Evidence Found for China’s Ancient Origin Story

New geological findings suggest that an ancient flood in a popular legend about the birth of China's civilization might have actually occurred, but some 150 years later than historians thought.

This photo shows Jishi Gorge upstream from the landslide dam. Gray silt deposits reveal an ancient, massive lake held by the dam. Credit: Wu Qinglong

By JoAnna Wendel 3 hours ago

In Chinese mythology, the tale of a great flood marks the beginning of the ancient civilization and the debut of China’s first-ever, but possibly fictional, dynasty—the Xia Dynasty. Today, researchers published a paper in *Science* *(http://science.sciencemag.org/cgi/doi/10.1126/science.aaf0842)* laying out geological evidence for a huge flood on the Yellow River almost 4000 years ago that may have inspired the origin story.

“The scientific evidence of this flood would lend support to parts of the legendary history,” said Li Liu, an archaeologist at Stanford University in

California and coauthor on the new paper. Specifically, the findings could lend credibility to arguments that the Xia Dynasty actually existed (http://www.chinahighlights.com/travelguide/china-history/the-xia-dynasty.htm).

Yu the Great

The story of the Xia Dynasty (http://www.ancient.eu/Xia_Dynasty/) starts with a flood that supposedly lasted 20 years. In ancient times, a man called Yu recruited villagers in the Yellow River valley to divert the waters that had been raging untamed for almost a decade. Over another decade, Yu and the villagers dug channels and tributaries that led the water to the sea.

Grateful countrymen crowned Yu the Great (http://www.chinaknowledge.de/History/Myth/personsyu.html) as their ruler. He started the dynastic tradition when he eventually passed his throne to his son. Modern scholars suggest that Yu's reign started in 2070 B.C.E (http://www.self.gutenberg.org/articles/xia%E2%80%93shang%E2%80%93zhou_chronology_project).—if it existed at all.

Because Chinese texts made no mention of this story for the next millennium, some scholars reject the existence of the dynasty itself, said Wu Qinglong, a geologist at Peking University in Beijing and lead author of the paper.

History in Rock

Starting nearly a decade ago, Wu found evidence of a landslide along the slopes bordering the Yellow River in the Jishi Gorge. Sediments from this landslide contained a jumbled mix of green schist and purple mudstone grains, which he also found 25 kilometers away in sediment that filled earthquake fissures at the Lajia archaeological site, an earthquake-damaged site famous for preserving the oldest intact noodles (http://news.nationalgeographic.com/news/2005/10/1012_051012_chinese_noodles.html).

How did these sediments get so far downstream? To Wu, one answer seemed the most logical—a huge flood must have burst through the landslide dam, washing down sediment from higher elevations. Although he realized a flood must have carried these sediments, Wu didn't discover its epic size until he and his team investigated more closely.

The Size of the Dam

The researchers started by calculating the size of the dam itself. They already knew about parts of the dam, but further inspection using satellite imagery revealed its breadth—the ancient landslide completely blocked the river, spanning 700–800 meters across, rose 240 meters above the river's water level, and stretched downriver for more than a kilometer. Lake sediments found upstream of the ancient dam indicate that a massive lake grew and grew, holding as much as 17 cubic kilometers of water.

The raging waters would have carried 300,000–500,000 cubic meters of water per second.
At the mouth of Jishi Gorge, where it opens into the downstream Guanting Valley, the researchers found boulders scattered around as if they'd been carried by a violent flood, said Darryl Granger, a geologist at Purdue University in West Lafayette, Ind. They also found beds where smaller grains lay beneath larger ones. Usually, floods deposit sediment in the opposite way—the largest and heaviest rocks carried by a flood sink first, then smaller and smaller grains rain out of the passing waters. This inversely graded bed indicates that the mass of water began moving slowly—as it overtopped the dam—and then rapidly sped up when the dam collapsed, Granger said.

Using sediments found downstream of the gorge, the researchers estimated that the ancient flood would have climbed as high as 38 meters above the current river's level. With flood discharge calculations—using the amount of water thought to have been present in the massive lake and the gorge's geometry—they estimated that the raging waters would have carried 300,000–500,000 cubic meters of water per second, making it one of the largest freshwater floods on Earth in the last 10,000 years, Granger said.

"This cataclysmic flood would have been devastating for anyone living on the Yellow River downstream," Granger continued.

Radiocarbon dating of charcoal found in ancient flood deposits on both sides of the river's path through the Jishi Gorge revealed that the flooding occurred around 1920 B.C.E.

Piecing Together the Tale

Wu and his colleagues then compared their calculated radiocarbon dates of the flood to those from skeletal remains of children killed at the Lajia site during the same earthquake. The dates were a close match, indicating that the earthquake may have triggered the landslide in the first place.

Through research and models, a story came together: In 1920 B.C.E., an earthquake caused a landslide to tumble into the Yellow River, blocking it completely. Water accumulated behind this dam for 6–9 months, after which it started to pour over the top. Eventually, the 130-meter-high dam partially collapsed, unleashing a wall of water down through the Jishi Gorge and into the valley below. The flood could have lasted some tens of hours or even days, possibly creating new tributaries and channels as the water cascaded through the valley, Granger said.

Annual flooding of those tributaries could have disrupted the agricultural landscape with each rainy season, Granger continued—a possible inspiration for the myth of a 20-year-long flood.

