"Lucy Dethroned"

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Paleontologist Donald Johanson's account of the discovery of the creature now known popularly as "Lucy" reads like a Hollywood script that is full of mystery, excitement, and emotion. In his own words, "Lucy was utterly mind-boggling" (Johanson and Edey, 1981, p. 180). He tells of feeling a strong subconscious "urge" to go (with American graduate student Tom Gray) plot an area of Hadar, Ethiopia, known as "locality 162." The superstitious paleontologist even recalls writing in his daily diary that he was "feeling good" about the day. So, on November 30, 1974, Johanson (who was serving at the time as the director of the Cleveland, Ohio, Museum of Natural History) and Mr. Gray loaded up in a Land Rover and headed out. After several hours of surveying in 100+ degree heat, the two decided to head back. However, on returning to their vehicle, Johanson suggested they take an alternate route in order to survey the bottom of a nearby gully. Johanson wrote: "It had been thoroughly checked out at least twice before by other workers, who had found nothing interesting. Nevertheless, conscious of the 'lucky' feeling that had been with me since I woke, I decided to make that small final detour."

Buried in the sandy hillside of the slope was an arm bone—the single bone that eventually led to the unearthing of a skeleton that was nearly **40% complete.** While the description of this now-famous find might lead one to think that it was similar to some serendipitous treasure unearthed in a movie script, the truth is far from that. The fossils Dr. Johanson unearthed were destined to become one of the most famous (and most controversial) finds of all time, and would shake every single limb on the alleged hominid family tree, completely upsetting then-current theories about how man came to be bipedal. Richard Leakey and Roger Lewin wrote of the find: "Johanson had stumbled on a skeleton that was about 40% complete, **something that is unheard of in human prehistory farther back than about a hundred thousand years**. Johanson's hominid had died at least 3 million years ago" (1978, p. 67, emp. added). But, as additional studies were carried out, it became obvious that this "missing link" was "too good to be true."

Dr. Johanson named his find *Australopithecus afarensis*—the southern ape from the Afar depression of northeastern Ethiopia (Johanson, et al., 1978, 28:8). The creature quickly earned the nickname "Lucy," after the Beatles' song, "Lucy in the Sky with Diamonds," which was said to be playing all through the celebratory night back at Johanson's camp. The fossil, officially designated as AL 288-1, consisted of skull fragments, a lower jaw, ribs, an arm bone, a portion of a pelvis, a thighbone, and fragments of shinbones. It was said to be an adult, and was dated at 3.5 million years. [Johanson also found at Hadar the remains of some 34 adults and 10 infants, all of which he dated at 3.5 million years.] In their assessment of exactly where this new species fit in, Johanson and colleague Tim White took pride in noting: "These new hominid fossils, recovered since 1973, constitute the earliest definitive evidence of the family *Hominidae*" (1979, 203:321). Not only was this fossil find unusually complete, but it also was believed to have been from an animal that walked in an upright fashion, as well as being the oldest human ancestor—the equivalent of a grand slam in baseball.

Having collected the fossils, Johanson and White were responsible for publishing their descriptions, as well as giving their interpretation of exactly how they fit into the hominid family tree. Not wanting to waste valuable space on the description of *A. afarensis* in one of the major science journals, they ultimately decided to publish it in *Kirtlandia,* a relatively obscure publication of the Cleveland Museum of Natural History. Then, in what was either an extremely naïve (albeit zealous) move, or a calculated and ambitious one, Johanson and White decided to bump the Leakey's prized *Australopithecus africanus* off the main hominid tree and replace it with *A. afarensis* (for their full assessment, see Johanson and White, 1979). Leakey's *A. africanus* was relegated to a tangential side branch that went—literally—nowhere. This decision eventually would weigh heavily on Lucy as she fell under attack from scientists who felt she was nothing more than another example of *A. africanus*—or worse, an animal with numerous chimp-like qualities.

One of the ironic discoveries regarding Lucy had to do with the size of her skull. Prior to her discovery, evolutionists had assumed that these ape-like species had evolved larger brains, which then allowed them to crawl down out of the trees and begin foraging for food on the ground. According to evolutionary timelines, the creatures adopted bipedalism as their primary form of transportation, and once on the ground, began to use tools. Lucy, as it happened, took this nice, neat little story and turned it upside down. Her brain case was not enlarged. In fact, from all appearances, it was comparable in size to the common chimpanzee. And yet, Johanson and White steadfastly defended the position that this creature walked uprightly like man. They noted:

> Bipedalism appears to have been the dominant form of terrestrial locomotion employed by the Hadar and Laetoli [in Tanzania—BH/BT] hominids. Morphological features associated with this locomotor mode are clearly manifested in these hominids, and for this reason the Laetoli and Hadar hominid remains are **unequivocally assigned to the family *Hominidae*** (Johanson and White, 1979, 203:325, emp. added).

