Giving Neandertals Their Due

Similarities with modern humans shift the image of the caveman brute

By JEFFREY BRAINARD

Neandertals' choice of spear varied depending on the type of prey they hunted, according to a new hypothesis. Replicas of artifacts from the Near East show a sharpened wood spear (left), used for deer and boar, and stone tips hafted to wooden shafts (right), for horse and ibex.

Since 1856, when a thick-browed, humanlike skull turned up in Germany's Neander valley, the ancient people known as Neandertals have suffered a less-than-flattering reputation.

A 19th-century anatomist described Neandertals as "benighted" members of the genus *Homo*. Their muscled bodies and simple tools contributed to their image as the brutish cousins of the human family.

Most researchers do credit Neandertals with being well-adapted creatures who survived the cold climate of Europe long before the appearance of modern humans, *H. sapiens*. Some anthropologists consider Neandertals a regional variant of modern humans, who most scholars believe evolved in Africa about 200,000 years ago.

Many, however, see them as a separate species and doubt that they shared *H. sapiens*' newly sophisticated behaviors. Although Neandertals' brains were roughly the same size as those of modern people, they often have been portrayed as lacking the language skills, foresight, creativity, and other cognitive abilities of modern humans.

In this view, the simpler ways of Neandertals marked them for extinction after modern humans—the makers of cave paintings and more advanced tools—arrived in Western Europe about 40,000 years ago. By 30,000 years ago, Neandertals had vanished.

"That tends to predispose people to thinking about them in one specific kind of way, as the loser," says John J. Shea of the State University of New York (SUNY) at Stony Brook.

In recent years, however, research has begun to cast a more complimentary light on the older cousins. This emerging view depicts Neandertals as having a capacity for creative, flexible behavior somewhat like that of modern people. For example, although some anthropologists have argued that Neandertals showed limited prowess as hunters, German archaeologists in 1997 reported finding a trio of aerodynamic wooden spears that they concluded ancestors of Neandertals made 400,000 years ago (SN: 3/1/97, p. 134).

Studies published in a supplement to the June CURRENT ANTHROPOLOGY offer further support for polishing the Neandertal's image. Researchers from France and Portugal report that Neandertals occupying a French cave developed their own, relatively sophisticated ornaments and tools, distinct from those of their modern-human neighbors. Two other studies challenge the view that Neandertals could not hunt effectively and had to survive by scavenging the leftovers of animal predators.

Other scientists have disputed aspects of the new studies. But many say that the emerging evidence may help researchers find possibly subtle differences between modern human and Neandertal cultures that can explain why one flowered and the other vanished.

"We can make [Neandertals] more like us in some respects, but that's not saying they were like us in all respects," says Christopher B. Stringer, an anthropologist at the Natural History Museum in London. Although he views Neandertals as a separate species, he says, studies like the one from France "narrow the gap."

Today's fashion magazines demonstrate how modern people use earrings, necklaces, and other body ornaments to attract mates and communicate status. Scientists say this behavior has a surprisingly long history.

The 1996 discovery in a French cave of a Neandertal fossil lying next to pierced animal teeth, probably worn as pendants, and ivory rings may extend the history of finery back to before modern man. Investigators had seen similar methods of working bone, ivory, and stone, a style called Châtelperronian, in other French caves and dated it to between 40,000 and 30,000 years ago. The style is considered a hybrid of the shaped stones made by Neandertals and the more stylized bone and ivory crafted by early modern humans.

Some scientists have argued that the Neandertals did not invent the Stone Age equivalent of jewelry on their own. They have proposed that Neandertals flattered their newly arrived modern-human neighbors by imitating their more glamorous style of personal adornments, called Aurignacian.

The scientists who made the 1996 finding—Jean-Jacques Hublin of the Musée de l'Homme in Paris and his colleagues—suggested that Neandertals traded with modern humans, much as New World people bartered with colonial Europeans before becoming subjugated. Other scientists have suggested that the Neandertals picked up ornaments from abandoned Aurignacian sites.

