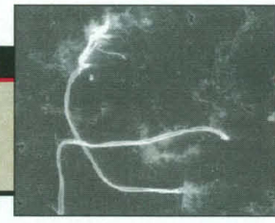


get at the marrow. The bone fragments were apparently then dumped amid the remains of deer and other butchered mammals. "Human and mammal remains were treated very similarly," says first author Alban Defleur of the Université du Mediterrané at Marseilles. "We can safely infer that both species were exploited for a culinary goal."

Tantalizing hints of cannibalism have been spotted at other Neanderthal sites for decades, but this is far and away the best documented case, say other researchers, who praise the team's careful comparison of breakage and cut marks in deer and human bones. "Quite convincing," says anthropologist Fred H. Smith of Northern Illinois University in De Kalb, noting that there's little sign of gnawing or other indications that carnivores rather than people mauled the bones. "And the documented cut marks seal the deal."

Flesh-eating feast? A teenager's jaw and an adult thigh bone bear cut marks.

Smith and a few others say that without an eyewitness, we may never know exactly why Neanderthals handled corpses so seemingly brutally. But most paleoanthropologists are unfazed by the idea of early humans eating each other. As Milford Wolpoff of the University of Michigan, Ann Arbor, puts it, "Why should modern humans be the only violent ones?"

Defleur began to zero in on cannibalism after he saw cut marks on human bones from a test pit sunk into the cave at Moula-Guercy, a site that had previously yielded stone tools characteristic of the Neanderthals' Mousterian culture. He teamed up with paleoanthropologist Tim White of the University of California, Berkeley, to rigorously compare the pattern of marks on the human bones with those on bones from red deer, presumably hunted for meat, at the same site.

The bones—78 pieces identified as belonging to at least six humans and almost 400 fragments attributed to other mammals—were scattered over 20 square meters. All the braincases and long bones of both deer and humans were smashed open, presumably to allow brains and marrow to be extracted. "In both taxa, marrow bones were systematically broken, and bones without marrow were not damaged," says Defleur.

Analysis of three pieces of a large thigh bone showed how, after its muscles were sliced away, it was set on an anvil stone and hit repeatedly with another stone. Telltale striations mark the bone's outer surface on the anvil side, directly opposite "percussion pits" made by the hammerstone. Cut marks on the clavicle also show where the Neanderthals disarticulated the arm at the shoulder. Others reveal where they cut out tongue and jaw muscles, severed the Achilles' tendon, and sliced other tendons below the toes and at the elbow. The bones bear few signs of burning or roasting, says White, suggesting that even though the Neanderthals had fire, they ate this flesh raw or hacked it off the bone before cooking. "The circumstantial forensic evidence [of cannibalism] is excellent. No mortuary practice has ever been shown to leave these patterns on the resulting osteological assemblages," he says.

In White's view, this well-documented case strengthens other reports of Neanderthal cannibalism, from sites such as Krapina and Vindija in Croatia. Modern humans ranging from Fijians (see p. 39) to ancient southwesterners (not to mention the best selling Hannibal Lecter) apparently had a taste for human flesh. But the evidence implies, says White, that "the incidence of this behavior among the Neanderthals and their ancestors may have been higher than among modern people." Other researchers have suggested that Neanderthals might have been desperate for dietary fat by winter's end—and brains and marrow are rich sources of fat, Wolpoff notes.

Still, White says, "we are not claiming that all Neanderthals were cannibals, rather, that there were some cannibals among the Neanderthals." Indeed, sometimes Neanderthals buried their dead, arranging bodies in a fetal position in semicircular graves. At the moment no one knows why the Moula-Guercy corpses were handled so differently—whether they were enemies or because of some different cultural practice. "Actions fossilize, intentions don't," says Smith.

