

The origins of cannabis smoking: Marijuana use in the first millennium BC

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The typical brazier and burnt stones in ancient Pamirs. Credit: Xinhua Wu

Cannabis has been cultivated for millennia in East Asia as an oil-seed and fibre crop. Little is known, however, about the early use and eventual cultivation of the plant for its psychoactive and medicinal

properties. Despite being one of the most widely used psychoactive drugs in the world today, there is little archaeological or historical evidence for the use of marijuana in the ancient world. A new study, published in the journal *Science Advances*, identifies psychoactive compounds preserved in 2,500-year-old funerary incense burners from the Jirzankal Cemetery in the eastern Pamirs. Researchers from the Max Planck Institute for the Science of Human History, the Chinese Academy of Sciences, and the Chinese Academy of Social Sciences have shown that people were selecting plants with higher levels of THC and burning them as part of mortuary rituals. This is the earliest clear evidence to date of cannabis being used for its psychoactive properties.

Cannabis is one of the most popular [plants](#) in the world, especially in light of rapidly changing legislation surrounding its legalization in Europe and America. Despite the popularity of the plant for its psychoactive properties, very little is known about the earliest use or cultivation of [cannabis](#) for its mind-altering effects. Cannabis plants were cultivated in East Asia for their oily seeds and fibre from at least 4000 BC. However, the early cultivated varieties of cannabis, as well as most [wild populations](#), have low levels of THC and other cannabinoid compounds with psychoactive properties. Therefore, it has been a longstanding mystery as to when and where specific varieties of the plant with higher levels of these compounds were first recognized and used by humans.

Many historians place the origins of cannabis smoking in the ancient Central Asian steppes, but these arguments rely solely on a passage from a single ancient text from the late first millennium BC, written by the Greek historian Herodotus. Archaeologists have thus long sought to identify concrete evidence for cannabis smoking in Eurasia, but to date, there are few reliable, well-identified and properly dated examples of early cannabis use.

The researchers in the current study uncovered the early cannabis use when they sought to identify the function of ancient wooden burners discovered by archaeologists from the Chinese Academy of Social Sciences, who were excavating in the high mountainous regions of eastern China. The burners were recovered from 2500-year-old tombs in the Pamir mountain range. The international research team used a method called gas chromatography-mass spectrometry to isolate and identify compounds [preserved](#) in the burners. To their surprise, the chemical signature of the isolated compounds was an exact match to the chemical signature of cannabis. Moreover, the signature indicated a higher level of THC than is normally found in wild cannabis plants.



Dense patches of wild cannabis grow across the mountain foothills of Eurasia from the Caucasus to East Asia; these plants were photographed growing in the Tian Shan Mountains of Kazakhstan. Credit: Robert Spengler

The data produced by the research effort, which brought together archaeologists and laboratory scientists from Jena, Germany and Beijing, China, provides clear evidence that ancient people in the Pamir Mountains were burning specific varieties of cannabis that had higher THC levels. The findings corroborate other early evidence for cannabis from burials further north, in the Xinjiang region of China and in the Altai Mountains of Russia. As Nicole Boivin, Director at the Max Planck Institute for the Science of Human History notes, "The findings support the idea that cannabis plants were first used for their psychoactive compounds in the mountainous regions of eastern Central Asia, thereafter spreading to other regions of the world."

Cannabis likely spread across exchange routes along the early Silk Road

The THC-containing residues were extracted from burners from a cemetery known as Jirzankal in the remote Pamir Mountains. Some of the skeletons recovered from the site, situated in modern-day western China, have features that resemble those of contemporaneous peoples further west in Central Asia. Objects found in the burials also appear to link this population to peoples further west in the mountain foothills of Inner Asia. Additionally, stable isotope studies on the human bones from the cemetery show that not all of the people buried there grew up locally.



