

Bridge Named After the
Mathematician Who
Discovered
the Chinese Remainder
Theorem

跨越千年的数学桥

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照片提供：李佳 / 蔡天新



左上图：道古桥畔；左下图：重建后的道古桥；右图：道古桥上

正如流经剑桥大学的剑河上有一座传说由著名的大科学家艾萨克·牛顿建造的“数学桥”，中国城市杭州也有一座类似的历史更为悠久的桥——道古桥。

道古桥建于 770 多年前，位于西溪路上，横跨西溪河，靠近浙江大学的西溪校区。当地居民对这座石桥的历史几乎无所知晓，直到浙江大学数学系教授蔡天新揭开了这一段尘封的记忆。

据史料记载，道古桥建于 1237 年至 1241 年间。大约十二年前，因该地区的房屋整修计划被拆。不过，2005 年，一座新的石桥建成于离原址一百来米远的地方，两岸垂柳摇曳。在蔡天新的倡议之下，此新石桥被命名为“道古桥”。

“尽管桥址已移动，历史和故事仍延续下来。”4 月 27 日，蔡天新在道古桥重命名仪式上如是说，为此他做出了努力。

Just as there is a famous bridge built by the great scientist Isaac Newton over the River Cam in Cambridge University called "Mathematical Bridge", the Chinese city of Hangzhou also has its own such bridge, with an even longer history.

The Daogu Bridge is some seven hundred seventy years old and crosses the Xixi River near Zhejiang University's Xixi campus on Xixi Road. The stone bridge's history was known by few modern people, until Cai Tianxin, a mathematics professor from Zhejiang University, uncovered its dust-laden secrets.

According to local historical records, the bridge was built between the years of 1237 and 1241. It was demolished a decade ago during a local building project. However, in 2005 a new stone bridge was built about 100 meters away from the original



秦九韶塑像，南京北极阁气象博物馆



上图：秦九韶故里；下图：秦九韶纪念馆，路甬祥题

此桥以南宋（1127-1279）数学家秦九韶（1208-1261）命名，路甬祥是他的字。

秦九韶被认为是 13 世纪最伟大的数学家之一，发现了世界著名的中国剩余定理，这是古代中国最著名的科学定理。他的声望建立在 1247 年写就的著作《数书九章》上，该书内容从丢番图分析到军事与测量，涉猎可谓广泛。

除了中国剩余定理，书中还有已知三角形三条边长求面积的秦九韶公式，即海伦公式。德国数学史家莫里茨·康托尔称秦九韶为“最幸运的天才”，美国科学史家乔治·萨顿则认为秦九韶是“他那个时代最伟大的数学家之一”。

秦九韶，祖籍山东，生于普州安岳（今四川安岳）。1219 年，他随家人到杭州的西溪河边定居，如今从上海乘坐高铁到那里只需 40 分钟。那时杭州叫临安，是中国的首都，他的父亲在京城做官。“从孩童时代起，他就被认为是一个

location over the river, with willow trees swaying on both banks. It is now named Daogu Bridge, as Cai proposed.

"Though the site and bridge are now removed, its history and story remain," says Cai, who contributed to the renaming and attended the renaming ceremony held on the bridge on April 27. Cai says that historical gazetteers reveal that the old Daogu Bridge was named after a mathematician of the Southern Song Dynasty (1127-1279), Qin Jiushao, or spelled Ch'in Chiu-Shao (1208-1261) (Daogu is Qin's courtesy name).

Qin, regarded as one of the greatest mathematicians of the thirteenth century, created the world-renowned Chinese Remainder Theorem, considered the most famous scientific theorem of ancient China. His reputation lies in the Mathematical Treatise in Nine Sections (Shu Shu Jiu Zhang), issued in 1247, which covered matters that ranged from indeterminate analysis to military matters and surveying.

In the treatise, besides the Chinese Remainder Theorem, Qin also included "Qin Jiushao's formula" for finding the area of a triangle with given length of three sides, which is the same as Heron's formula, discovered earlier. No wonder the German mathematical historian M. Cantor praised him as "the luckiest genius," and American scientific historian George Sarton regarded him as one of the greatest scientists of the time.

Qin was born in Sichuan Province, and his ancestry can be traced back to Shandong. In 1219 he settled near the Xixi River in Hangzhou, a city nowadays only forty minutes away from Shanghai by bullet train, which was then known as Lin'an and was the dynastic capital when his father was assigned as an



