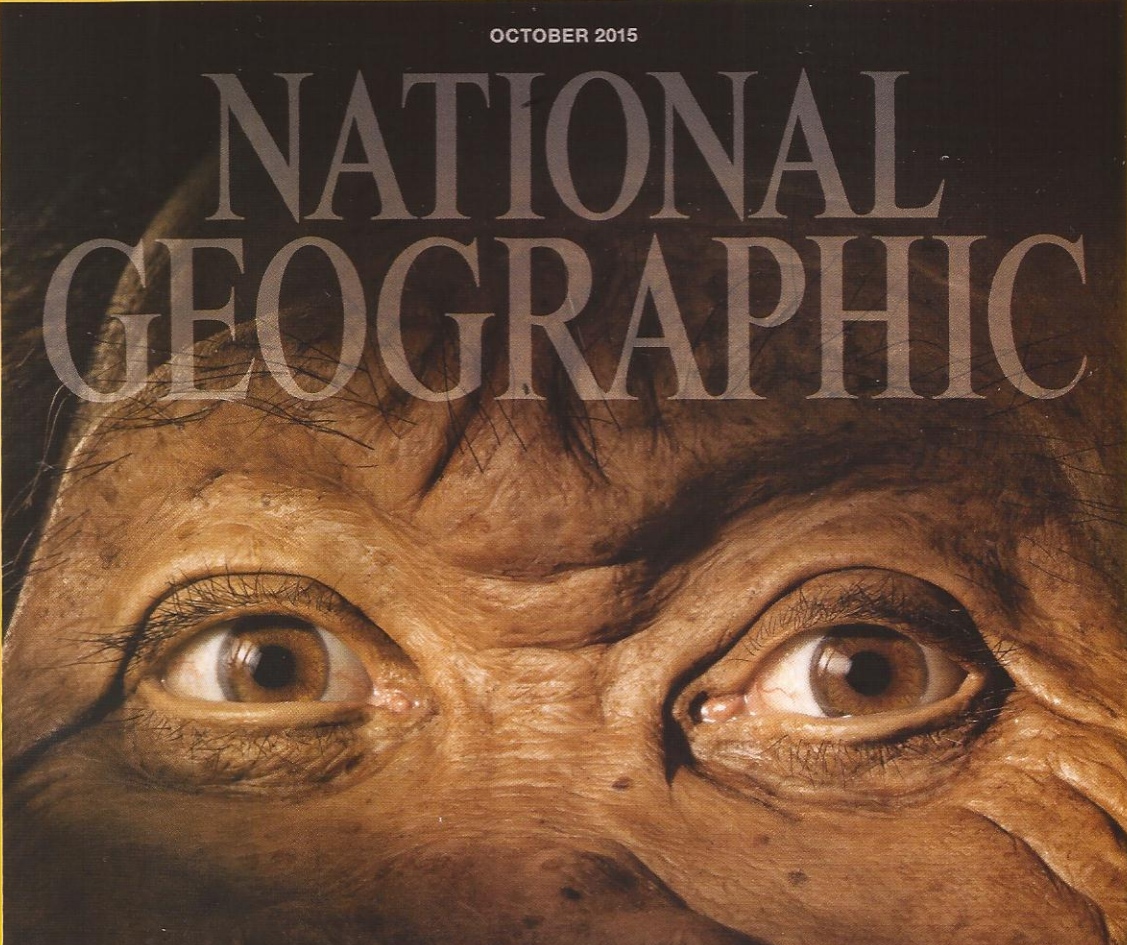


OCTOBER 2015

# NATIONAL GEOGRAPHIC

A close-up photograph of a hominid face, likely a Neanderthal or similar ancient human. The face is brown and wrinkled, with large, wide, light-colored eyes looking directly at the viewer. The background is dark, making the face stand out.

# ALMOST

A NEW ANCESTOR SHAKES UP OUR FAMILY TREE

# HUMAN

UNCOVERING  
A LOST CITY

DARING JOURNEY  
ON THE CONGO

TREKKING SWEDEN'S  
GLACIAL WILDERNESS



# MYSTERY MAN

*A trove of fossils found deep in a South African cave adds a baffling new branch to the human family tree.*

Conjured in clay and cast in silicone by paleoartist John Gurche, *Homo naledi* is the newest addition to our genus.

MARK THIESSEN, NGM STAFF

An *H. naledi* group disposes of one of their own in Rising Star cave in this artist's depiction. Though such advanced behavior is unknown in other primitive hominins, "there appears to be no other option for why the bones are there," says lead scientist Lee Berger.

ART: JON FOSTER. SOURCE: LEE BERGER, UNIVERSITY OF THE WITWATERSRAND (WITS), SOUTH AFRICA





O

n September 13, 2013, two recreational

cavers named Steven Tucker and Rick Hunter entered a dolomite cave system called Rising Star, some 30 miles northwest of Johannesburg. Rising Star has been a popular draw for cavers since the 1960s, and its filigree of channels and caverns is well mapped. Tucker and Hunter were hoping to find some less trodden passage.

In the back of their minds was another mission. In the first half of the 20th century, this region produced so many fossils of our early ancestors that it later became known as the Cradle of Humankind. Though the heyday of fossil hunting there was long past, the cavers knew that a scientist at the University of the Witwatersrand in Johannesburg was looking for bones. The odds of happening upon something were remote. But you never know.

Deep in the cave, Tucker and Hunter worked their way through a constriction called Superman's Crawl—because most people can fit through only by holding one arm tightly against the body and extending the other above the head, like the Man of Steel in flight. Crossing a large chamber, they climbed a jagged wall of rock called the Dragon's Back. At the top they found themselves in a pretty little cavity decorated with stalactites. Hunter got out his video camera, and to remove himself from the frame, Tucker eased himself into a fissure in the cave floor. His foot found a finger of rock, then another below it, then—empty space.

