Spanish fossils enter human ancestry fray

Fossils found in a cave in northern Spain constitute a new species in the human evolutionary family that may represent the last common ancestor of Neandertals and modern humans, according to a new report.

The approximately 800,000-year-old Spanish hominid, dubbed *Homo antecessor* by its discoverers, originated more than 1 million years ago in eastern Africa, where it gave rise to *H. sapiens*, propose paleobiologist José Maria Bermúdez de Castro of the National Museum of Natural Sciences in Madrid and his colleagues. In their view, *H. antecessor* later trekked to Europe, where it was ancestral to a German species known as *H. heidelbergensis* and to Neandertals.

"*H. antecessor* displays a unique combination of cranial, dental, and [lower jaw] traits that collectively is different from other known *Homo* fossils," the Spanish researchers report in the May 30 SCIENCE.

The identification of fossil hominid species and their evolutionary relationships to one another is a controversial endeavor. For instance, after initial reports of the finds in Spain's Atapuerca Mountains (SN: 8/12/95, p. 100), some investigators assigned them to *H. heidelbergensis*. Other scientists hold that the extent of anatomical variation in *Homo* specimens from that general time range precludes any species designations.

"The Atapuerca specimens were part of a movement of early hominids from Africa into southern Europe that probably began more than 1 million years ago," asserts anthropologist Erik Trinkaus of the University of New Mexico in Albuquerque. "But it's highly premature to assign them to a new species and call it ancestral to later hominid groups."

The Spanish researchers disagree. Their position hinges on an analysis of nearly 80 Atapuerca fossil teeth, jaws, and braincase fragments from at least six individuals. The fossils were excavated between 1994 and 1996.

A specimen containing much of the midface, including the nasal cavity and upper jaw, is larger than the corresponding region in modern humans but otherwise looks much the same, they note. In particular, the Atapuerca face is relatively flat, in *H. sapiens* fashion, without the jutting jaw of the Neandertal.

However, Bermúdez de Castro and his coworkers align several anatomical traits of the braincase, lower jaw, and teeth with those of more primitive hominids—*H. ergaster*, which lived in eastern Africa close to 2 million years ago, and *H. erectus*, which other scientists have proposed as the original settler of Europe around 500,000 years ago.

The unusual mosaic of modern and primitive features on the Atapuerca fossils merits their inclusion in a new species, the Spanish investigators contend. The specimens are the oldest undisputed hominids in Europe and have played a major role in pushing back many estimates of that continent's initial settlement to 1 million or more years ago (SN: 1/4/97, p. 12).

The discovery of other ancient hominid sites in southern Europe will help to clarify the evolutionary standing of the Atapuerca individuals, holds archaeologist John J. Shea of the State University of New York at Stony Brook. For now, Shea finds it difficult to accept the Spanish finds as a separate species from *H. heidelbergensis*. —*B. Bower*

Bermúdez de Castro

Lower jaw fragment and teeth, found in a Spanish cave, belonged to an 800,000-year-old hominid.

Enzyme rare in adults may signal cancers

Like a bit player in a Broadway production, the enzyme telomerase is rarely seen in the healthy human body. In cancer patients, however, it often steals the show, performing a molecular sleight-of-hand that lets cell growth run amok.

Now, growing evidence shows that this tendency to hog the limelight may make telomerase an ideal warning of the cancers it seems to foster.

Recent studies in Germany and Japan offer the hope that bladder cancer can someday be detected with only a urine test for telomerase. In women with cervical cancer, the enzyme has shown up in samples taken with cotton swabs from the cervix, making telomerase a possible marker for that disease as well.

The studies follow a flood of basic research in the past decade linking telomerase to cancer (SN: 11/25/95, p. 362). The search for the means by which cancer cells divide unchecked often leads back to telomeres, tiny structures on the ends of chromosomes.

Like the plastic tips on the ends of shoelaces, telomeres stabilize chromosomes and keep them from fraying, says Jerry Shay, a researcher at the University of Texas Southwestern Medical Center at Dallas. Each time a cell divides, however, telomeres shorten. Eventually, the telomeres become small and the cell stops reproducing.

Telomerase, comprising RNA and proteins, keeps telomeres from shortening. Normally, the enzyme plays that role while an embryo is forming and cells are dividing frequently. In fact, it's rarely active in adults except in tumors, which can be rife with telomerase. How cancer cells trigger telomerase production is still unknown.

"That's the million-dollar question," says Shay.

Meanwhile, researchers in Germany are solidifying the cancer-telomerase connection. They found the enzyme in 29 of 40 bladder cancer patients given a bladder washing, a diagnostic procedure in which a catheter is inserted into the bladder, saline solution is pumped in, and the solution and urine are withdrawn together. Markus Müller of Freie University in Berlin reported the results on April 13 at the American Urological Conference in New Orleans.

Scientists in Japan report that of the 45 bladder cancer patients they tested, 36 exhibited telomerase in a bladder washing and more than half had the enzyme in a urine sample. Combined, the two procedures flagged telomerase in 40 of the patients, Hidefumi Kinoshita and his colleagues at Kyoto University report in the May 21 JOURNAL OF THE NATIONAL CANCER INSTITUTE. Bladder washings from 12 patients without cancer showed no telomerase.

In a separate study, researchers at Kanazawa University in Japan examined 82 women, including 17 who had cervical cancer and 32 with a precancerous condition. Telomerase showed up in samples taken with cotton swabs from 15 of the cancer patients and 19 of the precancerous patients; it appeared in only 3 of 33 healthy patients, the researchers report in the May 15 CANCER RESEARCH.

"More and more, these types of research studies show really promising potential for telomerase activity measurement in detecting cancer," says Calvin Harley, chief scientific officer at Geron Corp. in Menlo Park, Calif. Nam Kim, a staff scientist at Geron, devised the inexpensive laboratory technique now commonly used to detect telomerase.

The technique has spawned dozens of studies in the past 3 years, says Shay. Researchers are investigating the presence of telomerase as a marker for prostate, breast, lung, and colorectal cancers.

Ideally, researchers would like to have a simple technique to detect telomerase, such as a urine test. Patients object less to such noninvasive tests, Shay says.

—*N. Seppa*