HISTORY OF SCIENCE

Scientists Fete China's Supreme Polymath

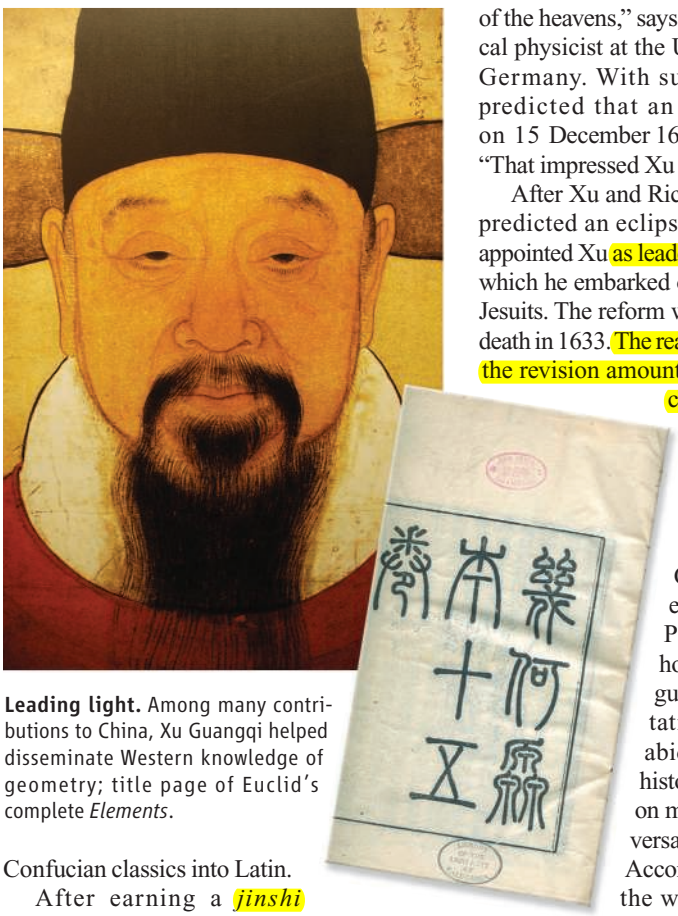
SHANGHAI—In the early 17th century, this humanist and experimentalist helped avert starvation in China by disseminating hardier crops and devised dams and canals for irrigation and flood control. He launched a decade-long effort to improve the accuracy of the Chinese calendar by incorporating a more precise knowledge of celestial geometry. His monumental contribution was to team up with a Jesuit scholar to translate part of Euclid's *Elements*, introducing late Ming Dynasty intellectuals to new mathematical concepts—and Western thought. For his achievements, he has been compared to Leonardo da Vinci and Francis Bacon.

Who was China's Renaissance man? Go to the head of the class if you guessed Xu Guangqi.

Last month, scientists from a variety of disciplines met here at the Partner Institute for Computational Biology (PICB) to commemorate the 400th anniversary of the publication of the first six volumes of *Elements* in Chinese and to explore Xu's remarkable legacy. "He started China's enlightenment," says cell biologist Pei Gang, president of Tongji University in Shanghai. "Xu promoted the idea of learning from the West." Over the past century, Chinese leaders have taken Xu's advice to heart, including a reference by President Hu Jintao at last month's Communist Party's 17th National Congress to the importance of taking a "scientific view of development."

Xu (pronounced like "sue") was born in Shanghai in 1562 and was groomed to be a civil servant. A watershed moment came in 1600, when Xu met Matteo Ricci, an Italian Jesuit and one of the first Westerners allowed to live in China. No intellectual slouch himself, Ricci had been a student of Europe's leading mathematician of the time, Christopher Clavius. "Xu was wholeheartedly attracted to him," says Hung-lam Chu, a historian at the Chinese University of Hong Kong. The kindred spirits came to realize that planar geometry and other higher mathematical concepts then unknown in China were essential to progress. "*Elements* is basically a book about Western logic," says Yu Sanle of Beijing Administration Institute.

In translating *Elements*, Xu and Ricci also coined a host of terms, including *jihe* as the character for "geometry." Ricci deserves equal billing, Yu argues: "His was the greatest contribution of any foreigner to Chinese culture and civilization." Knowledge flowed both ways: Ricci also translated several Confucian classics into Latin.



Leading light. Among many contributions to China, Xu Guangqi helped disseminate Western knowledge of geometry; title page of Euclid's complete *Elements*.

After earning a *jinshi* degree, the equivalent of a Ph.D., in the palace examination of 1604, Xu was admitted to Beijing's prestigious Hanlin Academy. He ascended smoothly through the government ranks until late in his career he came to be known, simply, as "The Minister." Throughout his life, one constant was his dedication to improving agriculture. His experiments in Shanghai with yams, then a new import from South America, led to the widespread adoption of the high-energy crop. "This was decades before the West began taking a scientific approach to agriculture," says PICB director Andreas Dress. Xu also trained imperial soldiers to use a newfangled device from Europe, the cannon. "He was a fascinating polymath who spread his interests far and wide for a specific purpose: statecraft," says Dagmar Schäfer of the Max Planck Institute for the History of Science in Berlin, Germany.

Xu was also a key figure in China's calendar reform. China's calendar was based on observed motions of the sun and moon, whereas the West's was based on average motions. "The Jesuits had better data than Late Ming astronomers and a clear geometry of the heavens," says Peter Richter, a theoretical physicist at the University of Bremen in Germany. With such knowledge, Ricci predicted that an eclipse would occur on 15 December 1610—right on the money. "That impressed Xu Guangqi," Richter says.

After Xu and Ricci's successors correctly predicted an eclipse in 1629, the emperor appointed Xu as leader of the calendar reform, which he embarked on with the assistance of Jesuits. The reform was completed after Xu's death in 1633. The reams of data used to justify the revision amounted to the first scientific collaboration between scientists in Europe and the Far East.

Xu's tomb is a 20-minute drive from PICB, jointly run by the Chinese Academy of Sciences (CAS) and the Max Planck Society. "That's how we learned about this guy," says Dress, a computational biologist with an abiding interest in science history. "Suddenly it dawned on me" that 2007 is the anniversary of Chinese *Elements*. Accordingly, Dress broadened the workshop into an International Xu Guangqi Conference, organized by CAS, the Shanghai Institutes for Biological Sciences, and Shanghai Xuhui District Government.

One aspect of Xu's remarkable life that the Chinese government rarely talks about is his conversion to Roman Catholicism and baptism in 1603 as Paul Xu Guangqi. Although some scholars argue that Xu converted out of gratitude or in recompense for Ricci's help, Chu and others are convinced that he was both a devout Christian and a faithful Confucian, noting that Xu's writings consistently adhere to Confucian philosophy. Nor were the Jesuits as zealous in their missionary work as groups that came later: After all, notes Richter, Ricci helped translate *Elements*—not the Bible—into Chinese.

Xu's legacy was imperiled by the collapse of the Ming Dynasty in 1644. But his seminal contributions are cherished by modern China. "He forged a dialogue between the West and China," says Li Tiangang of the Shanghai Academy of Social Sciences, a dialogue that grows richer, and more relevant, by the day. **–RICHARD STONE**

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