

CHAPTER 2

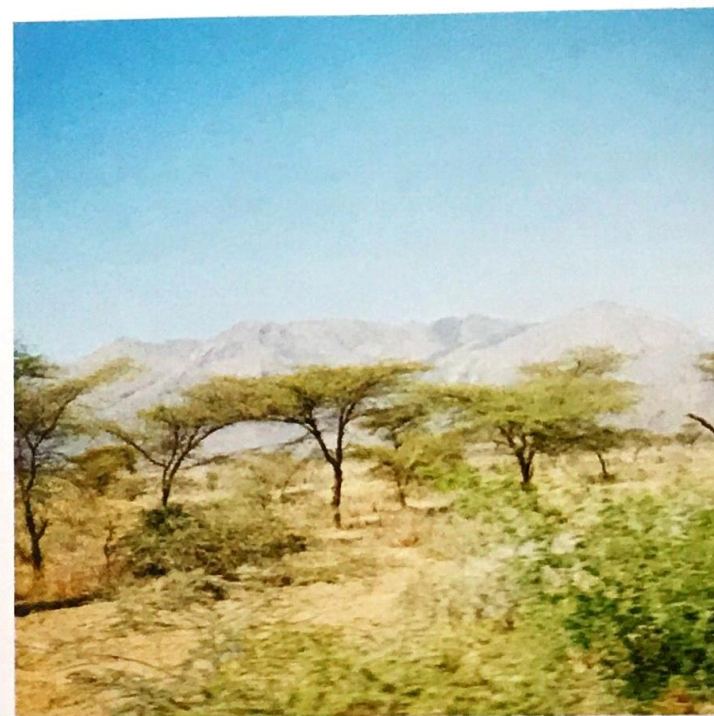
66 BONES AND
TEETH IN ETHIOPIA

THE BIG DIG

THE EARLIEST HOMINIDS— SO FAR

A lion roared in the distance. It would be dawn soon. Yohannes Haile-Selassie pulled the sleeping bag over his shoulder, wishing for a few more minutes of sleep. He would soon go out again into the Ethiopian scrubland. Maybe today would be the day—the day he would find hominid bones. “When you don’t find anything, an hour is like a day. But when you find good stuff, you don’t even want night to come, you want to work 24 hours to find more.” Maybe today would be that kind of day—a day when he wouldn’t want night to come.

Haile-Selassie wore a baseball cap to shield his eyes from the sun. He and his partner Giday WoldeGabriel stared out across the stony, sunbaked ground. Was this a good spot for



Erosion from wind and rare desert rainstorms expose fossils of animals that lived in this Ethiopian desert landscape when the climate was wetter than it is today.

SKULLDUGGERY

We commonly talk about “bones” when there is no bone left at all. An archaeological find may look like a bone, but the bone has been replaced by minerals and now is a fossil. People also commonly use the words “skull” and “cranium” interchangeably. But a skull is actually a cranium and a jaw-bone. When the jaw-bone is missing, as it often is, technically you have just a cranium.

SCIENCES THAT STUDY THE PAST

Anthropology	<i>anthropo</i> + <i>ology</i> = “man” + “study”	the study of humans
Geology	<i>geo</i> + <i>ology</i> = “earth” + “study”	the study of rocks and Earth’s history
Paleoecology	<i>paleo</i> + <i>eco</i> + <i>ology</i> = “ancient” + “environment” + “study”	the study of ancient environments
Paleontology	<i>paleo</i> + <i>onto</i> + <i>ology</i> = “ancient” + “existing” + “study”	the study of life on Earth in ancient times through fossils
Paleo-anthropology	<i>paleo</i> + <i>anthropo</i> + <i>ology</i> = “ancient” + “man” + “study”	the study of ancient humans

Haile-Selassie is an anthropologist. WoldeGabriel is a geologist. A dig requires the combined skills from scholars of many kinds of sciences.