Dr. Johanson insisted that *A. afarensis* was the direct ancestor of man (see Johanson and Edey, 1981). In fact, the phrase "the dramatic discovery of our oldest human ancestor" can be found

emblazoned on the cover of his 1981 book, *Lucy: The Beginnings of Humankind*. Numerous evolutionists, however, strongly disagree. Lord Solly Zuckerman, the famous British anatomist, published his views on the australopithecines in his book, *Beyond the Ivory Tower.* He studied these creatures for more than fifteen years, and came to the conclusion that if man did, in fact, descend from an apelike ancestor, he did so without leaving a single visible trace in the fossil record (1970, p. 64). Some might complain, "But Lord Zuckerman's work was done before Lucy was even discovered." True, but that misses the point. Zuckerman's research—which established conclusively that the australopithecines were nothing but knuckle-walking apes—was performed on fossils **younger** (i.e., closer to man) than Lucy!

And therein lies the controversy. If Lucy and her descendants were discovered to be nothing more than apes (or chimps), then all of Johanson's fame and fortune would vanish instantly—like an early morning fog hit by a hot noonday Sun. Remember—this single discovery **made** Johanson's career. Upon returning the entire Hadar hominid fossil collection to the National Museum in Ethiopia (as he previously had agreed to do), Johanson recounted:

> Lucy had been mine for five years. The most beautiful, the most nearly complete, the most extraordinary hominid fossil in the world, she had slept in my office safe all that time. I had written papers about her, appeared on television, made speeches. I had shown her proudly to a stream of scientists from all over the world. **She had—I knew it—hauled me up from total obscurity into the scientific limelight** (Johanson and Edey, 1981, p. 374, emp. added).

Thus, one can understand why he would have such a vested interest in keeping this fossil upright and walking on two feet. If others were to discover that Lucy was not a biped, then her hominid status would be called into question—something far less rewarding for Dr. Johanson, professionally speaking.

Did Johanson examine the evidence prior to making his decision about Lucy's ability to walk uprightly? Or was Lucy "upright" and "walking" even before all of her fossils were uncovered—i.e., from the moment that single arm bone buried in the sand was discovered? Johanson admitted that, immediately after seeing the single arm bone, "This time I knew at once I was looking at a hominid elbow. **I had to convince Tom, whose first reaction was that it was a monkey's**" (Johanson, et al., 1994, p. 60, emp. added). However, as more and more researchers gained access to the fossils (or replicas thereof), Lucy's "hominid" status began to be questioned—seriously questioned!

We would like for you to examine the evidence regarding this famous fossil find, and then determine for yourself whether Lucy and her kin were, in fact, our ancestors—or merely ancient apes or chimps. As a start, consider the following anatomical discoveries that have been made since Johanson's initial declaration of Lucy as a entirely new hominid species.

LUCY'S PELVIS AND GENDER

A great deal of the "hype" regarding Lucy has been pure speculation from the very beginning. In fact, incredible though it may seem, even the gender of the creature is now being called into question. Johanson's original assessment was: "The most complete **adult** skeleton is that of AL 288-1 ('Lucy'). The small body size of this evidently **female** individual (about 3.5 to 4.0 feet in height) is matched by some other postcranial remains..." (Johanson and White, 1979, 203:324). And yet, in his original review, Johanson's description of postcranial [below the skull—BH/BT] data was both speculative and deficient. Johanson and his colleagues recorded "strong dimorphism in body size; all skeletal elements with high level of robusticity in muscle and tendon insertion; pelvic region and lower limbs indicate adaptation to bipedal locomotion..." (Johanson, et al., 1978, 28:7-8). It was from the shattered fragments of the pelvis that Donald Johanson interpreted the AL 288-1 fossils as being those of a female—primarily due to the diminutive size. But these bones were far from being problematic. As Hausler and Schmid discovered:

> The sacrum and the auricular region of the ilium are shattered into numerous small fragments, such that the original form is difficult to elucidate. Hence it is not surprising that the reconstructions by Lovejoy and Schmid show marked differences (1995, 29:363).

