

MILLET ON THE MOVE

What was the most important grain in ancient China? If you said rice, you'd be wrong, according to some archaeologists. It was lowly millet that served as the staple grain that allowed Chinese civilization to flourish in ancient times, says archaeologist Gary Crawford of the University of Toronto, Mississauga, in Canada. "Millet was the principal crop that supported town life," he says. Although rice began to be domesticated in the southeast by 7000 B.C.E. or even earlier, millet was grown all across China in the preurban era, from the north to the southeastern coast.

And whereas important goods and technologies like wheat, bronze, horses, and chariots all flowed from West to East starting some 4000 years ago, perhaps across China's westernmost provinces (see main text), there is now intriguing

evidence that millet traveled the other way. Some researchers say the grain was first domesticated in northern China as early as 8000 B.C.E. and made its way to the Black Sea region of Europe by 5000 B.C.E. If so, it would be a sign of far earlier and extensive connections—going both ways—across the vast Eurasian landmass.

Until this year, the earliest solid evidence of domesticated millet dated to about 6000 B.C.E. from a handful of sites in northern China. But in May, seed cases found at a northeastern site called Cishan in Hebei Province were dated to 8000 B.C.E., according to a paper in the *Proceedings of the National Academy of Sciences* by Houyuan Lu of the Institute of Geology and Geophysics in Beijing and colleagues.

That's the oldest sign yet of this short-season crop, says Crawford, who backs the claim. But others are skeptical. The seed cases are domesticated millet, agrees Zhijun Zhao of the Institute

of Archaeology in Beijing—but the dates are 2000 years older than the Cishan settlement itself, a 400-square-meter site with many storage pits, stone grinders, and sickles. Houyuan counters that his team's dates, done with accelerator mass spectrometry analysis of carbon-14, are solid. "To confirm our results, we rechecked the stratigraphy and obtained additional C¹⁴ dates from a second C¹⁴ laboratory," he says. "Previous archaeological excavations in Cishan might be incomplete." Crawford agrees, noting that Cishan was dated back in the 1970s.

Whether the Cishan millet proves to be as old as supporters say, other sites in the region clearly show that millet was grown in significant quantities in northeastern China long before it appears around the Black Sea and in central Europe. Zhao and Crawford, for example, have dated millet at a northeastern Chinese site called Xinglonggou to approximately 5640 B.C.E. Early farmers in the

no longer found in the area is one sign, as is increased snowfall that created channels through the Tarim Basin that contains the Taklamakan. Some lakebed samples in northwest China hint at a warm and wet period between 2800 and 2000 B.C.E., followed by a 1000-year cold and dry spell, says environmental archaeologist Qi Wuyun of the Institute of Archaeology in Beijing. But she adds that further data are needed.

The most important area of settlement may have been an environmentally hostile region on the desert's eastern end called Lop Nur, which China used to conduct nuclear tests. But in ancient times, "the Lop Nur delta was a large oasis hundreds of kilometers in length," Liu says. Preliminary surveys and geological studies suggest a string of settlements along the now-dry Peacock River, which once flowed east and ended in a marshy lake.

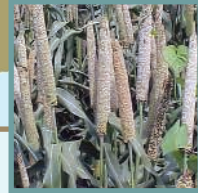
Researchers in others parts of Central Asia have found many settlements in similarly marginal climatic zones during the period, such as Gonur in the Kara Kum desert of Turkmenistan. But little archaeological work has been done along the Peacock because of its remoteness, security constraints, and a focus on rescuing sites endangered by development (see p. 936). Increasing aridity by 1500 B.C.E. may have forced the Peacock settlers to revert to a nomadic existence, says Liu. That cycle seems common throughout recorded history in Xinjiang, where small changes in rainfall have a dramatic effect.

Other ancient Xinjiang cemeteries, most from the period starting in 1500 B.C.E., are coming to light and may offer additional clues. At one site in Xiabandi, in the far western end of the province near the Pamir Mountains and adjacent to Kazakhstan, archaeologists found pottery resembling that of the Andronovo pastoralist culture of the steppes. Yet they also found bracelets and earrings that Liu says are in a style common to Gansu, a Chinese province far to the southeast. And to the northwest of Ürümqi, bordering the steppes, Liu excavated a settlement from 1000 B.C.E. with round altars and evidence of horse and sun worship—classic traditions of

Shipshape. Some Xiaohu tombs feature boat-shaped wooden coffins unique to the site.



region typically planted the crop on the fine and loose soil called loess, which may have been the home of millet's still-unknown wild ancestor. The grain—which can be turned into flour, porridge, or beer—then spread across northern China. It was widely planted in the Yellow River region and



as far southwest as the Chengdu plain, where it became an important staple by 4000 B.C.E.

