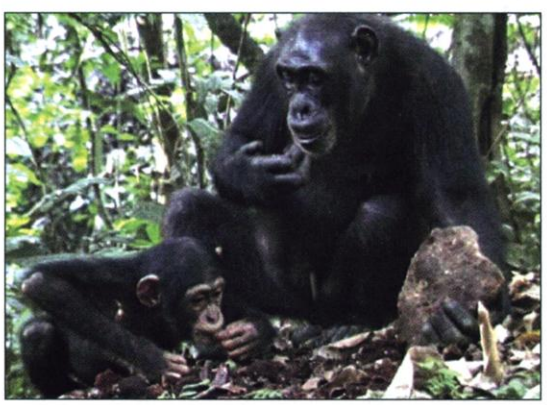
ARCHAEOLOGY

Can Chimps Ape Ancient Hominid Toolmakers?

As anyone with a weakness for pistachios knows, eating nuts can be a lot of work, but the rewards are worth the effort. The high-fat, high-protein foods are also a favorite of humans' closest living relatives, chimpanzees. In the tropical forests of West Africa, chimpanzees are especially avid nutcrackers, spending hours patiently using stone or wooden hammers to break open the tough shells of *Coula*, *Panda*, and other nuts. That behavior, studied for decades by primatologists (*Science*, 25 June 1999, p. 2070), now may also shed light on how early hominids began to make and use tools.



Fruits of their labor. Chimpanzees use stone tools to break nutshells, leaving shattered stone pieces (*top*) behind.

On page 1452, primatologist Melissa Panger and archaeologist Julio Mercader, both of George Washington University in Washington, D.C., with primatologist Christophe Boesch of the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, present one of the first research reports on chimpanzee archaeology—a description of stone pieces they dug up at a chimp nutcracking site in the Taï forest in Côte d'Ivoire.

Scientists have watched enough chimps to know that these fragments were created by accident, whereas many early hominid artifacts were clearly intentionally shaped. But the researchers argue that the chimps' leavings bear some resemblance to some of the simplest artifacts left by hominids millions of years ago—although other anthropologists disagree. In any case, says Mercader, the chimp assemblage raises the possibility that scientists could identify sites where ancient hominids, like the chimps, used unmodified stones as tools—something that so far hasn't been spotted in the archaeological record.

The work "opens new ways of looking at some of the oldest human sites," Mercader says. It may also deepen understanding of ape behavior. "We now have a way to detect and trace ape culture back in time," he says.

Written observations of chimpanzee nutcracking date back to Portuguese explorers in the early 1600s. Mercader and Panger teamed up with Boesch to see whether they could uncover evidence of even earlier nutcracking. To have a baseline with which to compare perhaps earlier finds, the team excavated a site around the remains of a recently deceased *Panda* tree. Boesch, with his wife Hedwige, had observed chimpanzees cracking nuts there for 2 decades.

The team members identified six wooden anvils around the tree where chimpanzees had cracked nuts. As they dug, they found a wealth of stone pieces, evidently broken off as the chimpanzees pounded their hammers on the nuts. Some pieces, the team claims, resemble some of those found at certain early human sites, with sharp edges and signs that they had been broken more than once.

The authors—and other anthropologists—emphasize that the chimpanzee site does not resemble classic early human toolmaking sites, where there is clear evidence that the inhabitants used sophisticated flaking techniques to detach stone slivers, used as cutting tools, from larger "cores." But the chimpanzee data, coupled with the wealth of behavioral observations, might help researchers interpret some of the more ambiguous sites containing fewer cores, Mercader argues.

The work shows that chimpanzees can leave a definite record of nutcracking, says archaeologist Jeanne Sept of Indiana University, Bloomington. The description "should encourage archaeologists to examine Paleolithic assemblages more closely" for signs of ancient nut feasts, she says.

Stanley Ambrose of the University of Illinois, Urbana-Champaign, points out that because chimpanzee and hominid hands are different, early hominids probably had different tool-using skills. However, sophisticated tools appear suddenly in the archaeological record about 2.5 million years ago, so additional study of chimp sites might help researchers detect ancient assemblages that represent earlier steps in toolmaking. "It is a short step from accidentally producing sharp-edged flakes and cores to discovering their utility for cutting and chopping," Ambrose says.

But several paleoanthropologists, including Ambrose, were not impressed by some of the similarities the researchers found between the chimp stone fragments and those of early hominids. For example, the team notes that at both the chimp site and at three early hominid sites, the stone pieces were chiefly small and large pieces were rare. But that's not surprising, says Ambrose, because there were no naturally occurring large stones available in at least one of the ancient sites.

Paleoanthropologist Tim White of the University of California, Berkeley, finds that "what they have excavated is utterly unsurprising. … Even the 'simplest' Oldowan sites are fundamentally different" from those of the chimpanzees. He notes that the chimpanzees show no evidence of selecting stone for its material properties aside from weight.

The original goal—finding evidence of ancient chimpanzee nutcracking—will take much more digging, says Mercader. Anthropologist Frédéric Joulian of École des Hautes Études en Sciences Sociales in Paris, who has also analyzed chimp and human nutcracking sites in and near the Taï forest, agrees. Separating chimp from human or prehuman activity, he warns, will not be an easy nut to crack. **–GRETCHEN VOGEL**

OPTICS

Theorists Doubt Claims for Perfect Lens

A spat has broken out in the normally calm world of optics over whether it is possible to make a perfect lens. Two years ago, physicist John Pendry of Imperial College in London predicted that a strange class of optical materials, known as negative index media, could make a lens that focuses all the parts of a light wave, even those that normally decay. But now, two different groups of researchers are attacking Pendry's conclusions.

When light crosses a boundary between two materials, it changes speed; because it changes speed, it bends. The "index of refraction" of a material is a measure of how much it bends a beam of light. In 1968, Russian physicist Victor Veselago used Maxwell's equations—the basic laws governing electricity and magnetism—to predict that in certain specialized materials the refractive index can be negative, with the re-

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