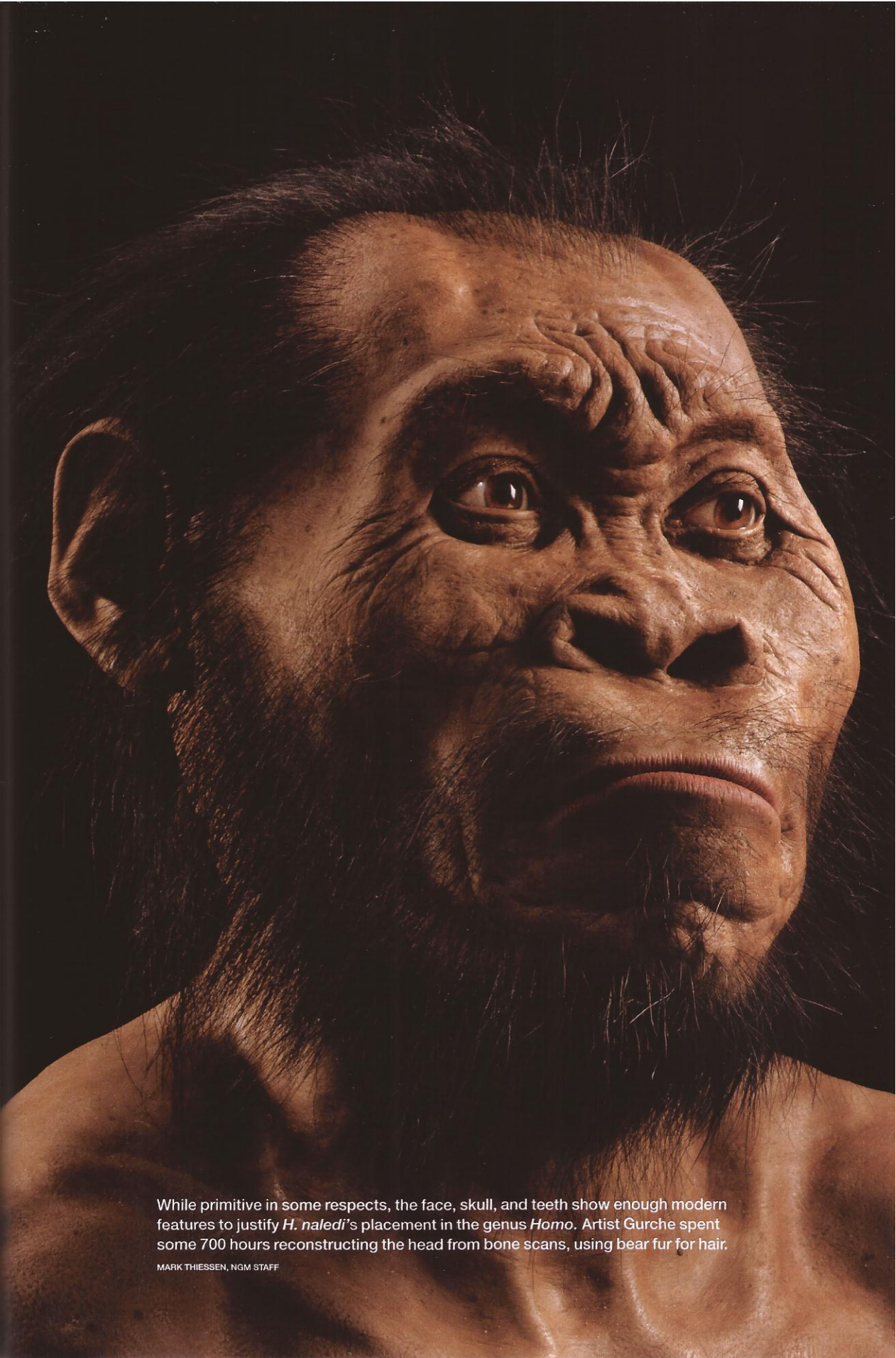
Dropping down, he found himself in a narrow, vertical chute, in some places less than eight inches wide. He called to Hunter to follow him. Both men have hyper-slender frames, all

bone and wiry muscle. Had their torsos been just a little bigger, they would not have fit in the chute, and what is arguably the most astonishing human fossil discovery in half a century—and undoubtedly the most perplexing—would not have occurred.

Lee Berger, the paleoanthropologist who had asked cavers to keep an eye out for fossils, is a big-boned American with a high forehead, a flushed face, and cheeks that flare out broadly when he smiles, which is a lot of the time. His unquenchable optimism has proved essential to his professional life. By the early 1990s, when Berger got a job at the University of the Witwatersrand (“Wits”) and had begun to hunt for fossils, the spotlight in human evolution had long since shifted to the Great Rift Valley of East Africa.

Most researchers regarded South Africa as an interesting sidebar to the story of human evolution but not the main plot. Berger was determined to prove them wrong. But for almost 20 years, the relatively insignificant finds he made seemed only to underscore how little South Africa had left to offer.

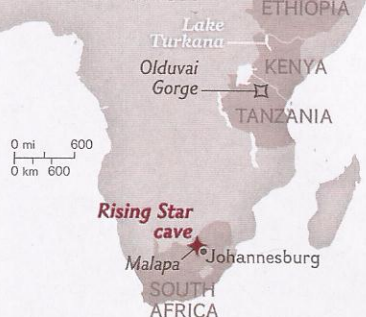
What he most wanted to find were fossils that could shed light on the primary outstanding



While primitive in some respects, the face, skull, and teeth show enough modern features to justify *H. naledi*'s placement in the genus *Homo*. Artist Gurche spent some 700 hours reconstructing the head from bone scans, using bear fur for hair.