HOW TO BECOME
A FOSSIL

Becoming a fossil is a matter of luck. When an animal dies, it often is torn apart by scavengers, or stepped on and crushed, or scattered by rain and wind. If it is buried quickly, its chances of turning into a fossil are better. Under the protective layer of mud, sand, or ash, the animal will rot, leaving hard parts such as teeth and bones. Slowly, what was once alive is replaced by minerals. Fossils aren’t just made from animals—they can be from plants, shells, dung, or even footprints.

fossils? If something died here would it have been quickly covered and protected from scavengers? Because given a chance, scavengers will rip apart, crunch and munch, and scatter bones—and that’s not good for fossil hunters. They wondered if this was once a riverbed where water tumbled along, carrying whatever fell in and jumbling the bones for miles—that’s not good for fossil hunters, either.

WoldeGabriel squinted, trying to picture the landscape 6 million years ago. The boulders and pebbles scattered over the desert in front of him faded away. He didn’t see the sparse scrub brush or the cracked earth. He didn’t feel the temperature beginning to rise with the sun. Before him the landscape blossomed into what existed millions of years ago. He felt moist air. He saw a lush forest. He heard the rumble of volcanoes. From the pages of the *Washington Post* WoldeGabriel tells us, “in this particular area, most of the volcanoes erupted through lakes and groundwater.” WoldeGabriel said, “During the eruptions, it was very hostile.”

THE BURIED PAST

The past gets buried under layers and layers of dirt carried by wind and water, under rotting plants, under lava flows, or even under trash we throw away. One important way archaeologists date fossils is by the layer in which they are found. The deeper down you go, the farther you travel back in time. Ancient layers can be exposed by erosion, or forced to the surface by earthquakes.

It was hostile for hominids, but it was good for fossil making. Volcanic ash rains down helping to preserve what it covers. Lava flows and traps things, too. Eruptions do something else that scientists appreciate. Eruptions make it possible to pinpoint the age of a fossil. Volcanic rock contains radioactive material, and radioactive material can be dated. They can learn just how old the fossils were—and that is good for fossil hunters.

The two Ethiopian scholars decided where the day's work should begin. The place they chose "was very steep and very rugged, with most of the surfaces covered by loose rock," said WoldeGabriel. "The [layers] we were looking for just poked through the surface." This was a promising place.

Armed with trowels, they began to carefully move dirt and small pebbles into pails. Workers carried the full pails away and replaced them with empty pails. They moved in slow motion, struggling against the heat. Haile-Selassie tied a bandana around his neck. Sand and grit mixed with his sweat and collected in the folds of his skin. He stood and stretched his cramped legs. He drank from his canteen, wiping his mouth with the back of his hand.

Off to the side, two students on either end of a screen framed in wood pushed and pulled, sifting the sand that the workers had lugged over in the pails. Sand and dirt fell in clouds, leaving bits too large to fit through the holes bouncing over the screen bed. Haile-Selassie watched as they sorted through the bits, picking bone fragments from among the pebbles. Each identified bone added another detail to the picture. What did they learn from that small chunk of a monkey skull? There must have been trees—a forest, in fact. And what did that antelope horn reveal? That particular antelope favored a wild grass that must have grown here. Like a jigsaw puzzle slowly pieced together, little by little a picture from 6 million years ago of this place called the Middle Awash was filling in.

Haile-Selassie stared off, looking at the scattered pebbles. Suddenly a pattern in the rocks became visible. It seemed to stand out from the random placement of light stones. Without taking his eyes from the spot he hooked his finger around

the string tied at his neck and fished out his hand lens. He crouched over the rim of fossil barely above the ground.

With a dental pick he carefully scraped dirt away from a single tooth and from the surface of a jawbone, reaching now and then for his paintbrush to brush away the loose sand. The thrill he felt chilled him. A perfect arc of jawbone emerged from the sun-baked desert floor.

