the Cultural Revolution. When he visited Chinese universities in the early 1970s, Yang—by then a professor at the State University of New York–Stony Brook—was (like many other U.S. scientist visitors) impressed by the observed emphasis on practical applications. Even during his trip in summer 1971, however, he saw problems with the lack of attention to basic research. He raised the issue with Premier Zhou Enlai when Zhou hosted a banquet in his honor.[33] On his return visit in 1972, Yang made a stronger push for basic research.[34] Chinese scientists seized the opportunity afforded by Yang's and other visiting U.S. scientists' advocacy to advance not only the cause for basic research, but also the political fortunes of Chinese science in general.

Likewise, when T.D. Lee met with Zhou Enlai in Beijing on 14 October 1972, he encouraged Zhou to launch China's own basic research program in high-energy physics. He also urged Zhou to invite foreign scientists for visits and to send Chinese students and scientists abroad for study and research. Lee assured Zhou that CERN (European Center for Nuclear Research) and many other laboratories in the West would welcome Chinese scientists, and that such exchanges would not create a "two Chinas" problem because he did not believe that Taiwan was interested in high-energy research.[35] Later, Lee played a key role in the development of the Beijing Electron-Positron Collider. He has remained active in facilitating cooperation between Chinese and U.S. high-energy physicists.[36]

Shared Motives, Different Visions

In many ways, Yang and Lee are representative of Chinese American scientists' home-country cultural nationalism. The most important contribution in his life, Yang said on 28 January 1995 in Hong Kong, was helping "Chinese change their perception that the Chinese were not as talented as others."[37]

In spite of their common goal of helping China, Yang and Lee held sharply different visions for the direction of Chinese science policy, which led them to give radically divergent advice to China's policymakers.[38] Generally speaking, Yang recognized the importance of basic research. He was instrumental in Zhou Enlai's drive to rehabilitate basic research in China. Yet, he came to believe that much more applied research should be undertaken. To Yang, applied research in areas such as computers or biochemistry served as a link in the chain that would transform scientific ideas into technologies and expedite national economic development. For this reason, he advised against China's undertaking an expensive high-energy physics program.[39] With memory of the first-half-of-the-twentieth-century sufferings in mind, Yang regarded poverty as the source of most of China's problems. "The most important thing for China," he said in 1986, is "to advance its economy." He did not want the PRC to engage in high-energy physics because it had nothing to do with economic development; it "might even have negative effects, because it is too expensive."[40]

Lee, on the other hand, consistently advocated that China invest in basic research. He thought that the PRC should develop its own high-energy physics program, including the building of accelerators, as a way to ensure that Chinese scientists keep abreast of advances at the frontiers of science and that China maintain a balanced infrastructure in science. Lee also created the popular China–U.S. Physics Examination and Applications (CUSPEA) program, which, from 1980 to 1988, annually brought about one hundred top Chinese physics students for graduate studies in the United States.[41] His other projects included a continuing special class for science prodigies at the University of Science and Technology of China in Hefei, establishment of the Chinese Center for Advanced Science and Technology in Beijing, initiation of a system of postdoctoral research in China, and, of course, the Beijing Electron-Positron Collider.[42]

The Impact of Chinese American Scientists in China

In spite of divergence in their advice, the prominent role of the Chinese American scientists helped moderate concern in the PRC about the political and cultural values that accompanied scientific exchanges in particular and

modernization and globalization in general. The fact that these Chinese American scientists acted out of nationalistic motives facilitated the transmission of such new values. The identification of Chinese American scientists with Chinese culture also helped alleviate any affront to national pride when they, rather than Westerners who were not ethnically Chinese, promoted ideas that challenged Chinese orthodoxy. Their international background and prominence further enabled them to speak out on sensitive issues with impunity; for similar actions, Chinese scientists would experience trouble. T.D. Lee, for example, told a group of Chinese graduate students in 1979 that he did not think that philosophy had any impact on physics.[43] In 1986, C.N. Yang similarly dismissed this privileged branch of scholarship in China: "Physics influenced philosophy, but philosophy never influenced physics."[44] Government officials denounced such views when advocated by people like Fang Lizhi, the Chinese astrophysicist-dissident who wrote a book entitled *Philosophy Is a Tool of Physics*, as efforts to undermine Marxism's guiding role in Chinese science and society.[45] Inconsistently, the government published both Lee's and Yang's speeches even after purging Fang from the Communist Party for expressing the same view.

Yang and Lee by no means were the only influential Chinese American scientists in China. Hundreds of other Chinese American scientists and professionals visited China in the 1970s. These included such prominent figures as the mathematician Shiing-shen Chern of Berkeley, architect I.M. Pei, and physicist C.S. Wu of Columbia, the first female (and Chinese American) president of the American Physical Society in 1975. Many of these Chinese American scientists were immigrants who had received an undergraduate education in China and had come to the United States in the 1930s and 1940s for graduate training—often with funding from the then Kuomintang government of China. In the 1970s, they participated in exchanges with China in the name of scientific internationalism, but their strongest motivation was cultural nationalism in the sense of identification with the developmental aspirations of their country of origin.[46] Their active participation in U.S.–China scientific exchanges constituted the single most important factor determining the success and character of the transnational scientific network. In turn, the U.S.–China reopening energized Chinese American scientists who, until then, had maintained an almost invisible presence among the U.S. scientific community and the public at large.