Far from implying that Neanderthals were brutes, Smith and others say that the finding of cannibalism may indicate sophistication of a sort. The varied treatment of the dead at different Neanderthal sites, Smith says, demonstrates cultural variation and therefore complexity: "When you see some Neanderthals practicing intentional burial and others practicing cannibalism, that is a clear indication of behavior that is multidimensional—a pattern that mirrors the behavior of more modern people."

"To me this is, paradoxically, a very human behavior that indicates a human mind," says anthropologist Juan Luis Arsuaga, excavator at the Spanish site of Atapuerca, where there is evidence of cannibalism among 800,000-year-old humans. "Cannibalism is very old in human evolution." Other animals such as chimps sometimes kill and eat parts of their own kind, but "only humans practice systematic cannibalism," says Arsuaga. "This is the dark side of the human coin." **–ELIZABETH CULOTTA**

CREDITS: DEFLEUR *ET AL.*

BIOMEDICAL FUNDING

Senate Tops House Panel In Raising NIH's Budget

Sometimes it pays to be patient. After months of delays that had made science lobbyists anxious, House and Senate spending committees this week were expected to approve hefty increases in biomedical research funding for the fiscal year that starts today. The increases for the National Institutes of Health (NIH)—$2 billion, or 13%, in the Sen-

Pumped up. Porter's bill gives NIH an 8.5% raise; Senate colleagues offer 13%.

ate and $1.1 billion, or 8.5%, in the House—would far exceed the White House's 2000 request for the $15.6 billion agency and sustain the biomedical community's drive to double the agency's budget by 2004.

It may take at least another month, however, for Congress and the White House to agree on the exact size of NIH's raise, as Republicans and Democrats engage in last-minute budget negotiations. Still, "the omens are very good for biomedical scientists," says an aide to one House Democrat, who predicts that "the final number will probably be at or near the Senate's mark."

That outcome would delight biomedical lobbyists, who have been struggling to repeat last year's record-setting $2 billion increase for NIH (*Science*, 23 October 1998, p. 598). Their campaign had an early setback in February, when President Bill Clinton requested only 2.1% more, some $320 million, in his budget proposal to Congress. The outlook dimmed further in recent weeks after Republican leaders shifted nearly $20 billion from the massive appropriations bill that funds NIH and a host of politically sensitive education and welfare programs to other spending measures. The borrowing allowed congressional leaders to claim that they were adhering to strict spending caps imposed by a 1997 budget-balancing law, but left Representative John Porter (R–IL) and Senator Arlen Specter (R–PA)—who lead the House and Senate subcommittees responsible for approving NIH's budget—with the nearly impossible task of recouping the funds with offsetting cuts elsewhere. Both lawmakers had repeatedly delayed scheduled votes on their bills in the hope of finding budgetary gimmicks—such as "forward funding" programs by borrowing money from the 2001 budget—that would allow Congress to break the spending caps without having to admit it.

The fruits of that labor were revealed 23 September, as Porter won approval, by an 8–6 party line vote, for an $89.4 billion Labor–Health and Human Services (HHS) spending bill that bought the $1.1 billion NIH boost by forward funding some programs and designating other spending as "emergencies." But some fiscal conservatives chafed at the additional spending, and the White House threatened to veto the bill because it would cancel a program to hire 100,000 new precollege teachers and cut welfare programs. Representative David Obey (D–WI), the appropriation panel's ranking Democrat, praised Porter for his hard work but said the bill was "a fantasy" that would never survive.

