Neandertals Take Big Step Back in Time

Three partial fossil skulls found deep within a Spanish cave last July document an early stage of Neandertal evolution in Europe that began at least 300,000 years ago, according to a report in the April 8 NATURE.

The skulls are a small sampling of the more than 700 fossils recovered so far in the cave, located in northern Spain's Atapuerca Mountains. The bones represent the remains of at least 24 hominids (members of the human evolutionary family), according to paleontologist Juan-Luis Arsuaga of Complutense University in Madrid and his colleagues. This is the largest single collection of hominids from the Middle Pleistocene period, which extends from around 500,000 to 130,000 years ago, when the first unambiguous fossils of European Neandertals turn up, Arsuaga's group maintains.

"These new skulls are exciting and seem to confirm the argument, advanced by some French anthropologists since the early 1980s, that Neandertals evolved for quite a long time in Europe," says Milford H. Wolpoff, an anthropologist at the University of Michigan in Ann Arbor.

The large number of Atapuerca fossils will help resolve whether hominid skulls from various European Middle Pleistocene sites come from one species that consisted of much larger males than females or two species that lived at the same time, writes Christopher B. Stringer, an anthropologist at the Natural History Museum in London, England, in a comment accompanying the new report.

Debate over the origins of anatomically modern humans continues, however, despite the new finds (SN: 6/20/92, p.408). Wolpoff sees the Spanish evidence as providing further support for his theory that *Homo sapiens* originated close to 1 million years ago and gradually evolved into modern races in several parts of the world, breeding with Neandertals along the way. Stringer argues that modern humans first appeared in Africa and replaced other hominids, including Neandertals. The origin of *H. sapiens* must extend as far back as that of the Atapuerca Neandertals, but the two species evolved separately, he contends.

The age estimate for the Spanish specimens comes from an analysis of a stalagmite that sits just above the fossil site. The analysis compares the amount of uranium in the stalagmite to two uranium by-products assumed to have accumulated since the stalagmite's formation.

The skulls found at Atapuerca come from two adults and one juvenile, Arsuaga's group maintains. One adult braincase is comparable in size to the smallest European and African Middle Pleistocene specimens, while the second is one of the largest known from that period, they say.

Features that foreshadow the look of later, "classic" Neandertals appear on the Spanish skulls, the researchers add. These include a prominent brow ridge, a jutting face, large jaws, and a bony protrusion at the back of the head. Other anatomical traits depart from the classic Neandertal look or do not clearly classify the specimens as members of a particular species, the investigators note.

Atapuerca and other European Middle Pleistocene hominids apparently all developed greater numbers of Neandertal features over time, they argue, although the speed at which this occurred remains unclear.

Stringer agrees. "The Neandertal lineage seems to have its roots deep in the Middle Pleistocene," he says. The Atapuerca finding weakens the claim that several European finds represent *H. erectus*, Stringer asserts, as well as a theory that a few European and African skulls fall within another species, *H. heidelbergensis*.

Some European Middle Pleistocene skulls exhibit differences in bone thickness, the shape of the back of the head, and other traits, but Stringer now regards these as falling within the anatomical variation observed at Atapuerca.

Wolpoff plans to examine the Atapuerca specimens next month in Spain. He will look for anatomical links to African finds of about the same age, which might provide clues to interbreeding among these hominid populations. *—B. Bower*

Radio telescope images second dust disk

For nearly a decade, Beta Pictoris has reigned as the only mature, main-sequence star with an encircling disk of dust — perhaps much like the disk from which our solar system evolved 4.6 billion years ago — that astronomers have clearly imaged. Now, astronomers have used a French radio telescope to map the dust encircling nearby Fomalhaut, the second star proved conclusively to have such a disk.

Fomalhaut, Beta Pictoris, and our own sun are main-sequence stars because they fuse hydrogen into helium to generate energy. The presence of dust around such middle-aged stars may signify that the process of solar-system formation has proceeded at least to the point where comets and asteroids have come into existence, explains planetary astronomer Alan Stern of the Southwest Research Institute in San Antonio, Texas.

Stern and colleagues David A. Weintraub and Michel C. Festou announced their observations of Fomalhaut in a March 30 circular of the International Astronomical Union. The disk appears to extend at least 500 astronomical units (AU) across — 500 times the average distance between the Earth and the sun — although Stern expects this number to grow with more extensive observations. In comparison, the Beta Pictoris disk reaches 2,300 AU across and is significantly more massive. Fomalhaut, however, lies 21 light-years closer to Earth than Beta Pictoris does, which may prove advantageous in upcoming efforts to map the star's disk in more detail, says Stern.

The new observation also marks the first time astronomers have imaged a disk around a mature, main-sequence star using the radio energy given off by dust particles. The dust in Fomalhaut's disk soaks up energy from the star and then emits a wan thermal signal at a wavelength of 1.3 millimeters, whereas the star itself is almost undetectable in this region of the spectrum. Consequently, the radio trace of the dust stands out comparatively brightly.

In contrast, astronomers had to use special instruments to mask Beta Pictoris' face in order to detect the scant amount of visible light scattered off dust particles in that star's disk (SN: 6/20/92, p.413). "You've got a more effective tool [for mapping dust disks] if you can see the stuff in its own thermal emissions," comments Weintraub, an astronomer at Vanderbilt University in Nashville.

Astronomer Dana E. Backman of Franklin and Marshall College in Lancaster, Pa., explains that the new radio survey of Fomalhaut has confirmed in a concrete manner observations made a decade ago with the Infrared Astronomical Satellite (IRAS). Then, astronomers discovered tantalizing evidence that dusty rings may encircle a number of nearby stars, but IRAS proved inadequate for mapping them in detail.

"You now have substantially better information about the second well-studied example of what I think is a ubiquitous phenomenon," says Backman, whose studies of nearby stars have convinced him that many, if not most, main-sequence stars have disks. "This study of Fomalhaut is just one more step [toward] showing that." *—D. Pendick*