Chinese American Scientists as a Transnational Community

The U.S.–China reopening gave Chinese American scientists a sense of community for the first time and enabled them to gain a voice not only in science,

but in public-policy making in the United States and China. Much networking went on among the widely dispersed Chinese American scientists and scholars in the early 1970s, when they sought to organize into groups to expedite their visits to China. They were impressed by the social and material progress in the People's Republic and, upon their return, became influential opinion makers in shaping the U.S. perception of the new China.[47] For the first time in the history of Chinese American scientists, they gained a voice in U.S. public-policy making. In 1971, for example, Yang met Edward David, President Nixon's science advisor, at a scientific meeting and told him about his recent visit to China. Later, David wrote a memorandum for Henry Kissinger concerning this conversation.[48]

Institutionally, Chinese American scientists, especially physicists, began to organize themselves at the national and, later, international levels. In 1977, Yang became the first president of the National Association of Chinese Americans (NACA). NACA, designed to lobby for normalization of the U.S.–China relationship, was composed mainly of scientists and other professionals.[49] Among other actions, the group paid for a full-page advertisement in the *New York Times* pushing for U.S.–China normalization. When Deng Xiaoping visited the United States in 1979, shortly after the two countries finally reestablished diplomatic relations, Yang organized a banquet for him on behalf of the NACA and other Chinese American organizations.[50]

Since the 1970s, common interests in the development of Chinese science, technology, and education and in improving U.S.–China relations have continued to unite Chinese American scientists. In Yang's words, it is "my responsibility to build a bridge of understanding and friendship between the two countries that are close to my heart. I also feel that I should help China in her drive toward developing science and technology."[51] In 1987, a Hong Kong journalist asked Yang what he thought should be done about continued Western restrictions on the export of high technologies to China. Yang replied:

> Ethnic Chinese scientists in the US in general care about the development of science and technology in China. They have requested that relevant agencies relax the restrictions on high-tech exports to China. However, the most important step toward solving this problem is (improving) China's own self-reliance. What we could do is help train China's scientific and technological talents.[52]

It should be understood that by working for enhanced Chinese science and education and improved U.S.–China relations in the 1970s and 1980s, Yang, Lee, and other Chinese American scientists were not in any way pursuing a secret agenda in conflict with that of the U.S. government. Indeed,

many of the exchange programs resulted from official U.S.–China agreements when the Soviet Union's invasion of Afghanistan helped to sustain the Sino-U.S. strategic alliance in the early 1980s. Later, as the China Mainland under Deng Xiaoping launched economic reforms, the administration of President Ronald Reagan promoted scientific contacts as a way both to encourage Chinese reform and to expand the potential market for U.S. products and technology. In testimony before the Congressional Task Force on Science Policy in 1985, John P. McTague, deputy director of the White House Office of Science and Technology Policy, emphasized that "the most effective channel we have found for nations to cooperate has been through science and technology. The example . . . of the People's Republic of China may be the most spectacular success. . . ."[53] In response to questioning from congressmen, he explained that "by increasing technological capabilities in other countries, we then open up new markets for ourselves and, I think, help stabilize the world situation," and added, "it is clear that the People's Republic of China has decided to make a very major effort to utilize science and technology to modernize its nation, to increase its industrial base, to increase the standard of living for its people, to open its markets with the West."[54]

The influx of Chinese scientists and engineers who settled permanently in the United States after the reopening of U.S.–China relations also infused the Chinese American scientific community with much vitality. By the mid-1990s, according to one survey, there were over 1,000 academics above the rank of university lecturer in the United States who came from the China Mainland—about 800 in the sciences and engineering, 300 in social sciences and humanities, and 80 in other fields.[55] Their entrance into the research community also helped change the racial and gender structure of U.S. science, as the new Chinese American scientists and engineers increased the proportion of Asian Americans and a substantial percentage of them were women.[56]

While the Chinese government has been concerned over this obvious "brain drain," these science-trained expatriates are not a complete loss for China. Many of them became entrepreneurs who promoted U.S.–China trade and contributed to the Mainland economic boom of the 1990s.[57]

The loose connections among Chinese American scientists in the diaspora have developed into a powerful transnational network.[58] In 1980, a conference on particle physics theories in Guangzhou drew together, for the first time, many ethnic Chinese physicists from around the world.[59] In 1990, Chinese American physicists organized the Overseas Chinese Physics Association. OCPA includes physicists from the U.S., PRC, Taiwan, and Hong Kong. Its membership of more than 400 by July 2000 boasted several Chinese American Nobel laureates in physics—including C.N. Yang, T.D. Lee, Samuel Ting

of MIT, and Daniel Tsui of Princeton, as well as the astrophysicist-dissident Fang Lizhi. The association organizes special "Physics without Borders" sessions at the annual meetings of the American Physical Society, maintains an e-mail network, sponsors workshops in the Asia-Pacific region, and acts as a clearinghouse of information on jobs for its members. It also gives the Outstanding Young Researcher and Achievement in Asia awards to recognize the talent of ethnic Chinese physicists and to promote scientific research in the Asia-Pacific region.[60] OCPA held the First International Ethnic Chinese Physics Conference in Shantou in 1995—just after the PRC conducted a series of menacing missile tests near Taiwan as a warning against the independence movement on the island. Many observers viewed conference attendance by scientists from the official Academia Sinica of Taiwan as an encouraging sign that scientists might play a crucial role in the eventual peaceful unification of China.[61]

Tiananmen Setback

The United States and many other nations imposed diplomatic and economic sanctions against China after the Tiananmen Incident on 4 June 1989. The U.S. scientific community interrupted bilateral scientific and technological exchanges in protest against the violence. The National Academy of Sciences and several other U.S. academic organizations suspended most of their joint projects with China in "outrage and sadness." While these measures received general approval, more radical forms of protest threatened far-reaching curtailment of scientific contact and, therefore, divided the scientific community in the West—including Chinese American scientists.

