These apes were made for walking: the pelves of *Australopithecus afarensis* and *Australopithecus africanus*

Matthew Murdock

The debate surrounding hominid bipedality is sometimes fought more on the grounds of presuppositions than it is on factual data. Here I present the fossil evidence for bipedality in australopithecines. The pelvic anatomy of several australopithecines are examined and compared to extant apes and humans to determine their posture and locomotor ability. It can be shown that australopithecines did in fact walk upright, and a relationship to living chimpanzees can be established.

Be informed

There has been great debate over whether or not australopithecines walked upright or were quadrupeds, i.e. knuckle walkers. Very few enter this debate fully informed, having not studied the fossil evidence themselves and relying solely on the work of others.

The problem is that if one cites a particular writer in this debate, and that writer is in error, then that person unknowingly perpetuates a myth. This has occurred many times in relation to the australopithecine pelvis (especially in the case of 'Lucy'), and some of those myths will be laid to rest here.

Reading the popular literature (non technical papers), one would get the impression that there has only been one australopithecine pelvis found: the one belonging to A.L. 288-1 ('Lucy'). Students sometimes get the notion that from this pelvis alone that australopithecine locomotion has been determined. The truth is there are several pelves belonging to australopithecines, some partial, some complete, and the evidence for australopithecine bipedality was established long before the skeleton of Lucy was even discovered.

The pelvis of *Australopithecus africanus*

Pelvic remains of *Australopithecus africanus* have been recovered from the South African sites of Makapansgat and Sterkfontein. The Makapansgat remains consist of two juvenile ilia: a left; MLD 7 (male), MLD 25 (female) also from the left side, and ischial (the innominate, or hip bone, consists of 3 bones that fuse together with age; the ilium, ischium, and the pubis) fragment MLD 8.[1] These remains are claimed to be 3.3–3.0 Ma old.

Pelvic remains from Sterkfontein include: Sts 14 (a partial skeleton with a nearly complete pelvis), Sts 65 (a right innominate), and Stw 431 (a partial skeleton from Sterkfontein Member 4) found in 1987. Apart from Stw 431 all of these remains were discovered long before A.L. 288-1 ('Lucy').

Sts 14

Of the many australopithecine fossils found at Sterkfontein, South Africa, Sts 14 is the most complete postcranially (except for possibly the 'Little foot' skeleton, of which little has been published so far). This specimen (Sts 14) was discovered in August 1947 by Robert Broom and J.T. Robinson. It represents an adult female member of the genus/species *Australopithecus africanus*.

Sts 14 consists of several ribs and vertebrae, a partial sacrum, two innominate bones and a right femur all belonging to the same individual. It has recently been suggested that the famous Sts 5 'Mrs. Ples' skull, (also discovered by Broom earlier on April 18, 1947 at Sterkfontein) may belong to this skeleton. Sts 14 is one of the best preserved australopithecine pelves we have.

The left innominate of Sts 14 is largely complete, with some restoration having been done to the anterior inferior iliac spine and along the inferior and anterior gluteul line, but these are all intact on the right ilium (figure 1). The right innominate of Sts 14 is more complete, missing only the anterior superior iliac spine and a small part of the pubic crest (but these parts are preserved on the left).

Sts 14 has iliac blades that are short, deep front to back and expanded posteriorly. The ilium is strongly curved toward the sacrum, giving the whole pelvis a rounded bowl shape. This bowl shape is seen in other bipeds and helps hold and balance the weight of the body in an upright stance.

There is some minor distortion in the left pubic bone. As such, a perfect articulation cannot be obtained at the pubic symphysis.

Preyed upon

The right ilium of Sts 14 displays what appears to be two puncture marks. One is above the acetabulum the other is in the iliac fossa. They are likely the result of predation by a leopard, as the marks match the distance between the canine teeth (again this is inconsistent with creation com-

promises such as the 'Gap Theory' or the 'Day Age theory', as there was clearly both death and predation at the time of the australopithecines, placing them in a timeframe with man, and after Adam's sin).

The sacrum of Sts 14

The sacrum[2] is the series of vertebrae at the base of the spine that connect the two hip bones. In Sts 14, the first two (out of five) sacral vertebrae are preserved. Of these only the left and middle portion are represented, with some of the vertebrae preserved just right of the median sacral crest. As there appears to be little to no distortion in these vertebrae, an accurate mirror image can be made of the right side from the left.

The last three vertebrae however were reconstructed based on an extrapolation of the first two sacral vertebrae, including the angle of their vertebral bodies[3] and their accuracy compared with the same vertebral fossils preserved in *A. afarensis* individuals, A.L. 288-1 and A.L. 129-52.[4]

The left side of the sacrum preserves a beautiful auricular (articular) surface for the left hip bone (the auricular surface gets its name from its resemblance to the curved shape of an ear). From this we can see clearly how the sacrum articulates with the ilium. The completeness, and perfect articulation of these parts, will silence any arguments about alleged tampering in the same area of Lucy's pelvis (discussed later).

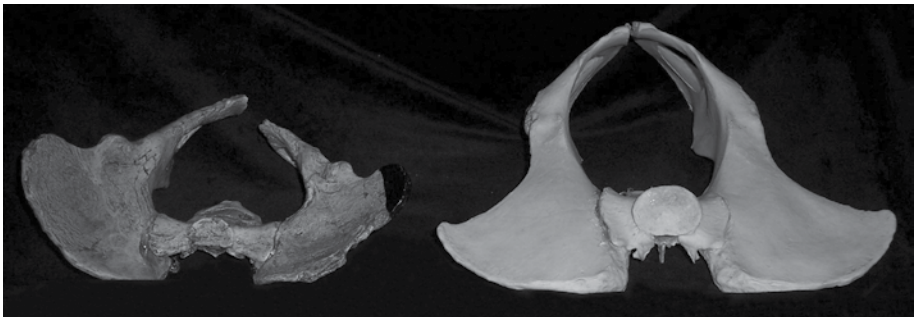

Figure 1. Pelvis of *Australopithecus africanus* specimen Sts 14 (left). The right side of the Sts 14 sacrum was mirrored from the left, and the bottom three vertebrae were missing, but have been reconstructed. This reconstruction (right) is consistent with two later finds from Ethiopia (A.L. 288-1 and others).

