



PALEOANTHROPOLOGY

New 'Hobbits' Bolster Species, But Origins Still a Mystery

Last year's announcement of an astonishingly tiny species of extinct human from the Indonesian island of Flores sent anthropologists reeling. News of the first, nearly complete skeleton ignited a debate about what evolutionary path might have led to humans who stood about 1 meter tall. A few researchers argued that the skeleton, dated to only 18,000 years ago, was simply a diseased modern human (*Science*, 12 November 2004, p. 1116).

This week, the original Australian-Indonesian discovery team unveiled new specimens of *Homo floresiensis*. Their paper in *Nature* describes bones of seven additional adults at least as small as the original, as well as a child's arm and leg bones so tiny that they snuggle neatly on a bank note (see photograph, p. 209). The new finds also include the right arm of the original skeleton and a lower jaw estimated at 15,000 years old. The age bolsters the case that the "hobbits" inhabited the Liang Bua cave for thousands of years.

"This destroys the argument that the first skeleton was an aberrant individual," says paleoanthropologist Russell Ciochon of the University of Iowa in Iowa City. "They have [found] a unique population of small-bodied hominids."

But a few researchers disagree. A Technical Comment in this week's issue of *Science* (p. 236) argues that it is possible that the single skull unearthed suffered from micro-

cephaly, a pathological condition that causes small brains and may affect body shape. Daniel Lieberman of Harvard University says that the new bones make pathology unlikely but points out that no one has yet compared *H. floresiensis* with a wide range of microcephalics, so "everyone still has a right to ask that [microcephaly] question."

The discovery team, led by Michael Morwood of the University of New England in Armidale, Australia, found the latest bones in Liang Bua cave during the 2004 field sea-



Hobbits multiply. Researchers have found more bones of *Homo floresiensis*, including a second jaw.

son. The *H. floresiensis* specimens range from 12,000 to at least 74,000 years old, Morwood says. Stone tools, charred pebbles, and extinct animals were also found in the hominid-bearing layers. Because of a dispute with a leading Indonesian researcher (*Science*, 25 March, p. 1848), Indonesian officials postponed planned work at Liang Bua this year, Morwood says.

Researchers familiar with this week's paper say it underscores how strange the little Flores people were. The first skeleton uncovered, thought to be that of a 30-year-old female, has a tiny skull with a modern-looking face and teeth perched atop a short, chunky body. She has relatively long arms and short legs, and a bizarrely rotated upper arm bone not seen in any other ape. "They're so weird," says Lieberman.

Paleoanthropologist and team member Peter Brown, who described the bones, says the distinctive similarities among the specimens show that they are a new species rather than diseased moderns. For example, the two jaws both lack a chin, considered a hallmark of modern humans, and the long bones are unusually thick for their length.

Brown draws special attention to the right arm bone because it completes the skeleton of the little lady of Flores. He notes that her limb proportions differ from those of all other known members of *Homo* but match those of "Lucy," the 3-million-year-old *Australopithecus afarensis* from Africa. ▶

PAKISTAN EARTHQUAKE

A Seismic Murmur of What's Ahead for India

The death toll from last weekend's major earthquake was soaring past 30,000 at press time. But it could have been worse, seismologists say. And it probably will be.

The magnitude-7.6 quake ruptured 40 kilometers of the westernmost end of a 2500-kilometer fault zone that arcs from northern Pakistan across the top of India, through Nepal, to eastern India. This zone is where the Indian subcontinent—more than 40 million years after colliding with Asia—still dives into the mantle at a rate of 2 meters per century, pushing up the Himalayas in the process. Major quakes broke fault segments

just to the east of the latest quake in 1885 and again in 1905, when 19,500 people were killed.

Longer segments have ruptured in the past 200 years, setting off several great quakes up to 30 times more powerful than last week's temblor, according to studies by seismologist Roger Bilham and tectonophysicist Peter Molnar of the University of Colorado, Boulder, and geoscientist Vinod Gaur of the Indian Institute of Astrophysics in Bangalore. But earthquakes have ruptured less than half of the Himalayan arc in that time. Meanwhile, the urban population in the Ganges Plain—which stretches along the Himalayan foothills—has

increased by a factor of 10 since the 1905 earthquake. A quake that powerful on long-unbroken segments could kill 200,000 people, the trio wrote in 2001 (*Science*, 24 August 2001, p. 1442). A plausible great quake striking near a megacity such as Delhi, they estimated, could conceivably kill 2 million.

