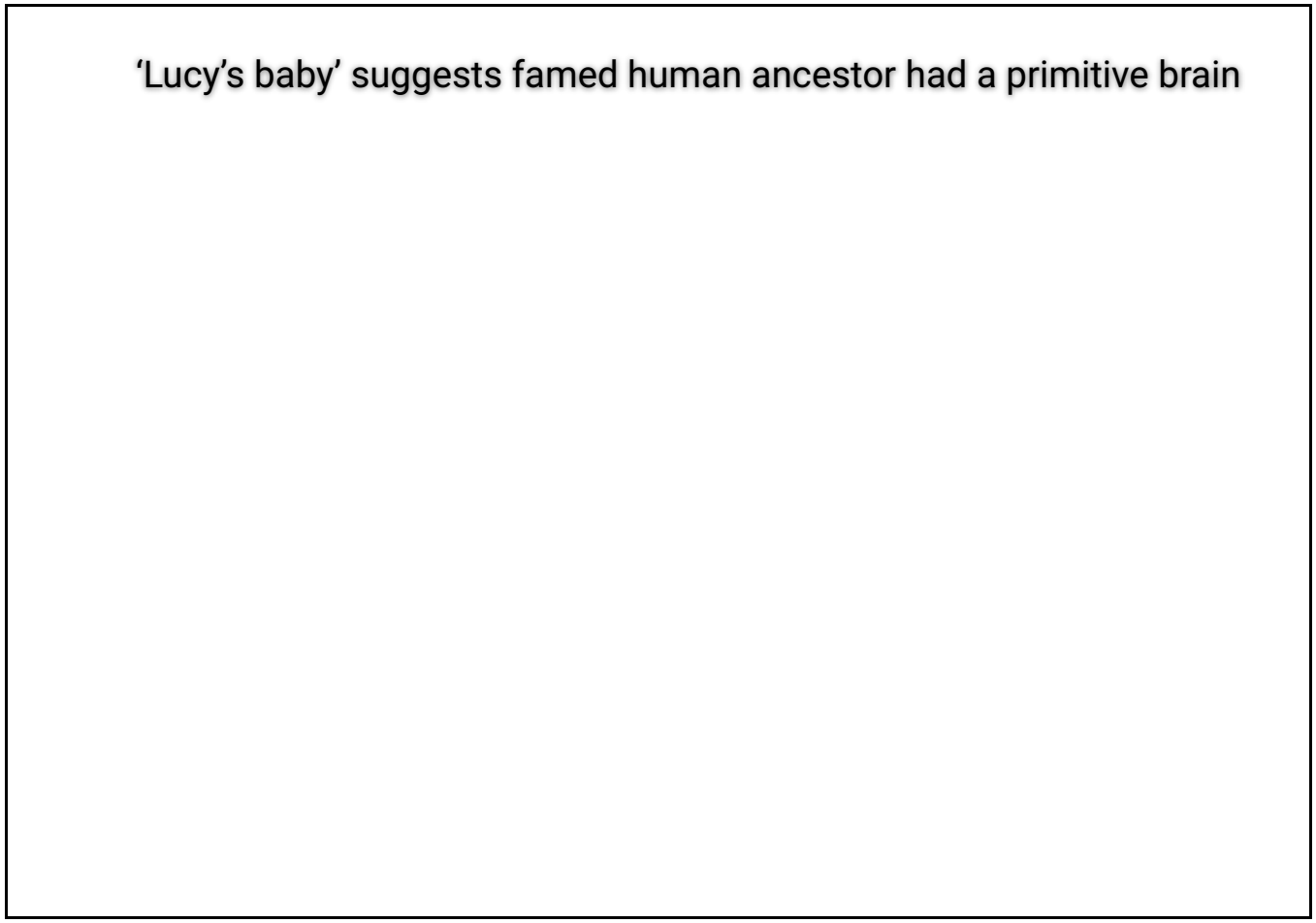
‘Lucy’s baby’ suggests famed human ancestor had a primitive brain