Millet either diffused from China to Europe or was domesticated independently in each place. Archaeologist Martin Jones of the Univer-

sity of Cambridge in the United Kingdom suspects that the timing of millet's appearance around the Black Sea is no coincidence. Millet can produce seeds quickly—in 45 to 60 days—and the most common variety can survive dry conditions that kill other grains like wheat. So although wheat must have been traded across the steppes, mountains, and deserts that separate China and the Near East, millet could have been passed along by farmers who took up its cultivation across central Asia. Early results from ongoing genetic studies suggest that Chinese and European millets are indeed related, Jones says cautiously. Next year, he hopes to go into the field in Kazakhstan and China's northwest to find millet remains that might connect the dots between north China and the West. "It may seem like looking for a needle in the haystack," says Jones, "but we're going to track down these sites." **—A.L.**

steppe pastoralists. But at the same site, he also excavated painted pottery of a type found in the upper Yellow River valley. Such finds offer intriguing but still enigmatic evidence of the links between Central Asian pastoralists and China proper, says Liu.

On the bronze trail

The connection between the steppes and eastern China clearly existed. But did pastoralists such as those buried in Xiaohe carry important technologies like bronze eastward? That idea remains controversial. Bronze technologies in the form of weapons and adornment appear starting in the 3rd millennium B.C.E. across the steppes. The Xinjiang bronzes appear to be slightly earlier than several found in Gansu, to the southeast, and then, not long after, in Erlitou in the mid-Yellow River area. That makes for a neat pattern of diffusion. "But the techniques used in Gansu are more developed than in Xinjiang," notes Liu. And the earliest bronze-casting workshops in the region don't appear until the 4th century B.C.E., adds Lu. "It is not likely these skills were introduced from Xinjiang," he says, standing on the parched ground at the Yanghai cemetery.

Trade with Central Asia likely led to the acquisition of bronzes here—but not necessarily the means to make them, Lu says. He and others increasingly think that bronze technology filtered south from Inner Mongolia, far to the east, and eventually was picked up by peoples along the Yellow River.

But others point out that mold-casting dominates early Chinese metallurgy, and that technology is not used until later in the region between Europe and Central Asia—arguing against a technology transfer. Some scholars argue there was a connection with the West but that the technology then took an independent turn. Evidence for all theories remains thin. "How does it get to Gansu?" asks Chen

Xingcan of the Institute of Archaeology in Beijing. "The route is just not clear."

Whatever the route for bronze, Lu cites another transformative import that he says arrived from the west via the Peacock River valley: wheat. Domesticated first in the Near East 10,000 years ago, wheat is northern China's most important staple today. And at the moment, the oldest domesticated wheat in China seems to be that strewn over bodies before burial at Xiaohe 3000 years ago. "The new term we use is the 'wheat road,'" says Lu.

But other archaeologists in China are not yet convinced. Wheat next turns up in the 1st millennium B.C.E. in northern China, and it's not clear if wheat from Xiaohe made its way there or if diffusion from the west simply stopped in Xinjiang. "We need to find actual wheat fields at Xiaohe," says Xiaohong Wu of Peking University. Some researchers instead see a pattern similar to that of bronze, with wheat coming from the steppes through Inner Mongolia. And a recent find of a few early wheat samples roughly dated to 2000 B.C.E. in the far southeastern province of Fujian raise the possibility of seaborne transfer from the Indus civilization in today's India and Pakistan.



Heads up. This tiny wooden face provides a glimpse into the beliefs of the Xiaohe people.

Similar debates revolve around the appearance of domesticated sheep, goats, and cattle in China. Xinjiang sites show evidence of all three in the 2nd millennium B.C.E.—about the time that they appear in central China. But tracing a path of diffusion is difficult, in part because there are few Chinese zooarchaeologists. Everyone agrees that these questions require more extensive excavations in the province as well as better analytical techniques. In a region that retains its position as a continental crossroads, archaeologists are only starting to understand how this bridge between East and West contributed to China's evolution.

—ANDREW LAWLER

SOURCE: MARTIN K. JONES; CREDITS (TOP TO BOTTOM): WIKIPEDIA; XINJIANG CULTURAL RELICS AND ARCHAEOLOGY INSTITUTE

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