In regard to Lucy's pelvis, Johanson affirmed:

> Lucy's wider sacrum and shallower pelvis gave her a smaller, kidney-shaped birth canal, compared to that of modern females. She didn't need a large one because her newborn infant's brain wouldn't have been any larger than a chimpanzee infant's brain (Johanson, et al., 1994, p. 66).

That admission begs the question as to why this fossil was not categorized from the outset as simply a chimpanzee. But this gender declaration poses additional problems for Lucy. As Hausler and Schmid went on to note: "If AL 288-1 was female, then one can exclude this species from the ancestors of *Homo* because its pelvis is certainly less primitive than the pelvis of Sts 14 [the designation for a specific *A. africanus* fossil—BH/BT]" (1995, p. 378). Both of the pelvises mentioned display some degree of damage, and both are missing critical parts, but it should be noted that in regard to the Lucy fossil, **more than one attempt was made at reconstruction**.

After various reconstructions of the inlet and midplane of Lucy's pelvis, along with comparisons to other fossils and modern humans, it became evident that the shape of Lucy's pelvis was not structured correctly for the eventuality of a birth process. The pelvis was just too narrow to accommodate an australopithecine fetus. Hausler and Schmid noted that Lucy's pelvis was ridgeless and heart-shaped, which means that "she" was more likely a "he." They wrote:

> Contrary to Sts 14 [designation for a specific *A. africanus* fossil—BH/BT], delivery [of a baby—BH/BT] in AL 288-1 would have been more complicated than in modern humans, if not impossible, due to the protruding promontorium.... Consequently, **there is more evidence to suggest that AL 288-1 was male rather than female**. A female of the same species as AL 288-1 would have had a pelvis with a larger sagittal diameter and a less protruding sacral promontorium.... Overall, the broader pelvis and the more laterally oriented iliac blades of AL 288-1 would produce more favourable insertion sites for the climbing muscles in more heavily built males.... **It would perhaps be better to change the trivial name to "Lucifer" according to the old roman god who brings light after the dark night, because with such a pelvis "Lucy" would apparently have been the last of her species** (29:380, emp. added).

This declaration produced an immediate reaction from the evolutionist community, as many scientists worked diligently to try to defend Lucy. If Hausler and Schmid's conclusion is correct, then this implies that the equivalent female of this species would be even smaller—something unheard of in trying to compare this creature to modern-day humans! Lucy's pelvis is not what it should be for an upright-walking hominid—but the dimensions fall easily within primates found among the family *Pongidae* (apes).

LUCY'S APPENDAGES—MADE FOR BIPEDALISM, OR SWINGING FROM TREES?

But what do Lucy's arms and legs tell us in regard to her locomotion? If she were a biped, surely her upper and lower extremities would point to an upright stance. After all, the bone that led to Johanson's discovery of Lucy was that of an arm. Yet the bony framework that composes Lucy's wrists may be the most telling factor of all. Brian Richmond and David Strait of George Washington University experienced what many might call a "eureka!" moment while going through some old papers on primate physiology at the Smithsonian Institute in Washington, D.C.

> "We saw something that talked about special knuckle walking adaptations in modern African apes," Dr. Richmond said. "I could not remember ever seeing anything about wrists in fossil hominids... Across the hall was a cast of the famous fossil Lucy. We ran across and looked at it and bingo, it was clear as night and day" (see BBC News, 2000).

The March 29, 2000 *San Diego Union Tribune* reported:

> A chance discovery made by looking at a cast of the bones of "Lucy," the most famous fossil of *Australopithecus afarensis,* shows her wrist is stiff, like a chimpanzee's, Brian Richmond and David Strait of George Washington University in Washington, D.C., reported. This suggests that her ancestors walked on their knuckles (Fox, 2000).

Richmond and Strait discovered that knuckle-walking apes have a mechanism that locks the wrist into place in order to stabilize this joint. In their report, they noted: "Here we present evidence that fossils attributed to *Australopithecus anamensis* (KNM-ER-20419) and *A. afarensis* (AL 288-1) retain specialized wrist morphology associated with knuckle-walking" (2000, 404:382, parenthetical item in orig.). They went on to observe:

> Pre-bipedal locomotion is probably best characterized as a repertoire consisting of terrestrial knuckle-walking, arboreal climbing, and occasional suspensory activities, not unlike that observed in chimpanzees today. This raises the question of why bipedalism would evolve from an ancient ancestor already adapted to terrestrial locomotion, and is consistent with models relating the evolution of bipedalism to a change in feeding strategies and novel non-locomotor uses of the hands (404:384).