The dilemma facing many Chinese American scientists was how to demonstrate their disapproval of the PRC government's actions without isolating their colleagues in China. Proponents of radical measures—such as boycotting scientific exchanges with the Mainland—argued that only an unambiguous public stand could help the situation of scientist-dissidents. They urged colleagues to avoid meetings in the PRC and campaigned against holding future conferences there until the repression ceased. Business as usual, argued James C. Wang, a Chinese American professor of biochemistry and molecular biology at Harvard University, was unconscionable.[62]

On the other hand, there were scientists such as T.D. Lee, who insisted that a boycott would interrupt the free flow of scientists and scientific ideas, push China back into intellectual isolation, and hurt both Chinese science and scientists. While calling the Tiananmen Incident "a great tragedy," Lee—who was in Beijing as the host of a scientific seminar on June 4th—argued for maintaining U.S.–China scientific exchanges on grounds that "only

through continuous contact with our colleagues in China can we help them in a genuine way."[63] Lee went back to Beijing in September 1989 and met with Deng Xiaoping in an effort to secure the government's lenient treatment of students and scientists who had been involved in the nonviolent protests. Many of his fellow Chinese American scientists criticized Lee's actions, however, when pictures of him holding hands with Deng made headlines all over the world. On the other hand, the U.S. government took his meeting with Deng seriously. On 17 October 1989, Lee met with President George Bush in the White House to convey Deng's message that he wanted to improve U.S.–China relations.[64] The fact that Lee played the messenger role at this critical juncture indicates that Chinese American scientists indeed had become a bridging and stabilizing force in bilateral relations.

Likewise, Yang pushed for resuming U.S.–China relations in the aftermath of Tiananmen. During a visit to Hong Kong in August 1989, he publicly opposed U.S. sanctions on China. Carefully avoiding comments on the Tiananmen Incident itself, Yang argued that continued attempts to punish China in this manner only threatened international stability.[65] His overriding concern for economic development led Yang to give priority to stability over political reforms (such as democratization and human rights). "Let the economy grow and later on reform," he told the New York Academy of Sciences' Committee on the Human Rights of Scientists in 1996. "Eventually we will reach a more open, more democratic society," Yang said, "but we don't want to go through the problems they had in the Soviet Union."[66]

In the debate over Tiananmen, other scientists believed that quiet diplomacy would be more effective than open sanctions. Sharp objections also arose over basing actions on the interests of scientists working in China rather than on those of dissidents or exiled scientists. In sum, the Chinese American scientific community, which led the way in establishing ties among scientists in the two countries, was highly polarized over scientific sanctions against the PRC.

By the end of the 1990s, as the political environment in the Mainland improved and interest in trade with China grew, scientific and technological exchanges resumed. However, the scars left by Tiananmen linger on in the new global political context of the post–Cold War era.

The Wen Ho Lee Case

Post–Cold War international politics reshaped bilateral scientific relations in the 1990s. With the end of the Cold War in the early 1990s, some policymakers in Washington, D.C., increasingly viewed China as the primary threat to

U.S. interests and charged the PRC with weapons proliferation, human rights abuses, and illiberal trade practices. Such shifts in official attitudes paralleled the deterioration in U.S. public opinion toward China following the Tiananmen tragedy.[67] The loyalty of the entire Chinese American community came under question in the aftermath of the campaign-contribution scandal during the presidential election of 1996 when several Chinese Americans funneled illegal donations to the Democratic Party.[68] Domestic partisan politics and the sensation-seeking media helped make U.S.–China relations and the loyalty of Chinese Americans topics of national controversy in the post–Cold War era. In this new political climate, scientific exchange with China, and the role of Chinese American scientists therein, came under increased scrutiny in the United States.

In 1997, the Federal Bureau of Investigation arrested Peter Lee, a Taiwanese-born Chinese American physicist who once worked at the Los Alamos National Laboratory, on grounds that he had transmitted secret laser technology and techniques used in the detection of submarines to Chinese scientists. In a plea bargain, Lee admitted that he leaked classified information when he visited China, but insisted that it was unintentional—he had been carried away by his enthusiasm for scientific exchange. In light of his cooperation and the fact that the U.S. government soon thereafter declassified the information Lee had leaked, he received a lenient sentence—one year confinement in a halfway house. His case received scant media attention.[69]

In early 1999, the *New York Times* reported, based on leaked information from government sources, that China stole U.S. nuclear weapons secrets in the 1980s and that one scientist at the Department of Energy's Los Alamos weapons laboratory in New Mexico was under investigation as a Chinese spy.[70] The explosive report came on the heels of the unsuccessful impeachment trial of President Bill Clinton and completion of a classified investigation under Republican congressman Christopher Cox alleging Chinese thefts of U.S. nuclear and other military technologies. It generated great public and congressional pressure on the Clinton administration to take action. Three days after the *New York Times* reported the existence of a suspect at Los Alamos, Bill Richardson, secretary of the Department of Energy, fired Wen Ho Lee from the laboratory. Although Richardson had no evidence that Lee committed espionage, and fired him for "failure to properly notify Energy Department and laboratory officials about contacts with people from a sensitive country, specific instances of failing to properly safeguard classified material, and apparently attempting to deceive lab officials about security matters," the *New York Times* and other media sources immediately identified Lee as the primary suspect in the Chinese espionage case.[71] Thus began the national political controversy over the Wen Ho Lee "spy case," which,

along with U.S. bombing of the Chinese embassy in Belgrade and the subsequent attacks by Chinese students on the U.S. embassy in Beijing, led to a rapid decline in U.S.–China relations during the spring of 1999.