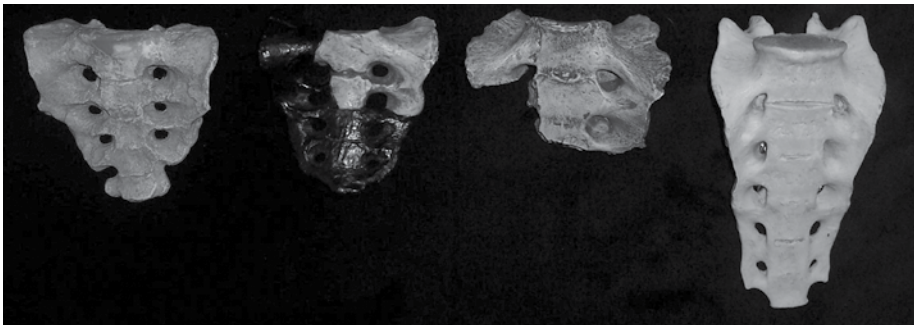

Figure 2. From left to right, the sacrums of A.L. 288-1 (Lucy), Sts 14, Stw 431 and a chimpanzee (male).

The sacral vertebrae fuse together with age. Based on this, Hausler and Schmid give Sts 14 an age of 20–25 years[5] though it may be older, based on slower rates of maturation in the past.[6]

Extant apes have relatively straight sacrums, whereas those of humans are more curved. Even in the two sacral vertebrae recovered, Sts 14 is curved considerably inwards toward the birth canal, much more so than in extant chimpanzees. Other australopithecine fossils have this same (curved) morphology.[7]

The pelvis of *Australopithecus afarensis*, A.L. 288-1

Arguably the most famous of all australopithecine specimens is A.L. 288-1, the catalogue designation number for the remains better known by the nickname 'Lucy' (or 'Dinquinesh' to the Ethiopians, which means 'you are wonderful'). As there are many other *A. afarensis* specimens found (many before Lucy), it is important to use catalog numbers to differentiate between *afarensis* specimens. Far too often I have seen the name 'Lucy' used (abused actually) as a generic term for this species, when it represents merely one of many *A. afarensis* individuals. The name 'Lucy' should be used only in reference to the A.L. 288-1 skeleton.

It has been said that Lucy's skeleton is 40% complete. This is an exaggeration, as in reality it only approaches 20% of a complete skeleton.[8] The former figure (40%) did not take into consideration the many missing bones of the hands and feet. Nevertheless A.L. 288-1 provides much information on the australopithecine skeleton.

A. afarensis sacrum A.L. 288-1an

The sacrum of A.L. 288-1 is complete and well preserved. All sacral vertebrae are present, though the sacrum does deviate slightly to the left distally from the midline. All centra (plural of centrum, part of a vertebra: a thick mass of bone in a vertebra that is the point of attachment to the vertebrae above and below) are fused, which help determine the age of this individual at death.

As you can see (figure 2) Lucy's sacrum is short and wide like our own. In contrast the sacrum of a chimp is narrow, and is much longer than either ours or Lucy's, almost twice as long in fact.

The area of articulation of Lucy's sacrum with the innominate (retroauricular part of the innominate) is

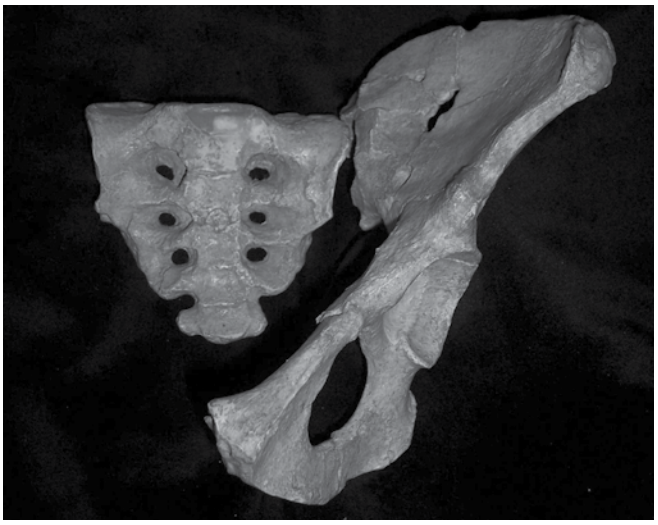

Figure 3. The left innominate (A.L. 288-1ao) of Lucy was pressed into the sacrum (A.L. 288-1an) during the process of fossilization, causing an anatomically impossible articulation.

