Barley fuelled farmers' spread onto Tibetan plateau

Cold-tolerant crop enabled high-altitude agriculture some 3,600 years ago.

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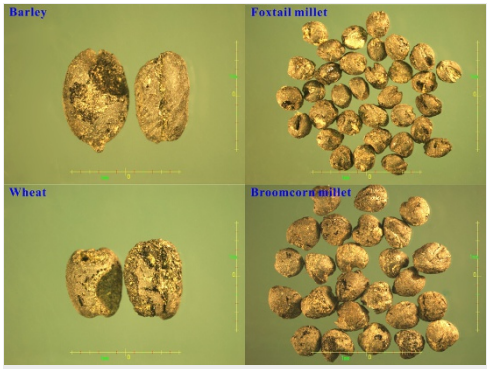
Barley is a staple crop in present-day Tibet.

A switch to growing barley, a crop that can tolerate cold temperatures, allowed people to farm the high-altitude Tibetan plateau starting about 3,600 years ago, a survey of archaeological sites suggests.

The work fleshes out a picture of how farmers from lower elevations began pushing into areas occupied by nomadic cultures for thousands of years. “It shows how that pattern developed and when it developed,” says David Madsen, an archaeologist at the University of Texas at Austin, who was not involved in the research.

The peopling of the Tibetan plateau represents an important shift in human history, as people evolved physiological adaptations that enabled them to live at high altitudes[1]. It also marked a convergence of hunter-gatherer, pastoral and farming traditions from East and West. “There are all kinds of things about the occupation of Tibet that intrigue a whole array of scientists across a number of different fields,” says Madsen.

The new study suggests that the push to farm at higher altitudes happened as temperatures were cooling. That contradicts the common idea that people would move to higher and colder places only when the environment improves, say the researchers, who are led by Fahu Chen and Guanghui Dong of Lanzhou University in China. Their work appears in *Science* on 20 November[2].



Chen and his team gathered archaeological artefacts, animal bones and the remains of plants at 53 sites in the northeastern part of the plateau, where it begins to slope down towards the Yellow River valley. All of the sites contained the charred remains of cereal grains such as millet, barley and wheat.

Millet was domesticated in China but is sensitive to frost. Barley and wheat, from the Middle East’s Fertile Crescent, are hardier.

All the archaeological sites higher than about 2,500 metres contained primarily barley and not millet, Chen and his colleagues say. That includes a 4,000-year-old

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Carbonized grains unearthed in the northeastern Tibetan plateau include barley (top left), two types of millet (right) and wheat (lower left).

site with the oldest known evidence for barley on the plateau. Barley may have arrived in the region as part of the same cultural exchange that brought wheat from the West, Chen's team says.

The researchers think that farmers overpopulated the Yellow River valley region, so when new crops became available, they began moving to higher elevations. “Only after 3,600 years ago, when frost-hardy and cold-tolerant barley and wheat — and perhaps sheep, too — arrived, could people continue to move higher,” the team says. Even today, barley and wheat are the most widely grown crops on the plateau.

Early farmers may have experimented with a variety of crop types to see which worked the best in the harsh Tibetan environment, says Jade d’Alpoim Guedes, a palaeoethnobotanist at Washington State University in Pullman, who has studied the transition from millet-based agriculture to wheat and barley farming[3].

But she warns against drawing sweeping conclusions about what the presence of cereal grains may mean. “The fact that we find grain seeds in one place on the plateau does not mean we should assume these people were necessarily agricultural,” she says. “There can be a lot of complex social dynamics at play.”

The Tibetan plateau is large and geographically diverse, and its history is complex as well, adds Mark Aldenderfer, an archaeologist at the University of California, Merced, who has studied the peopling of the plateau[4]. “There are lots and lots of sites we can attribute fairly clearly to hunters and gatherers,” he says. “It’s not like nothing matters until the farmers show up.”

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References

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