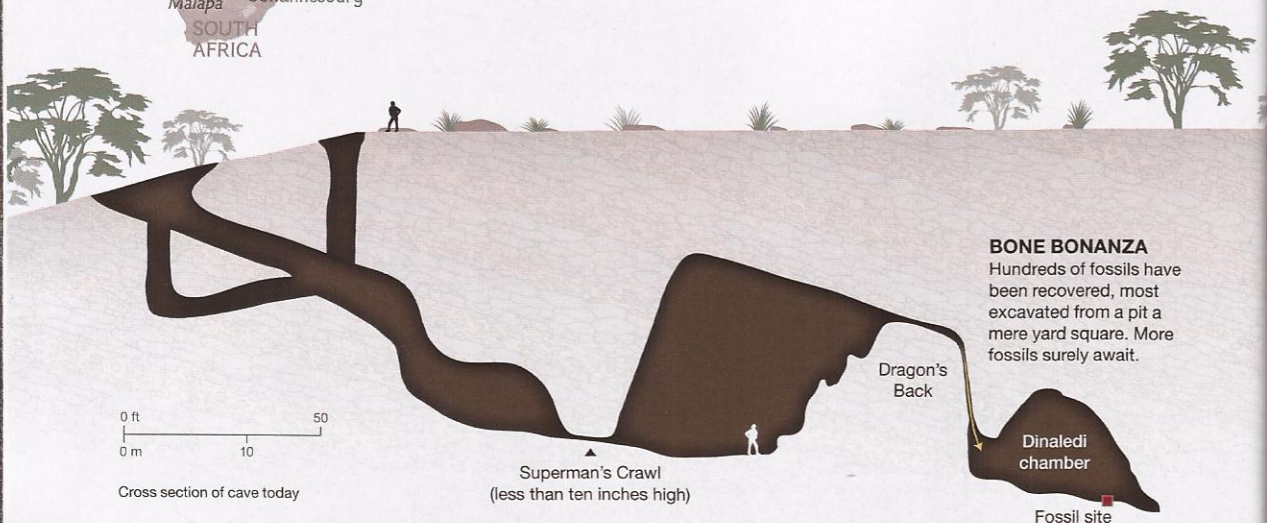
MARK THIESSEN, NGM STAFF

## AFRICA



## Deep in the Dark Zone

The bones were found in a chamber named Dinaledi (chamber of stars), accessible only through a narrow chute, almost a hundred yards from the cave entrance. How they got there is a mystery. The most plausible answer so far: Bodies were dropped in from above.



### BONE BONANZA

Hundreds of fossils have been recovered, most excavated from a pit a mere yard square. More fossils surely await.

mystery in human evolution: the origin of our genus, *Homo*, between two million and three million years ago. On the far side of that divide are the apelike australopithecines, epitomized by *Australopithecus afarensis* and its most famous representative, Lucy, a skeleton discovered in Ethiopia in 1974. On the near side is *Homo erectus*, a tool-wielding, fire-making, globe-trotting species with a big brain and body proportions much like ours. Within that murky million-year gap, a bipedal animal was transformed into a nascent human being, a creature not just adapted to its environment but able to apply its mind to master it. How did that revolution happen?

The fossil record is frustratingly ambiguous. Slightly older than *H. erectus* is a species called *Homo habilis*, or “handy man”—so named by Louis Leakey and his colleagues in 1964 because they believed it responsible for the stone tools they were finding at Olduvai Gorge in Tanzania. In the 1970s teams led by Louis’s son Richard found more *H. habilis* specimens in Kenya, and ever since, the species has provided a shaky base for the human family tree, keeping it rooted in East Africa. Before *H. habilis* the human story goes dark, with just a few fossil fragments of *Homo* too sketchy to warrant a species name.

As one scientist put it, they would easily fit in a shoe box, and you’d still have room for the shoes.

Berger has long argued that *H. habilis* was too primitive to deserve its privileged position at the root of our genus. Some other scientists agree that it really should be called *Australopithecus*. But Berger has been nearly alone in arguing that South Africa was the place to look for the true earliest *Homo*. And for years the unchecked exuberance with which he promoted his relatively minor finds tended only to alienate some of his professional colleagues. Berger had the ambition and personality to become a famous player in his field, like Richard Leakey or Donald Johanson, who found the Lucy skeleton. Berger is a tireless fund-raiser and a master at enthraling a public audience. But he didn’t have the bones.

Then, in 2008, he made a truly important discovery. While searching in a place later called Malapa, some ten miles from Rising Star, he and his 14-year-old son, Matthew, found some hominin fossils poking out of hunks of dolomite.

Over the next year Berger’s team painstakingly chipped two nearly complete skeletons out of the rock. Dated to about two million years ago, they were the first major finds from South Africa published in decades. (An even more complete

skeleton found earlier has yet to be described.) In most respects they were very primitive, but there were some oddly modern traits too.

Berger decided the skeletons were a new species of australopithecine, which he named *Australopithecus sediba*. But he also claimed they were “the Rosetta stone” to the origins of *Homo*. Though the doyens of paleoanthropology credited him with a “jaw-dropping” find, most dismissed his interpretation of it. *A. sediba* was too young, too weird, and not in the right place to be ancestral to *Homo*: It wasn’t one of us. In another sense, neither was Berger. Since then, prominent researchers have published papers on early *Homo* that didn’t even mention him or his find.

Berger shook off the rejection and got back to work—there were additional skeletons from Malapa to occupy him, still encased in limestone blocks in his lab. Then one night, Pedro Boshoff, a caver and geologist Berger had hired to look for fossils, knocked on his door. With him was Steven Tucker. Berger took one look at the pictures they showed him from Rising Star and realized that Malapa was going to have to take a backseat.

**A**fter contorting themselves 40 feet down the narrow chute in the Rising Star cave, Tucker and Rick Hunter had dropped into another pretty chamber, with a cascade of white flowstones in one corner. A passageway led into a larger cavity, about 30 feet long and only a few feet wide, its walls and ceiling a bewilderment of calcite gnarls and jutting flowstone fingers. But it was what was on the floor that drew the two men’s attention. There were bones everywhere. The cavers first thought they must be modern. They weren’t stone heavy, like most fossils, nor were they encased in stone—they were just lying about on the surface, as if someone had tossed them in. They noticed a piece of a lower jaw, with teeth intact; it looked human.

Berger could see from the photos that the bones did not belong to a modern human being. Certain features, especially those of the jawbone and teeth, were far too primitive. The photos showed more bones waiting to be found; Berger could make out the outline of a partly buried

**“Looking down into the chute, I wasn’t sure I’d be OK. It was like looking into a shark’s mouth. There were fingers and tongues and teeth of rock.”**

—Marina Elliott, anthropologist

cranium. It seemed likely that the remains represented much of a complete skeleton. He was dumbfounded. In the early hominin fossil record, the number of mostly complete skeletons, including his two from Malapa, could be counted on one hand. And now this. But what *was* this? How old was it? And how did it get into that cave?