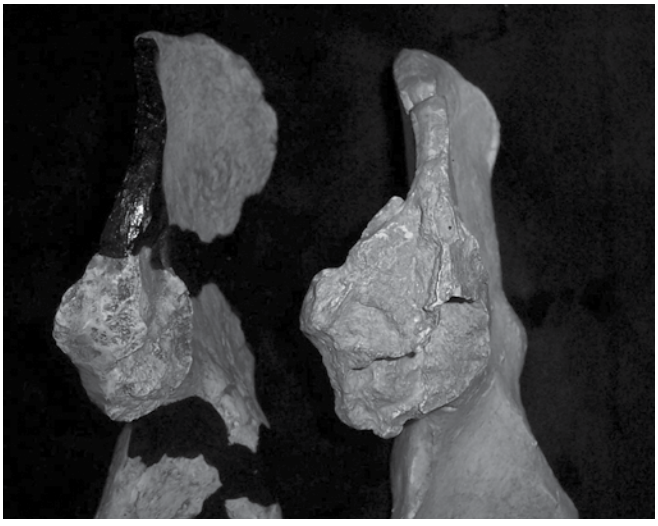

Figure 4. Pressures during the process of fossilization have left Lucy's sacroiliac joint (on the right) distorted. Owen Lovejoy's reconstruction of this joint is consistent with the anatomy of other undistorted australopithecine pelves, such as Sts 14 (on the left).

Figure 5. The distorted sacroiliac joint caused Lucy's ilium to be twisted forward of its true anatomical position.

preserved most clearly on the right side. On the left there is distortion coinciding with its being pressed into the left innominate during fossilization. This causes the left auricular surface to be about 2.7 cm shorter than the right (figure 3).[9]

The upper portion of the left auricular surface is also rotated. This causes the face of the right articular process to be positioned more posteriorly than the left.[9] The left ala sacralis is flattened dorsoventrally (extending from the back of the body to the front) and rotated backwards at least 2 mm.[4]

A. afarensis left innominate A.L. 288-1ao

Lucy's skeleton had only one innominate recovered, the left, designated A.L. 288-1ao. This innominate is complete but it (like the left side of the sacrum) has a distorted auricular surface—both the auricular and retroauricular surface were crushed during fossilization (figure 4). Apart from this and some mild distortion to the ischiopubic region the innominate is in near perfect condition.

When I placed a cast of the unrestored ilium next to the sacrum, the distorted auricular surface forced the ilium into an anatomically incorrect position (figure 5). It is rotated to a right angle of where it should be no matter what the posture of this individual was (biped or quadruped). No animal alive or dead has a pelvis orientated this way, and this was clearly not its position during life, and no other australopithecine has this problem. It is clearly a case of post mortem distortion in this specimen (A.L. 288-1) only. As such, some repair had to be done to this surface (see postscript).

Like the other australopithecines, Lucy's ilium is short and curved from side to side forming a bowl shape.

Determining age and gender from the pelvis

Based on the pubic symphysis, Cook[10] has estimated Lucy's age as being in her late 30s, but gives her an age of under 30 based on her dentition. This discrepancy most likely reflects a difference in the rate of maturation between humans and animals in the past than those in the present. See the work of Jack Cuozzo[6] for more information.

In human females, the pelvic cavity is wider in all diameters than in males. Females also have a greater distance between the ischial spines and ischial tuberosities than males. The sacrum of females is wider, and the first sacral vertebra does not project as far forward as a males. The obturator foramina are also smaller and spaced farther apart in women.

The sex of Sts 14 was determined based on the wide subpubic angle and wide greater sciatic notch. Females have a wider subpubic angle (usually greater than 90 degrees) than males (usually less than 90°). The greater sciatic notch of a female is also wider (usually greater than 68°) than in males (less than 68°). Both the greater sciatic notch and the subpubic angle of Sts 14 and A.L. 288-1 seem to indicate that these specimens are female. It is interesting to note that Hagar[11] found that both Sts 14 and A.L. 288-1 both have a pongid length of the pubis.

Hausler and Schmidt's arguments that Lucy was actually a male (which they frighteningly dubbed 'Lucifer') were silenced in a response by Tague and Lovejoy.[12] Hausler and Schmid argue that it is statistically improbable that all the pelves of *A. africanus* found are actually female.[13] So they contend that the pelves of *A. africanus* can not be sexed in the same way that we would human pelves. These apes are not related to humans so there will be differences. However, it is still relatively easy to determine the sex from the pelvis' of apes (extant or extinct), and Tague and Lovejoy had no problem doing so.[12]

The chimpanzees I studied (*Pan troglodytes* and *Pan paniscus*) show dimorphism in the subpubic angle (the greater sciatic notch, as do gorillas orangutans, and gibbons. Studying A.L. 288-1 and Sts 14 I found that sex can be determined both by the angle of the greater sciatic notch and also the subpubic angle. (The sex of Stw 431 can not be determined in this manner, as the greater sciatic notch is not preserved, and neither is the pubis.) And improbable or not, most australopithecine pelves do appear to be female.

Does the possibility that we have 'only' found female pelves mean that gender can not be determined by these means in australopithecines? Don't forget that the juvenile ilium MLD 7 was classified as a male, as is Sts 65.[14] Clearly it can be done. Perhaps there were more female australopithecines in each social group. Geological evidence seems to indicate that many Australopithecine fossils are from Flood and post-Flood deposits. Would they not need more females in their groups to repopulate the world after the Flood?

It has also been determined that A.L. 288-1 is female based on relative body size compared to other *A. afarensis* individuals (though an adult, Lucy is small even for a female, but there are at least three adult specimens even smaller), and also on pelvic morphology.

The abduction of Lucy

It is not only the shape of the pelvic bones that are important in locomotion, it is the attachment of the muscles. Abductors are pulling muscles that draw a body part away from the midsagittal line (midpoint or midline of the body), such as moving your arms outward, or spreading your legs apart. Quadrupeds have a gluteus maximus (muscle of the buttocks) that acts as an abductor of the thigh. In bipeds the ilium is expanded posteriorly, and the gluteus maximus originates behind the hip joint. So rather than abducting the thigh, it serves to pull the thigh back in one leg while the other is moving forward.[15]

Both Lucy and Sts 14 have the posterior expansion of the pelvis that would allow the gluteul muscles to abduct the thigh in bipedal locomotion.

