

BUILDING BODIES

Primate Bipedalism: Understanding Standing Up

A. THE BIG IDEA: Bipedalism, walking on two legs, is one of the major biological innovations of the human lineage. Combined with other characteristics, it makes us unique. Members of the human lineage developed this locomotor pattern perhaps as long ago as 4.2 million years, nearly two million years before evidence for increased brain size and the regular use of stone tools. The Laetoli trackway, dated at 3.6 million years old, provides one of the most powerful and persuasive bits of evidence of early hominid behavior and anatomy. These tracks confirm and extend other fossil evidence that indicates changes in locomotion were among the earliest human characteristics to appear in our ancient forebears.

B. BACKGROUND: There's little doubt that the great apes, especially the chimpanzees, have a great deal in common with humans. Their anatomy, DNA, and even their behavior come so remarkably close to our own that we find ourselves captivated by them. Some have seen them as models of our ancient relatives, creatures in many ways nearly human, but not quite. These distant cousins may indeed give us hints into the lives of our early hominid ancestors who emerged in Africa. Remarkably, even Charles Darwin had correctly predicted in the 1870s in his *Descent of Man* that the ancient ancestors of modern humans had their origins in Africa.

A century ago there was little direct fossil evidence to show the sequence of events in human evolution. One popular expectation was that increases in brain size, and thus cranial capacity, preceded other changes in the human lineage. Human intelligence was thought by many to be a key characteristic in human origins. Changes in posture, locomotion, diet, behavior, jaws and teeth, etc., were expected to come later.

Ultimately the fossil evidence, thousands of specimens of early human and prehuman hominids to date, showed that this brain-first scenario was not correct. An extensive fossil record has since then provided definitive evidence for a sequence of events that began with human ancestors first walking upright, but developing bigger brains, tool use and manufacture, and a rich and varied material culture much later, over the course of several million years of evolution.

Human bipedalism is one of the most unusual forms of locomotion to have evolved in the animal kingdom. The biomechanical difficulties associated with moving the body forward and balancing it above two limbs have led to a number of anatomically unique specializations (Tattersall et al, p.394). Despite obvious disadvantages to our hominid forebears like the greater difficulty of young learning to walk, humans have successfully capitalized on these newfound abilities to the extent that the evolution of bipedalism is arguably the most important adaptation in the early part of human evolution.

Although chimpanzees are capable of upright walking for short periods, it is less energetically efficient than human bipedalism. By comparing the skeletal and muscular anatomy of humans and chimpanzees we can speculate what changes in anatomy were necessary for accomplishing this transition to upright walking in our hominid ancestors. Bipedality, the definitive characteristic of the human lineage among the primates, is just the first in a series of anatomical modifications that have shaped our destiny as a species.

C. ACTIVITIES AND QUESTIONS

At this point, go to the activity sheets provided and follow the directions found there. At various points, answer the Check Questions to see if you have understood the concepts presented up to that point.