Most pressing of all: how to get it out again, and quickly, before some other amateurs found their way into that chamber. (It was clear from the arrangement of the bones that someone had already been there, perhaps decades before.) Tucker and Hunter lacked the skills needed to excavate the fossils, and no scientist Berger knew—certainly not himself—had the physique to squeeze through that chute. So Berger put the word out on Facebook: Skinny individuals wanted, with scientific credentials and caving experience; must be “willing to work in cramped quarters.” Within a week and a half he’d heard from nearly 60 applicants. He chose the six most qualified; all were young women. Berger called them his “underground astronauts.”

With funding from National Geographic (Berger is also a National Geographic explorer-in-residence), he gathered some 60 scientists and set up an aboveground command center, a science tent, and a small village of sleeping and support tents. Local cavers helped thread two miles of communication and power cables down into the fossil chamber. Whatever was happening there could now be viewed with cameras by Berger and his team in the command center. Marina Elliott, then a graduate student at Simon Fraser University in British Columbia, was the first scientist down the chute.

“Looking down into it, I wasn’t sure I’d be



**There were bones everywhere, just lying about on the surface. The cavers noticed a piece of a lower jaw, with teeth intact.**

OK,” Elliott recalled. “It was like looking into a shark’s mouth. There were fingers and tongues and teeth of rock.”

Elliott and two colleagues, Becca Peixotto and Hannah Morris, inched their way to the “landing zone” at the bottom, then crouched into the fossil chamber. Working in two-hour shifts with another three-woman crew, they plotted and bagged more than 400 fossils on the surface, then started carefully removing soil around the half-buried skull. There were other bones beneath and around it, densely packed. Over the next several days, while the women probed a square-yard patch around the skull, the other scientists huddled around the video feed in the command center above in a state of near-constant excitement. Berger, dressed in field khakis and a Rising Star Expedition cap, would occasionally repair to the science tent to puzzle over the accumulating bones—until a collective howl of astonishment from the command center brought him rushing back to witness another discovery. It was a glorious time.

The bones were superbly preserved, and from the duplication of body parts, it soon became clear that there was not one skeleton in the cave, but two, then three, then five... then so many it was hard to keep a clear count. Berger had allotted three weeks for the excavation. By the end of that time, the excavators had removed some 1,200 bones, more than from any other human ancestor site in Africa—and they still hadn’t exhausted the material in just the one square yard around the skull. It took another several days digging in March 2014 before its

sediments ran dry, about six inches down.

There were some 1,550 specimens in all, representing at least 15 individuals. Skulls. Jaws. Ribs. Dozens of teeth. A nearly complete foot. A hand, virtually every bone intact, arranged as in life. Minuscule bones of the inner ear. Elderly adults. Juveniles. Infants, identified by their thimble-size vertebrae. Parts of the skeletons looked astonishingly modern. But others were just as astonishingly primitive—in some cases, even more apelike than the australopithecines.

“We’ve found a most remarkable creature,” Berger said. His grin went nearly to his ears.

**I**n paleoanthropology, newly discovered specimens are traditionally held close to the vest until they can be carefully analyzed and the results published, with full access to them granted only to the discoverer’s closest collaborators. By this protocol, answering the central mystery of the Rising Star find—*What is it?*—could take years, even decades. Berger wanted the work done and published by the end of the year. In his view everyone in the field should have access to important new information as quickly as possible. And maybe he liked the idea of announcing his find, which might be a new candidate for earliest *Homo*, in 2014—exactly 50 years after Louis Leakey published his discovery of the reigning first member of our genus, *Homo habilis*.

In any case there was only one way to get the analysis done quickly: Put a lot of eyes on the bones. Along with the 20-odd senior scientists who had helped him evaluate the Malapa skeletons, Berger invited more than 30 young scientists, some with the ink still wet on their Ph.D.’s, to Johannesburg from some 15 countries, for a blitzkrieg fossil fest lasting six weeks. To some older scientists who weren’t involved, putting young people on the front line just to rush the papers into print seemed rash. But for the young people in question, it was “a paleofantasy come true,” said Lucas Deleuzene, a newly appointed professor at the University of Arkansas. “In grad school you dream of a pile of fossils no one has seen before, and you get to figure it out.”

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Support for this project was provided by the Lyda Hill Foundation and your Society membership.



With other team members, Berger, Elliott, and Kruger (foreground, from left) view the first images from the fossil chamber. Steve Tucker (far right) co-discovered the site. K. Lindsay Hunter and Alia Gurtov (back left) helped excavate the bones.

The workshop took place in a newly constructed vault at Wits, a windowless room lined with glass-paneled shelves bearing fossils and casts. The analytical teams were divided by body part. The cranial specialists huddled in one corner around a large square table that was covered with skull and jaw fragments and the casts of other well-known fossil skulls. Smaller tables were devoted to hands, feet, long bones, and so on. The air was cool, the atmosphere hushed. Young scientists fiddled with bones and calipers. Berger and his close advisers circulated among them, conferring in low voices.

Delezene's own fossil pile contained 190 teeth—a critical part of any analysis, since teeth alone are often enough to identify a species. But these teeth weren't like anything the scientists in the "tooth booth" had ever seen. Some features were astonishingly humanlike—the molar crowns were small, for instance, with five cusps like ours. But the premolar roots were weirdly primitive. "We're not sure what to make of these," Delezene said. "It's crazy."

The same schizoid pattern was popping up at

the other tables. A fully modern hand sported wackily curved fingers, fit for a creature climbing trees. The shoulders were apish too, and the widely flaring blades of the pelvis were as primitive as Lucy's—but the bottom of the same pelvis looked like a modern human's. The leg bones started out shaped like an australopithecine's but gathered modernity as they descended toward the ground. The feet were virtually indistinguishable from our own.


"You could almost draw a line through the hips—primitive above, modern below," said Steve Churchill, a paleontologist from Duke University. "If you'd found the foot by itself, you'd think some Bushman had died."

But then there was the head. Four partial skulls had been found—two were likely male, two female. In their general morphology they clearly looked advanced enough to be called *Homo*. But the braincases were tiny—a mere 560 cubic centimeters for the males and 465 for the females, far less than *H. erectus*'s average of 900 cubic centimeters, and well under half the size of our own. A large brain is the sine qua non



The braincase of this composite male skull of *H. naledi*, shown actual size, measures a mere 560 cubic centimeters in volume—less than half that of the modern human skull behind it. Female braincases were even smaller.