Culture Shock

Around 1900 B.C.E., legend says, the Xia Dynasty began after Yu the Great calmed the flooding waters. This date closely coincides with a radical cultural shift, said David Cohen, an archaeologist at the National Taiwan University in Taipei and a coauthor on the study. China's Bronze Age (http://afe.easia.columbia.edu/special/china_4000bce_bronze.htm) started around 1900 B.C.E., he said, when urban centers and bronze centers started to rise.

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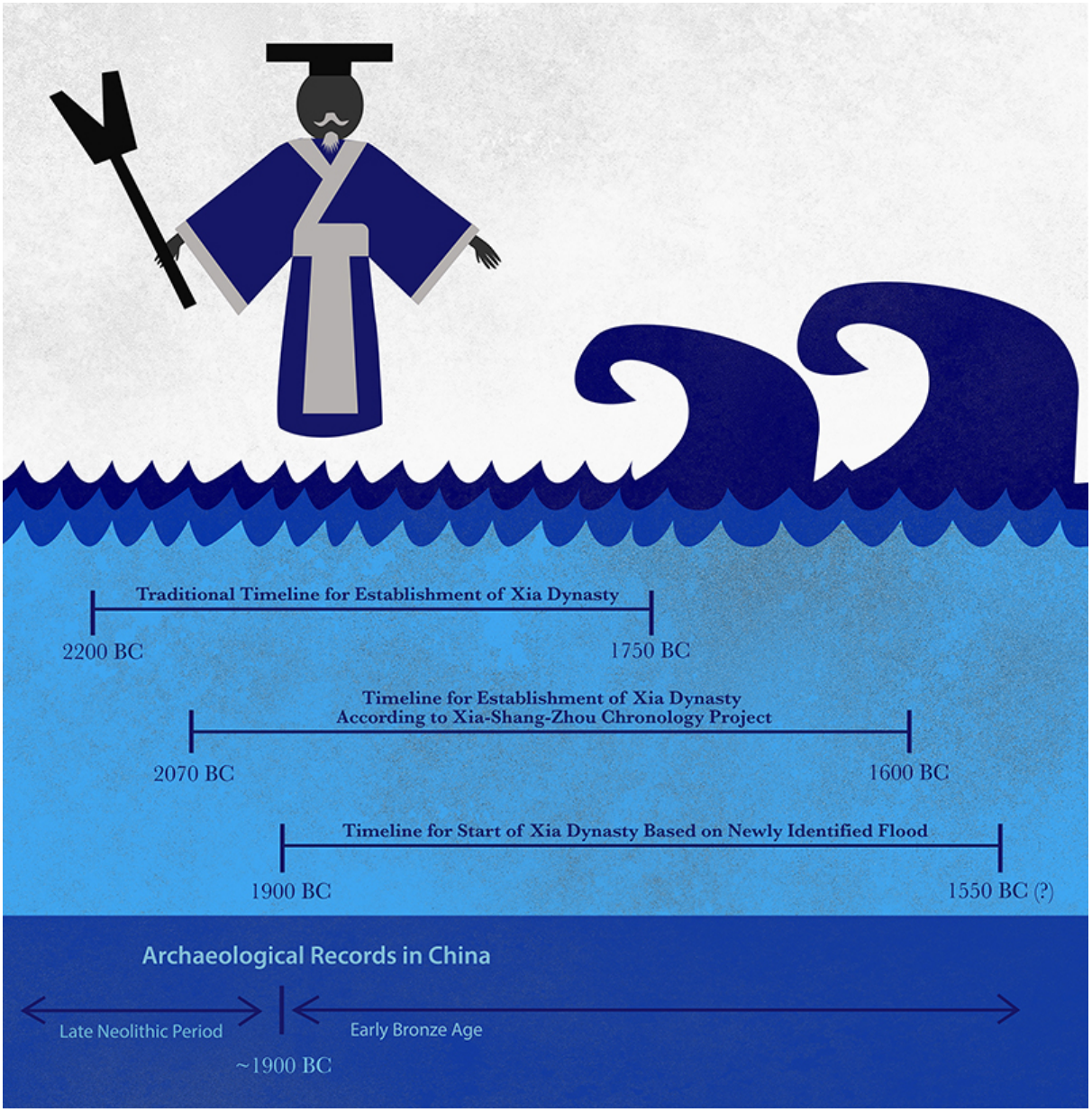
One collection of urban ruins identified as the Erlitou culture (http://www.chinadaily.com.cn/en/doc/2003-11/11/content_280475.htm), which some historians have associated with the Xia Dynasty, also dates to about 1900 B.C.E. That is too late to overlap with the dynasty if Yu truly came to power in 2070 B.C.E. However, if the newly documented flood is the flood of myth, its timing strengthens the possibility the Erlitou culture and hypothetical Xia Dynasty were linked, Cohen said.

"The [Great Flood] tale is central to Chinese identity and is known by everyone in China, just as Westerners know the story of Creation in the Bible or Noah's flood," Cohen told *Eos*. "I think many will be excited to see 'scientific evidence' of some truth behind this founding legend."



Historians have debated timelines for the beginning of the Xia Dynasty for decades. New research argues that on the basis of geological evidence of a great flood, the Xia Dynasty began almost a century later than originally proposed and coincides with archeological evidence of the beginning of China's Bronze Age. Credit:

—JoAnna Wendel, Staff Writer

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