Wen Ho Lee, born in Taiwan in 1939, came to the United States for graduate studies at Texas A&M University in 1965 and received his doctorate degree in mechanical engineering in 1969. He became a U.S. citizen in 1974, and worked for a variety of industrial and government research firms before moving to the Los Alamos laboratory in 1978—where he worked on applied mathematics and fluid dynamics involving computer simulations of nuclear explosions from 1978 to 1999.[72] In 1996, the FBI began investigating Lee as the prime suspect in the leaking of the design of W-88, the most advanced U.S. nuclear warhead, to the PRC. After his firing in March 1999, the FBI searched his office and home and found evidence that he had improperly downloaded classified computer codes onto unclassified computers and tapes.[73] On 10 December 1999, prosecutors indicted Lee on 59 counts of illegally removing classified nuclear data at Los Alamos.[74] Lee, pressured to confess his crime under the threat of execution, spent the next nine months awaiting trial in solitary confinement under harsh conditions.

As the Lee case evolved, Chinese Americans became alarmed over the racial and political overtones of the investigation, which was code-named "Kindred Spirit" at one time to reflect the perceived Chinese practice of using Chinese Americans as spies. Many in the Asian American community believed that government officials had singled out Wen Ho Lee because of his Chinese ethnic background and used him as a scapegoat for national security problems, real or imagined, amid a background of domestic partisan politics and increasing U.S.–China tensions. On 1 April 1999, the Overseas Chinese Physics Association, of which Wen Ho Lee was a member, wrote a letter requesting that President Bill Clinton take action to prevent "the deterioration of the working environment of Chinese-American scientists" and damage to U.S.–China scientific exchanges due to the fallout from the Lee case:

> We urge you as the President to speak out to set the Los Alamos incident in its proper perspective and let the public know that the overwhelming majority of the Chinese-Americans scientists are law-abiding, that they have contributed significantly to the advancement of science in the United States, and that scientific exchanges between the United States and China related to basic research also serve American interests.[75]

Likewise, the 80–20 Initiative, an Asian American political action committee with Chang-Lin Tien among its founders, questioned whether the government followed due process of law when it fired and prosecuted Wen Ho Lee.[76]

In July 1999, responding to increased criticism that Wen Ho Lee was a victim of racial profiling, President Clinton issued a statement decrying discrimination against Asian American scientists. Using the occasion of his appointment of Chang-Lin Tien as a member of the National Science Board, Clinton praised Tien and other Asian Pacific American scientists for their contributions to U.S. science and society:

> Asian Pacific American scientists and engineers have long made major contributions to our country, to our national security, and to our unmatched scientific enterprise. . . . That is why it is intolerable that the patriotism of Asian Pacific American scientists be questioned in the wake of recent allegations of espionage at one of our national laboratories. Security matters are of the highest priority in my administration, but history has shown the damage to the lives of our citizens and to our society that results from the destructive grip of prejudice, suspicion and discrimination. Racism and stereotyping have no place in our One America in the 21st century.[77]

Such reassurance, though welcome by Chinese Americans, did not turn the tide of widespread suspicion. In May 1999, Congress released an unclassified version of the Cox report, which stated that "threats to national security can come from PRC scientists, students, business people, or bureaucrats, in addition to professional civilian and military intelligence operations." Several congresspersons questioned whether such incendiary language might be used unfairly to question the loyalty of all Asian Americans.[78] By mid-2000, as Lee languished in pre-trial detention, handcuffed and shackled, Asian American scientists began to leave or avoid jobs at nuclear weapons laboratories.[79] "The labs are having great difficulty recruiting Asian [American] scientists and engineers, and many who are there are considering other jobs," reported Bob H. Suzuki, president of the California State Polytechnic University at Pomona and, with Tien, another Asian American member of the National Science Board.[80] In August 2000, the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine openly expressed their dissatisfaction with Wen Ho Lee's treatment while in detention and with the government's handling of the entire case in an open letter to Attorney General Janet Reno.[81] These academies together represent the most prominent bodies of U.S. science, technology, and medicine—with dozens of Chinese Americans among their membership.

After a series of dramatic turns and twists, the case against Lee unraveled as government investigators admitted making false statements and as the prosecutors failed to turn up any evidence of espionage. Wen Ho Lee's lawyers

and the prosecutors reached a plea-bargain agreement in September 2000. Under the agreement, Lee pleaded guilty to one count of mishandling national security data and received a sentence for time already served, while the prosecutors dropped the other 58 counts against him.[82]

Chinese American scientists greeted Lee's release with relief. Nevertheless, they still harbored deep concern about what is perceived to be deep-seated racism exposed by the case. The Committee of 100, a nonpartisan organization of some of the most prominent Chinese American professionals formed in 1990 by Chang-Lin Tien, the architect I.M. Pei, the musician Yo-Yo Ma, and others, expressed two paramount concerns:

> The Committee of 100 remains deeply concerned about two remaining issues. First, there is "racial profiling," particularly as practiced by federal personnel at the national laboratories and in the defense industries. Americans of Chinese descent are unjustly singled out solely because of their ancestry. Second, the Committee fears that the anti-Chinese hysteria . . . which led to Dr. Lee's indictment and prosecution may reappear wherever tensions or disagreements arise between China and the United States.[83]