ART: STEFAN FICHTEL. SOURCES: LEE BERGER AND PETER SCHMID, WITS; JOHN HAWKS, UNIVERSITY OF WISCONSIN-MADISON



**“Tiny little brains stuck  
on these bodies that  
weren’t tiny. Weird as hell.”**

—Fred Grine, paleoanthropologist

**“We’ve found a most  
remarkable creature.”**

—Lee Berger, paleoanthropologist

of humanness, the hallmark of a species that has evolved to live by its wits. These were not human beings. These were pinheads, with some humanlike body parts.

“Weird as hell,” paleoanthropologist Fred Grine of the State University of New York at Stony Brook later said. “Tiny little brains stuck on these bodies that weren’t tiny.” The adult males were around five feet tall and a hundred pounds, the females a little shorter and lighter.

“The message we’re getting is of an animal right on the cusp of the transition from *Australopithecus* to *Homo*,” Berger said as the workshop began to wind down in early June. “Everything that is touching the world in a critical way is like us. The other parts retain bits of their primitive past.”

In some ways the new hominin from Rising Star was even closer to modern humans than *Homo erectus* is. To Berger and his team, it clearly belonged in the *Homo* genus, but it was unlike any other member. They had no choice but to name a new species. They called it *Homo naledi*, tipping a hat to the cave where the bones had been found: In the local Sotho language, *naledi* means “star.”

**B**ack in November, as Marina Elliott and her mates were uncovering that startling trove of bones, they were almost as surprised by what they weren’t finding. “It was day three or four, and we still hadn’t found any fauna,” Elliott said. On the first day a few little bird bones had been found on the surface, but otherwise there was nothing but hominin bones.

That made for a mystery as perplexing as that of *H. naledi*’s identity: How did the remains get

## The Sum of Its Parts

A composite skeleton reveals *H. naledi*'s overall body plan. Its shoulders, hips, and torso hark back to earlier ancestors, while its lower body shows more humanlike adaptations. The skull and teeth show a mix of traits.

### HOMO FEATURES

#### Humanesque skull

The general shape of *H. naledi*'s skull is advanced, though the braincase is less than half that of a modern human's.

#### Versatile hands

*H. naledi*'s palms, wrists, and thumbs are humanlike, suggesting tool use.

#### Long legs

The leg bones are long and slender and have the strong muscle attachments characteristic of a modern bipedal gait.

#### Humanlike feet

Except for the slightly curved toes, *H. naledi*'s feet are nearly indistinguishable from ours, with arches that suggest an efficient long-distance stride.

### AUSTRALOPITHECINE FEATURES

#### Primitive shoulders

*H. naledi*'s shoulders are positioned in a way that would have helped with climbing and hanging.

#### Flared pelvis

The hip bones of *H. naledi* flare outward—a primitive trait—and are shorter front to back than those of modern humans.

#### Curved fingers

Long, curved fingers, useful for climbing in trees, could be a trait retained from a more apelike ancestor.

SKELETON: STEFAN FICHEL  
BODY COMPARISON PAINTING:  
JOHN GURCHE  
SOURCES: LEE BERGER AND  
PETER SCHMID, WITS; JOHN HAWKS,  
UNIVERSITY OF WISCONSIN-MADISON

Projected adult height

## A New Kind of Ancestor

*H. naledi* was much closer in appearance to *Homo* species such as *H. erectus* than to australopithecines, such as Lucy. But it possesses enough traits shared with no other member of our genus that it warrants a new species name.

### "Turkana Boy"

*Homo erectus*

1.6 million years ago

Adolescent male

Height: 5 ft | Weight: 110-115 lbs

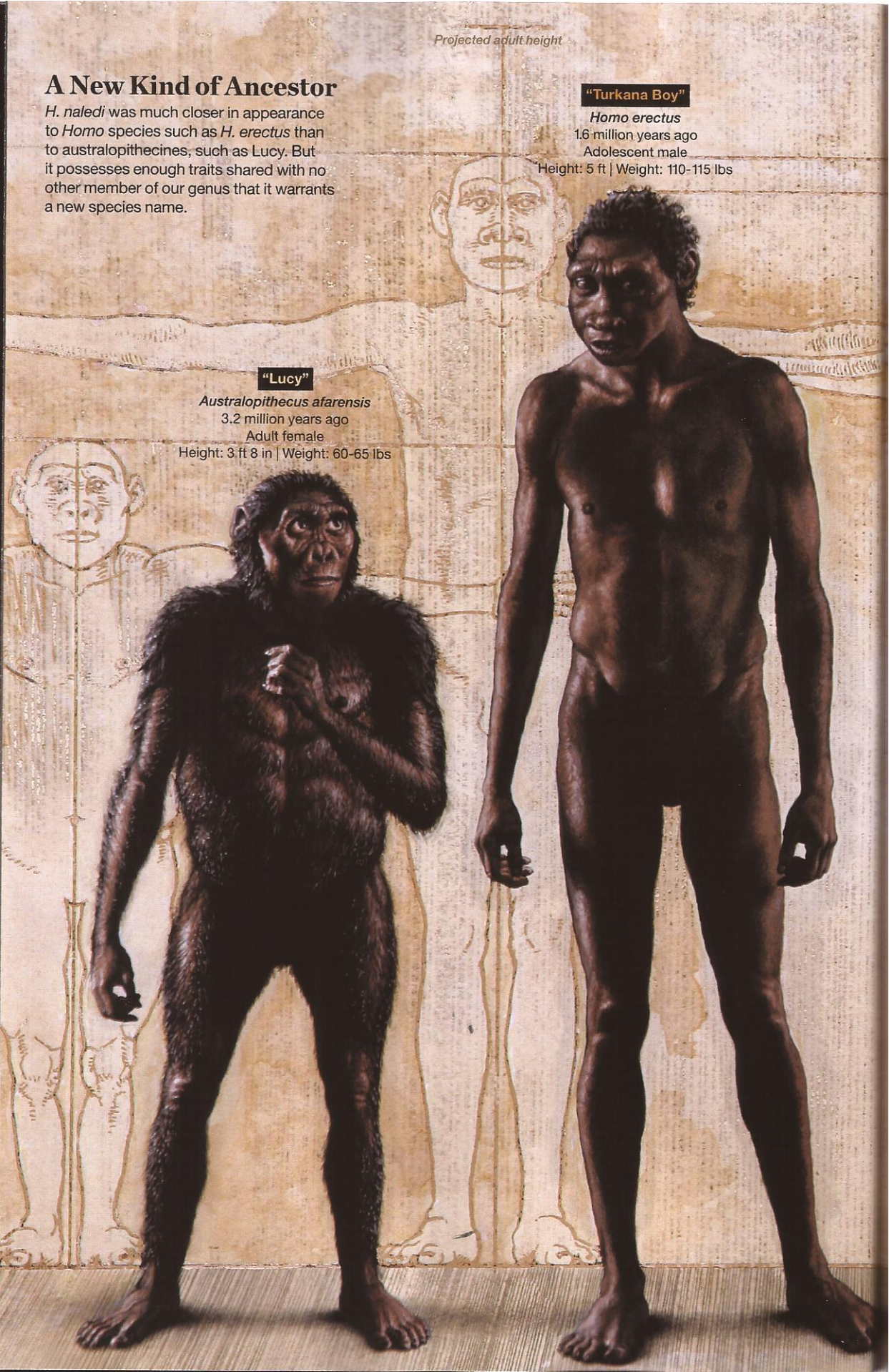
### "Lucy"