These ideas are disputed by João Zilhão of the University of Lisbon in Portugal and his French colleagues in the June CURRENT ANTHROPOLOGY. They analyzed other ornaments and tools from the cave that yielded the 1996 discovery, the Grotte du Renne in Arcy-sur-Cure, near Auxerre, France.

They argue that Neandertals probably made Châtelperronian-style ornaments at Arcy-sur-Cure, using methods and materials quite different from those of the Aurignacian style attributed to modern humans.

The evidence from Grotte du Renne so far does not clearly suggest that either culture directly affected the other, the authors say. But they contend that even if Aurignacians influenced the Châtelperronians, these Neandertals independently reinterpreted the newcomers' fashions and tools.

Both the Châtelperronians and Auri-

gnacians probably wore pendants as a sort of social badge, just as modern people do, the authors suggest. So if the Neandertals made their own pendants, they must have understood symbolism, says one of the researchers, Francesco d'Errico of the Institute of the Prehistory and Geology of the Quaternary in Talence, France.

"We do not know whether Neanderthals developed the use of symbols independently or as a consequence of cultural contacts with anatomically modern humans," d'Errico told SCIENCE NEWS. "What we know is that their way of using symbols was not qualitatively different from that of anatomically modern humans, which contradicts the hypothesis of their cognitive inferiority.

"The Neandertal was not so different from us from a cognitive point of view," he says. "We look at ourselves as the only species which is able to . . . produce symbols. But it seems that we are not alone."

D'Errico and his colleagues would even flip the established hierarchy, proposing the novel idea that Neandertals may have taught modern humans how to make some objects. Anthropologists who rule out that possibility suffer from anti-Neandertal prejudice, d'Errico says.

"I think if people look at future archaeological discoveries without wishful thinking, they'll look at it as an interaction between two human populations," he says.

In a commentary accompanying the article by d'Errico and his colleagues, anthropologist Randall White of New York University argues that artifacts in Châtelperronian sites across Europe show similarities to the Aurignacian style, and ornaments are rare. He suggests that Aurignacians influenced Châtelperronian culture and disputes d'Errico's conclusion that Châtelperronian culture is older than Aurignacian. Both agree that the artifacts need to be dated more accurately.

Other critics point to the timing of Châtelperronian production.

"Why, after over 200,000 years of lacking these behavioral features, should Neanderthals suddenly—and independently—have invented these features at almost precisely the point when anatomically modern populations were expanding across Europe?" says archaeologist Paul Mellars of Cambridge University in England in a separate commentary in the same issue.

Artifacts of the two styles have been found at sites across Europe, but it's still unclear whether only Neandertals made Châtelperronian objects and only modern humans made Aurignacian items.

In addition, the quantity of symbolic artifacts associated with Neandertals simply doesn't match that of the early modern humans, says Ian Tattersall, an anthropologist at the American Museum of Natural History in New York. He maintains that Neandertals did not regularly use symbols. "We're not discriminating against them to say they were not like *Homo sapiens*."

Prejudiced or not, the traditional view of Neandertals questions their sophistication in many areas of life, from tool making to meal planning. Many anthropologists have assumed that these early people could not stock their own larders but had to rely on the leftovers of others.

Studies of animal bones from European caves have concluded that Neandertals probably obtained animal flesh primarily by scavenging prey killed by carnivores, such as wolves. Most of these bones came from the heads or feet of prey animals, which contain little meat. According to this view, the absence of bones from the limbs—the meatiest part—indicates that predators killed the prey and consumed the best flesh, leaving the scraps to the Neandertals.


Shea

A 1992 excavation of this Neandertal site, Amud Cave in Israel, yielded large numbers of stone points, which offer clues to hunting behavior.

Interpreting piles of bones is a bit like assembling a jigsaw puzzle, though, and in another paper in the June CURRENT ANTHROPOLOGY, researchers contend that these studies have overlooked the most important pieces.

Archaeologist Curtis W. Marean of SUNY-Stony Brook, who worked with the late Soo Yeun Kim, reports that they painstakingly reassembled a collection of bones from Kobeh Cave, about 300 kilometers west of Tehran, Iran. The type of tools found in the cave suggest that Neandertals lived there more than 40,000 years ago.

