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Book Review

Thread of the Silkworm

Iris Chang, Basic Books, New York, 1995, 329 pp., $27.50

In September 1935 the steamship *President Jackson* arrived in Seattle, Wash., with 20 Chinese scholars funded by the U.S. Boxer Rebellion Indemnity Fund. The scholars were a carefully screened group representing the best students in pre-World War II China. One of these scholars was the brilliant 24-year-old Tsien Hsue-Shen, who would become very well known as H.S. Tsien in the U.S. aerospace research community. Iris Chang's biography *Thread of the Silkworm* tells the story of Tsien's life from his birth to an upper-class family in China to his modern role as a prominent leader of the missile program in the People's Republic of China. The *Silkworm* is the missile that China has exported in recent years to Middle Eastern countries.

Tsien's life extends from the United States' preeminent engineering research institutions to the Third Reich's rocket development programs at Peenemünde to the present-day missiles and launch vehicles of Communist China. It is a story that spans some of the most tumultuous events of the 20th century, from the origins of aerospace technological developments such as supersonic flight and ballistic missiles in World War II; the international arms race of the Cold War; and the near hysteria of the U.S. government during the McCarthy era to the development of atomic weapons and missile delivery systems in the political turmoil of Mao Zedong's China.

When Tsien arrived in the United States, he began his graduate studies in aeronautical engineering at the Massachusetts Institute of Technology (MIT). He was an outstanding student because of his strong theoretical background, but after receiving his Master's degree, he left MIT to work with Prof. Theodore von Kármán at the California Institute of Technology (Cal Tech). Under von Kármán's direction he developed rapidly to become an extraordinary researcher, and they collaborated on a number of significant research papers, particularly in the area of compressible flow. During his doctorate studies at Cal Tech, Tsien also became involved in the pioneering rocket development program with Frank Malina. Tsien was so highly regarded by von Kármán that, at the end of World War II, von Kármán arranged for Tsien to accompany him to Germany to visit secret research facilities and meet with top German scientists, such as Ludwig Prandtl, Adolf Buseman, and Wernher von Braun.

After the war, Tsien returned to MIT as a faculty member, but two years later he returned to Cal Tech as the Robert Goddard Professor of Jet Propulsion. He was among the most prominent U.S. researchers with significant publications in leading journals. He also had U.S. government security clearances, and he was directing major classified rocket development programs even though he had not become a U.S. citizen. In 1950, his extraordinary U.S. engineering career erupted in controversy, as the government made accusations that he was an alien Communist and canceled his security clearances. His bitter reaction and subsequent events received high-level government attention, but ultimately he was forced to return to China in 1955. After his return, he became one of the leaders of China's missile development program. That such a prominent engineering researcher was returned to Communist China during a critical period in the Cold War is regarded by many, including von Kármán, as a serious mistake and by author Chang as "one of the tragedies of this century."

The book draws heavily on von Kármán's 1967 autobiography with Lee Edson *The Wind and Beyond* for descriptions of Tsien's early work at Cal Tech and the 1968 book *The China Cloud* by William L. Ryan and Sam Summerlin for details of the government's case and actions toward Tsien. These sources and other documents are supplemented by information obtained from extensive interviews conducted by the author both in the United States and in China. The author visited China and interviewed several sources familiar with China's missile development program; unfortunately, she was unable to interview Tsien himself. It is the latter part of the book, with descriptions of China's rocket development program, that breaks the most new ground, but much remains to be learned of Tsien's contribution to China's missile development program and his thoughts on his experiences in the United States. For these missing links in the story we must wait, for Tsien has authorized his secretary to write a biography but only after his death. Until then we can be grateful to Iris Chang for her excellent depiction of what can now be determined of this interesting life in a most fascinating period of aerospace history.

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