PALEOANTHROPOLOGY

Chinese Stone Tools Reveal High-Tech *Homo erectus*

About 800,000 years ago, a large meteorite struck Southeast Asia, exploding in an atmospheric fireball or perhaps slamming into the ground in a now-vanished crater. Either way, geologists say, the impact sent up a spray of molten debris and ignited fires throughout the landscape. In the Bose basin of the Guangxi Zhuang region of southern China, the fires cleared a thick cover of trees and brush and exposed red earth and underlying beds of large cobblestones. Now on page 1622, Chinese and American anthropologists suggest that after the initial cataclysm, early humans in this region found a heaven-sent opportunity in the newly exposed rock: For the first time, they had plentiful cobbles for flaking off stone tools. Using state-of-the-art dating techniques, the researchers show that thousands of stone tools found in the basin, including sophisticated two-sided cutters, were made at about the same time as the meteorite impact, 803,000 years ago.

That's a startlingly early date for such sophisticated tools in Asia, as other reliably dated large cutting tools in East Asia are no more than 500,000 years old. Yet some of the Bose basin artifacts rival the refinement of contemporaneous African stone tools, known as Acheulean technology. Thus the new study finally disproves a long-standing hypothesis that *Homo erectus* in Asia was less handy—and by implication, less intelligent and adaptive—than its African relative. "There is no essential difference in the biology and culture between the early human groups of the East and West," says Huang Weiwen, a paleontologist at the Institute of Vertebrate Paleontology and Paleoanthropology in Beijing, co-leader of the excavation.

Other researchers agree. "It shows that [Asian] *H. erectus* was culturally resourceful and was able to take advantage of these unusual environmental shifts," says Russell Ciochon, a paleoanthropologist at the University of Iowa in Iowa City.

Most anthropologists have long agreed that the first early humans to make tools lived in Africa. Their creations have been classified in one of two traditions—the Oldowan, starting 2.5 million years ago, which includes simple stone cores and flakes; and the Acheulean, starting at least 1.5 million years ago, which includes large, teardrop-shaped, two-sided handaxes and cleavers. Although the Acheulean appears in Europe 500,000 years ago, it has been almost completely absent in Asia. That absence prompted Harvard University anthropologist Hallam Movius to write off Asia as a cultural backwater more than 50 years ago. He split the Early Stone Age world in two, drawing a technological barrier known as the Movius Line between *H. erectus* in Africa, the Middle East, and Europe and its cousins in northern India, China, and Southeast Asia (*Science*, 13 March 1998, p. 1636).

Some researchers pointed out that ancient Asians might have crafted tools in perishable wood or bone, and Chinese paleontologists have long argued that stone tools found at about a dozen sites in eastern Asia were separate but equal in sophistication to the Acheulean. But few of those sites have been reliably dated.

That's just what Huang and his colleagues, including excavation co-leader Richard Potts of the Smithsonian Institution in Washington, D.C., have now done. Geochronologist Alan Deino of the Berkeley Geochronology Center in California collected tektites—glassy remnants of molten rock thrown up by the impact—from exactly the same layer of soil as the stone artifacts. He then used the radiometric decay of argon isotopes to pinpoint the tektite age at 803,000 ± 3000 years.

These dates are now "the most precise paleoanthropological dates in East Asia," says Potts—and they prove the early Asians' abilities. "What we have in the Bose basin is the most Acheulean-like assemblage of stone tools ever found in East Asia, requiring the same behavioral and technical competence." He adds that not only the shape of the tools but also how they were made and strewn across the land is similar to Acheulean sites.

The dates are "outstanding," filling in a crucial gap, says Clark Howell, a paleoanthropologist at the University of California, Berkeley. They give a shot of much-needed credibility to Chinese paleontologists' claims that tools at other Chinese sites may be as much as 2 million years old and as advanced as those of similar age in Africa. "It will help people cast off the control of the Movius Line," says Huang, who hopes Western scientists will take a second look at Chinese sites.

Despite the excitement over the Bose basin tools' resemblance to African ones, however, the Acheulean signature piece—a teardrop-shaped handax—is missing. That suggests two separate toolmaking traditions that had not had recent contact, says Richard Klein, a paleoanthropologist at Stanford University in Palo Alto. "This site doesn't demonstrate that the Acheulean was there or that there was a cultural connection between Africa and Asia," notes Klein. But, he adds, "it is an important site, because it demonstrates that people 800,000 years ago in China were flaking tools that are as sophisticated as anything made in Africa."

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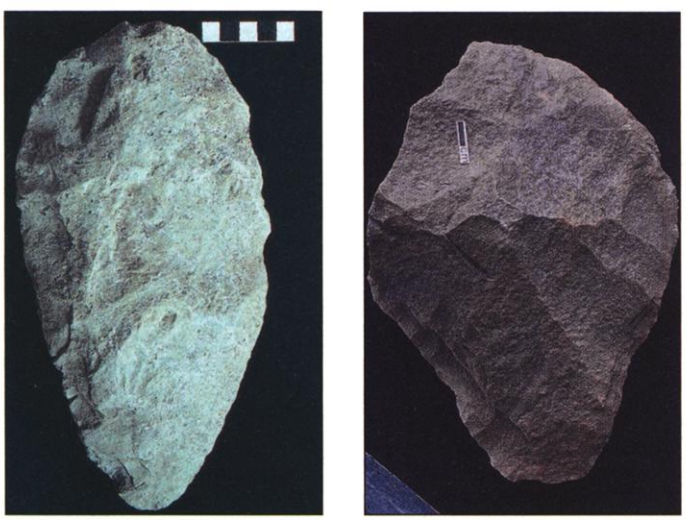

Separate but equal. Chinese stone tool (*right*, vertical scale line=1 cm) is as refined as its contemporaneous African counterpart (*left*, each scale block=1 cm).

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