While the debate over the Wen Ho Lee case continues against a background of U.S.–China tensions, domestic partisan politics, and the media's thirst for sensational reporting, it is clear that the case has had a chilling effect on the morale of Chinese American scientists and on the atmosphere for cross-national scientific communication between the United States and China that they worked hard to create.[84] It likely will result in more stringent restrictions in weapon-related exchanges—especially in view of the new George W. Bush administration's more cautious policy toward the PRC. There is no evidence, however, that fallout from the Wen Ho Lee case has caused a Tiananmen-like disruption of U.S.–China scientific exchanges. Collaborative projects outside of sensitive areas continue to flourish. In January 2001, for example, the National Academy of Sciences/National Research Council sponsored a major joint study with the Chinese Academy of Engineering on the future of personal transport in China that considers environmental, energy, and health effects.[85]

Conclusion

In spite of recent setbacks, Chinese American scientists have had and continue to have a profound impact on U.S.–China scientific and political relations. Geopolitical considerations initially motivated the United States and China to encourage their efforts to promote scientific exchanges between the

two countries. However, neither the scale of the subsequent exchanges nor the enthusiasm of the participants can be explained solely in terms of the interest of the state. The activism of Chinese American scientists, motivated by Chinese cultural nationalism and traditional beliefs in science as an international activity, gave the exchange programs drive and momentum. Individually and collectively, Chinese American scientists played a crucial nongovernmental role in bringing tens of thousands of Chinese students and scientists to the United States who, whether they stayed or returned to China in the end, helped further promote mutual scientific understanding. Some of these scientific-exchange personnel became involved in setting up companies engaged in trans-Pacific business and trade and, in no small measure, are responsible for the growing commerce between the two countries and for advancing China's economic development.

The dominance of states in international science does not mean that traditional, informal ties among scientists, such as the connections between Chinese American scientists and their colleagues in China, will disappear from the scene. In the case of U.S.–China scientific relations, the state and private actors entered into a new era of intricate interactions. While the U.S. and PRC governments often utilized Chinese American scientific networks to accomplish their geopolitical goals, Chinese American scientists took advantage of official cooperation to promote their own agenda—including the advancement of science in their country of birth and improved relations between the two countries. Trips to China by Chinese American scientists often took on a spirit of Chinese cultural nationalism as they tried to moderate the country's radical, Cultural Revolution–inspired science and educational policy and to encourage Chinese interaction with the outside world. At the same time, Chinese American scientists' active role in PRC science and educational policy and in U.S.–China relations helped them create a sense of their own distinct scientific community.[86]

Ironically, the Chinese nationalism that motivates many Chinese American scientists to promote U.S.–China scientific exchanges also undermines the authority of the Chinese nation-state. Consciously or unconsciously, the extensive scientific and cultural interactions they encourage introduce liberal-democratic ideas and values that challenge the orthodoxy of Marxist ideology. PRC officials cannot control every step of the exchange process, nor can they keep an iron grip on whom to send abroad (in terms of ideological correctness), where to send them, and what they will be exposed to. Thus, scientific exchanges have promoted meritocracy and facilitated the creation of a de-ideologized civil-society sphere.

A comparison of U.S.–China scientific exchanges with those between the United States and the Soviet Union, which analysts have judged less

successful, helps illuminate the important role of Chinese American scientists.[87] Historical ties between senior members of the Chinese and U.S. scientific communities and the active role of Chinese American scientists gave U.S.–China exchanges an emotional appeal that was missing in the U.S.-Soviet case. Similarly, the China–Soviet Union exchanges of the 1950s failed, at least in part, due to the absence of a transnational community like that created by Chinese American scientists. While some Soviet advisors offended national pride by acting in an arrogant and patronizing manner with senior Chinese scientists, the participation of culturally sensitive Chinese American scientists in U.S.–China exchanges mitigated or avoided such situations.

The intermixing role of Chinese American scientists is likely to be of even greater importance in future U.S.–China scientific and political relations. As an ethno-international scientific community, Chinese American scientists helped blur national boundaries in science—even at the height of the Cold War. They will play an even more prominent post–Cold War role as the United States becomes increasingly involved in the Asia-Pacific region, as Asian Americans increase in number and political influence in the United States, as China, Taiwan, and Hong Kong enjoy more intimate interactions, and as globalized commerce and technology further remove geographic and cultural barriers.

Modern science, born at about the same time as the modern nation-state, helped break the grip of sovereignty through the threat of nuclear war.[88] Cross-national scientific exchanges offer a safer, more positive route to the goal of "peace through science." In the post–Cold War era, U.S.–China scientific cooperation will be crucial in meeting major global challenges involving the environment, energy, and the proliferation of nuclear weapons.[89] In these vital collaborative endeavors, Chinese American scientists, as agents for transnational exchange, have played and will continue to play a crucial role. Nevertheless, the Wen Ho Lee case reminds us that the influence of the nation-state over scientific communication will not end in the foreseeable future.

Notes

This chapter draws in part on my article "U.S.–China Scientific Exchange: A Case Study of State-sponsored Scientific Internationalism During the Cold War and Beyond," in *Historical Studies in the Physical and Biological Sciences* 30:1 (1999): 249–277. I thank the University of California Press for permission to reprint portions of the article.

