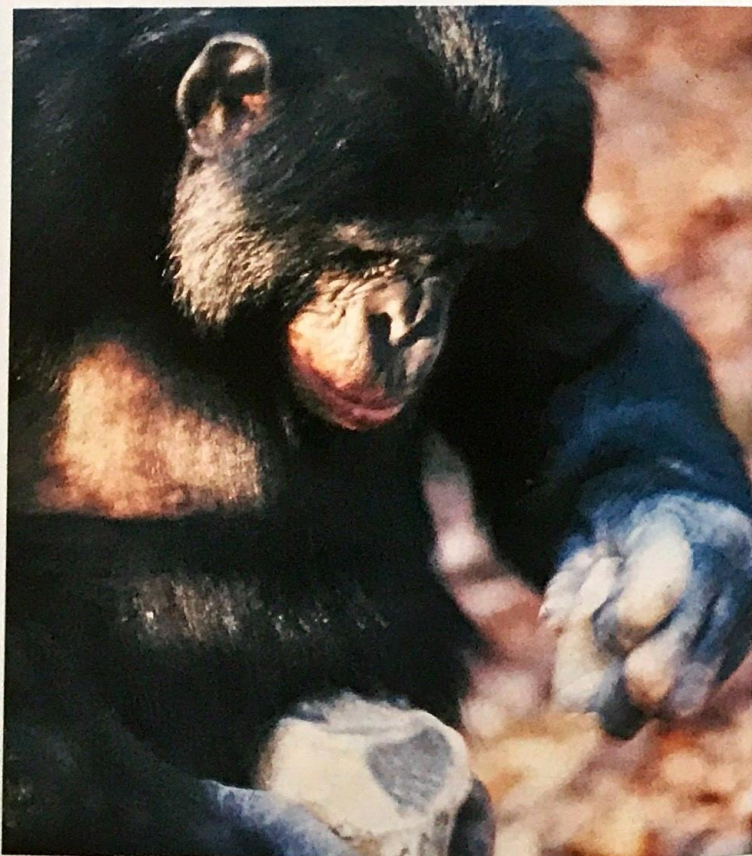


“ FLAKE TOOL IN  
ETHIOPIA AND  
HOMINID SKULL IN  
TANZANIA

## HOMO HABILIS TOOLMAKING AND THE HAMMERING HOMINID

The bus hummed along the highway. The scientists were worn out from the conference. Talk had wound down to murmurs here and there. Nick Toth sat in the back with his legs out straight, his arms folded across his chest, and his eyes closed. Sue Savage-Rumbaugh recalls in her book, *Kanzi*, that she thought he was asleep. So it startled her when he asked, “Do you think Kanzi could learn to make stone tools, the way early humans did?”



Kanzi, a bonobo chimpanzee, bashes rocks together to try to make a stone tool. It takes great concentration not to smash fingers.

Could he? Kanzi had amazed her time and again with his intelligence. And she knew that tool use was common in the wild. Chimps used stones as hammers to crack open nuts. They even made tools. They stripped leaves off branches to fish for termites. But pulling a few leaves off a branch wasn't even close to the skill it takes to make stone tools. Making stone tools was a human skill. Wasn't it?

Savage-Rumbaugh asked Toth, “Isn't stone tool-making a bit advanced for apes?” All the while Savage-Rumbaugh thought, what if? What if toolmaking turns out to be something Kanzi *can* do? When chimps were discovered making tools in the wild, scientists grumbled. They had to let go of the idea that toolmaking was uniquely human. It didn't take long for them to come up with a new definition that kept humans front and center. Using tools *to make* tools—now we're talking about a skill unique to humans. There's planning involved. You need big brains for that! But what would happen if Kanzi used tools to make tools? What made humans unique then?

Apparently Toth wasn't afraid of that question *or* the answer, because three weeks later he showed up at the research center with a truck full of rocks. Toth approached Kanzi's cage with an armload. Just outside the enclosure, he dropped the rocks, searching through the pile for the right two—two fist-sized rocks. Toth picked two rocks to knock together like our ancestors did at Olduvai Gorge in Africa. The rocks he chose would flake off into sharp slivers—sharp *knifelike* slivers. At Olduvai Gorge archaeologists found so many of these slivers, in so many different shapes, that they called it a tool kit and they named it after **Olduvai**. It is called the Oldowan tool kit. Toth wondered if Kanzi had the skill to make the Oldowan tools. Was this too much for an ape? Was this tool kit just for hammering hominids?

Inside his enclosure Kanzi wasn't concerned about the rocks. He knew what a rock was, but who was this man *with*



“ Flake tool, Hadar, Ethiopia, 2.3 million years ago

### CANYON OF PREHISTORY

One of the most studied Stone Age archaeological sites is Olduvai Gorge. The gorge is a 30-mile-long, 300-foot-deep gash in the eastern Serengeti Plain in Tanzania. Ash from nearby volcanoes provided layers of protective coating. Today erosion is peeling away the layers. The layers of ash are easy to date, keeping a record of our earliest toolmaking ancestors and their tools.