*Australopithecus afarensis*

3.2 million years ago

Adult female

Height: 3 ft 8 in | Weight: 60-65 lbs



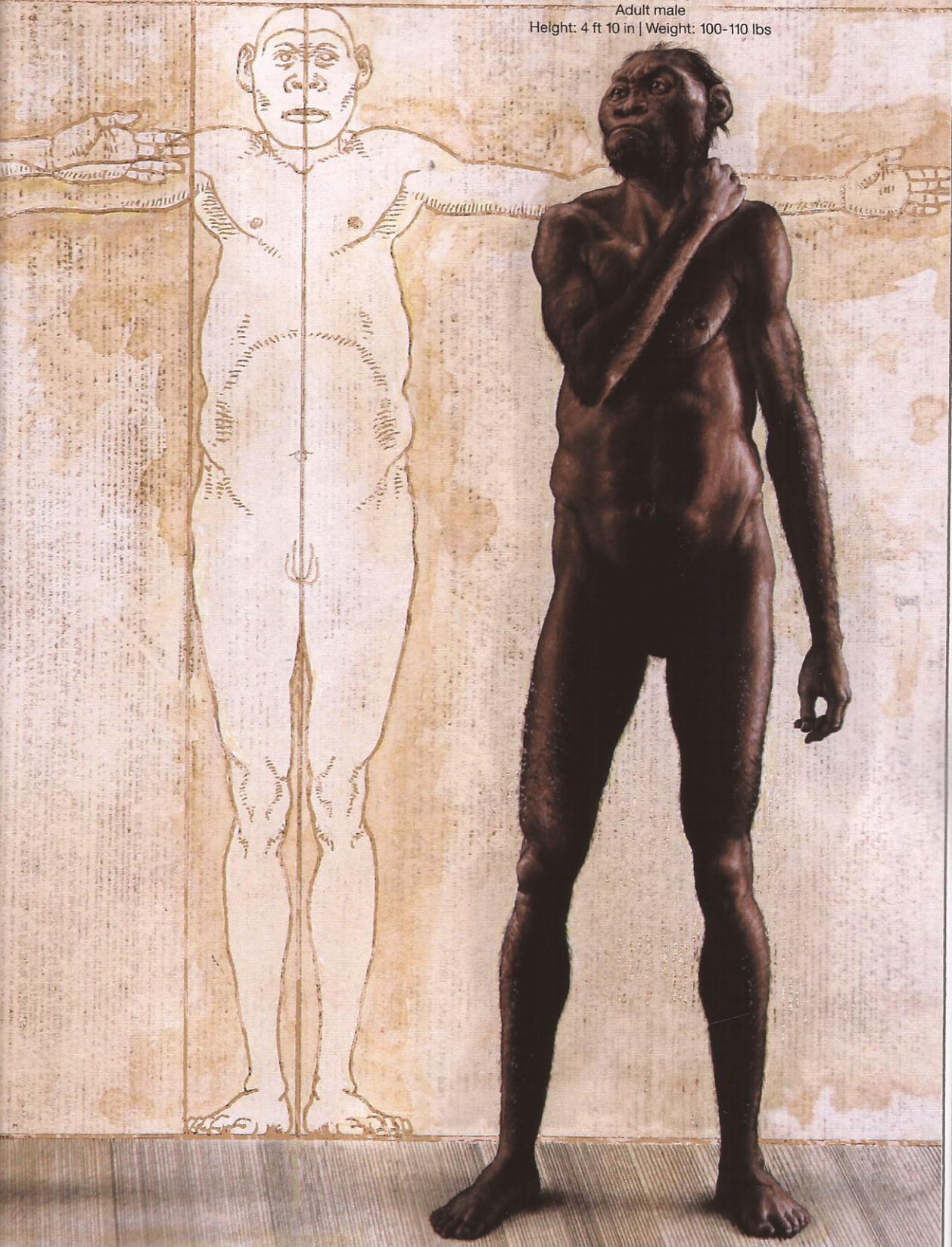
Rising Star hominin

*Homo naledi*

Date unknown

Adult male

Height: 4 ft 10 in | Weight: 100-110 lbs





Assembled from 3-D scans of individual fossils, a life-size rendering of *H. naledi*'s hand displays curved fingers, a clue that the species had retained an ability to climb in trees and on rocks. The thumb, wrist, and palm bones all look remarkably modern.