By Ann GibbonsApr. 1, 2020 , 2:10 PM



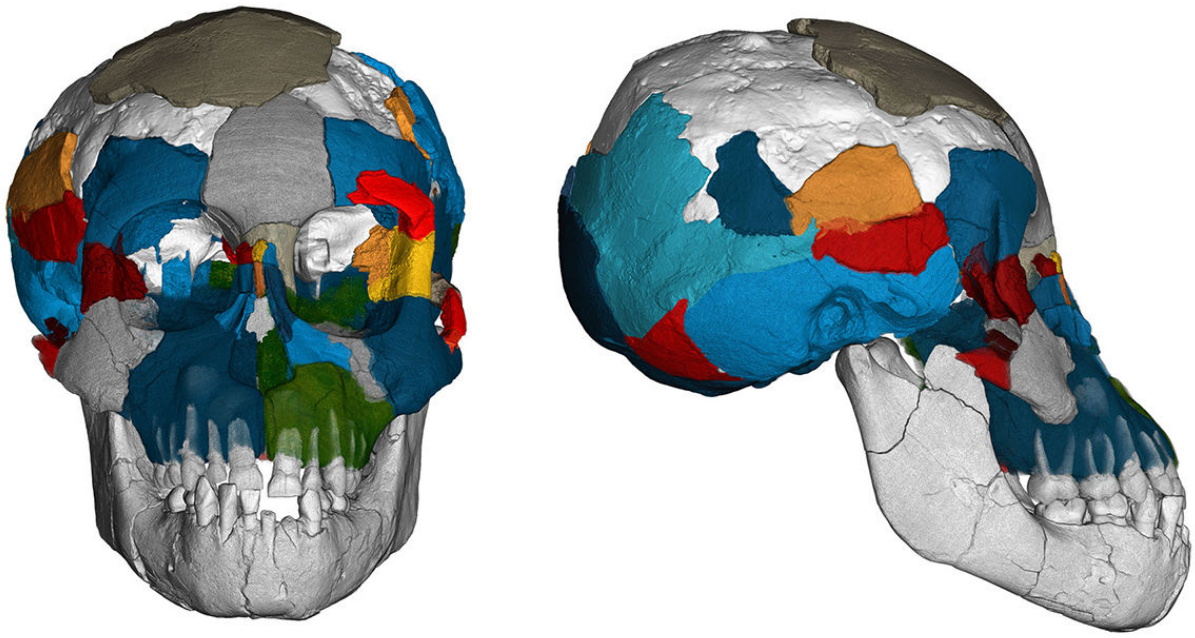
In 1974, the world was stunned by the discovery of “Lucy,” the partial skeleton of a human ancestor that walked upright—and still spent time in the trees—3.2 million years ago. Later discoveries revealed her species, scattered throughout eastern Africa, had brains bigger than chimpanzees. But a new study of an ancient toddler finds that the brains of Lucy’s kind were organized less like those of humans and more like those of chimps. That suggests the brains of our ancestors expanded *before* they reorganized in the ways that let us engage in more complex mental behaviors such as making tools and developing language. The

remains also suggest Lucy's species had a relatively long childhood—similar to modern humans—and that they would have needed parenting longer than their chimp relatives.

Anthropologists have made much of the fact that adult members of Lucy's species—*Australopithecus afarensis*—had skulls 20% larger than a chimpanzee's. Researchers have long debated what this meant for their brain power. Had the brains of these early hominins, or members of the human family, already reorganized by the time their kind was walking upright in Africa and—perhaps—hafting sharp stone tools 2.9 million to 3.9 million years ago? "There's been a big debate about when the reorganization of the brain took place in the hominin lineage," says University of Chicago paleoanthropologist Zeresenay Alemseged.

To test this idea, an international team of paleoanthropologists used a synchrotron in Grenoble, France, to take super–high-resolution images of the deformed skull and teeth of an *A. afarensis* toddler, known as the Dikika child, which Alemseged discovered in Ethiopia in 2000.

The team zoomed in on the inside of the skull, where the brain leaves an imprint. They found that a fold in the tissue at the back of the brain, called the lunate sulcus, was in the same position as in a chimp, not a human brain where its position may have had some impact on complex mental function. Other features also showed "the brain imprint of *A. afarensis* is completely apelike," says paleoanthropologist Philipp Gunz of the Max Planck Institute for Evolutionary Anthropology. Gunz spent 7 years doing the 3D reconstruction of the skull of Dikika and six other adult and juvenile members of the species.



High-resolution images of a toddler *Australopithecus afarensis* suggest its brain was organized like that of a chimpanzee.

Philipp Gunz/MPI EVA Leipzig

The team also painstakingly counted growth lines on the Dikika child’s teeth and found that it was 2.4 years old at the time of death. Its brain volume was about 275 milliliters, the same as for a chimp of the same age. A second skull was of similar age and size; both suggest *A. afarensis*’s brain grew at about the same rate as a chimp’s, the team reports today in *Science Advances*. To reach its adult brain size, *A. afarensis* therefore must have had a longer period of brain growth—or childhood—which is a hallmark of later humans, including us.

Those longer childhoods demand that mothers or other caretakers invest more energy in raising their offspring. “This suggests that a longer childhood emerged way before [our genus] *Homo*,” Alemseged says.

The new reconstructions of the Dikika skull are “exceptional,” says paleoanthropologist Steven Leigh of the University of Colorado, Boulder, who was not part of the study. But evolutionary neuroscientist Chet Sherwood of George Washington University cautions that because the

study is based on skulls of only two juveniles and five adults, “one needs to be cautious.” And recent studies question how much differences on the surface of the brain actually correspond with rewiring of the brain and real functional change in different species, says neuroscientist and anthropologist Katerina Semendeferi of the University of California, San Diego. Nevertheless, both think the reconstructions are spectacular. And, Sherwood adds, these fossils are so rare that they’re “worth pursuing as much as possible.”