Both specimens (A.L. 288-1 and Sts 14) have a wide and thick ilium along with a long femoral neck which adds to the leverage the abductors can exert. The more leverage the abductors have the more efficient the creature can walk bipedaly.[16]

Did the australopithecine hip joint work like ours or like an ape's? Owen Lovejoy contends that the abductors of the pelvis, which stabilize the hip in creatures that walk upright, operated in much the same way in Lucy as they did in humans.[17] In contrast, the abductor muscles of a chimp are not sufficiently placed for them to be habitual bipeds. For better function of these muscles, the outwardly flaring ilium in chimps would need to be curved inward as in Lucy or as in humans. A bowl shaped pelvis shortens the abductor muscle and gives it a more efficient working angle.[18]

Christine Berge[19] reconstructed the australopithecine pelvis using both an ape and a human gluteul pattern to determine which was most efficient. She found that for bipedal walking, the ape-like gluteul pattern was most effective for the australopithecine pelvis. This pattern also allowed the leg to move in all directions. She proposes that Lucy's gluteul muscles 'retained some ape-like traits'.[20] While I agree that Lucy walked upright, and likely also had some tree climbing ability, this is not because australopithecines 'retained' them from evolution sort of like left-over evolutionary baggage. It is likely that australopithecines were created with a mosaic of ape-like and human traits, making them more adaptable to varying conditions such as open savannas or canopy forests.

Do you see how starting with the wrong world view can bias the way you look at data? Berge would never reach the right conclusion because she started out looking in the wrong direction. Lucy didn't retain ape gluteal muscles; she had them because she was an ape—albeit a bipedal one!

These same kind of presuppositions are why australopithecines have not been seen as more complex (less degenerate) versions of chimpanzees. Nobody is looking for animals that are more complex than their living relatives in the fossil record (biblical view). They do find them, however, but not having the right framework in which to place them they interpret them as being imaginary stages between apes and man (evolutionary view).

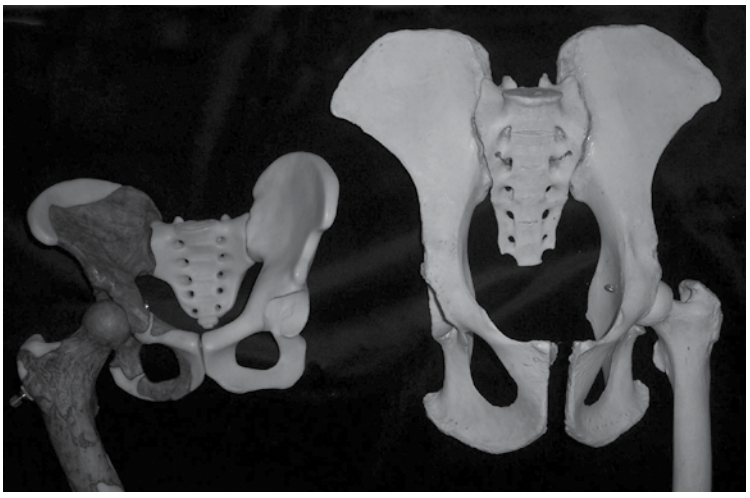

Figure 6. The femur of a quadrupedal ape is nearly vertical (right) but angled in a biped (left).

Pelvic abduction and the femur

The degree to which an animal can abduct its hindlimb is related to its ability (efficiency) to climb trees. Laura MacLatchy's[21] research shows that Lucy had less hip abduction than a chimpanzee. This would mean that australopithecines were not as adapted to climbing trees as apes are today.

The femurs of extant apes are nearly vertical in their articulation to the pelvis. Bipeds have a femur that angles medially from the hip to the knee (figure 6). This is called the carrying angle. It is approximately eleven to fourteen degrees from the body midline and enables a biped to stand upright. This brings the knees closer together in bipeds and places it under the body's center of gravity. It is clear from the acetabulum (or hip joint socket), the femoral head, necks and shaft of Sts 14 and A.L. 288-1 that the australopithecine femur was not vertical but angled as in bipeds (figure 5).

Sacral articulation

The sacrum articulates low on the pelvis (the auricular surfaces are closer to the acetabulum[22]) in australopithecines, humans and other bipedal hominids (*H. rudolfensis, H. erectus*), but high on extant quadrupedal apes (chimpanzees, gorillas, etc.). This causes each to have a different center of gravity in the pelvic region.

In quadrupeds the articulation of the sacrum is narrow and is positioned in front of the leg articulation (the acetabulum). This causes the full weight of the upper body to pass across the front of the hip. In bipeds the sacrum articulates behind the leg joint so that the upper body is balanced when standing upright. This also brings the weight of the spinal column closer to the femoral head.[23]

In Lucy and Sts 14 the articulation of the sacrum is behind the acetabulum. It is not possible to determine its position in Stw 431, as the ilium is too incomplete. The articulation of the sacrum to the vertical axis of the australopithecine pelvic bones is consistent with bipedality.

Implications of pelvic morphology: australopithecines walked upright

Our pelvis is bowl shaped, whereas the pelvis of chimps and other apes are long and narrow with iliums that flare out to the sides like the ears of an elephant. Australopithecine iliac blades are curved in a position similar to our own, and less like the chimpanzees. The pelvis of *Australopithecus* shows a clear bowl shape and overall pattern that resembles that of humans and other bipeds (such as the habilines and *H. erectus* among others). In addition, there are many features of the skull, spinal column, arms, legs and feet which indicate australopithecines were bipedal.

