THE WORLD OF LUCY'S CHILD

BY RANDOLPH FILLMORE

USF geologist husband and wife team Jonathan Wynn and Diana Roman have reported on the world's oldest fossil remains of a juvenile female, early pre-human ancestor. The *Australopithecus afarensis* was discovered in Dikika, Ethiopia. The geologists' findings were published in the September 21 issue of *Nature*. The coverage served as the magazine's cover story, "A Child of her Time." Roman also was quoted in the December 2006 issue of *Scientific American* on how the fossils were dated at 3.3 million years old.

Because the new fossil was found in the region of Ethiopia where similar adult female fossils called "Lucy" were found in 1974, the popular press dubbed the new 3.3 million-year-old child fossil bones "Lucy's child."

"Not only is this fossil the oldest juvenile hominid discovered to date, the fossil is remarkably well preserved for a specimen of such antiquity," says Wynn. "Juvenile specimens in such a pristine state of preservation are known from much later species, such as the Neanderthals, while most of the early pre-humans are known from a few teeth and isolated, disarticulated bones."

JOSEPH GAMBLE

USF PROFESSORS OF GEOLOGY JONATHAN WYNN AND DIANA ROMAN RECENTLY RETURNED FROM ETHIOPIA WHERE THEIR RESPECTIVE FIELDS COINCIDE TO DEFINE THE WORLD OF LUCY'S CHILD. ROMAN'S WORK DETERMINES HER AGE, AND WYNN'S DESCRIBES THE ENVIRONMENT WHERE SHE LIVED.

Scientists found the 3-year-old child's almost complete skull associated with scapulae (shoulder bones) and clavicles, some vertebrae, some rib bones and fingers, parts of leg bones and metatarsals. All were buried, most likely by a flood, soon after the child died. The more non-human-like nature of the shoulder, leg and finger bones have led scientists to speculate that this Australopithecine may have spent considerable time climbing in trees as well as walking the earth. More delicate bones, such as the hyoid bone (important for human speech) and scapula, are preserved in anatomical precision. The "Lucy's child" fossils present a nearly complete upper body and face, with brain features preserved in good detail.

"This unique preservation will provide anthropologists with many clues as to early human adaptations such as upright walking and the potential for—or lack of—the capacity for speech," notes Wynn.

Wynn provided geological expertise to help explain the geological context of the find, noting that the unique state of preservation of this fossil is a direct result of the geological environment in which it lived 3.3 million years ago.

"In this part of Ethiopia's developing rift valley, the floor of the rift was dropping down very rapidly due to the spreading of Earth's crustal plates that define the rift zones of East Africa," explains Wynn. "Rapid rates of tectonic activity provided the setting for rapid accumulation of sediments, perhaps from a flood, which buried the fossil shortly after death."

Encapsulated in sediment as a corpse, the fossilized bones were excavated by anthropologists more than three million years later.

"We provided answers about the paleoenvironment and the complex geological history of the site," says Wynn. "We were also able, through an examination of the local geology, and especially the active volcanic history of the region, to provide a solid geological date for the fossil."

Roman, a volcanologist, used chemical "fingerprints" preserved in volcanic glass around the fossil to identify unique eruptions of known geological age that were subsequently used to "bracket" the age of the fossil.

Roman explains that "tephrostratigraphy," a technique of examining volcanic ash layers above and below the fossil, produced a date range of 3.31 to 3.35 million years old for "Lucy's child." The ash was dated by a combination of paleomagnetic analysis and a technique that compares the relative amounts of potassium and argon in the feldspar crystals the ancient eruptions produced.

Volcanic activity not only helped date the fossils but may have formed an important backdrop to the "Lucy's child's" life millions of years ago.

"Volcanoes thought to have been active during the time that "Lucy's child" lived, and which are preserved in the geological record, may have also influenced the local environments and influenced the habitats she lived in," suggests Roman.

THE TEAM WORKS ON THE DIKIKA RESEARCH PROJECT IN THE AFAR REGION OF ETHIOPIA. LOCAL PEOPLE OF THE AFAR AND ISSA TRIBES ARE HIRED BY THE SCIENTISTS AS GUIDES. FOSSILS ARE DATED BY THE STUDY OF "TUFF"— VOLCANIC ASH FOUND IN THE LAYERS OF SOIL.

USF geologists help explain the earliest known human ancestor—a 3-year-old pre-human child who may have lived in a volcano's shadow.