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Technology and China

Gregory Rohlf
Associate Professor of History, University of the Pacific
Summarized by Stephen Pitcher
smpitch@sbcglobal.net

Professor Rohlf began by citing Thomas J. Campanella's book *The Concrete Dragon*, an examination of urban explosion, which, he contends, is the most significant thing happening in China today. A Chinese middle class is developing in the cities, and the city as a concept is being completely reinvented thereby. In vivid demonstration of the scale and intensity of Chinese cities, 1,000 new cars hit the streets of Beijing every day, and more high-speed rail serves China than exists in the rest of the world put together.

This spate of new technology came from within China, a product of its own intellectual, cultural, and material resources. Modern science was not invented in China; technology, in a sense, was. Modern science, derived from the explorations of the Greeks and Romans, was essentially invented in 19th- and 20th-century Europe. Technology, on the other hand, has a very long history in China.

Professor Rohlf embarked upon a "Dynastic History of China in Ten Minutes or Less" [see the dynastic timeline included at the end of this summary]. Arriving in the present, he showed a Google Earth view of the "very orderly" urban morphology of Beijing, commenting that imposing order on nature had been intrinsic to Chinese culture for 2,000 years. It is informative to compare the layout of Xi'an, tidily circumscribed by its imposing city wall, with the arbitrary, weed-like sprawl of London. A slide of the Xichang launch center in Sichuan province in the 1980s, at a time when China was a country of bicycles, illustrated the investment in technology that was so important both to the state and to the Communist Party.

A brief description of some dynasties central to the history of Chinese technology followed. The Zhou dynasty was described as the golden age of philosophy (Confucianism among others). The creation of imperial China was ascribed to the Qin, and the moment when China "becomes high-tech" to the Tang, when, rather than building walls, China engaged in warfare, diplomacy, and commerce—a period of interaction with, rather than seclusion from, the world. The Song Dynasty was also high-tech, the center of the world economy, and the Ming utilized some very advanced technology, not to mention extremely sophisticated accounting, to send ships through the Straits of Malacca to Africa. The last dynasty was the Qing, which was usurped in 1912 by the Republic of China (now on the island of Taiwan). The dynastic cycle was a natural and organic one, recurring over and over in a pattern not seen elsewhere in the world.

Proto-nationalism (individually manifested as ambition and/or greed) drove this cycle: “men wanted to sit on that imperial throne."

What was the source of China’s phenomenal early accomplishments in technology, its mastsery of mathematics, hydrology, pharmacology, astronomy, and manufacturing? Silk-making is a high-tech procedure, whether it is industrial or not, and it is but one of many innovations, including paper, gunpowder, porcelain, and the compass, by which China demonstrated its early technological prowess, indeed its preeminence. The history of Western science is a straight line from Greece to the steam locomotive; but what, in the virtual absence of science, drove this effusion of technological innovation in China?

An idea central to the understanding of Chinese history—of greater importance even than Taoism—is that of legalism. During the golden age of Chinese philosophy (roughly 500 B.C.– 200 A.D.), it was thought that philosophy should *matter,* should have consequences in the physical world. Schools of thought were concerned with the world of men, not the gods. Confucius declared that he was “not someone who was born with knowledge” but someone who needed to acquire it, and his followers were bookish people seeking knowledge and guidance in ancient texts. By contrast, legalism, which developed alongside Confucianism and Taoism, was concerned with a pragmatic approach to the present time: particularly prominent in legalist thought was the idea that a well-thought-out, clearly enunciated legal system was the foundation of an efficiently functioning society. Legalists deplored the poetic, archaic bent of the Confucians, whom they regarded as “morons with no business advising kings.” People were sheep, needing to be led. They did not need to be intelligent; what they needed were clear laws. They required neither tradition nor philosophy—just devotion to the empire.