ART: STEFAN FICHEL. SOURCES: LEE BERGER AND PETER SCHMID, WITS; JOHN HAWKS, UNIVERSITY OF WISCONSIN-MADISON



into such an absurdly remote chamber? Clearly the individuals weren't living in the cave; there were no stone tools or remains of meals to suggest such occupation. Conceivably a group of *H. naledi* could have wandered into the cave one time and somehow got trapped—but the distribution of the bones seemed to indicate that they had been deposited over a long time, perhaps centuries. If carnivores had dragged hominin prey into the cave, they would have left tooth marks on the bones, and there weren't any. And finally, if the bones had been washed into the cave by flowing water, it would have carried stones and other rubble there too. But there is no rubble—only fine sediment that had weathered off the walls of the cave or sifted through tiny cracks.

"When you have eliminated the impossible," Sherlock Holmes once reminded his friend Watson, "whatever remains, however improbable, must be the truth."

Having exhausted all other explanations, Berger and his team were stuck with the improbable conclusion that bodies of *H. naledi* were deliberately put there, by other *H. naledi*. Until now only *Homo sapiens*, and possibly some archaic humans such as the Neanderthals, are known to have treated their dead in such a ritualized manner. The researchers don't argue that these much more primitive hominins navigated Superman's Crawl and the harrowing shark-mouth chute while dragging corpses behind them—that would go beyond improbable to incredible. Maybe back then Superman's Crawl was wide enough to be walkable, and maybe the hominins simply dropped their burden into the chute without climbing down themselves. Over time the growing pile of bones might have slowly tumbled into the neighboring chamber.

Deliberate disposal of bodies would still have required the hominins to find their way to the top of the chute through pitch-black darkness and back again, which almost surely would have required light—torches, or fires lit at intervals. The notion of such a small-brained creature exhibiting such complex behavior seems so unlikely that many other researchers have simply refused to credit it. At some earlier time,

## **Disposal of the dead brings closure for the living and confers respect. Such sentiments are a hallmark of humanity. But *H. naledi* was not human.**

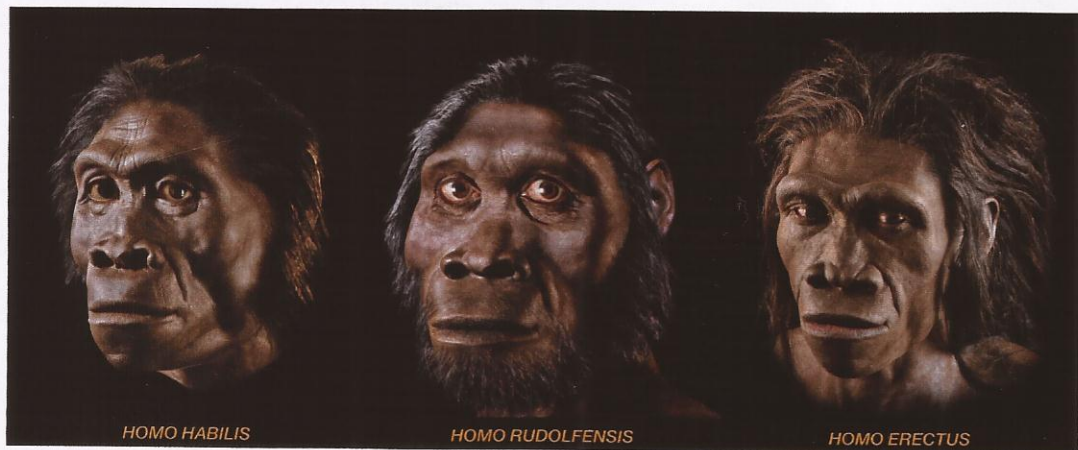
they argue, there must have been an entrance to the cave that afforded more direct access to the fossil chamber—one that probably allowed the bones to wash in. "There has to be another entrance," Richard Leakey said after he'd paid a visit to Johannesburg to see the fossils. "Lee just hasn't found it yet."

But water would inevitably have washed rubble, plant material, and other debris into the fossil chamber along with the bones, and they simply aren't there. "There isn't a lot of subjectivity here," said Eric Roberts, a geologist from James Cook University in Australia, svelte enough to have examined the chamber himself. "The sediments don't lie."

Disposal of the dead brings closure for the living, confers respect on the departed, or abets their transition to the next life. Such sentiments are a hallmark of humanity. But *H. naledi*, Berger emphatically stresses, was *not* human—which makes the behavior all the more intriguing.

"It's an animal that appears to have had the cognitive ability to recognize its separation from nature," he said.

**T**he mysteries of what *H. naledi* is, and how its bones got into the cave, are inextricably knotted with the question of how old those bones are—and for the moment no one knows. In East Africa, fossils can be accurately dated when they are found above or below layers of volcanic ash, whose age can be measured from the clocklike decay of radioactive elements in the ash. At Malapa, Berger had gotten lucky: The *A. sediba* bones lay between two flowstones—thin layers of calcite deposited by running water—that could also be dated radiometrically. But the bones in the Rising Star



A trio of other *Homo* species, all first appearing in the fossil record around two million years ago, argues against a linear progression toward humanness—a message underscored by *H. naledi*'s unique blend of primitive and advanced traits.

IMAGES NOT TO SCALE

chamber were just lying on the cave floor or buried in shallow, mixed sediments. *When* they got into the cave is an even more intractable problem to solve than *how*.

Most of the workshop scientists fretted over how their analysis would be received without a date attached. (As it turned out, the lack of a date would prove to be one impediment to a quick publication of the scientific papers describing the finds.) But Berger wasn't bothered one bit. If *H. naledi* eventually proved to be as old as its morphology suggested, then he had quite possibly found the root of the *Homo* family tree. But if the new species turned out to be much younger, the repercussions could be equally profound. It could mean that while our own species was evolving, a separate, small-brained, more primitive-looking *Homo* was loose on the landscape, as recently as anyone dared to contemplate. A hundred thousand years ago? Fifty thousand? Ten thousand? As the exhilarating workshop came to an end with that fundamental question still unresolved, Berger was sanguine as always. "No matter what the age, it will have tremendous impact," he said, shrugging.

A few weeks later, in August of last year, he traveled to East Africa. To mark the occasion of the 50th anniversary of Louis Leakey's description of *H. habilis*, Richard Leakey had summoned the leading thinkers

on early human evolution to a symposium at the Turkana Basin Institute, the research center he (along with the State University of New York at Stony Brook) had established near the western shore of Lake Turkana in Kenya.