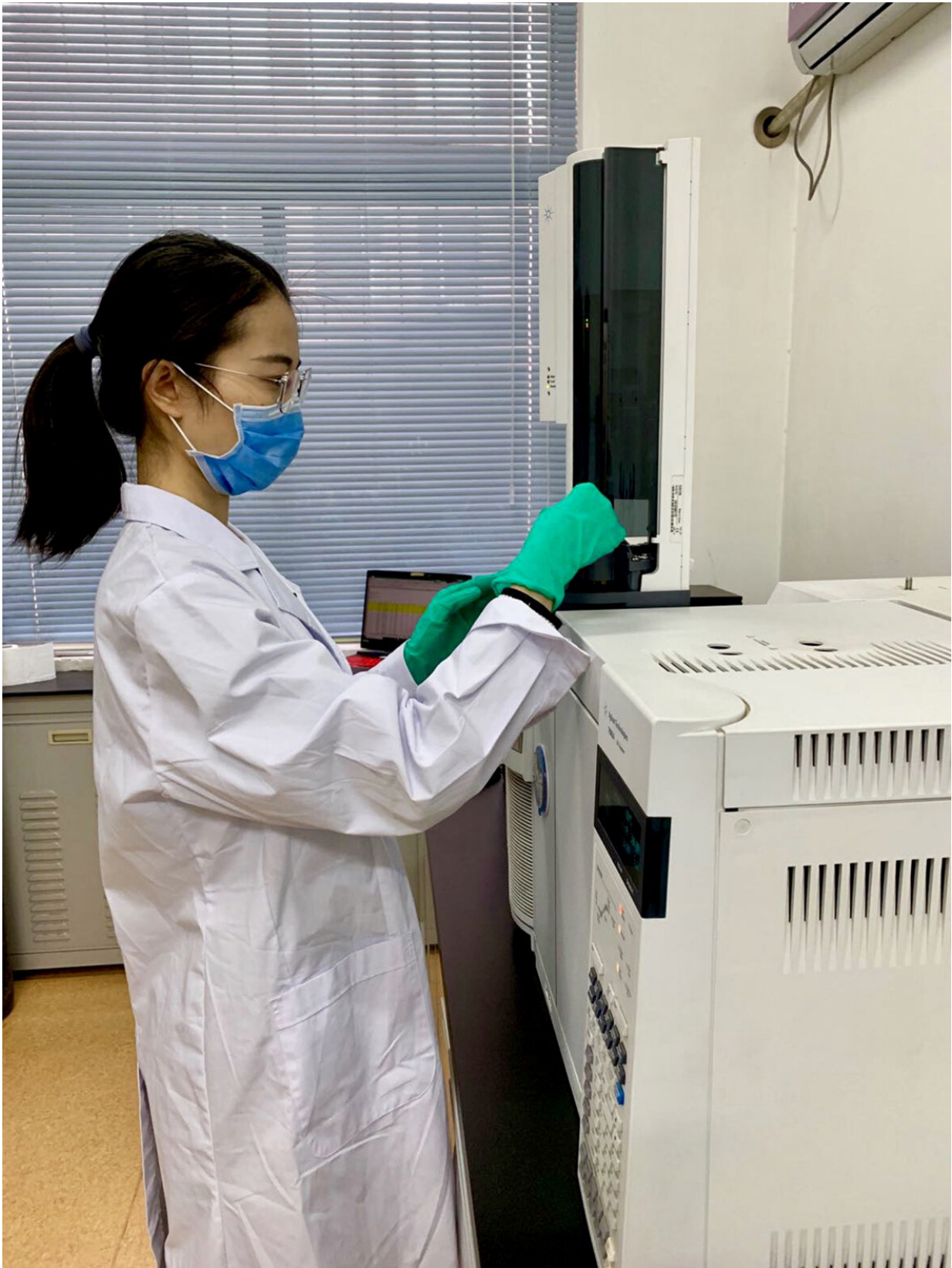
The excavation of the tomb M12, in which the brazier was found. In the photo, the brazier can be seen at the middle bottom edge of the central circle. Credit: Xinhua Wu

These data fit with the notion that the high-elevation mountain passes of Central and Eastern Asia played a key role in early trans-Eurasian exchange. Indeed, the Pamir region, today so remote, may once have sat astride a key ancient trade route of the early Silk Road. The Silk Road was at certain times in the past the single most important vector for cultural spread in the ancient world. Robert Spengler, the lead archaeobotanist for the study, also at the Max Planck Institute for the Science of Human History, explains, "The exchange routes of the early Silk Road functioned more like the spokes of a wagon wheel than a long-distance road, placing Central Asia at the heart of the [ancient world](#). Our

study implies that knowledge of cannabis smoking and specific high-chemical-producing varieties of the cannabis plant were among the cultural traditions that spread along these exchange routes."

People sought and later cultivated more psychoactive varieties of cannabis for use in burial rituals

Compared to cultivated varieties, wild cannabis plants contain lower levels of THC, one of the psychoactive compounds in cannabis. It is still unclear whether the people buried at Jirzankal actively cultivated cannabis or simply sought out higher THC-producing plants. One theory is that cannabis plants will produce greater quantities of active compounds in response to increased UV radiation and other stressors related to growing at higher elevations. So people roaming the high mountainous regions may have discovered more potent wild plants there, and initiated a new kind of use of the plant.



Dr. Meng Ren works with GCMS in Beijing. Credit: Yimin Yang

While modern cannabis is used primarily as a recreational drug or for medical applications, cannabis may have been used rather differently in the past. The evidence from Jirzankal suggests that people were burning cannabis at rituals commemorating the dead. They buried their kin in tombs over which they created circular mounds, stone rings and striped patterns using black and white stones.

Whether cannabis also had other uses in society is unclear, though it seems likely that the plant's ability to treat a variety of illnesses and symptoms was recognized early on. Yimin Yang, researcher at the University of the Chinese Academy of Sciences in Beijing observes, "This study of ancient cannabis use helps us understand early human cultural practices, and speaks to the intuitive human awareness of natural phytochemicals in plants." Dr. Yang has studied ancient organic residues in East Asia for over ten years. He notes that "biomarker analyses open a unique window onto details of ancient plant exploitation and cultural communication that other archaeological methods cannot offer."

Professor Boivin points out that "given the modern political climate surrounding the use of cannabis, archaeological studies like this can help us to understand the origins of contemporary cultural practice and belief structures—which, in turn, can inform policy." As Dr. Spengler observes, "Modern perspectives on cannabis vary tremendously cross-culturally, but it is clear that the plant has a long history of human use, medicinally, ritually, and recreationally, over countless millennia."

More information: "The origins of cannabis smoking: Chemical residue evidence from the first millennium BC in the Pamirs," *Science Advances* (2019). DOI: 10.1126/sciadv.aaw1391 ,

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