Anthropology

Bruce Bower reports from Denver at the annual meeting of the American Association of Physical Anthropologists

Fossil skull, C.O.D.

On May 23, 1993, a local farmer approached two anthropologists doing fieldwork in Java and offered to sell them a partial fossil skull he had discovered the week before. The scientists—Donald E. Tyler of the University of Idaho in Moscow and Grover S. Krantz of Washington State University in Pullman—realized the specimen came from a human ancestor but declined to barter for it. Instead, they called in a senior Indonesian anthropologist, who gave the farmer a "finder's fee." Such payments have a long history in Java, where residents have found a number of hominid fossils.

The initially intact but fragile braincase lay in nearly 40 pieces by the time the farmer handed it over to the scientists. Krantz gingerly pieced the cranium back together and, based on its size and shape, assigned it to *Homo erectus*.

The researchers first placed the find at between 500,000 and 700,000 years old, Krantz says. New age estimates for soil where the cranium was found indicate that it may date to 1.5 million years ago, he notes (SN: 3/5/94, p.150).

Surprisingly, the fossil shows more similarities to *H. erectus* skulls found in China than those from Java, Krantz asserts. For instance, as in Chinese specimens, the braincase bulges at the front and flattens in the rear, he points out. These and other features also appear on an African *H. erectus* skull, according to the Washington State researcher.

Krantz and Tyler obtained another *H. erectus* skull through Javanese sources last October. In an apparent attempt to discourage local inhabitants from selling fossils directly to foreign anthropologists, the Indonesian government banned all hominid research in Java for the first 3 months of 1994, reports Alan G. Thorne of the Australian National University in Canberra.

Prehistoric pathology of compassion

Detailed study of a partial skull found in Morocco in 1971 yields the earliest known evidence of severe deformity and a physical handicap in an adult hominid.

The well-preserved cranium, which retains much of its base but lacks facial bones, dates to around 400,000 years ago. It belonged to a young adult, probably a female. The fossil turned up in a quarry near Salé, on the Atlantic coast.

"The Salé individual undoubtedly had reduced mobility but still survived into adulthood," contends Jean-Jacques Hublin of the Museum of Man in Paris. "This implies a certain degree of compassion in ancient social groups."

Anatomical features of both *H. erectus* and early *H. sapiens* show up on the specimen, Hublin asserts. As in the former species, the cranium narrows toward the front and would have encased a relatively small brain. Expansion of the midcranium links the skull to the latter species.

Rounded, relatively smooth bone at the back of the head superficially resembles *H. sapiens*. But closer inspection of this area suggests that its shape reflects distorted bone and muscle development, probably produced by a fetal abnormality that limited head and limb movement, Hublin argues.

Compared with a sample of *H. erectus* and another of *H. sapiens*, the back of the Salé cranium thickens dramatically near its base, he says. Attachment marks for chewing and neck muscles stand out on the left side of the skull and show signs of atrophy on the *right* side, the French researcher notes. Also, several parts of the skull project farther downward on the left side.

Congenital torticollis, a twisting of fetal posture due to lack of amniotic fluid, produces the same anatomical pattern in modern humans, Hublin says. In addition to reducing head mobility and distorting facial muscles, the condition is linked to inborn hip displacements and club feet, he remarks.

Earth Science

Richard Monastersky reports from a meeting of the Seismological Society of America in Pasadena, Calif.

Quake sleuth 'saves' 300,000 lives

Residents of Calcutta should sleep easier, thanks to seismologist Roger Bilham, who is rewriting the history of their city. Contrary to what most quake scientists learn in school, Bilham reports, Calcutta did not suffer a devastating tremor in 1737 that killed 300,000 people. In seismic listings, this shock often appears among the five deadliest.

A researcher at the University of Colorado at Boulder, Bilham has compiled a string of facts suggesting that the quake either never occurred or killed far fewer people. It supposedly struck on Oct. 11, the same night a strong storm pummelled Calcutta with heavy rain, gale-force winds, and flood waters. When Bilham checked the records of British residents in Calcutta at that time—including those of Oliver Cromwell's grandson—he found many references to the storm but no mention of the quake. The British East India Company reported 3,000 deaths that night in Calcutta and two dozen damaged colonial structures close to the river, where the flooding would have been most severe.

Because he could find no eyewitness accounts of a quake that night, Bilham attributes those deaths to the storm. He notes that records from the city of Dacca, 150 kilometers away, make no note of any earthquake that night.

The earliest reference to the quake that Bilham found appeared in reports by British merchants 6 months after the supposed disaster. A century later, a British seismologist included it in a catalog of Indian earthquakes, and from there it filtered into the seismological literature. Bilham finds the 300,000 deaths improbable, in part because the population of Calcutta at the time numbered less than 20,000.

Whether the quake occurred or not has important implications for the 10 million residents of modern Calcutta, Bilham says. The city has no record of other major quakes, and the population is expected to swell another 50 percent in the next decade.

Earth's core out of kilter

The solid iron core at the planet's heart has an unexpected tilt, according to seismologists who have studied the waves of 15,722 earthquakes that passed through Earth's deep interior.

In the mid-1980s, scientists from Harvard University first noticed an unusual feature of Earth's core: Seismic waves tended to travel fastest when they paralleled Earth's axis of rotation. Their speed dropped by as much as 3 percent when the waves moved perpendicular to the rotation axis. The seismologists who discovered this asymmetry explained it by suggesting that the iron crystals in the core point toward the poles and thus transmit seismic waves fastest when they travel that way. This pattern may develop from the way Earth's magnetic field orients the crystals that solidify on the surface of the inner core.

Wei-jia Su and Adam Dziewonski of Harvard now report that the asymmetrical pattern doesn't line up exactly with the rotation axis; rather, it leans 12.5° from that line. Seismic waves, they found, move fastest when heading to or from Siberia instead of toward a pole. That pattern leads Su and Dziewonski to wonder if most of the core's iron crystals point in that skewed direction.

Because detecting asymmetries in the core is a difficult venture, the new results may well encounter some skepticism. But if such findings hold up in future studies, this tilted pattern could give scientists a much-needed clue to understanding Earth's solid iron center. "The inner core is still a mystery," notes Dziewonski.

If the magnetic field orients the iron crystals as the core grows, then the crystals' tilt would also offer insight into the way the field has changed with time. "By mapping this [pattern], we may be mapping the history of the magnetic field and how the field has existed in the inner core," Dziewonski says.