Anthropology

Neandertal noisemaker

Neandertals, whose evolutionary relationship to modern humans inspires much scientific sound and fury, apparently made some noise of their own—perhaps even music. Amid stone implements typical of European Neandertals excavated last year in a Slovenian cave, researchers found a piece of a juvenile bear's thighbone that contains four artificial holes and resembles a flute.

Similar bone flutes have been recovered at several *Homo sapiens* sites in Europe and Asia dating from 22,000 to 35,000 years ago. A preliminary age estimate for the new find, however, places it at between 43,000 and 82,000 years old.

"This bone could have been used to make noise or, possibly, music," contends geologist Bonnie Blackwell of the City University of New York's Queens College in Flushing, N.Y. "It would not surprise me if this was a Neandertal musical instrument."

Blackwell and her colleagues, including excavation director Ivan Turk of the Slovenian Academy of Sciences in Ljubljana, are slated to publish an analysis of the flutelike bone and other discoveries at the Divje Babe I cave in an upcoming GEOARCHAEOLOGY.

The ends of the hollow bone artifact are broken off, and the holes, which penetrate only one side of the shaft, run in a straight line. Neandertals probably produced the holes, possibly by using a carnivore tooth as a punch, according to Blackwell. Cave bears or other carnivores could have gnawed off the ends of the bones, she holds.

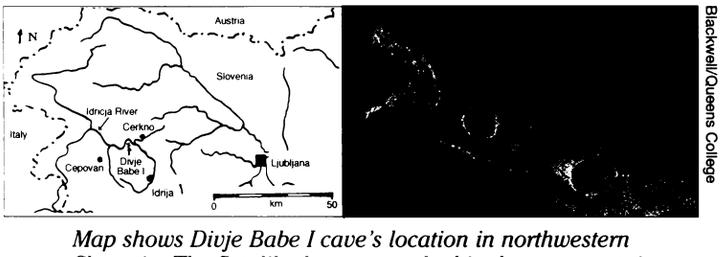
Five cave bear teeth from three sediment layers at the site were dated by a technique known as electron spin resonance. Researchers calculated a maximum and minimum age for the teeth based on measurements of minute amounts of radioactivity that the teeth had absorbed while buried and on estimates of periodic fluctuations in natural radioactivity levels in the cave soil.

Excavations at Divje Babe I began in 1980. Fossil remains unearthed so far consist primarily of more than 65,000 cave bear teeth. Other animals whose bones lie in the sediment include lions, leopards, ibexes (a type of wild goat), bats, and a number of rodent species.

Remnants of several hearths have been found as well, along with sharpened stone implements and debris from tool making. The flutelike bone turned up near stones and charcoal associated with a small hearth.

The Slovenian bone closely resembles several hole-bearing bones that were likely to have been used as musical instruments by humans at later European sites, according to archaeologist Randall K. White of New York University. White hopes to construct a model of the Divje Babe I bone artifact in order to explore the range of sounds that could have been produced by blowing into it.

"Neandertals were apparently quite similar to *Homo sapiens* in their behavior and cognitive capacities," Blackwell asserts. "In both groups, musical traditions probably extend back very far into prehistory."



Blackwell/Queens College

Map shows Divje Babe I cave's location in northwestern Slovenia. The flutelike bone unearthed in the cave contains four holes punched into one of its sides and may have been a Neandertal musical instrument.

Astronomy

One way into the hot seat

Recent discoveries of giant planets orbiting within spitting distance of their stars have upset a central tenet of astronomers—that Earth's solar system, where large planets orbit far from the sun, provides the model for planetary development everywhere.

Some theorists have responded to these findings by suggesting that friction within the dust cloud around young stars dragged these distant planets farther into their solar system (SN: 12/16/95, p. 412). Others dispute the idea, saying that by the time the planets formed, little dust would have remained.

Now, researchers have produced an alternative explanation, one requiring two giant planets to knock each other off course in a case of planetary pinball.

"We think it takes an interaction between two objects of comparable size," says Frederic A. Rasio of the Massachusetts Institute of Technology, coauthor of the report in the Nov. 8 SCIENCE. He conjectures that around the distant stars, two equally huge planets evolved close to one another, leading to instability.

In computer simulations, two giant planets born close together usually pull each other out of their original orbits. In many cases, one such planet ejects its twin from the solar system and heads into a much smaller orbit. Sometimes the survivor ends up crashing into its star.

"It would be depressing if the whole universe was like this," says Alan P. Boss of the Carnegie Institution of Washington (D.C.). "But this is a worthwhile way to think," he adds, because it explains how planets could be drawn close to their stars without the drag exerted by a diminishing planetary dust cloud.

"We may find neither our solar system nor these close-in giants are normal," says Boss. "We need more observations."

Mooning over life in the cosmos

Of the nine planets astronomers have discovered outside the solar system, only one spends any time in the habitable zone—the region around a star in which water can exist in liquid form and life might have the best chance of surviving. This massive planet, however, suffers from extremes in temperature, periodically growing hotter than Venus and colder than Mars (SN: 10/26/96, p. 262). Such temperature variations would probably make it difficult for the planet to sustain life.

Even if a massive planet never strayed from the habitable zone, it still might not support life akin to that on Earth, notes Darren M. Williams of Pennsylvania State University in State College. That's because mammoth planets, if solar system behemoths Jupiter and Saturn are any example, contain small, solid cores surrounded by massive atmospheres. With the only solid surface buried in noxious gases, Earthlike organisms aren't likely to gain a foothold.

If the giant planet has a moon, however, that tiny body could support life, reported Williams and Penn State colleagues John F. Kasting and Richard A. Wade last month at the annual meeting of the American Astronomical Society's Division of Planetary Sciences in Tucson.

The moon would have to be large enough to retain a dense atmosphere for billions of years, enabling it to resist changes in temperature. If formed from ice, the moon would have a deep ocean in the habitable zone, whereas rockier bodies that contain less water might sustain land-based life. If, like Earth's moon, this moon always presents the same face to the planet it orbits, its orbital period must be short enough that neither face is in continuous sunlight or darkness for more than several days at a time.

George W. Wetherill of the Carnegie Institution of Washington (D.C.) notes that even if a planet or moon could not support life globally, each might contain a tiny niche where life could thrive.