There has been unwillingness by some to accept the possibility that some apes walked upright in the past. It seems that evolutionists have set up a straw man idea of what constitutes a human, and many have accepted it as truth. For example:

> 'The origin of bipedal locomotion is so significant an adaptation that we are justified in calling all species of bipedal ape "human".'[24]

With quotes like this is it any wonder that some Christians are afraid of the concept of bipedal apes? Bipedalism in apes needs to be viewed in the proper context. These apes walked upright not because we share a common ancestor but because we share a common designer. They must also be viewed as more complex versions of extant apes (having not suffered as many years of the curse).

Australopithecines walked upright, though they did so in a manner that is different than in humans. Their legs lacked stabilization[19] and they were less able to maintain hip and knee extension while walking.[20] Lucy's iliac blade does not wrap as far around the sides of the body as it does in humans, but is sited towards the back and faces forwards similar to what is seen in extant apes. Berge contends that this would have affected medial rotation while walking upright.[25] Stern and Susman[26] state that based on Lucy's pelvis, australopithecine bipedalism was more similar to the way a chimp would walk upright than it was to the way a human does.

It is important to note that the difference between chimps and australopithecines is that the anatomy of australopithecines allowed them to walk upright habitually, while chimps only do so occasionally because they are literally forced by their anatomical structure to go back to the ground on all four limbs. In addition to being bipedal, it appears as if australopithecines could also climb vertically and suspend themselves in trees, though not with the ease of a chimpanzee.

Maintaining a proper balance

The hip is one of the most diagnostic bones for determining posture. In extant apes the hip bone is long, high and narrow and it faces forwards. In contrast, humans have a short hip bone. It wraps around the sides of the body to provide support when standing.

Lucy's iliac blade does not wrap around the sides of the body as in humans, but is sited towards the back and faces forwards as in extant apes. Since it is the forward extension of the hip that provides the attachment for the muscles that enable us to keep our balance when standing upright, it seems likely that its absence in *Australopithecus* meant that though they could walk upright, but they would have had difficulty maintaining their balance while standing still.[27]

It appears as if they moved their pelvis and lower limbs differently than we do, waddling as they walked. If we view the spinal column as an axis there would be 'large rotatory movements of the pelvis and shoulders around the vertebral column'.[20]

This would effect the stride length and speed of australopithecines (as will be discussed in a future article on the Laetoli prints) both differing significantly from humans.

The bipedal posture and locomotion of australopithecines not only differed from that of humans, but also from other hominids (*Homo habilis*, *Homo erectus*, etc.).[20]

The pelvis and iliums of Stw 431

Stw 431 is a partial skeleton of *Australopithecus africanus*. This skeleton found in 1987 includes large portions of the right ilium, a fragment of the left ilium and a partial sacrum.

The right ilium of Stw 431 is more complete than the left. It consists of the iliac crest, anterior superior spine, the anterior inferior spine, a partial acetabulum and the body of the ilium. The iliac fossa is not preserved, nor is the area for the articulation with the sacrum. The ischium is missing completely (figure 7).

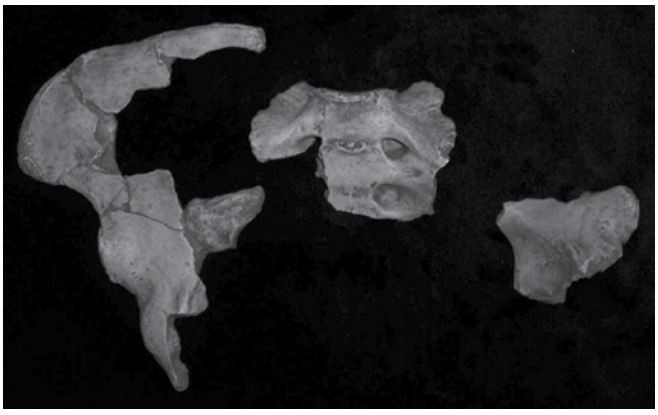

Figure 7. Partial pelvis of *A. africanus* specimen Stw 431. From left to right, right innominate, partial sacrum and left acetabulum.

Africanus more ape-like than *afarensis*?

The *A. afarensis* skeleton A.L. 288-1 ('Lucy') is geologically older (3.18 Ma) than that of the *A. africanus* skeleton Sts 14 (2.4–2.8 Ma.).[28] Thus, if the age of each is accurately established and evolution from apes to humans had occurred, we would expect that the later *A. africanus* specimens would be more human-like than *A. afarensis*. However, the opposite is true. *A. africanus* has a more apelike limb proportion than *A. afarensis*.

Certain aspects of the *A. africanus* pelvis are also more chimp-like than *A. afarensis*. So rather than becoming more human (the evolution model) these (once originally more complex) apes are degenerating towards their current position (becoming more ape-like. I realize this sounds like a contradiction in terms for an ape to become more ape-like, but I mean this in the respect that they are degenerating into what we consider ape like (extant) qualities).

If you asked Adam what an ape looked like, he would have described something even more complex than Lucy. If you asked someone today (after the fall of man, and thousands of years of degeneration later) what an ape looks like, we will likely describe a chimpanzee (something less complex than Lucy). Following this pattern, a hundred years from now they will be even more degenerate, perhaps not being able to walk upright at all.

Australopithecines/chimps have lost their ability to walk upright habitually and the fossil record documents this. Evolutionists have a preset framework of what they expect to find in the fossil record. As such, they are not looking for signs of complexity but of primitiveness, and because of this they misinterpret it (complexity) when they do find it.

If apes walked upright in the past then why don't they do so today?