上图：道古桥畔合影，前排右一是蔡天新，后排左一是张立新；下图：左起林正炎、唐孝威、沙健、严伟明

天才，不仅在数学上有造诣，且精通天文、工程、音乐，并在多个省份为官。”蔡天新说。

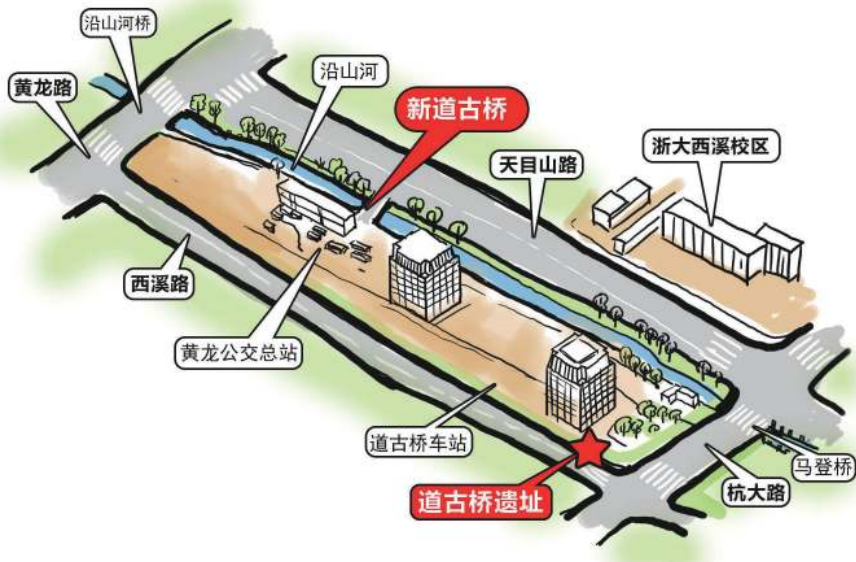
“1238年，秦九韶丁父忧回到杭州，由于发现交通不便，他决心在西溪河上造桥，以利民众通行。他亲自设计，并得到当地政府的资助。刚开始此桥被称为西溪桥，等到元代北方来的数学家朱世杰游历杭州，才建议将此桥命名为道古桥。”

“此桥之所以被人遗忘，甚至在当时未能以‘道古’命名的一个重要原因，是由于数学家本人身处政治漩涡，其政治对手将其描述成一个行贿者和投毒者。但是，数个世纪以后的清朝，就有多位学者怀疑这些指责，试图为他恢复名誉。今天，关于秦九韶的道德疑问仍无法澄清，而时光已给这个故事蒙上了神秘的面纱。”

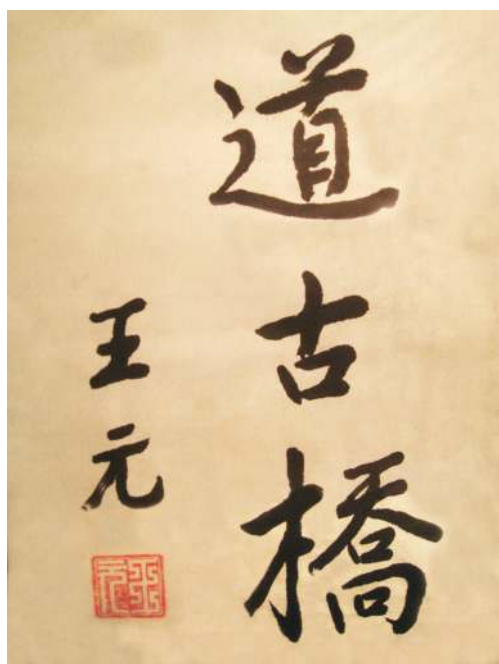
一年前，作为秦九韶的数论同行、《数学文化》杂志的编委，曾在道古桥附近住过18年多的蔡天新重游了此地，

official there. "Hailed as a genius since his boyhood, he not only devoted his life to mathematics but also to many other fields, such as astronomy, engineering, and music, and even held a series of bureaucratic positions in several Chinese provinces," Cai says.

"In 1238, when Qin went back to Hangzhou for his father's funeral, the man found there was no bridge over the Xixi River, a fact which caused inconvenient transportation. As a result, the 'Daogu Bridge' was built under his design as well as financial support from the local government. At the beginning the bridge was called Xixi Bridge for its location and was later altered to Daogu Bridge when Zhu Shijie, another famous mathematician from North China, traveled to Hangzhou in the early Yuan Dynasty (1271-1368) and proposed changing Xixi Bridge into



左图：道古桥地图（梁津铭绘）；右图：道古桥施工中



王元院士为道古桥题写桥名

注意到附近的那座桥与原先的道古桥有些相似，这给了他灵感。在他的努力和当地政府的支持下，举行了一个重新命名的仪式。

桥边新落成一块石碑，刻着“道古桥”三个字，题字的是 83 岁的著名数学家、教育家和科普作家王元院士。反面是一篇碑文，讲述了相关的历史故事。

道古桥所在地虽算不上是风景名胜，但杭州这座城市却是有名的旅游天堂：著名的西湖已列入世界遗产名录，离桥不远的西溪湿地也是游人的必访之地。

Daogu Bridge in honor of Qin Jiushao. "

"One reason that the bridge was forgotten and not even named after Qin is that the mathematician, who went into politics, was later, in articles written by two of his political opponents, described as a person who bribed and poisoned someone. However, centuries later in the Qing Dynasty several scholars doubted these claims and tried to rehabilitate him. Today there remains no certain answer to Qin's political merit, and time has cast a shroud over the convoluted story."

A year ago, Cai, who is also a number theorist like Qin as well as an editor of the Hong Kong-based magazine Mathematical Culture, and who had lived near the bridge for over eighteen years and recently visited the place, was aware that the bridge is in similar surroundings to those of the original Daogu Bridge, which drove him to the idea of renaming the new bridge with the historic name. With Cai's endeavors and support from local government, a naming ceremony was officially held.

Beside the bridge there is a tablet with the inscription "Daogu Bridge", written by eightythree-year-old Wang Yuan, a renowned Chinese mathematician, educator, and popular science writer. On the reverse side of the tablet an article tells the historic story. The site of the bridge is not exactly a scenic attraction, yet the city of Hangzhou is known as a tourist's paradise: the city's West Lake was inscribed on the list of World Heritage Sites, and the Xixi Wetland, which is not far from the bridge, is also a must-visit location.

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