The investigators concentrated on fragments from the middle of limb shafts. At other sites, researchers have often discarded such fragments because they don't help to identify species of prey.

By piecing together more than 3,000 shaft fragments over 3 years, Marean and his colleagues assembled specimens they say constitute individual upper and lower leg bones of animals. They then analyzed marks left on the assembled items by breaking, cutting, and biting.

The researchers found on the once-meat-laden bone shafts a pattern that they say is consistent with an emphasis on hunting—a high concentration of break and cut marks, indicative of human butchering, but relatively few animal bite marks. Marean and Kim suggest that people stripped the bones and cracked them open to obtain marrow.

This is the first such detailed reconstruction of bone fragments from any site, and similar work needs to be done at other sites to establish whether Neandertals elsewhere primarily hunted for meat, Marean says.

The report drew praise from several other archaeologists in the June CURRENT ANTHROPOLOGY, but most of them worried that such an approach would burden researchers with thousands of hours of perhaps unnecessary work.

"Completely refitting hundreds of thousands of shaft fragments from every . . . site is an expense not yet warranted by the evidence," says anthropologist Mary C. Stiner of the University of Arizona in Tucson. She used less labor-intensive methods to judge the prevalence of limb shaft fragments in Italian caves. Contrary to what Marean and Kim found in the Iranian cave, her evidence indicates that Neandertals scavenged extensively, Stiner says.

Not only did Neandertals hunt regularly in the Near East, they crafted a varied arsenal, including deadly stone-tipped spears that they used to kill certain kinds of elusive prey. So says a third study in the June CURRENT ANTHROPOLOGY. It challenges the idea of Neandertals as hidebound simpletons less adaptable than modern humans.

Shea studied stone points from 58 caves in Lebanon, Syria, Israel, and Jordan. Both Neandertals and modern humans lived in the Near East before 40,000 years ago, and both groups probably used these same, relatively simple tools as tips of hunting spears, Shea argues.

He reports a significant variation among the sites, both those inhabited by Neandertals and those by modern humans, in the number of tips produced from cores of rock. He suggests this disparity is linked to the type of prey hunted.

Hunters needed stone-tipped spears to kill certain kinds of animals, such as wild horses and ibex, says Shea. These animals ranged widely but followed predictable migration routes. Hunters had limited opportunities to kill them and thus needed to carry their most lethal spears when stalking them. This kind of planned pursuit is called intercept hunting.

In contrast, hunters probably used spears with sharpened wood ends to go after less predictable prey, such as deer and boar, he says. Being more

quickly made than stone-tipped spears, the wood-tipped speares would allow hunters more time to look for these quarries.

Of the sites studied by Shea that contained stone tips, only five have yielded fossils of Neandertals or modern humans. He found that the two groups showed similar variation in how many points were produced from a rock.

Anthropologists have assumed that only modern humans typically engaged in intercept hunting, but Shea suggests that his data indicate that Neandertals did too. This contradicts the idea that Neandertals were markedly inferior, he says.

Surprisingly, the Neandertals' efficiency at producing stone spear tips tended to be high—up to 28 times that of the early modern humans.

"I often tell my students these guys [Neandertals] were probably like wolves with knives," Shea says. "They were big people. . . .They probably required enormous amounts of calories to subsist."

Critics challenge the accuracy of Shea's method of calculating the efficiency of stone-point production and suggest that differences in the distribution of stone points do not necessarily suggest variable hunting styles.

After analyzing the same data, Steven E. Churchill of Duke University in Durham, N.C., says in a CURRENT ANTHROPOLOGY commentary that the variation in production does not correlate with the locations of migrating prey, as it should if Shea's thesis is correct.

Some scientists argue that Neandertals sawed the long bones of birds to produce the tubes decorated with notches found in a cave in Arcy-sur-Cure, France.

Shea responds that fossils of such species have not been preserved or studied sufficiently to reveal whether or not any correlation exists.

Shea's explanation may not be complete, says Erik Trinkaus, an anthropologist at Washington University in St. Louis. "But I think his approach needs to be very much commended for trying to get at things that are behaviorally and adaptively important," he adds. "It may be that the traditional ways that people have looked at animal bones and stone tools may not tell us much."