It is clear from the anatomy of australopithecines that they could walk upright. The same can be said of other extinct species like *Homo habilis* and *Homo erectus*. It seems as if apes in the past (australopithecines, *Homo habilis* and *Homo erectus*) were able to walk more upright than apes are able to do today.

There are signs of degeneration in every bone of the chimpanzee body compared to an australopithecine. Every bone of the australopithecine body is more complex than a chimpanzee. There are differences in the skull, the vertebrae and the limbs that enabled the australopithecines to walk upright habitually, and which limits chimpanzees to walking upright only part of the time. When they do walk upright, they do so with the knees and back bent slightly.

A quadruped attempting to walk upright (with its back erect) should do so with its legs and back forming a 180° angle. Instead they keep their back sloped, and knees bent, so their hip joint does not have to extend to 180°.[29] Their pelvic anatomy allows them to only waddle awkwardly from side to side. Chimps not only do not have the pelvic anatomy necessary for habitual upright walking, their muscles are attached differently. For an australopithecine to degenerate into a chimpanzee (which I propose they did) then some of the pelvic anatomy would have to change, along with the muscle attachments.

This is not meant to provide an oversimplified explanation, as I realize there are minor differences in some other parts of the skeleton as well. I will explore these differences and their implications at a later time, but can say that they all follow a degeneration pattern from biped to quadruped.

So *Australopithecus* could probably stand upright perfectly at first (in Eden for which we have no fossils) and then years later with difficulty, balancing as we see in Lucy (post-Flood), and finally to what we now see today in chimps, which is habitual quadrupedalism, with only moments of awkward bipedality.

The silly puddy pelvis

The australopithecine pelvic bones approach only three-quarters the length of that seen in chimpanzees. I propose that the pelvis of these apes began to change (degenerate due to a loss of genetic information) after the fall (Genesis 3) and they lost their ability to walk upright. These changes most likely originated in the pelvis, and affected the entire spinal column. I have seen evidence of lumbar lordosis (inward curving of the spine in the lower part of the back) in Lucy, Sts 14 and in Stw 431. Extant apes however have a spine that is almost straight.

Bone has an interesting makeup that allows it to be somewhat elastic and adapt to applied loads. Its density also

responds to the amount and direction of such loads. In the United States we have a stretchy compound that children play with called 'Silly puddy'. You can place this puddy on your favorite newspaper comic, and the image will be reproduced on the puddy. You can stretch and pull on the edges and the image will become distorted. This is how I envision the chimpanzee pelvis, a stretched and distorted version of what we now call australopithecines.

The world in which we live is no longer 'very good' as God proclaimed it in Genesis 1 and 2, and must be viewed as having been altered by the curse in Genesis 3. All of creation is suffering through the bondage of decay.

With significant changes occurring in the spinal column and pelvis of australopithecines, they would slump over more and more in each subsequent generation. The center of gravity of the body would have changed, and the muscles of the back, hips and thighs would have pulled on the tilted pelvis, causing the iliac blades to be pulled and stretched like taffy. It is important to look at the body and its functions in their totality. However, the scope of this paper limits this discussion. We must keep in mind that the other parts of the body would have to adapt as well. The more 'ape-like' limb proportions of *A. africanus* seem to play this out.

The pelvic blades would be forced to change in response to the changes in the vertebrae and sacrum. As the australopithecines started to hunch over (more and more in each generation) the muscles of the back and hips would drift in response to the altered bone shape, and in some instances cause it. This drift would cause the pelvic blades to have been stretched like rubber bands.

This may have been the first area of degeneration in australopithecines, causing them to lose the ability to walk upright habitually. I do not believe this change happened overnight, but I also do not believe it took millions of years. It is likely a process that began when the earth was cursed (when Adam sinned) and exists today in its fallen state.

STW 431 Chimp-like features

From what is preserved of the pelvis (and my study of the rest of the skeleton, to be published later) it appears as if Stw 431 is becoming less 'Lucy-like' and more like the chimpanzee. The iliac crest extends medially well past that of either Lucy or Sts 14, and it approaches the position and orientation of Pan.

Though the iliac fossa is missing, the remainder of the pelvis does not appear to cup inward as in humans or the other two australopithecines (Sts 14 and Lucy), and the body of the ilium (in Stw 431) is broader than Sts 14 and Lucy in the same area as it is in the chimpanzee. The length of Stw 431's iliums is still shorter than that seen in Pan, but the beginnings of the Pan condition appear to be there. There are also portions of the acetabulum that look more chimp-like than that of Sts 14. I found the same things in the partial left acetabulum.

I plan to reconstruct this pelvis using mirror imaging where appropriate. I have made a computer model of Lucy's pelvis and a chimpanzee's showing the transition from one to the other (from australopithecine to chimpanzee). Sts 14 fits well into this model, as does Stw 431 (moving farther away from bipedal) in this downward spiral towards quadrupedalism.

The sacrum of Stw 431 consists of the first three centra, undistorted on the left side, but missing part of the right. The left auricular surface is intact and undistorted. It is similar in shape to both Sts 14 and Lucy, but is in a very different position. In the two latter, the auricular surface is high on the first sacral vertebra: they start just above it. Whereas in Stw 431 the auricular surface begins lower almost at the top margin of the first sacral foramen (the series of holes you see running down the sacrum in two parallel lines), just as it does in the chimp.

From what is preserved, the sacrum (and iliums) of Stw 431 appear more chimp-like than that of Lucy's or Sts 14. This follows a creation/degeneration model.

Like Sts 14, the bottom of the sacrum is missing (the first 3 appear to have been fused in life). It could be that the last two and a half sacral vertebrae are missing because the individual was diseased (there is evidence of arthritis in this specimen, especially in the vertebrae) and the sacrum is one of the places devolution from biped to quadruped would happen first, making this area more vulnerable to breakage.