The purpose of the meeting was to try to come to some consensus over the confounding record of early *Homo*, without grandstanding or rancor—two vices endemic to paleoanthropology. Some of Lee Berger's harshest critics would be there, including some who'd written scathing reviews of his interpretation of the *A. sediba* fossils. To them, he was an outsider at best, a hype artist at worst. Some threatened not to attend if he were there. But given the Rising Star discovery, Leakey could hardly not invite him.

"There's no one on Earth finding fossils like Lee is now," Leakey said.

For four days the scientists huddled together in a spacious lab room, its casement windows open to the breezes, casts of all the important evidence for early *Homo* spread out on tables. One morning Meave Leakey (who's also a National Geographic explorer-in-residence) opened a vault to reveal brand-new specimens found on the east side of the lake, including a nearly complete foot. When it was his turn to speak, Bill Kimbel of the Institute of Human Origins described a new *Homo* jaw from Ethiopia dated to 2.8 million years ago—the oldest member of our genus yet. Archaeologist Sonia Harmand of

Homo sapiens

Today

## A Place in Time

Mixed soil sediments in the cave where *H. naledi* was found make it difficult to date the bones. High-tech dating methods could provide an age. Three possibilities are considered here—any of which would throw a curve into current thinking on human evolution.

One Million Years Ago (m.y.a.)

### Australopithecines

Early species were adapted to climbing as well as bipedalism; later species had more specialized diets of tough, fibrous foods.

### Homo

Long lower legs were adapted to walking and running; smaller teeth and larger brains in later *H. erectus* could indicate hunting and eating more meat.

### EARLY HOMO

*H. naledi*'s anatomy—transitional between australopithecines and *Homo*—is most compatible with an age of some two to two and a half million years.

### NUDGING OUT LUCY

Though it's highly unlikely, if *H. naledi* is extremely old, it could call into question the idea that Lucy's species, *A. afarensis*, was on our direct evolutionary lineage.

Two m.y.a.

Three m.y.a.

Four m.y.a.

*A. robustus*

*A. boisei*

*H. habilis*

*H. erectus*

*A. sediba*

*H. rudolfensis*

*H. naledi*

*A. aethiopicus*

*A. africanus*

*A. garhi*

*H. sp.*  
(species unknown)

*A. afarensis*

*Kenyanthropus platyops*

*H. naledi*

Earlier divergence?

*Australopithecus anamensis*

JASON TREAT, NGM STAFF  
SOURCES: LEE BERGER, WITS; JOHN HAWKS,  
UNIVERSITY OF WISCONSIN-MADISON

**“What *naledi* says to me is that you may think the fossil record is complete enough to make up stories, and it’s not.”**

—Fred Grine

Stony Brook University dropped an even bigger bombshell—the discovery of dozens of crude stone tools near Lake Turkana dating to 3.3 million years ago. If stone tools originated half a million years *before* the first appearance of our genus, it would be hard to argue anymore that the defining characteristic of *Homo* was its technological ingenuity.

Berger meanwhile was uncommonly subdued, adding little to the discussion, until the topic turned to a comparison of *A. sediba* and *H. habilis*. It was time.

“More of interest perhaps to this debate is Rising Star,” he offered. For the next 20 minutes he laid out all that had happened—the serendipitous discovery of the cave, the crash analysis in June, and the gist of its findings. While he talked, a couple of casts of Rising Star skulls were passed hand to hand.

Then came the questions. Have you done a cranio-dental analysis? Yes. The *H. naledi* skull and teeth place it in a group with *Homo erectus*, Neanderthals, and modern humans. Closer to *H. erectus* than *H. habilis* is? Yes. Are there any tooth marks on the bones from carnivores? No, these are the healthiest dead individuals you’ll ever see. Have you made progress on the dating? Not yet. We’ll get a date sometime. Don’t worry.

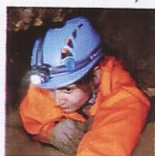
Then, when the questions were over, the

gathered doyens did something no one expected, least of all Berger. They applauded.

**W**hen a major new find is made in human evolution—or even a minor new find—it’s common to claim it overturns all previous notions of our ancestry. Perhaps having learned from past mistakes, Berger doesn’t make such assertions for *Homo naledi*—at least not yet, with its place in time uncertain. He doesn’t claim he has found the earliest *Homo*, or that his fossils return the title of “Cradle of Humankind” from East to South Africa. The fossils do suggest, however, that both regions, and everywhere in between, may harbor clues to a story that is more complicated than the metaphor “human family tree” would suggest.

“What *naledi* says to me is that you may think the record is complete enough to make up stories, and it’s not,” said Stony Brook’s Fred Grine. Maybe early species of *Homo* emerged in South Africa and then moved up to East Africa. “Or maybe it’s the other way around.”

Berger himself thinks the right metaphor for human evolution, instead of a tree branching from a single root, is a braided stream: a river that divides into channels, only to merge again downstream. Similarly, the various hominin types that inhabited the landscapes of Africa must at some point have diverged from a common ancestor. But then farther down the river of time they may have coalesced again, so that we, at the river’s mouth, carry in us today a bit of East Africa, a bit of South Africa, and a whole lot of history we have no notion of whatsoever. Because one thing is for sure: If we learned about a completely new form of hominin only because a couple of cavers were skinny enough to fit through a crack in a well-explored South African cave, we really don’t have a clue what else might be out there. □



GARRETH BIRD

**Video: Meet the Cave Women**

Out of 60 applicants, six intrepid women were picked to explore the Dinaledi chamber—a job that gives new meaning to “working in cramped quarters.” Go to [ngm.com/more](http://ngm.com/more).



COURTESY NG STUDIOS

**From Ape to Human**

*Dawn of Humanity*, a two-hour National Geographic/NOVA special, chronicles the discovery of *Homo naledi*. Tune in to your PBS station September 16 at 9 p.m. ET.



The foot of *H. naledi* is astonishingly humanlike. Only a few traits, such as slightly more curved toe bones, retain a primitive cast. "This is essentially the foot of a modern human, but subtly different," says paleontologist Will Harcourt-Smith.

ART: STEFAN FICHEL. SOURCES: LEE BERGER AND PETER SCHMID, WITS; JOHN HAWKS, UNIVERSITY OF WISCONSIN-MADISON