Olduvai, Olduway, Oldoway—all European stabs at what the Maasai herders call the Gorge. In their language it means, “The Place of Wild Sisal.” Sisal is a plant whose fiber is often used to make rope.



the rocks? He bared his teeth. To Toth this may have looked like a happy grin, but Kanzi was anything but happy. Savage-Rumbaugh writes, “Kanzi considered Toth a stranger, and, as an adult male, felt it his duty to frighten away all ‘outsiders.’” Kanzi made himself as large as possible. His hair stuck straight out. He screamed and charged the fence. He stamped his feet and charged the fence again, hooting, barking, and flailing his arms. Savage-Rumbaugh tried to convince Kanzi that Toth was a friend. But Kanzi would have none of it. He grabbed handfuls of cedar chips and threw them at Toth.

Toth picked up two rocks and began hitting them together.

Kanzi puffed up, hooted, and swayed from side to side.

Savage-Rumbaugh quietly spoke to Kanzi.

Toth noisily **knapped** rocks.

Flakes scattered. Rock chips flew. Cedar chips flew. Then suddenly everything was quiet. Toth put down what was left of his two rocks and searched for the sharpest flake in the debris around him. He picked a razor-sharp flake and used it to cut through the rope holding the lid in place on a clear plastic box. Inside the clear box was one of Kanzi’s favorite treats—a juice box.

Kanzi watched. Hmmm, he liked what he saw inside those clear boxes—grapes, yum—watermelon, yum—juice boxes, YUM! Kanzi’s hooting quieted to soft whimpers. Once things settled down and Savage-Rumbaugh convinced Kanzi that Toth was not a threat, she moved the tool-making materials inside the cage. Toth stayed outside, flaking stones. He passed sharp flakes to Savage-Rumbaugh inside the enclosure. She showed them to Kanzi. By the end of the day, Kanzi was using the flakes to cut ropes all by himself. This tool-using trick was great! The only time he forgot about his tool-using and juice-box drinking was when Toth got too close to the fence. Then Kanzi turned his attention to finding ways to grab Toth’s shirt.

By the second day, Kanzi could tell the good flakes for cutting rope from the dull ones. Savage-Rumbaugh recalls in her book *Kanzi*, “several flakes flew off in different directions. Kanzi was watching closely and seemed to know

Stone knapping refers to the removal of flakes from a larger rock, called a core by archaeologists, by hitting it with another, smaller rock. You have to hit the core with just the right amount of force and at the correct angle to remove a flake.

which was the best flake, even before they hit the ground. He let out a **bonobo** squeal of delight, rushed to pick up the sharpest flake, and was off to the tool site with it, all in one fluid motion.” He had even started bashing rocks together, trying to make his own tools. Savage-Rumbaugh writes, “Making flakes for himself, however, proved difficult . . . he seemed unable or unwilling to deliver a powerful blow. Bonobos are three times stronger than a human of the same size, so there was no doubt that Kanzi had the muscle power to do the job. We wondered whether he was nervous about hitting his fingers.”

One afternoon a few months later, Savage-Rumbaugh was in her office when she heard BANG . . . BANG . . . BANG! She rushed to Kanzi’s indoor room and, “there was Kanzi stone knapping with tremendous force. He had finally learned how to fracture rocks to make sharp flakes.” Kanzi’s tool-making abilities were extraordinary. He was bright, focused, and eager to get at the juice boxes. But how good were the tools he made? He wasn’t even close to having the Oldowan hominid’s skill. Kanzi’s blows lacked the control that produced the flakes that Toth had examined at Olduvai Gorge.

Who was that hammering hominid at Olduvai? Just to make it crystal clear who that rock star was, scientists named him *Homo habilis*, which means “handy man.” *Homo habilis* lived about a million years after Lucy’s species, *Australopithecus afarensis*. How can archaeologists know for sure that *Homo habilis* was the hammering hominid? Well, he may not have been the only one. In fact, we’re still not sure how many different hominids shared Africa 2 million years ago.

Another hominid often found at early tool sites is *Australopithecus boisei*. His cheekbones pushed so far forward they stuck out beyond his nose, giving his whole face a dish shape. On the top of his head, he had a ridge of bone called a **sagittal crest**. It looked like a bone mohawk. The crest wasn’t a fashion statement; it was to hold muscles—muscles that powered his teeth. And this hominid had huge back teeth—really big—up to five times bigger than a human’s. His jaws were so massive that he got the nickname