Professor Rohlf told the story of Han Feizi, dating from ca. 240 B.C., which ridicules the contemplative, backward-looking ways of the Confucians. The eponymous farmer had been a diligent tiller of the soil until one day he saw a rabbit, frantically racing across his field, crash into a stump and break its neck. He promptly laid aside his plow and set up watch by the stump, hoping for a repetition of this anomaly. Instead of getting more rabbits, he got a reputation for idiocy throughout the land, the (highly legalistic) moral being that those who would use ancient ways to govern modern people are nothing but “stumpwatchers.”

The gentleness of Confucianism, with its emphasis on meditation as a guide to right behavior, teaching by example, and ritual, has no equivalent in legalism, in which one finds an insistence on punishment (mostly capital) for numerous infractions, and on deterrence (often fatal as well). This mindset continues to this day: two officials were executed in the aftermath of the 2008 baby formula scandal in China, and Rohlf opined that the Chinese people feel that justice was served. Under legalism, and in distinction to American practice, government officials are held to the same standard as others are (for all that official malfeasance is far from unknown in modern China). As Den Xiaoping remarked in a slightly different connection (the massacre in Tiananmen Square), “Sometimes blood has to be spilled.”

Born of the prevailing national habit of mind and an abundance of natural resources, China had acquired high technology by 600 B.C. The Dujiangyan Irrigation Project in Sichuan, built in 256 B.C. and still in use today, is regarded as a superior work of engineering, far preferable to the typical dam in that it blocks only a portion of the water, so there is no problem with sedimentation and minimal disturbance to the ecology. China's global primacy in high technology lasted until 1800, at which point, fueled by coal-fired steam power, Europe took the lead. It is true that Britain profited from a conspicuous wealth of easily accessible coal, but Rohlf feels that a civilizational explanation is more pertinent: the Chinese frame of mind had changed.

Audience Member: Couldn't part of it be that they'd just come out of a time when they were ruled by foreigners and they never wanted it to happen again?

Gregory Rohlf: Absolutely. If the Mongols had invaded England, they might have built a wall too.

Audience Member: [Question about the Chinese role in Africa]

Gregory Rohlf: China is a major player in Africa right now, yes, and it says "We're just doing what you're doing" to the U.S. "Look at your best friend Saudi Arabia"—which is a *mess:* Saudi Arabia is a *disaster,* an antiquity—"so if you want to complain about our relationship to Sudan, just go look in the mirror."

From 1800 to 1950, China failed to modernize. At that point, feeling that Confucianism was incompatible with modernization, Mao Tse Tung declared the country Marxist. (Japan kept key parts of East Asian civilization, like the emperor and filial piety, yet modernized quite rapidly, so the thesis that Confucianism is antagonistic to modernization wouldn't seem to have a rational basis.) China became modern about 2000, or at least as modern as we are (something of a mix of new and old, in other words). When Rohlf lived in China in the 1980s, they were building roads with shovels and rocks. Now they are exporting their technological expertise worldwide: engineering of the new Bay Bridge was performed by a Chinese state firm, and Chinese automobiles will soon be arriving in the U.S. Continuities from legalism present in modern China include a strong (at times a police) state, harsh punishment, and a focus on the intense and efficient utilization of all resources—human, mineral, air, water, and other: a general frame of mind. The Chinese are high-tech leaders once again: how will that turn out? Who knows?

CHRONOLOGY OF THE DYNASTIES OF CHINA

[NOTE: Overlapping dates indicate times when transition between dynasties was not clear-cut]

Xia	ca. 2000 B.C –1600 B.C.
Shang	ca. 1600 B.C. – 1045 B.C.
Zhou	1045 B.C. – 221 B.C.

Qin	221 B.C. – 206 B.C.
Han	202 B.C. – 220 A.D.
Wei, Jin	220 – 589
Sui	581 – 618
Tang	618 –907
Song	960 – 1279
Yuan	1279 – 1368
Ming	1368 – 1644
Qin	1644 – 1911
Republic of China	1912 – present (on Taiwan)
People's Republic of China	1949 – present