1. A. Doak Barnett, *China and the Major Powers in East Asia* (Washington, D.C.: Brookings Institution, 1977), p. 178. See also Harry Harding, *A Fragile Relationship: The United States and China Since 1972* (Washington, D.C.: Brookings Institution, 1992); Leo A. Orleans, *Science in China and U.S.–China Scientific*

Exchanges: Assessment and Prospects (Washington, D.C.: U.S. Government Printing Office, 1976), p. 11.

2. David M. Lampton, *A Relationship Restored: Trends in U.S.–China Educational Exchanges, 1978–1984* (Washington, D.C.: National Academy Press, 1986); and Leo A. Orleans, *Chinese Students in America: Policies, Issues, and Numbers* (Washington, D.C.: National Academy Press, 1988). Also, see Kathlin Smith, "The Role of Scientists in Normalizing U.S.–China Relations, 1965–1979," in *Scientific Cooperation, State Conflict: The Roles of Scientists in Mitigating International Discord*, ed. by Allison L.C. de Cerreno and Alexander Keyan (New York: New York Academy of Sciences, 1998), pp. 114–136; and Richard P. Suttmeier, "Scientific Cooperation and Conflict Management in U.S.–China Relations from 1978 to the Present," in *Scientific Cooperation, State Conflict: The Roles of Scientists in Mitigating International Discord*, pp. 137–164; Denis F. Simon, "The Role of Science and Technology in Chinese Foreign Relations," in *China and the World: Chinese Foreign Policy in the Post-Mao Era*, ed. by Samuel S. Kim (Boulder, CO: Westview Press, 1984), pp. 293–318.

3. Julia Sommer, "Yuan T. Lee Receives Clark Kerr Award," *Berkeleyan*, 3 March 1999, accessed from its website: http://www.berkeley.edu/news/berkeleyan/1999/0303/lee.html on 5 February 2001.

4. On Chu, see Gary Cheung, "Presidential Challenge for Houston Scientist," *South China Morning Post*, 16 December 2000, p. 5. On Woo, see Howard LaFranchi, "A University President Determined to Integrate Education, Everyday Life," *Christian Science Monitor*, 4 May 1984, p. 19; and Elaine Woo, "Hong Kong University Gets Cal State S.F. Head," *Los Angeles Times*, 7 November 1987, p. 32.

5. Elisabeth Tacey, "Ex-Bush Adviser Appointed to Top University Position," *South China Morning Post*, 3 June 1994, p. 6; "Eugene Wong Named to NSF Post," *Berkeleyan*, 6 May 1998, accessed from its website: http://www.berkeley.edu/news/berkeleyan/1998/0506/wong.html on 15 February 2000.

6. Barbara B. Clowse, *Brainpower for the Cold War: The Sputnik Crisis and National Defense Education Act of 1958* (Westport: Greenwood Press, 1981); Benjamin Zulueta, "Forging the Model Minority: Chinese Immigrant Intellectuals, American Science, and the Cold War, 1949–1965" (Unpublished Ph.D. dissertation, University of California, Santa Barbara, 2002).

7. Anon., "These Chinese Choose," *Newsweek* 50 (23 December 1957): 36; C.N. Yang, "Prof C.N. Yang's Address at the Nobel Banquet, 1957," in C.N. Yang, *Ningqiao wuzhuo: Yang Zhenning fangtan lu* (Interviews with C.N. Yang), ed. by Pan Guoju and Han Chuanyuan (Singapore: World Scientific, 1988), n.p.

8. Yang, "Address at the Nobel Banquet," n.p.

9. Chen Ning Yang, *Selected Papers with Commentary* (San Francisco: W.H. Freeman, 1983), p. 57.

10. Elizabeth Venant, "A Position of Prominence," *Los Angeles Times*, 27 August 1990, p. E3.

11. Iris Chang, *Thread of the Silkworm* (New York: Basic Books, 1995), p. 143.

12. Ibid., p. 170.

13. Ibid., p. 189; Jin Chongji, editor in chief, *Zhou Enlai zhuan, 1949–1976* (Biography of Zhou Enlai, 1949–1976), vol. 1 (Beijing: Zhongyang wenxian, 1998), p. 235.

14. Interview with Chang-Lin Tien by Zuoyue Wang, 19 March 1999, Berkeley. Chang, *Thread of the Silkworm*, pp. 196–198.

15. Interview with Chang-Lin Tien by Zuoyue Wang, 19 March 1999, Berkeley.

16. Yang, *Selected Papers*, pp. 56–57. Also see Li Peishan, "Science and Technology: U.S. Impact on China," *Beijing Review* 34 (18 November 1991): 35–37.

17. William Wei, *The Asian American Movement* (Philadelphia: Temple University Press, 1993).

18. Shih-shan Henry Tsai, "Review of *The Asian American Movement* by William Wei," *Pacific Historical Review* 64 (February 1995): 154–155.

19. Interview with Chang-Lin Tien by Zuoyue Wang, 19 March 1999, Berkeley; Chi-Kung Jen, *Recollections of a Chinese Physicist* (Los Alamos: Signition, 1991).

20. Yang, *Selected Papers*, pp. 56–57. Yang, "My Reflections on Some Social Problems," a speech delivered to the Hong Kong Student Association in New York on October 3, 1970, in Yang, *Dushu jiaoxue sishinian* (Forty years of studying and teaching) (Hong Kong: Sanlian, 1985), pp. 55–61.