Following the apparent pattern of elongation (becoming chimp) it follows that the last sacral vertebra would be more fragile during this process of change both in life and during fossilization.

Some arthritic changes are apparent on the body of the first sacral vertebra and the posterior body of the ilium (and I have seen much more evidence of arthritis in the rest of this skeleton, which I will report on in the future). May I propose that the australopithecines in their many steps down toward the chimp condition must have suffered greatly. No longer fully bipeds, but not yet adapted for habitual quadrupedalism, they were likely easy targets for carnivores. This in-between stage likely caused them much pain, causing them to suffer injuries, and incur illnesses more readily. Do not let it be said that I am claiming australopithecines were pathological chimpanzees, they were not. They were more complex (less devolved) versions of today's chimpanzees.

Conclusion: A+B does not equal C

Many textbooks will show a picture of the pelvis of a chimpanzee, a human and of an australopithecine (see figure 8). They will then ask the student which of the two are related. It's a trick question. There are similarities between the pelvis of australopithecines and humans because they are both bipedal. They will stress the similarity between the australopithecine pelvis and the human pelvis, and use this to try to prove a relationship between the two. Does similarity in a dog pelvis and a horse pelvis mean they are related? No, it merely means they are both mammals that walk on all fours.

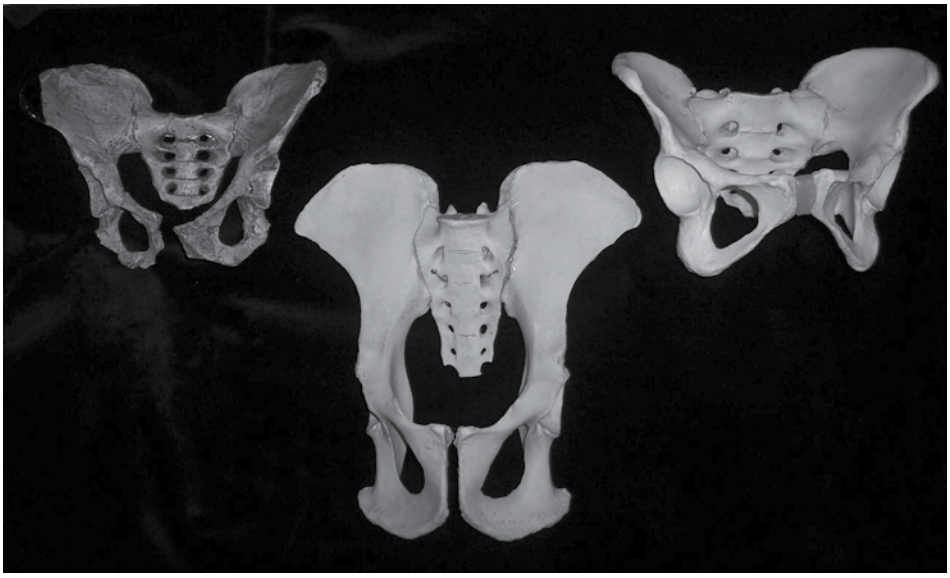

Figure 8. The pelvis of australopithecines (Sts 14, left) is similar to that of a human (right) not because they are related but because they both walked upright (chimpanzee pelvis shown in middle).

Another way to look at the same evidence is to realize that the short bowl shaped pelvis of the australopithecines is similar to that in humans because they both walked upright. Similar means of locomotion do not prove a common ancestor. It could prove a common designer (the God of the Bible).

It has been claimed that all of the above features make australopithecines human-like and likely ancestors. In reality these features just mean that australopithecines, like us walked upright.

The pelvis of australopithecines should be compared to those of humans only to establish a similar form of locomotion, not to conjure up an imaginary evolutionary relationship. Having studied not just the pelvis of australopithecines, but skeletons of three of them (two published, one unpublished), and comparing them with humans, other hominids and extant apes it is easy to see the similarities between australopithecines and chimpanzees. There are far more similarities than there are differences, whereas between australopithecines and humans there are similarities yes, mostly in their dentition (large molars and small canines which are best explained by a vegetarian diet) and in their pelvis (similar locomotion), but there are far more differences between the two. The few similarities that do exist have been over emphasized to try to establish an evolutionary relationship.

Appendix

A skeleton in Lucy's closet?

In the process of fossilization the left sacroiliac joint of A.L. 288-1 was crushed and rotated as seen in figure 4. Because of this the sacrum and ilium no longer articulate properly. Therefore some restoration needed to be done to this joint.

I have seen a few creationists claim that it was this restoration that gave Lucy her upright posture. It does not appear as if these people have studied the skeleton in any detail (even if only through the writings of others). For if they did, they would see that it is not just the pelvis of Lucy that makes her bipedal, but her entire skeleton. Curvature of the spine (lumbar lordosis), length and angulation of the femur and tibia/fibula, and the hand and foot skeleton all indicate bipedal locomotion.

Was it wrong to cut this joint into pieces? There are definite cases of fraud in the fossil record. For instance the chin of the Neandertal skull La Quina H5 was cut off the mandible after it was excavated.[6] This was done because the person in charge of its restoration wanted to make the skull look more apelike than it really was. This is not the only time fossils have been tampered with to fit a preconceived notion. But in relation to Lucy it does not appear to be what happened with her pelvis. A small part of it was damaged during fossilization and repaired later. The repairs are consistent with the anatomy of other known australopithecine pelves. Compare Lucy's crushed sacroiliac joint (figure 3) with the undistorted sacroiliac joint of Sts 14.

