Oldest hominid skeleton provides new evidence for human evolution

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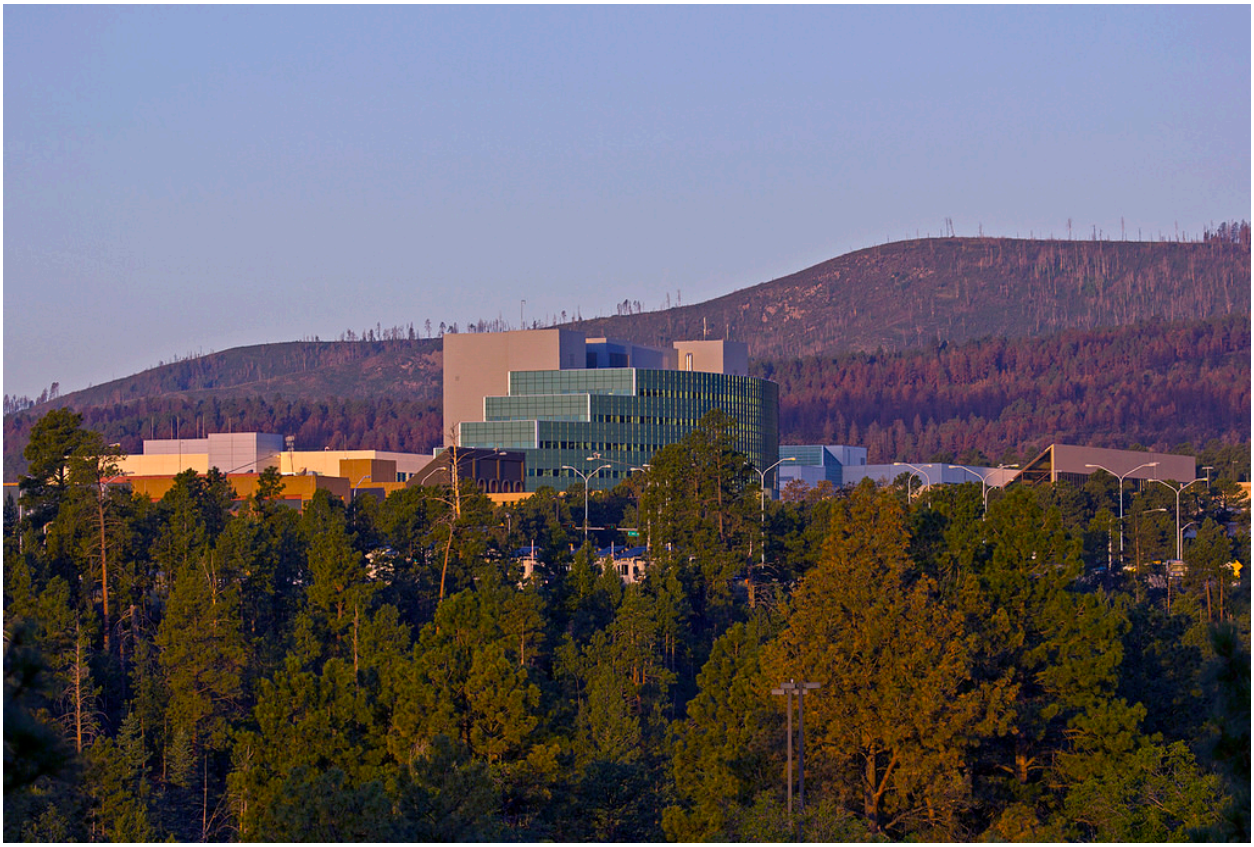

Los Alamos geologist is codirector of international discovery team

Partial skeleton of Ardipithecus ramidus, a hominid species living about 4.4 million years ago in Ethiopia. This female stood about 1.2 meters high. Eleven papers from an international team of authors published in print and online in this special issue describe the anatomy of this species and its habitat and discuss the implications for understanding human evolution. One result is that extant great apes are poor models for our last common ancestor with chimpanzees. See page 60 for an introduction. [Image: © T. White, 2008]

Los Alamos, New Mexico, October 1, 2009—A Los Alamos National Laboratory geologist is part of an international research team responsible for discovering the oldest nearly intact skeleton of Ardipithecus ramidus, who lived 4.4 million years ago. The

discovery reveals the biology of the first stage of human evolution better than anything seen to date.

The 17-year investigation into the discovery of the extremely fragile remains of the small “ground ape,” found in the Afar region of Ethiopia, is described today in a special issue of the journal Science, which includes 11 papers about the discovery. Nearly 15 scientists from 10 different countries were responsible for the 1994 discovery, including Los Alamos geologist Giday WoldeGabriel, who led the field geology investigations and sampling of ancient lavas and ashes that were used to determine the age of the fossilized remains.

The fossil, nicknamed “Ardi,” is the earliest skeleton known from the human branch of the primate family tree. The branch includes Homo sapiens as well as species closer to humans than to chimpanzees and bonobos. The discoveries provide new insights about how hominids—the family of “great apes” comprising humans, chimpanzees, gorillas and orangutans—may have emerged from an ancestral ape.

Until the discovery of Ardi, the earliest well-known stage of human evolution was Australopithecus, the small-brained, fully bipedal “ape man” that lived between 4 million and 1 million years ago. The most famous Australopithecus fossil is the 3.2-million-year-old “Lucy,” found in 1974 about 45 miles north of where Ardi would later be discovered. Ardi’s skeleton and associated Ardipithecus ramidus remains are older and more primitive than Australopithecus.

After Lucy’s discovery, there was some expectation that when earlier hominid remains were found, they would converge to a chimpanzee-like anatomy, based on the genetic similarity of humans and chimps. The Ardipithecus ramidus fossils do not, however, corroborate this expectation.

Ardi’s skeleton contains enough of the skull, teeth, pelvis, legs, feet, arms, and hands to estimate her body weight and height; that she walked on two legs on the ground, but climbed trees and spent time in them as well; and that she probably was omnivorous. Perhaps surprising, Ardi and her companions did not have limb proportions like chimps or gorillas, but rather like those of extinct apes or even monkeys, and her hands also are not chimpanzee- or gorilla-like, but more closely related to earlier extinct apes.

WoldeGabriel and his colleagues used field and laboratory geological methods to determine the age of the extremely fragile fossils by painstakingly analyzing and dating the stratigraphic markers of ancient lavas, ashes, and sedimentary deposits in which the bones were discovered. He also was able to precisely characterize the environment in which Ardi lived.

Ardi’s woodland home included fresh-water springs and small patches of fairly dense forest. Palm trees graced the forest edges, and grasslands extended perhaps many kilometers away. Other fossils associated with Ardi included fig and hackenberry trees; land snails; diverse birds, including owls, parrots, and peafowl; small mammals such as shrews, mice, and bats; and other animals such as porcupines, hyenas, bears, pigs, rhinos, elephants, giraffes, two kinds of monkey, and several different types of antelope.

“It is a privilege to have the opportunity to look back in time into the lives of mankind’s oldest relatives,” said WoldeGabriel. “This is a fascinating and important discovery.”

WoldeGabriel’s research collaborators include Tim White, University of California at Berkeley; Berhane Asfaw, Rift Valley Research Service, Addis Ababa, Ethiopia; Paul Renne, Berkeley Geochronology Center; Yohannes Haile-Selassie, Cleveland Museum

of Natural History; C. Owen Lovejoy, Kent State University; and Gen Suwa, University of Tokyo.