21. Yang, "My Reflections on Some Social Problems." Ruan Beikang and Ouyang Yingzi, "Zhongmei de huagong yanjiu he yingyong: fang Wei Qianguang jiaoshou," (Research and applications of chemical engineering in China and the United States: an interview with Professor James Wei on 21 August 1978) in Ruan Beikang and Ouyang Yingzi, eds., *Xueren zhuanfang lu* (Interviews with scholars) (Hong Kong: Tiandi Tushu, 1980), p. 124. The experience of Chinese American scientists in many ways paralleled that of Chinese American writers. See Xiao-huang Yin, *Chinese American Literature Since the 1850s* (Urbana: University of Illinois Press, 2000), pp. 185–194.

22. "An Open Letter to President Nixon and Members of the Congress," full-page ad in *New York Times*, 23 May 1971, p. E7. When Yang visited China in 1971, the Chinese government regarded Yang's signature on the letter as a sign of his concern for his native country even after he had acquired U.S. citizenship. See the diary entry of Zhu Kezhen, vice president of the Chinese Academy of Sciences, on 12 July 1971, in Zhu Kezhen, *Zhu Kezhen riji* (Zhu Kezhen diary), v. 5 (Beijing: Science Press, 1990), p. 464. The dispute over Diaoyutai Islands has not been resolved to date.

23. Henry Kissinger, *White House Years* (Boston: Little, Brown, 1982), pp. 693, 705; Harding, *Fragile Relationship*, pp. 35–36, 394–395.

24. Cited in Kissinger, *White House Years*, p. 1492.

25. For instance, the Central Intelligence Agency hired Sylvia Lee, wife of Wen Ho Lee and an employee at the Los Alamos weapons laboratory, to report on the activities of Chinese scientists visiting the laboratory in the 1980s. See Mathew Purdy, "The Making of a Suspect: The Case of Wen Ho Lee," *New York Times*, 4 February 2001, p. A1; and Mathew Purdy with James Sterngold, "The Prosecution Unravels: The Case of Wen Ho Lee," *New York Times*, 5 February 2001, p. A1.

26. Memorandum of Beijing conversation between Kissinger, Zhou, and others, 13 November 1973, in William Burr, ed., *The Kissinger Transcripts: The Top-Secret Talks with Beijing and Moscow* (New York: New Press, 1998), p. 204. The Chinese government did not follow up on the offer.

27. When the Chinese American mathematician Shiing-shen Chern visited China in 1972, he brought a letter from the CSCPRC seeking exchanges with the Chinese Academy of Sciences. See Zhu Kezhen diary entry for 14 September 1972, in Zhu, *Zhu Kezhen Diary*, v. 5, p. 553.

28. See Glenn T. Seaborg, "China Journal: Report of a Visit to the People's Republic of China, 22 May–10 June 1973" (Unpublished manuscript courtesy of Professor Seaborg, 1973), pp. 29–39.

29. See Zuoyue Wang, "U.S.–China Scientific Exchange: A Case Study of State-

sponsored Scientific Internationalism during the Cold War and Beyond," *Historical Studies in the Physical and Biological Sciences* 30, No. 1 (1999): 255–256.

30. See Jen, *Recollections*.

31. Interview with Chang-Lin Tien by Zuoyue Wang, 19 March 1999, Berkeley; Venant, "Position of Prominence," p. E3.

32. Zhu Kezhen diary entry on 12 July 1971, in Zhu, *Zhu Kezhen Diary*, v. 5, p. 464.

33. Wu Heng, *Keji zhanxian wushinian* (Fifty years on the scientific and technological front) (Beijing: Keji wenxian, 1992), p. 351; Yang, *Selected Papers*, pp. 76–77.

34. Yang, "Commentary (on 'What Visits Mean to China's Scientists')," in Yang, *Selected Papers*, pp. 77–78.

35. Wu Heng, *Keji zhanxian wushinian,* pp. 368–369. In addition, Lee described U.S. institutional and cultural approaches to the promotion of science and technology—including the peer-review process and the relative autonomy of the scientific community. See Wang, "Scientific Exchange," p. 263. Zhou also relied on Lee to certify discoveries made by Chinese physicists. At a meeting, Zhang Wenyu asked Zhou whether Chinese scientists should publish the discovery of a new particle and Zhou said that he would need to discuss it with Lee first. See Zhu Kezhen diary entry for 5 October 1972 in Zhu, *Zhu Kezhen Diary*, v. 5, pp. 558–559.

36. On Lee and BEPC, see Liu Huaizu (chief editor), *Beijing zhengfu duizhuangji* (Beijing electron positron collider) (Beijing: Keji chubanshe, 1994). On Lee's continued involvement in U.S.–China high-energy-physics policy, see Lee to Jiang Zemin, 13 October1994, reprinted in Lee, *Li Zhengdao wenlu* (Essays of T. D. Lee) (Hangzhou: Zhejiang wenyi, 1999), pp. 60–67. The book also contains Lee's recollections of his interactions with Mao Zedong and Deng Xiaoping.

37. C.N. Yang, *Dushu jiaoxue zhai shinian* (Ten more years of learning and teaching) (Taipei: Shibao Press, 1995), back cover.

38. The difference reflected in some ways the well-known personal animosity between the two early collaborators. See, for example, T.D. Lee, "Broken Parity," in T.D. Lee, *T.D. Lee Selected Papers*, ed. by G. Feinberg (Boston: Birkhauser, 1986), vol. 3, pp. 487–509.

39. Zhu, *Zhu Kezhen Diary*, vol. 5, p. 544, entry for 4 August 1972.

40. C.N. Yang, "Tantan wulixue yanjiu he jiaoxue: zai beijing zhongguo kexue jishu daxue yanjiushengyuan de wuci tanhua" (On research and teaching in physics: five talks at the graduate school of the University of Science and Technology of China in Beijing, 27 May–12 June 1986), in C.N. Yang, *Yang Zhenning yanjiang ji* (Speeches of C.N. Yang) (Tianjin: Nankai University Press, 1989), p. 149.