We must ask ourselves, is it ever okay to cut a fossil? If a skull is pressed into a mandible during fossilization and the left mandibular condyle had been pressed so hard into the skull that it no longer held its original shape it would be ok to restore it—especially since you have an undistorted condyle on the right side to determine its original shape. In the case of Lucy's pelvis the sacrum was pressed so hard into the hip that it caused some distortion of the left sacroiliac joint. The right side of the sacrum is undistorted so the left can be reconstructed from the right.

For further verification, the restoration can be compared to that of Sts 14. Enough similarities exist between the two to provide a reliable basis for reconstructing the left sacroiliac joint of Lucy.

Did Lovejoy's restoration give Lucy a bipedal pelvis? No, she already had one. In fact, even if this damaged part of the pelvis had not been found, we could still determine Lucy's posture and gait from the rest of her pelvis (and skeleton). Lovejoy's restoration was on a cast, not the original. It is still in its original condition, damage and all, at the National Museum of Ethiopia in Addis Ababa. I was able to purchase the same cast before the museum stopped selling them a number of years ago. The ones available

today are only artists' renditions sculpted to look like the original, and are not actual casts.

Bipedal posture and locomotion of australopithecines can be determined from either the pelvis, as it was originally found, or from Lovejoy's reconstruction of it. Lovejoy's correction of the sacroiliac joint did not alter the overall anatomy of the pelvis or give Lucy a posture that she did not have during life.

Lucy and other australopithecines have a bowl shaped pelvis consistent with upright posture and locomotion. Their fossils are not evidence of ape men but of the original complexity that once existed in God's creation.

References

1. Day, M.H., *Guide to Fossil Man*, 4th ed., University of Chicago Press, Chicago, IL, p. 203, 1968.
2. Sacrum comes from the Latin (os) sacrum, a translation of the Greek 'hieron (osteon)' which means 'sacred (bone)', as it was once believed by some that the soul dwelt there.
3. Abitbol, M.M., Reconstruction of the STS 14 (*Australopithecus africanus*) pelvis, *American J. Physical Anthropology* **96**(2):143–58, 1995.
4. Hausler M. and Schmid, P., Comparison of the pelves of Sts 14 and AL 288-1; implications for birth and sexual dimorphism in australopithecines, *J. Human Evolution* **29**:365, 1995.
5. Hausler and Schmid, ref. 4, p. 374.
6. Cuozzo, J., *Buried Alive: The Startling Truth about Neanderthal Man*, Masterbooks, Green Forest, AR, 1998.
7. Note there are some pictures of Sts 14's pelvis that are backwards, for example, p. 71 of 'Extinct Humans' shows the pelvis reversed, with the left side on the right.
8. Walker, A. and Shipman, P., *The Wisdom of the Bones*, Alfred A. Knopf, New York, p. 181, 1996.
9. Johanson, D., Lovejoy, C.O., Kimbel, W.H. *et el*., Morphology of the Pliocene Partial Hominid skeleton (A.L. 288-1) from the Hadar Formation, Ethiopia, *American J. Physical Anthropology* **57:**436, 1982.
10. Cook, D.C. *et al*., Vertebral pathology in the afar australopithecines, *American J. Physical Anthropology* **60**:83–101, 1983.
11. Hagar L.D., The evolution of the sex differences in the hominid bony pelvis, Ph.D. dissertation, University of California, Berkley, 1989. This is a secondary source quoted in Hausler and Schmid, ref. 4.
12. Tague, R.G. and Lovejoy, O., AL 288-1—Lucy or Lucifer: gender confusion in the Pliocene, *J. Human Evolution* **35**:75–94, 1998.
13. Hausler and Schmid, ref. 4, p. 373.
14. Robinson, J.T., *Early Hominid Posture and Locomotion*, University of Chicago Press, Chicago, IL, p. 40, 1972.
15. Saladin, K.S., *Anatomy & Physiology: The Unity of Form and Function*, McGraw Hill, Boston, MA, p. 301, 2001.
16. Boyd, R. and Silk, J.B., *How Humans Evolved*, 3rd edition, W.W. Norton and Company, new York, p. 288, 2003.
17. Johanson, D. and Shreeve, J., *Lucy's Child: The Discovery of a Human Ancestor*, William Morrow and company, Inc., New York, p. 199, 1989.
18. Johanson D. and Edey, M., *Lucy: The Beginnings of Humankind*, Simon and Schuster, New York, p. 348, 1981.
19. Berge, C., How did the australopithecines walk? A biomechanical study of the hip and thigh of *Australopithecus afarensis*, *J. Human Evolution* **26**:259–273, 1994; p. 270.
20. Berge, ref. 19, p. 271.
21. MacLatchy, L.M., Another look at the australopithecine hip, *J. Human Evolution* **31**:455–476, 1996.
22. The acetabulum is the round cavity on the side of the hipbone. This is where the head of the femur articulates with the pelvis. It's name literally means 'vinegar cup' (acetum, 'vinegar')
23. France, D.L., *Physical Anthropology: Lab Manual and Workbook*, 3rd edition, Wadsworth Publishing Company, Florence, KY, p. 137, 1998.
24. Leakey, R., *The Origin of Humankind*, Weidenfeld and Nicolson, London, p. 13, 1994.
25. Berge, ref. 19, p. 259.
26. This is a secondary source quoted in Berge, ref. 19.
27. Stringer, S., *African Exodus*, Henry Holt and Company, New York, 1996.
28. Hausler and Schmid, ref. 4, p. 370.
29. Alexander, R.McN., *Human Bones: A Scientific and Pictorial Investigation*, Peter Nevraumont, New York, p. 174, 2005.

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