"Thankfully, the Earth has not delivered as immensely devastating a blow as was being forecast," says Valangiman Ramamurthy, secretary of the Department of Science and Technology in New Delhi. But the quake, he adds, is "a timely cue to get our act together for seismic planning." —RICHARD A. KERR AND PALLAVA BAGLA

CREDIT: PETER BROWN



who also stood about 1 meter tall. "There are so many similarities between the Liang Bua bones and australopithecines that I'm leaning toward the possibility that a small-brained, small-bodied hominid got [to Flores] and shrank further," he says. The hominid who first made landfall might have been as primitive as an australopithecine, he says.

However, many researchers are skeptical about that idea, because there's no evidence that such primitive hominids ever left Africa. In Ciochon's view, a more likely tale of hobbit origins starts with a relatively small *H. erectus* with a yen for travel. He notes that new *H. erectus* specimens from Dmanisi, Georgia, dated to about 1.7 million years ago, have statures of about 1.4 meters and brain sizes of 665 cubic centimeters (cc), or about half the size of a modern human brain. It's not far-fetched to imagine such a human settling



Littlest human. A child's leg and arm bones fit easily on an Indonesian bank note.

on Flores and eventually shrinking to *H. floresiensis*'s 106 centimeters of height and 417-cc brain, he and others say.

Meanwhile, a few researchers find the notion of such a small-brained human creating

sophisticated tools so outlandish that they remain open to the idea of microcephaly. Anthropologist Robert D. Martin of the Field Museum in Chicago, Illinois, points out that microcephaly often runs in families and that bones can be jumbled in caves, boosting the chances of finding several microcephalic individuals together. "I'm not 100% convinced it's microcephaly, but I am convinced that that brain size doesn't go with those tools," he says.

As opinions pour in, Fred Spoor of University College London notes that the first Neanderthal skull dug up in the 19th century was labeled degenerate, too. "There's a long history of finding new human species and someone shouting, 'Pathology!'" he says. Lieberman calls for additional analyses of microcephalics and for more-detailed scaling studies. "This is fun," he says. "But we have a ways to go."

—ELIZABETH CULOTTA

PUBLIC HEALTH

Pandemic Flu Jitters Grip Washington

The pandemic prophets are finally being listened to—at least in the United States. Last week saw a flurry of political activity on influenza in Washington, D.C. Flu experts relish the high-level attention but want to see actions to back up the words. Meanwhile, new reports from Turkey and Romania raised alarms that the H5N1 avian influenza strain may sweep through European poultry. Tests were pending when *Science* went to press.

To address the looming shortage of influenza vaccine during a pandemic, President George W. Bush met with flu vaccine makers at the White House on 7 October. The same day, the State Department met with representatives from more than 80 countries to discuss collaboration on bird flu. Secretary of Health and Human Services (HHS) Michael Leavitt, meanwhile, embarked on a 10-day trip to bird-flu-stricken countries in Asia to discuss collaboration on surveillance and testing, accompanied by the World Health Organization's Director-General Lee Jong-wook and pandemic influenza chief Margaret Chan.

What prompted the Administration's sudden activity last week remains a mystery, although experts have cited factors including criticism about its slow response to Hurricane Katrina and recent papers claiming that the 1918 pandemic flu originated in birds (*Science*, 7 October, p. 28).

Exactly how the Bush Administration plans to handle a pandemic is the topic of its long-awaited preparedness plan, some details of which were revealed in an 8 October story in *The New York Times*; the paper reported, for instance, that the plan says the country should be able to produce 600 million doses of vaccine within 6 months. It's not clear, however, how the plan differs from a draft that has been posted on the HHS Web site for more than a year. An HHS spokesperson would not say when the final plan might be released. The Senate, meanwhile, voted last week to spend \$3.9 billion to shore up defenses on bird flu, including \$3 billion for antiviral drugs.



Bird watchers. HHS head Leavitt (left) and WHO chief Lee (right) talked with Thailand's Minister of Public Health Suchai.

Worries about a pandemic would ratchet up if H5N1 is found to be the cause of two new outbreaks in birds. Ducks in two villages in Romania are said to have died from what scientists there, based on antibody tests, believe may be bird flu; in Turkey, an outbreak that has killed approximately 1700 turkeys was caused by an H5 virus, Turkish officials say, although its neuraminidase (N) type isn't clear.

Virus samples from Turkey were slated to be analyzed this week at the Veterinary Laboratories Agency (VLA), a U.K. government lab in Weybridge, and an E.U. team traveled to Romania to help confirm the cause of its outbreak. The virus's genome sequence—as well as epidemiological investigations—should give clues to where the virus came from and how it reached Turkey, says VLA virologist Ian Brown.

On 11 October, French foreign affairs minister Philippe Douste-Blazy called for an urgent E.U. meeting on how to protect Europe's vast poultry sector. If there's evidence that migratory birds carried H5N1 to Turkey, European countries may ramp up measures to try to prevent their flocks from becoming infected, Brown says.

—MARTIN ENSERINK

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