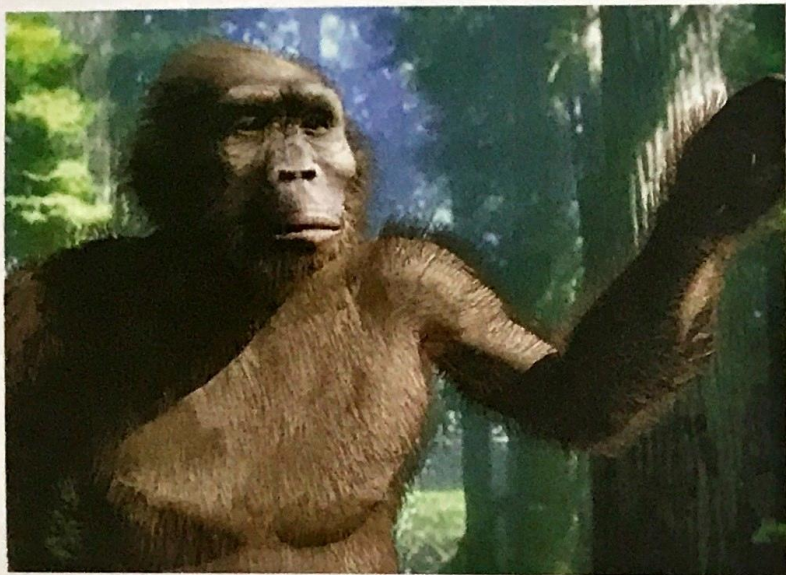
The bonobo is a pygmy chimpanzee.



66 *Australopithecus boisei* skull, Olduvai, Tanzania, 1.8 million years ago

sagitta + al = “arrow” + “pertaining to”  
A sagittal crest is a raised bony ridge that runs front to back on top of the skull.





Australopithecus boisei may have looked like this artist's reconstruction. If he lived today he'd be admired for those great cheekbones.

#### THE FIRST ROCK-BASHERS' CONVENTION

In Gona, Ethiopia, archaeologists have found some of the oldest tools and debris from their manufacture—nearly 3,000 pieces of worked stone. The tools are more than 2.5 million years old. Scientists believe the tools may have been used for digging up roots, butchering animals, and cracking shells and bones.

Nutcracker Man. You would think with such a big head that this was one tall hominid, but in fact, he only stood about four to four and a half feet tall. He spent his days chewing tough roots and bulbs. Could he have been a tool user, too? It's possible.

Even though stone tools look quite simple to make, don't let that fool you. They aren't. Savage-Rumbaugh wrote that Toth told her, "If a stone is merely slammed

into another hard surface, with little regard for the angle of the blow, it may break, but it will have a battered appearance, looking precisely as though it had been battered. Well-flaked stone looks as though it had been sculpted or chiseled." Although Kanzi had come a long way from his timid taps, his tools still looked battered. He knew his tools weren't as good as a human's. Sometimes he would hold out two rocks for Savage-Rumbaugh to bash. Savage-Rumbaugh wouldn't do it for Kanzi. Kanzi thought about that. One day he just hauled off and threw a rock as hard as he could against the cement floor. It shattered. Flakes! Savage-Rumbaugh was excited about Kanzi's clever solution, but Toth wasn't. The Oldowan toolmakers did not make their tools by throwing. "If Kanzi throws the rocks, the... marks will be random, and we won't learn anything." They would never find out if Kanzi was capable of flaking stones with the same skill as *Homo habilis*.

How could they discourage Kanzi now that he was quite taken with this easy new flaking method? They covered the room with carpet. Kanzi thought about that. One day he pulled back the carpet. He hauled off and threw his rock against the exposed cement. It shattered. Flakes! Savage-Rumbaugh was tickled. Toth was not. Kanzi-2, Humans-0.

Many early tools look like something you would find in your own backyard. How does the scientist tell the difference between stones shaped by nature, called **geofacts**, and stones shaped by hominids, called **artifacts**? The earliest tools are often hard to tell from rocks that have been broken by natural forces such as glaciers and rivers. Scientists have to be aware of what the site was like long ago—was it the base of a waterfall? Often the motion of a glacier, river, or waterfall doesn't stop once the rock breaks; it keeps the rock tumbling—dulling and rounding the edge. Tools don't have this rounded edge. Still, it takes a trained eye to spot these early tools—and even the professional is not always sure.

If you know what to look for, there are clues. Suppose you find flakes, but there are no places nearby to get large enough rocks to flake. Someone had to bring in the big rock. Rocks don't walk. Or suppose the area where you find piles of flakes was once a quiet pond. What bashed the rocks? Or rather—who bashed the rocks? And then there are favorite rocks—rocks that make sharp flakes, such as quartz. Early hominids sometimes carried these rocks several miles. This just goes to show that—a good rock is hard to find. But ancient tools are not. Anthropologist Ian Tattersall tells us in Bill Bryson's book *A Short History of Nearly Everything* that hominids made tools "in the thousands. There are some places in Africa where you literally can't move without stepping on them. It was as if they made them for the sheer pleasure of it."

At the research center, spring had arrived, and it was warm enough to move Kanzi outside. The dirt would be too soft for him to use his rock-throwing technique. Kanzi practiced his hammering and got better at it. One afternoon Savage-Rumbaugh watched Kanzi sitting with his rock, thinking, when suddenly, he stood up and hauled off and threw his rock against a large boulder in the yard. It shattered. Flakes! It seemed that even though Kanzi might never be as skilled at knapping as the Oldowan toolmakers, outsmarting modern humans was no challenge at all.

geo + *facere* = "earth" + "to make"

A geofact is something created naturally by the earth.

arte + *facere* = "art" + "to make"

An artifact is something created by human workmanship.