

Going Deeper Into the Grotte Chauvet

Ten years of research have yielded detailed new insights into the stunning images considered the world's oldest cave art. But questions about their age are resurfacing

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Podcast interview

with the author of

Sometime during the last ice age, artists entered a cave in southern France, lit torches and fires, and began work on a masterpiece. Squatting on the cave floor and wielding pieces of charcoal, the artists first drew the

outlines of two rhinoceroses locking horns. Then, standing up and moving to the left, they sketched the heads and upper bodies of three wild cattle. Finally, a lone artist stepped forward to execute the pièce de

résistance: four horses' heads, drawn with exquisite shading and perspective in the center of the tableau, each horse displaying its own expression and personality.

This, at least, is how researchers studying the Chauvet Cave in the Ardèche region of southern France envision the creation of the famous Horse Panel. According to direct radiocarbon dating of the two rhinos and one of the cattle, they were drawn between 32,000 and 30,000 radiocarbon years ago, making them the oldest known cave art in the world. (The exact calendar age is uncertain because there is no accepted radiocarbon calibration for this period; see Science, 15 September 2006, p. 1560.) These early dates, announced soon after the cave's discovery in December 1994, struck a blow to conventional assumptions that such sophisticated artworks did not appear until up to 15,000 years later.

In the decade since researchers began working in the Grotte Chauvet (*Science*, 12 February 1999, p. 920), they have photographed and redrawn many of the more than 400 animals depicted, identified signs

of human activity such as footprints and hearths, deciphered the cave's geology, and analyzed thousands of bones left by cave bears that shared the cave with humans. And archaeologists have begun to propose hypotheses

about what the art might have symbolized to those who created it.

But as the team continues its work, a small but persistent group of archaeologists continues to question the age of the paintings. "Chauvet is the world's most problematically dated cave art site," says archaeologist Paul Pettitt of the University of Sheffield, U.K., whose most recent challenge was published online this month in the Journal of Human Evolution (JHE). That contention—which the team vigorously rejects—has critical implications for our understanding of the origins of art. "The fundamental importance of Chauvet is to show that the capacity of *Homo sapiens* to engage in artistic expression did not go through a linear evolution over many thousands of years," says cave art expert Gilles Tosello of the University of Toulouse (UT), France. "It was there from the beginning."

Lions, and horses, and bears, oh my!

Since resolving lawsuits and beginning scientific study a decade ago, researchers have reconstructed how the artists worked, analyzing each stroke of charcoal, red ochre, and engraving. Tosello and his wife, UT cave art expert Carole Fritz, have spent hundreds of hours perched in front of the 6-square-meter Horse Panel, photographing it in sections and drawing the artworks onto tracing paper. Working in this meticulous fashion, and noting the superposition of charcoal lines as well as slight thickenings at the beginning and end of each stroke, the pair was able to reconstruct the order and direction in which each line was drawn.

"The detailed nature of their observations is extraordinary," says archaeologist Iain Davidson of the University of New England in Armidale, Australia. Tosello and Fritz found that the artists who drew the two rhinos began with the horns and muzzles, then drew the front legs and bellies, and finally the rest of the bodies, making corrections and filling in details as they went. As the artists worked around the panel from the edges to the middle (see diagram above), they reserved a space in the center for the four horses, whose heads and necks are slightly superimposed over the backs of the cattle and arranged in a tight, diagonal orientation. This suggests to Tosello and Fritz that they were drawn by one artist. To make the horses' heads even more vivid, the artist used a tool to etch the cave wall around their muzzles so that they stand out in a prehistoric version of bas-relief.

"The entire composition is very homoge-

neous and has a very strong coherence," Tosello says, making it likely that the artwork was drawn by a small number of artists over a fairly short period of time. He adds that the Horse Panel, along with other compositions in the cave—such as a troop of lions apparently chasing a herd of bison—seems to be telling a story. "The animals appear on the wall in a certain order, like characters coming on stage during a play," he says. He speculates that prehistoric humans, who hunted bison, might have identified with the lions and wished to emulate their hunting prowess.

Humans probably kept their distance from lions, but the artists of Chauvet shared their cave with at least one dangerous animal: the cave bear. The team has found about 4000 cave bear bones, representing nearly 200 animals, on the cave floor, including a skull that was apparently placed deliberately atop a limestone block. Archaeologists have long debated whether humans hunted cave bears, worshipped them, or had some other relation-

ship with these now-extinct animals. The artists clearly saw them from time to time: Chauvet's menagerie includes 15 drawings of cave bears.