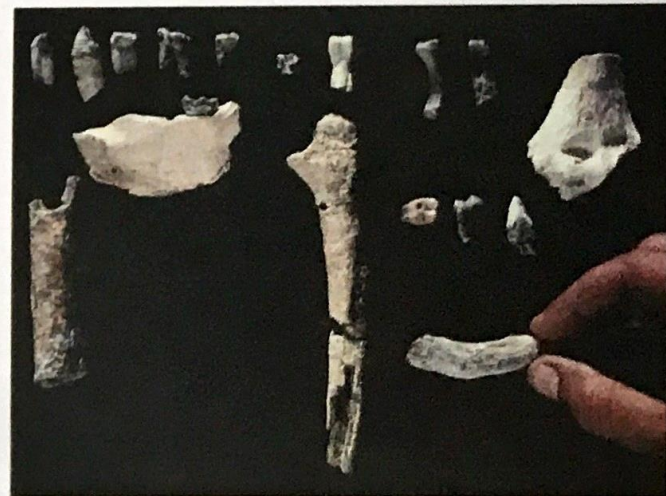
The workers and his friends came one by one until they surrounded Haile-Selassie. Later, *National Geographic* magazine recounted Haile-Selassie's speculations about the jawbone's origins. "It could be the earliest hominid, or it could be a common ancestor, or it gave rise only to the chimpanzee lineage, or it went extinct around 6 million years ago without giving rise to any species."

Haile-Selassie found more fossils from what he believes to be at least five individuals. He named this hominid *Ardipithecus ramidus kadabba*, which means root-ape ancestor. Was this the root of humankind? What could he learn from this Root-ape, who was about the size of a modern chimpanzee? What could he learn from the fossils? From the angle of the toe bone, Haile-Selassie learned that when Root-ape walked he left the front part of his foot on the ground and lifted his heel—like we do. Apes walk on the outside of their feet. From the wear on the teeth, he learned that Root-ape ate leaves and fruit. The fossils are painting the portrait of our ancestor. It's not a likeness of our grandfather, or of our great-grandfather, or even of our great-great-grandfather, but of an ancestor from 300,000 generations ago.

The picture of human evolution is drawn with the fossils that scientists such as Haile-Selassie and WoldeGabriel dig up.

Many scientists thought that hominids had split from the apes because of climate changes 5 million years ago. Drier weather was turning forests into grasslands. They thought

66 *Ardipithecus ramidus kadabba* bones and teeth, Middle Awash Valley, Ethiopia, 6 million years ago



66 *Ardipithecus ramidus kadabba* tooth, Middle Awash Valley, Ethiopia, 6 million years ago



EARLIEST HOMINID?

No one argues about how old Toumai is, or whether or not it was an important find, but the claim that it is “hominid” is in hot debate. One group of scientists is convinced that the skull and jaw fragments come from the face of the earliest hominid discovered so far. Another group is just as sure that Toumai was an ape. Everyone wants their bundle of bones to be from the earliest hominid. Some of the loudest challenges to Toumai’s lineage are from scientists who discovered *Orrorin tugenensis*—or “Millennium Man,” nicknamed after the year 2000, when the bones were found. Naturally, they would like their discovery to be the earliest hominid. If it is Toumai, it can’t be Millennium Man.

Is Toumai a hominid or an ape? Either way this is an important discovery. It brings us closer to the last common ancestor of ape and human. It’s another puzzle piece to our past. Where it fits in the picture is yet to come.

A team digging in the African desert of Chad found a skull from between 6 and 7 million years ago. The skull is called Toumai, which means “hope of life,” a nickname given to children born in the dry season.



that some apes were born with something that gave them an advantage in the grasslands. They thought that whatever that difference was, it gave rise to hominids. These scientists expected to find the first hominids in the African grasslands. The *Washington Post* quotes Haile-Selassie describing what was unexpected about his find. Instead of living in the grasslands, “the creature lived along with ancient elephants, antelopes, horses, monkeys and rhinoceroses in what was then a lush mountain forest periodically destroyed by volcanic eruptions.” Later, tests showed that Root-ape was almost 6 million years old, adding more evidence to the idea that the split was earlier than scientists had previously thought. “These fossils are strong evidence that lines leading to chimpanzees and humans had already split well before five million years ago,” Haile-Selassie said.

“It is hard to imagine that life would go on normally under such hostile environmental conditions,” WoldeGabriel said. “*Ardipithecus* and the other animals inhabiting the area were real survivors.”

Night fell on the camp in the Ethiopian scrubland. Lanterns made the tent walls glow and soft voices rose and fell. A lion looked down on the camp, then huffed and turned to hunt elsewhere. The day had been a good one. Despite tired, aching muscles from hours spent stooping, sleep wouldn’t come easy. Who knew what they would find tomorrow?