Moreover, additional evidence has come to light which suggests that Lucy is little more than a chimpanzee. Johanson and his coworkers admitted in an article in the March 31, 1994 issue of *Nature* that Lucy possessed chimp-proportioned arm bones (see Kimbel, et al., 1994) and that her alleged descendants (e.g., *A. africanus* and *H. habilis*) had ape-like limb proportions as well—which is a clear indication that she did not evolve into something "more human."

Not only have Lucy's wrists and arm-bones been called into question, but there also is a mountain of evidence that demonstrates this creature was better adapted for swinging through the trees, like modern-day chimps. After thoroughly examining *A. afarensis* fossils, Stern and Susman remarked: "It is demonstrated that *A. afarensis* possessed anatomic characteristics that indicate a significant adaptation for movement in the trees" (1983, 60:280). They went on to comment: "The AL 333-91 [designation for a specific *A. afarensis* fossil—BH/BT] pisiform [bone of the hand—BH/BT] is 'elongate and rod shaped' and thus **resembles the long, projecting pisiform of apes and monkeys**" (60:281, emp. added).

Stern and Susman's research detailed the fact that the hands and feet of *A. afarensis* are devoid of the normal human qualities assigned to hands and feet. Instead, their research demonstrated that these creatures had long, curved fingers and toes typical of arboreal primates. [In reading through the following descriptions of the fossils, bear in mind that the zoo in St. Louis, Missouri, proudly displays a life-size replica of Lucy with perfectly formed human hands and feet.]

Stern and Susman commented: "The overall morphology of metacarpals II-V [bones that comprise the hand—BH/BT] is similar to that of chimpanzees and, therefore, might be interpreted as evidence of developed grasping capabilities to be used in suspensory behavior [swinging in trees—BH/BT]" (60:283). In looking at the morphology of the fingers, they affirmed:

> The markedly curved proximal phalanges [bones of the fingers—BH/BT] indicate adaptation for suspensory and climbing activities which require powerful grasping abilities.... The trapezium [bone at the base of the first digit—BH/BT] and first metacarpal are very chimpanzee-like in relative size and shape. ...Enlarged metacarpal heads and the mildly curved, parallel-sided shafts are two such features of the Hadar metacarpals not seen in human fingers. The distal phalanges, too, retain ape-like features in *A. afarensis*.... On the other hand, the Hadar fossil falls within the range of each ape and less than 1 SD [standard deviation—BH/BT] unit away from the means of gorilla and orangutan (60:284).

In their concluding remarks, Stern and Susman remarked:

> It will not have escaped the reader's attention that the great bulk of evidence supports the view that the Hadar hominid was to a significant degree arboreal.... We discovered a substantial body of evidence indicating that arboreal activities were so important to *A. afarensis* that morphologic adaptations permitting adept movement in the trees were maintained (60:313).

In the September 9, 1994 issue of *Science*, Randall Susman reported that the chimp-like thumbs in *A. afarensis* were far better suited for tree climbing than tool making (Susman, 1994). Lucy also possessed a nonhuman gait, based on ratio of leg size to foot size (see Oliwenstein, 1995, 16[1]:42). One researcher even went so far as to suggest that *A. afarensis* was little more than a failed experiment in ape bipedalism, and as such, should be consigned to a side branch of the human evolutionary tree (as reported by Shreeve, 1996). So not only were Lucy's ribs and pelvis wrong, but her limbs also were physiologically more conducive to swinging around in treetops.

AUSTRALOPITHECINE TEETH: MORE EVIDENCE THAT LUCY WAS ARBOREAL

One of Donald Johanson's specialties is identifying differences within the teeth of alleged hominids. In fact, in his original description, he gave a great deal of attention to the dentition of *A. afarensis*. By measuring the various differences in molars and canines, he systematically assigned various fossils to predetermined groups. However, even his highly trained eyes may have missed some important microscopic data. Anthropologist Alan Walker has been working on ways of possibly determining behavior based on evidence from the fossil record. One of his methods includes quantitative analysis of tooth microwear. Using image enhancement and optical diffraction methods of scanning, Walker believes he might be able to reconstruct ancient diets from paleontological samples. In speaking of Walker's material, Johanson noted:

> Dr. Alan Walker of Johns Hopkins has recently concluded that the polishing effect he finds on the teeth of robust australopithecines and modern chimpanzees indicates that australopithecines, like chimps, were fruit eaters.... If they were pri-

marily fruit eaters, as Walker's examination of their teeth suggests they were, then our picture of them, and of the evolutionary path they took, is wrong (Johanson and Edey, 1981, p. 358).