Taken together, the studies leave researchers with many further mysteries to consider. Archaeological evidence for similarities between Neandertal and modern human behavior does not jibe with their distinct anatomies, which suggest to some researchers that the groups would have evolved different lifestyles.

Many investigators now agree that anatomical differences alone cannot explain the Neandertals' fate. But if the two groups' behaviors were similar, why did Neandertals disappear?

By suggesting new avenues of research, the recent studies may help scientists better understand what factors decided this ancient family struggle for survival.

"I think what other people should do is pretend [they] don't know Neandertals became extinct," Shea says. "Because it's just as likely that the end of the Neandertals was being driven by some fundamental change in what modern humans were doing than by some intrinsic flaw in Neandertal behavior." □

Biology

Cloned mice make long-awaited debut

The rumors were true. The brave new world of cloning now includes mice.

After gossip about their work had circulated for months (SN: 7/11/98, p. 21), scientists from the University of Hawaii in Honolulu have finally confirmed that they have cloned a mouse—actually, about 50 of them—from cells of adult animals. In the July 23 NATURE, Teruhiko Wakayama and his colleagues describe their technique, which differs slightly from the method used to clone the sheep Dolly.

As in the making of Dolly, the researchers removed DNA from an egg cell. However, instead of fusing an entire adult cell to the DNA-free egg—as Dolly's creators had—the Honolulu team merely injected the nucleus from an adult mouse cell into the egg. They allowed the transplanted DNA to sit inside the egg for several hours before treating the egg with a chemical that prompts the cell to start dividing into an embryo. Through this technique, the investigators have created dozens of mice, including clones of clones.

Since Dolly's birth, scientists have speculated that mice, and perhaps humans, might be impossible to clone because of the speed with which their developing embryos turn on genes (SN: 4/5/97, p. 214). Cloning depends upon the egg returning the adult cell's DNA to an embryonic state, but that reprogramming was suspected to require more time than the embryonic development of some species allowed. "Given that so many of us failed [to clone mice from adult cells], it is not immediately clear why Wakayama *et al.* have succeeded," notes Davor Solter of the Max Planck Institute for Immunology in Freiburg, Germany, in an accompanying NATURE commentary.

While inevitably reigniting the debate over the cloning of humans, this success in mice, the most common laboratory animals, should also speed research into the many mysteries still surrounding the working of this artificial reproductive method. The researchers, for example, were able to clone mice using nuclei from cumulus cells, which surround a growing egg in the ovary; attempts to clone mice from several other cell types, such as brain cells, failed.

Two additional reports in the same issue of NATURE also contain news about Dolly that should dispel doubts about her heritage. Some scientists had questioned the evidence establishing that Dolly was cloned from an udder cell of an adult sheep. Two new analyses of Dolly's DNA, one conducted by the research group that cloned her and another by an independent team, now concur that it's almost impossible that the sheep is not a clone. These reports "have shown that Dolly is indeed the direct descendant of an udder cell from a nameless Finn Dorset ewe," says Solter. —*J.T.*

Frozen in time: Cells' clocks tick on

Takes a freezing and keeps on ticking. Rat skin cells frozen for 25 years, when thawed out, exhibit daily rhythms of gene activity that suggest the cells maintain their own biological clocks, a Swiss research group reports.

This finding by Ueli Schibler of the University of Geneva and his coworkers, reported in the June 12 CELL, supports the growing belief that many, if not most, of the cells in an animal harbor individual biological clocks. Last year, for example, researchers showed that fruit flies seem to have clocks distributed throughout their bodies—including their wings, legs, and abdomens (SN: 12/6/97, p. 365).

The discovery that laboratory-grown cells can keep time may make it much easier for scientists to tease apart the workings of the biological clock (SN: 7/11/98, p. 24). In the past, they've had to examine whole organisms, such as flies, or to study specific tissues that are hard to keep alive in the lab, such as slices of a region in the brain called the suprachiasmatic nucleus. —*J.T.*