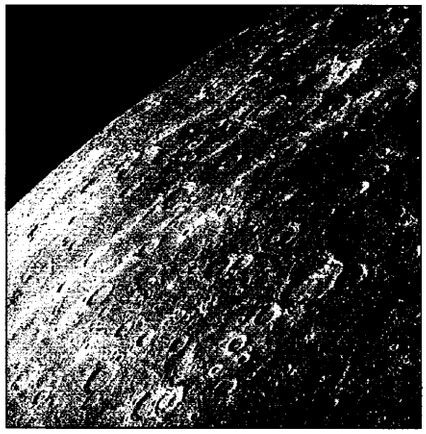
Similar predictions accompany the Senate's version of the bill, a $91.7 billion measure that would give NIH's two dozen institutes increases ranging from 11% to 13%. Specter's subcommittee was pushing to finish its work as *Science* went to press, but Senator Tom Harkin (D–IA), the subcommittee's ranking Democrat, predicted that the final bill would be a "heck of a lot better" than the House version. Still, staffers were pessimistic that it would ever reach the Senate floor. Instead, they say, Congress and the White House are likely to roll the Labor-HHS bill into a huge spending measure later this year with at least six of the 13 appropriations bills needed to fund government operations.

The coming weeks also give legislators time to ponder how to reconcile differences in their bills. The House, for instance, called for a 36% boost for NIH's controversial $50 million center for alternative medicine, to $68 million, while the Senate added only $6 million. One aide predicted that sorting out this and other differences could "take until Thanksgiving." **–DAVID MALAKOFF**

SPACE SCIENCE

ESA Gets Flexible To Cut Costs

NAPLES, ITALY—As NASA braces itself for the possibility of deep cuts in its science budget next year, its counterpart across the Atlantic, the European Space Agency (ESA), is already dealing with the reality of diminishing funds. For ESA, the ax fell in the spring when a meeting of government ministers from its 14 member states voted to maintain a fixed rate of science funding that had been in place since 1995: Inflation, which has already eaten into the budget for 4 years, will continue to do so (*Science*, 21 May, p. 1242). Last week, both ESA's decision-making Science Program Committee (SPC) and the Space Science Advisory Committee met here to discuss how to deal with their shrinking resources.



CREDIT: NASA

Hot destination. First it was Mars; now everyone wants to go to Mercury.

They voted for flexibility: In future, sever-

ScienceScope

Home Again? Sometimes you have to go backward to make progress. That's the direction being taken by the vaccine development team within UNAIDS, the United Nations' special program on AIDS. *Science* has learned that the vaccine team, which left the World Health Organization (WHO) 4 years ago, will soon rejoin its original sponsor (*Science*, 19 June 1998, p. 1863).

Officials hope the turnaround, long discussed by UNAIDS director Peter Piot and WHO chief Gro Harlem Brundtland, will boost international AIDS vaccine efforts. In particular, the new arrangement—probably a joint UNAIDS-WHO initiative—will allow the vaccine team to tap WHO's expertise and financial backing, according to UNAIDS vaccine leader José Esparza. UNAIDS has just $2 million annually to spend on vaccine development, he notes, not enough to capitalize on the results of trials under way in the United States and Thailand. It's not clear how much more money the new setup will produce. But Esparza is confident that "we are not really going back but forward in a more intelligent way."

You're Not Listening The National Science Foundation (NSF) is finding that old habits die hard. Specifically, NSF officials are unhappy that many reviewers are ignoring the broader impact of proposed research when scoring proposals. So last week NSF director Rita Colwell sent out an "important notice" to university presidents and others asking for their help in "conveying the importance of both intellectual merit and the broader impacts of research and education" to reviewers.

In 1997, NSF changed its reviewing criteria and elevated "impact"—on everything from student learning to geographic diversity—to the same status as the quality of the proposed science. But a recent informal study of 17,000 reviews done under the new system found that just 48% addressed the nonscience criterion. NSF deputy director Joseph Bordogna says that "concern would be too strong a word" to describe the agency's reaction to the noncompliance. But Congress may feel otherwise. The Senate wants to give NSF $750,000 so that the National Academy of Public Administration (NAPA) can study the impact of the new criteria, which help legislators measure if NSF is meeting a 1993 law aimed at making sure agencies spend tax dollars wisely. NAPA is set to begin a similar study that was requested last year by the same appropriators.

Contributors: Michael Balter, Jeffrey Mervis