So we now have impressive evidence that Lucy and her kin ate fruit from trees, rather than foraging for food on the ground.

LUCY'S RIB CAGE

Due to the impossibility of reconstructing Lucy's skull from the few fragments available, the determination that Lucy walked uprightly like a human had to be derived from her hips and ribs. Peter Schmid, a paleontologist at the Anthropological Institute in Zurich, Switzerland, studied Lucy extensively, and summarized his efforts as follows.

> When I started to put the skeleton together, I expected it to look human. Everyone had talked about Lucy as being very modern, very human, so I was surprised by what I saw. I noticed that the ribs were more round in cross-section, more like what you see in apes. Human ribs are flatter in cross-section. But the shape of the rib cage itself was the biggest surprise of all. The human rib cage is barrel shaped, and I just couldn't get Lucy's ribs to fit this kind of shape. But I could get them to make a conical-shaped rib cage, like what you see in apes (as quoted in Leakey and Lewin, 1992, pp. 193-194).

Ribs can be "tweaked" and rotated so that they appear more "barrel-like" or conical, but the best (and correct) arrangement is the original morphology. The facets from the ribs that line up on the vertebrae provide a tighter fit when aligned correctly. In Lucy's case, her ribs are conical, like those found in apes.

LUCY: HOMINID OR CHIMP?

When Lucy first arrived on the scene, newsmagazines such as *Time* and *National Geographic* noted that she had a head shaped like an ape, with a brain capacity the size of a large chimp's—about one-third the size of a modern man's. In an article that appeared in *New Scientist*, evolutionist Jeremy Cherfas noted: "Lucy, alias *Australopithecus afarensis*, had a skull very like a chimpanzee's, and a brain to match" (1983, 93:172). Adrienne Zihlman observed: "Lucy's fossil remains match up remarkably well with the bones of a pygmy chimp" (1984, 104:39). It should be no surprise then, that in Stern and Susman's 1983 analysis of *afarensis*, they pointed out:

> These findings of ours, in conjunction with Christie's (1977), observation on enhanced rotation at the tibio-talar joint in AL 288-1, Tardieu's (1979) deductions about greater voluntary rotation at the knee in AL 288-1, Senut's (1981) and Feldesman's (1982a) claims that the humerus of AL 288-1 is pongid in certain of its features, and Feldesman's (1982b) demonstration that the ulna of AL 288-1 is most similar to that of *Pan paniscus* [a chimp—BH/BT], all seem to lead ineluctably to the conclusion that the Hadar hominid was vitally dependent on the trees for protection and/or sustenance (60:311).

All of these characteristics led inevitably to the conclusion that Lucy was simply a chimp-like creature. And yet, more than a decade earlier, Charles Oxnard, while at the University of Chicago, already had passed judgment on these creatures. His multivariate computer analyses indicated that the australopithecines were, in fact, nothing but knuckle-walking animals (1975).

CONCLUSION

You might well be asking yourself why this charade has been allowed to go on this long. The answer—woven around power, fame, and money—can be found in Johanson's own words.

> There is no such thing as a total lack of bias. I have it; everybody has it. The fossil hunter in the field has it.... In everybody who is looking for hominids, there is a strong urge to learn more about where the human line started. If you are working back at around three million, as I was, that is very seductive, because you begin to get an idea that that is where *Homo* did start. You begin straining your eyes to find *Homo* traits in fossils of that age.... Logical, maybe, but also biased. **I was trying to jam evidence of dates into a pattern that would support conclusions about fossils which, on closer inspection, the fossils themselves would not sustain** (Johanson and Edey, 1981, pp. 257,258, emp. added).

He went on to admit: "It is hard for me now to admit how tangled in that thicket I was. But the insidious thing about bias is that it does make one deaf to the cries of other evidence" (p. 277).

Some are asking if *A. afarensis* is more primitive than *A. africanus*, or if they are one and the same? Others point to the many chimp-like features, and question whether Lucy ever walked upright at all? But, in the March 1996 issue of *National Geographic*, Donald Johanson himself admitted: "**Lucy has recently been dethroned**" (189[3]:117, emp. added). His (and Lucy's) "fifteen minutes of fame" are over. As Lee Berger declared: "One might say we are kicking Lucy out of the family tree" (as quoted in Shreeve, 1996). Fascinating, how often the hominid family tree is pruned!

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