

ARCHAEOLOGY

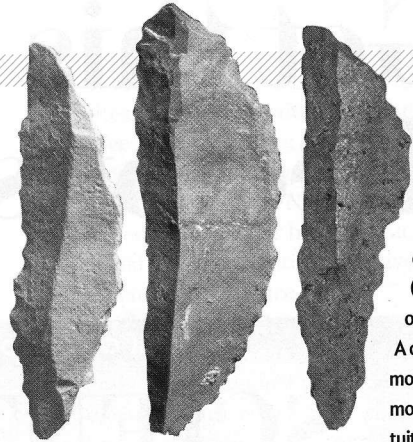
A Prehistoric Arms Race

Arrowheads hint at how modern humans overtook Neandertals

Archaeologists excavating a South African cave have recovered remains of the oldest known complex projectile weapons. The tiny stone blades, which were probably affixed to wood shafts for use as arrows, date to 71,000 years ago and represent a sophisticated technological tradition that endured for thousands of years. The discovery bears on an abiding question about when and how modern human cognition emerged.

Fossils show that humans who basically looked like us had evolved by 200,000 years ago. Yet based on the cultural stuff they left behind, it looked as though anatomically modern humans did not begin reliably thinking like us until little more than 40,000 years ago. The new finds, which come from a site called Pinnacle Point 5-6 (PP5-6), indicate otherwise.

Kyle S. Brown of the University of Cape Town and his colleagues argue that the tiny points they found, which the ancient people at PP5-6 made by carefully heating and shaping stone, are a proxy for complex cognition and that the 11,000-year duration of the tradi-



tion indicates it was transmitted verbally from generation to generation.

The findings, published online November 7, 2012, by *Nature*, add to mounting evidence that modern cognitive capacity evolved at the same time as modern anatomy, with various elements of modern behavior emerging gradually

over the subsequent millennia (*Scientific American* is part of Nature Publishing Group.) A competing hypothesis holds that modern human behavior arose far more recently as the result of a fortuitous genetic mutation.

Brown and his collaborators conclude their paper by noting that this projectile technology, which allows one to attack from a safe distance, would have given modern humans a significant edge during hunting and interpersonal conflict as they spread out of Africa into Europe and encountered the resident Neandertals equipped with handheld spears. —Kate W.

SCIENTIST IN THE FIELD

How to Survive the Next Big Storm

The scientist who predicted the damage from Hurricane Sandy explains how to protect coastal cities

City and state leaders on the U.S. East Coast are talking about putting barriers outside of New York City and other places. Will those work?

Barriers are not sustainable structures for more than 100 years, so they will not be sufficient for, say, 500 years of sea-level rise. Barriers can work, but you should only build them if you have [a plan to update them]. Hurricane Katrina in New Orleans overcame man-made barriers because the city kept [sinking] and the sea had risen after the levies and walls went up. You have to take action behind the barriers to prepare for their obsolescence—before you design and build them.

Would it be better for cities to alter their building and transportation infrastructure instead?

They need to do both. Even better, focus on land use and municipal planning. Most immediately, buildings on low ground should pull all their systems out of basements and put them on higher floors. Tall buildings should put their systems on the 10th floor—let the lower level be a parking garage or something. Then waterproof the basement and low floors. In New

York City, transportation systems such as subways have to close

platforms and find other ways to get people in and out. Gates are needed for subway entrances, or the entrances should be redesigned. In Taipei, for example, at stations you have to walk up from street level to enter the subway; you can walk down below street level into the subway.

What about retreating from the coast?

Yes, we should retreat in certain low-lying areas. Insurance companies will not insure any property located at a dangerous elevation. National flood insurance should also be revised; it is almost a hoax right now.

Can cities perhaps share solutions?

Every location needs a customized plan. But we also need to coordinate land use up and down the U.S. East Coast. We must overcome “municipal home rule” by towns so that states or regions can implement sensible land-use policies. It will be a huge political battle, but national home rule can make larger solutions almost impossible.

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