41. William Sweet, "Future of Chinese Students in US at Issue; CUSPEA Program Nears Its End," *Physics Today* 41 (June 1988): 67–71; Robert Novick, ed., *Thirty Years Since Parity Nonconservation: A Symposium for T.D. Lee* (Boston: Birkhäuser, 1988), p. 169.

42. See articles by or about T.D. Lee in *Zuji* (Footprints: C.N. Yang's, T. D. Lee's, Samuel Ting's, and Yuan Tze Lee's routes to success) (Beijing: Beijing Language College Press, 1989), pp. 95–166; and Lee, *Essays of T.D. Lee.*

43. T.D. Lee, "Wulixue ji qita" (Physics and beyond: a talk with graduate students at the graduate school of the University of Science and Technology of China, Beijing, 12 May 1979), in *Footprints*, p. 101.

44. Yang, "On Research and Teaching in Physics," p. 151.

45. See Fang Lizhi, *Bringing Down the Great Wall: Writings on Science, Culture,*

and Democracy in China, ed. and principal translator James H. Williams (New York: Knopf, 1991). On the great ideological and political debate over philosophy and physics in the 1970s and 1980s, see H. Lyman Miller, *Science and Dissent in Post-Mao China: The Politics of Knowledge* (Seattle: University of Washington Press, 1996).

46. Chinese leaders, especially Zhou Enlai, adroitly tapped into the home country nationalism of Chinese Americans. During a meeting with C.S. Wu (Wu Jianxiong) and her physicist husband, Luke Yuan (Yuan Jialiu), for instance, Zhou showed his deeply moved guests a map indicating how much Chinese territory formerly under Russian control he was able to get back from the Soviet Union through negotiations in the 1950s. See Jiang Caijian, *Wu Jianxiong: Wuli kexue de diyi furen* (C.S. Wu: the first lady of physical science) (Shanghai: Fudan University Press, 1997), p. 279.

47. See *Qishi niandai* (The seventies) journal editors, *Liumei huayi xuezhe chongfa zhongguo guangan ji* (Reflections on revisiting China by Chinese American scholars) (Hong Kong: The Seventies Press, 1974).

48. Edward David, Jr., to Henry Kissinger, September 22, 1971, on "Visit of U.S. Physicist, C.N. Yang, to the People's Republic of China," in National Archives, Nixon Presidential Materials, White House Central Files, Subject Files, FG 6–9, box 1, folder "(EX) FG 6–9 Office of Science and Technology 1/1/71–." David suggested that Kissinger call Yang for a briefing but it never took place. Yang e-mail to author, 6 November 1997.

49. Nie Huatong, "Wo suo zhidao de Yang Zhenning" (The C.N. Yang that I know), reprinted in *Ningzhuo wuqiao: Yang Zhenning fangtan lu* (Interviews with C.N. Yang), ed. by Pan Guoju and Han Chuanyuan, pp. 101–119.

50. Xu Shenglan and Meng Dongming, *Yang Zhenning zhuan* (A biography of C.N. Yang) (Shanghai: Fudan University Press, 1997), pp. 123–129.

51. Yang, "Commentary," p. 77.

52. C.N. Yang, "Fahui qiaoliang zuoyong" (Playing the role of a bridge), in Ning Pingzhi, Tang Xianmin, and Zhang Qinghua, eds., *Yang Zhenning yanjiangji* (A collection of C.N. Yang's Speeches) (Tianjin: Nankai University Press, 1989), pp. 196–197.

53. Testimony of John P. McTague, 20 June 1985, in *International Cooperation in Science, Science Policy Study—Hearings* Volume 7, Hearings before the Task Force on Science Policy of the Committee on Science and Technology, House of Representatives, 99th Congress, 1st session (Washington, D.C.: U.S. Government Printing Office, 1985), pp. 235–236.

54. Ibid., p. 249.

55. Wang Xi, "Dalu lumei xueren ziyuan yu ershiyi shiji zhongguo de fazhan" (Mainland scholarly personnel in the United States and China's development in the twenty-first century), *Shijie ribao* (World journal), 9 November 1997, p. A5.

56. According to a survey conducted by the American Institute of Physics in 1996, women made up 12 percent of the 144 Asian or Pacific Islander U.S. Ph.D. physicists, while only 6 percent of the 1,942 other U.S. Ph.D. physicists were women. E-mail from Raymond Chu of AIP to author, 5 March 1998.

57. See the chapters by Sufei Li and Norton Wheeler in this volume.

58. Shih-shan Henry Tsai uses the term "subnationalism" to depict the activism of Chinese immigrants who are occupied with and try to influence developments in their old country. Shih-shan Henry Tsai, *The Chinese Experience in America* (Bloomington: Indiana University Press, 1986).

59. See, for example, Yang, *Forty Years of Studying and Teaching*, p. 89.

60. On the association, see its website at http://www.ocpaweb.org. On Yang's role in the founding of the association, see Tung-Mow Yan, "Professor C.N. Yang's Impact on Physics," in C.S. Liu and S.T. Yau, eds., *Chen Ning Yang, A Great Physicist of the Twentieth Century* (Boston: International Press, 1995), pp. 451–456.

61. Ted Plafker, "Physics Meeting Unites the Two Chinas—Briefly," *Science* 269 (18 August 1995): 916.

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