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Technical Press Release for Science Writers

Major breaking news in Science:

Did Apes Evolve from Humans? Did Darwin have it backwards?

Hi, I'm Dr. Aaron Filler. I'm a spinal neurosurgeon at Cedars Sinai in LA and I'm also a Harvard trained evolutionary biologist. In two books earlier this year and in a major scientific article published this month, I've reported a solution one of the great mysteries in human evolution. The result is the amazing finding that the human body form – with its upright bipedal walking - goes back 15 million years earlier than most experts have thought. Lucy (Australopithecus afarensis) is just 3.5 million years old and her species now pales into relative insignificance. One remarkable implication is that many of the apes are actually descended from human or human-like ancestors who walked on two feet – appearing to meet our current criteria for being called humans rather than apes.

Startling and controversial as this may sound, the paper is being well received among academics and has been covered in hundreds of media and blogs in the past two weeks. National Geographic is about to report on the new study for their readership later this week. It has not yet been reported in broadcast media.

We all have a stake in human origins. This is non-Darwinian evolution and it is important to us because the science of human origins reflects an inner fascination we all share in how we came to be here and what will happen to our species in the future. Every textbook – scientific or creationist is now totally obsolete.

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I began my research on the origin and evolution of spinal structures as a student of Russell Tuttle doing my masters thesis at the University of Chicago in 1978. I had started medical school in 1977. In 1979 I finished the MA thesis and went to Harvard to start my PhD work. I was immediately the worlds only expert on spinal evolution and was invited to teach my own course in primate anatomy in my second year there in 1980-1981.

The Moroto vertebra was discovered around 1960 by William Bishop in Uganda, but was not immediately described. It was placed in a drawer, while the

skull, teeth and limb bones were written up. Alan Walker went to Uganda as a graduate student and was assigned to describe the vertebra and immediately recognized it was extremely unusual. Once he pointed this out Bishop took the fossil to Cambridge where he showed it to Elwyn Simons and his graduate student David Pilbeam.

Pilbeam flew to Uganda to inspect the site. He carried a cast of the fossil (Moroto vertebra) with him when he went to Yale. Later, Pilbeam was recruited to become Professor at Harvard. When he arrived in 1981, he called me into his office for an initial meeting and showed me the cast. He gave it to me and asked me to apply my growing knowledge in spinal evolution to find an explanation for this unusual fossil.

After a few months I focused on the change in position of the transverse processes and the absence of a typical primate styloid process. By the time I finished my PhD thesis in 1986, I was convinced that it represented critical evidence of uprgiht posture early in hominoid evolution.

However, not enough was known about the functional anatomy of vertebrae to make confident conclusions about function. Now however, because of research to develop artificial disks, much more is known about the movements and mechanics of human lumbar vertebrae.

Also, it was one single vertebral fossil suggesting this idea against all the other evidence accepted by most scientists. Now we have two more fossil hominoid species with the same vertebral anatomy - Oreopithecus bambolii and Pierolapithecus catalaunicus.

Finally, not enough was understood about the genetics of the embryology of segmental structures – homeotic morphogenetics. This field has advanced considerably, but very little has been published about homeotic evolution in mammals before my new paper.

I have now completed an extensive analysis of the various homeotically controlled features of mammalian vertebrae that is reported in the paper. This involved study of over 220 different species from across 250 million years. Taken together with the new genetic evidence, the new fossils, and our much improved understanding of spinal function the story is very strong.

In nearly all animals – vertebrate and invertebrate – there is a dividing line in the embryo between the dorsal half and the ventral half. We have a separate set of nerves and blood vessels for our dorsal and ventral portions. The dividing line is called the horizontal septum. Invertebrates have their nerve cord ventral to the septum and their digestive tracts in back, dorsal to the septum. Vertebrates are flipped from this perspective, the nerve cord is always dorsal to the horizontal septum – except in humans. Like a very small number of other creatures among

the vertebrates – humans have a bizarre alteration in which the horizontal septum is transposed into a position behind the nerve cord (spinal cord) in the lumbar region. The anatomical effects of this remarkable transposition result in the mechanical basis of our upright posture and bipedalism.

Because the transposition results in a unique postion of a bony element – the transverse processes of the lumbar vertebrae – we can see the appearance of this transformation in the fossil record and it is first seen in Morotopithecus bishopi 21.6 million years ago. This is the basis for the assertion in my paper and book (The Upright Ape) that Morotopithecus demonstrates the original genetic change that marks the origin of the upright bipedal human form.

Because the lumbar transverse processes in Morotopithecus and modern humans have attachments for the longissimus muscles and are built to resist powerful muscle contraction from below, I have also argued that this anatomy is not just for upright posture, but specifically for upright posture that involves support on the legs and not suspension from the arms above – hence upright bipedal posture – the defining aspect of the human creature.

All of the quadrupedal apes (proconsulids) died out in the Miocene perhaps due to competition with the monkeys. We have Morotopithecus, Oreopithecus, Pieralopithecus, Orrorin, and Sahelanthropus showing strong evidence of upright bipedality and not one single fossil ape from this lineage suggesting quadrupedal or knuckle walking stance. I also point out how common bipedality is among all apes, but that is the dominant method of ground locomotion in gibbons and siamangs. Thorpe and Crompton pointed out in their Science article earlier this year that Orangutans are significantly bipedal as well.

I believe at this time it is no longer possible to say my new theory is impossible. I call it a “Humanian” model as opposed to a troglodytian model (knuckle walking ancestor) or hylobatian model (arm swinging ancestor).

I believe that the origin of upright bipedalism was more or less a sudden random change in the main morphogenes – a part of the Pax complex genes. Mutations of these affect the dorsal to ventral placement of structures in vertebrae – as well as other tissues.

This will suggest that upright bipedalism arose abruptly, in a single generation due to a mutation in the early Miocene of 21 or 22 million years ago. The other hominoids at that time were quadrupedal proconsulid apes. This mutation generated an individual who became the founding ancestor of the hominiformid hominoids.

We accept that Australopithecus is human although the brain size is similar to the modern apes. This is because we have accepted that humans emerged by rising to upright bipedal status after diverging from the chimps 6 million years

ago. However, if bipedalism predates the split and the immediate common ancestor of chimps and humans was an upright biped, then that creature should be called human and not ape. In fact this upright bipedal lineage of “ancestral humans” or “human-like hominoids” or “hominiforms” as I have called them goes all the way back to Morotopithecus. The various modern apes arose from ancestors we can call human.