Doubts aired over Neandertal bone 'flute'

Amid much media fanfare, a research team in 1996 trumpeted an ancient, hollowed-out bear bone pierced on one side with four complete or partial holes as the earliest known musical instrument. The perforated bone, found in an Eastern European cave, represents a flute made and played by Neandertals at least 43,000 years ago, the scientists contended.

Now it's time to stop the music, say two archaeologists who examined the purported flute last spring. On closer inspection, the bone appears to have been punctured and gnawed by the teeth of an animal—perhaps a wolf—as it stripped the limb of meat and marrow, report April Nowell and Philip G. Chase, both of the University of Pennsylvania in Philadelphia.

"The bone was heavily chewed by one or more carnivores, creating holes that became more rounded due to natural processes after burial," Nowell says. "It provides very weak evidence for the origins of [Stone Age] music." Nowell presented the new analysis at the annual meeting of the Paleoanthropology Society in Seattle last week.

Nowell and Chase examined the bone with the permission of its discoverer, Ivan Turk of the Slovenian Academy of Sciences in Ljubljana (SN: 11/23/96, p. 328). Turk knows of their conclusion but still views the specimen as a flute.

Both open ends of the thighbone contain clear signs of gnawing by carnivores, Nowell asserts. Wolves and other animals typically bite off nutrient-rich tissue at the ends of limb bones and extract available marrow. If Neandertals had hollowed out the bone and fashioned holes in it, animals would not have bothered to gnaw it, she says.

Complete and partial holes on the bone's shaft were also made by carnivores, says Nowell. Carnivores typically break open bones with their scissorlike cheek teeth. Uneven bone thickness and signs of wear along the borders of the holes, products of extended burial in the soil, indicate that openings made by cheek teeth were at first less rounded and slightly smaller, the researchers hold.

Moreover, the simultaneous pressure of an upper and lower tooth produced a set of opposing holes, one partial and one complete, they maintain.

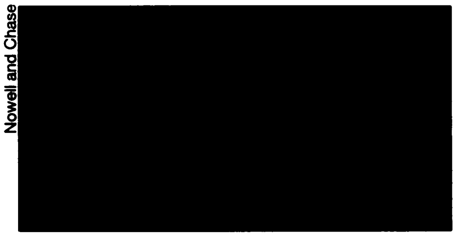
Prehistoric, carnivore-chewed bear bones in two Spanish caves display circular punctures aligned in much the same way as those on the Slovenian find. In the March ANTIQUITY, Francesco d'Errico of the Institute of Quaternary Prehistory and Geology in Talence, France, and his colleagues describe the Spanish bones.

In a different twist, Bob Fink, an independent musicologist in Canada, has reported on the Internet (http://www.webster.sk.ca/greenwich/fl-compl.htm) that the spacing of the two complete and two partial holes on the back of the Slovenian bone conforms to musical notes on the diatonic (do, re, mi . . .) scale.

The bone is too short to incorporate the diatonic scale's seven notes, counter Nowell and Chase. Working with Pennsylvania musicologist Robert Judd, they estimate that the find's 5.7-inch length is less than half that needed to cover the diatonic spectrum.

The recent meeting presentation is "a most convincing analysis," comments J. Desmond Clark of the University of California, Berkeley, although it's possible that Neandertals blew single notes through carnivore-chewed holes in the bone.

"We can't exclude that possibility," Nowell responds. "But it's a big leap of faith to conclude that this was an intentionally constructed flute." —*B. Bower*


Nowell and Chase

Both sides of the alleged Neandertal flute.

Storms paint bull's-eyes in stratosphere

An experimental satellite designed to improve the detection of ballistic missiles has captured images of giant natural bull's-eyes in the sky. These ring-shaped waves are triggered by thunderstorms and rise high up through the atmosphere.

Physicists have long known that thunderstorms could generate these so-called gravity waves, but they lacked satellite sensors specialized enough to capture images of such disturbances in the stratosphere, says Edmond M. Dewan of the Air Force Research Laboratory at Hanscom Air Force Base in Bedford, Mass. He and his colleagues report their discovery in the April 1 GEOPHYSICAL RESEARCH LETTERS.

"This [satellite] technique uses remote sensing from space as an effective way to study the dynamics of the middle atmosphere, which has been a difficult region to study," says coauthor Robert R. O'Neil, also of Hanscom. The stratosphere (17 to 50 kilometers in altitude) and the mesosphere (50 to 90 km) lie above the observational range of airplanes but below that of rockets.

Dewan, O'Neil, and their colleagues observed the wave patterns using a sensor on board the Midcourse Space Experiment (MSX) satellite. This instrument captures thermal radiation emitted by carbon dioxide molecules about 40 km above the surface.

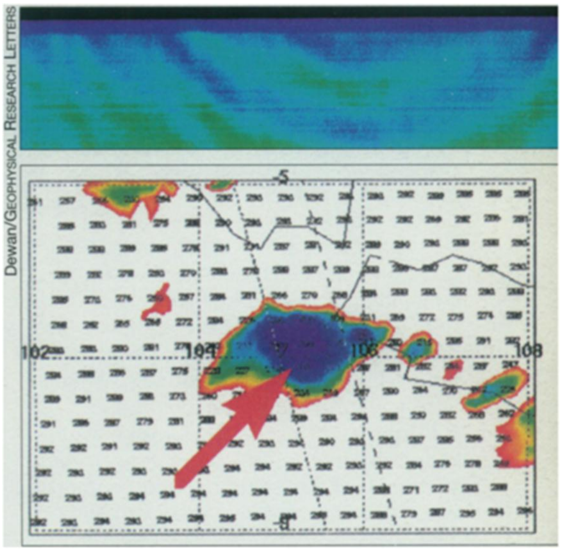
The researchers detected two cases of bull's-eye temperature patterns measuring many hundreds of kilometers across. The circles developed precisely over spots where a thunderstorm had been an hour or two earlier. These observations confirm geographically limited ones made from the ground during the 1980s that indicated thunderstorm-triggered gravity waves at an altitude of 80 km.

Atmospheric gravity waves resemble waves produced in water when a floating object is pushed down and released. As the object pops up, it overshoots its resting place, then sinks back below the surface. The bobbing motion sends rings rippling outward.

In a growing thunderstorm, hot air rises quickly and surpasses its proper altitude, ultimately falling back down. That action sends a wave rising up through the stratosphere and mesosphere.

Gravity waves can also be caused by winds passing over mountains and by pressure systems in the atmosphere. As the waves rise, they inject energy into the upper stratosphere and mesosphere. "Gravity waves are quite important in the overall thermal structure of the atmosphere—determining how it normally behaves," says C. Russell Philbrick of Pennsylvania State University in State College. The new satellite images "provide a three-dimensional view of gravity waves that we haven't had in the past."

The Department of Defense launched the MSX satellite in part to study what natural patterns exist in the atmosphere—a prerequisite for being able to distinguish the signature of a warm trail left by a ballistic missile. —*R. Monastersk*



Dewan/Geophysical Research Letters

Part of a circular gravity wave detected over Indonesia (above). A meteorological satellite image (below) shows a thunderstorm (arrow) directly underneath the gravity wave.

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