Radiocarbon dates on 18 bear bones put them between 28,850 and 30,700 radiocarbon years ago, "slightly younger" than the dates for the paintings, according to evolutionary biologist Hervé Bocherens of the University of Tübingen in Germany. One other bone exposed by erosion of the cave floor was dated to 37,000 years ago, indicating, Bocherens's team concluded in a 2006 paper in *JHE*, that bears

were already using the cave when prehistoric artists first entered.

"Imagine the terror of entering the cave with flickering lights, knowing that there might be bears in there," says Davidson. But bears and humans might have visited the caves in different seasons—winter hibernation for the bears, spring for the humans, points out paleogeneticist Jean-Marc Elalouf of the French Atomic Energy Commission in Saclay.

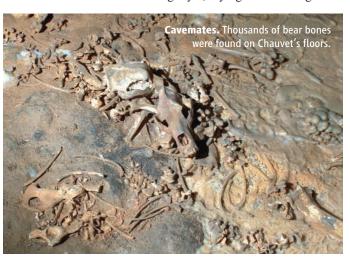
How old is old?

The dates for both the bears and the art correspond to the Aurignacian period, the first culture associated with the modern humans who colonized Europe beginning about 40,000 years ago. Yet some researchers have argued that the art more closely resembles much later cultures, possibly even the Magdalenian, which stretched from about 17,000

to 12,000 years ago and to which the great paintings at Lascaux in France and Altamira in Spain are attributed. But most experts accepted the dates, which were produced by the Laboratory of the Sciences of Climate and the Environment (LSCE) in Gif-sur-Yvette, France, a lab that pioneered the direct dating of cave paintings.

In 2003, however, Sheffield's Pettitt, along with British archaeology writer Paul Bahn, threw down the gauntlet again, arguing in *Antiquity* that the dates were not reliable because they had not been replicated by other labs; the Chauvet team defended its results in the same issue. "Chauvet is the best dated rock art site in the world," says French rock art expert Jean Clottes, former leader of the Chauvet team. Randall White, an archaeologist at New York University, agrees: "There are more dates from Chauvet than from most other caves combined."

In his new *JHE* paper, Pettitt launches the most detailed onslaught yet, saying that the



drawings are simply too magnificent for that time. "Chauvet stands out in terms of overall technical sophistication whatever one compares it to," Pettitt told *Science*. He insists that the seven direct dates from paintings are unreliable because of the small sample sizes and the possibility of contamination from the cave wall.

Pettitt also discounts radiocarbon dates from more than 40 charcoal samples from the cave floor, which range between about 27,000 and 32,000 years ago, as well as recent redating of charcoal samples from a chamber rich with art. Those samples, split between six radiocarbon labs, gave consistent results of about 32,000 years before the present. Pettitt says these charcoal dates are irrelevant to the age of the art. "Could I not enter the cave today, pick out a piece of this well-preserved charcoal from a hearth on the floor, and write

'Paul Pettitt was here' on the cave wall?"

Some archaeologists take Pettitt's argument seriously. "People might have picked up old charcoal from the Aurignacian period during the Magdalenian," says William Davies, an Aurignacian expert at the University of Southampton, U.K. Pettitt's Sheffield colleague, archaeologist Robin Dennell, goes further: "Chauvet should be removed from assessments of early modern humans in Europe. Including it leads to a gross distortion of their cognitive abilities."

But the Chauvet team is having none of it. "This is ridiculous," Clottes says. "There were heaps of charcoal right in front of the paintings." Tosello agrees: "Who can believe that the Aurignacians came into the cave, left behind piles of charcoal without making any drawings, and then thousands of years later the Magdalenians entered and used the charcoal kindly left by their ancestors to draw on the walls?" Team members insist that the close agreement of dates from the paintings, the

charcoal, and the bear bones argues that the cave was frequented by humans and bears during the Aurignacian, not the Magdalenian. Clottes also cites uranium/thorium dating that suggests that the cave entrance was blocked to entry by a landslide about 19,000 years ago—before the Magdalenian period. As for replicating the direct dating of the paintings, Hélène Valladas, leader of the LSCE team that carried out this work, says it is not possible to take more samples without "visibly altering the [art] traces."

Some archaeologists also find Pettitt's stylistic arguments unper-

suasive. Even Davies, who hesitates to call the art Aurignacian, says, "I am not convinced the paintings are Magdalenian. ... Some of the techniques are unique to the site and not found in the Magdalenian period." White adds that there is plenty of other evidence for sophisticated symbolism in the Aurignacian, including thousands of personal ornaments made from shell and bone. "It's all part of the Aurignacian package," White says.

In any case, the significance of Chauvet goes beyond the "oldest art" debate, says anthropologist Margaret Conkey of the University of California, Berkeley. "Chauvet was an expression of the sensibilities, beliefs, and social relations of anatomically modern humans in this part of the world," she says. "What was it about their lives that made imagemaking in caves meaningful?"

-MICHAEL BALTER