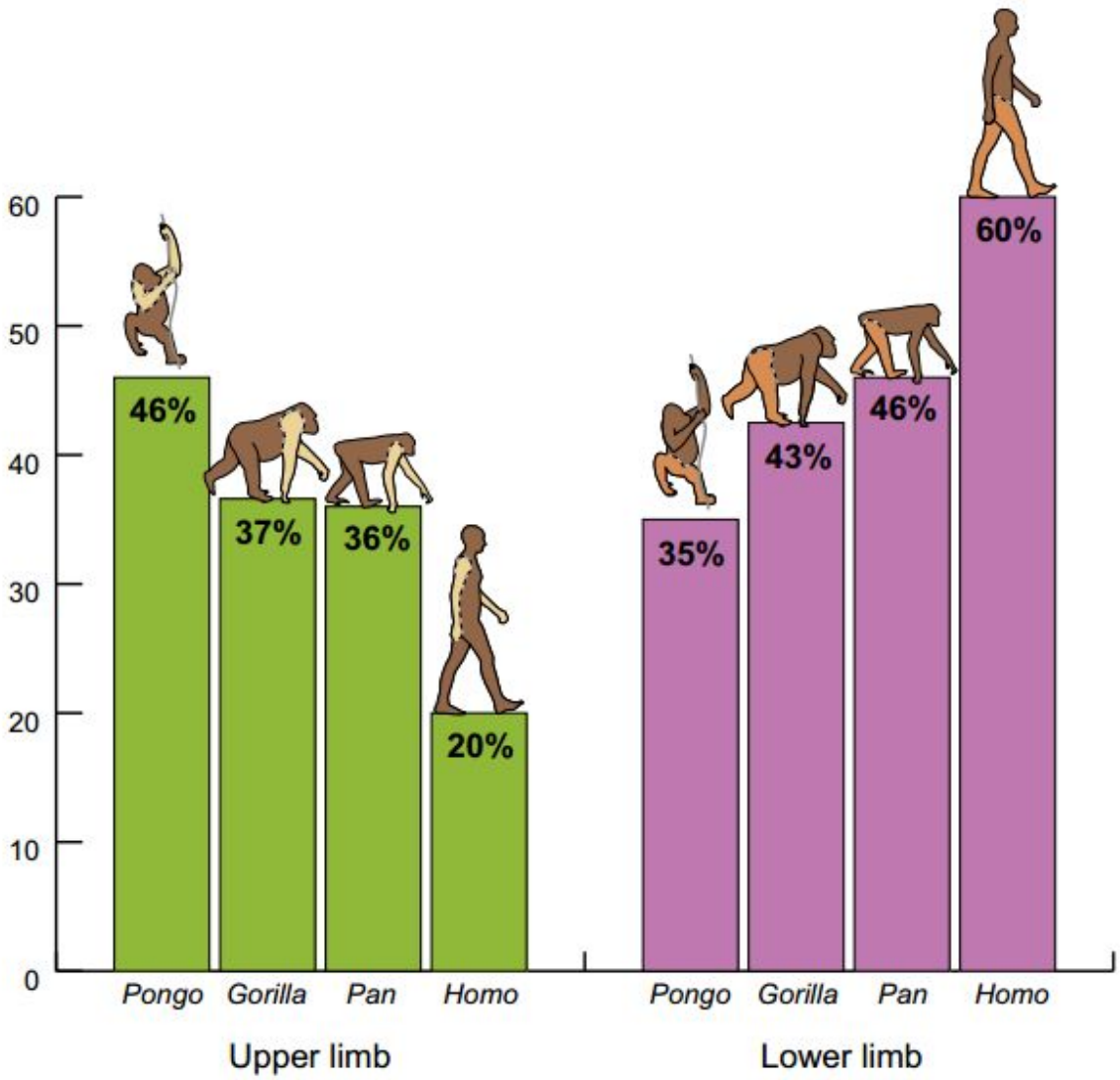
Comparison of bonobo anatomy to humans offers evolutionary clues

June 2 2015, by Bob Yirka



Percentage of muscle distribution to upper and lower limbs in Pongo pygmaeus, Gorilla gorilla, P. paniscus, and H. sapiens. Credit: (c) Adrienne L.

Zihlman,*PNAS*, doi: 10.1073/pnas.1505071112

(Phys.org)—A pair of anthropology researchers, one with the University of California, the other Modesto College has found what they believe are clues to human evolutionary development by conducting a long term study of bonobo anatomy. In their paper published in *Proceedings of the National Academy of Sciences*, Adrienne Zihlman and Debra Bolter, describe their anatomy studies and their ideas on why what they found offers new clues on why humans developed in the ways we did.

Scientists looking to understand how humans evolved have studied a lot of fossils, but such samples are of bones, which means there is little to no evidence of what organs, muscle or fat looked like in our ancestors which means there are still questions regarding things such as what percentage or proportion of fat or muscle was there, where were they located on the body, and what the organs were like. In this new study, the research pair sought to uncover clues by studying bonobos, apes that look a lot like chimpanzees and are considered to be our closest relative.

To learn more about bonobo anatomy, the researchers performed autopsies on thirteen of the apes that had died naturally over the course of three decades, carefully jotting down seldom noted information such as fat and muscle percentages. In so doing, they came to see that bonobos have considerably less fat on their bodies than do humans, even those that lived a similar sedentary life due to living in captivity. They also found that the apes had more upper body mass than humans as a rule and less leg muscle—bonobos also have a lot more skin.

In analyzing their results, the researchers suggest that the differences likely came about as early human ancestors began walking around upright, causing the need for more leg muscle and more fat—because a

nomadic lifestyle would necessitate a fat store to prevent starvation during lean times, especially for females if they were to successfully bear offspring. They also believe that we humans have less skin because as we moved around and moved faster on two legs—our skin developed an ability to sweat as a means to keep cool and that led to thinner skin.

More information: Body composition in Pan paniscus compared with Homo sapiens has implications for changes during human evolution, Adrienne L. Zihlman,*PNAS*, DOI: 10.1073/pnas.1505071112

Abstract

The human body has been shaped by natural selection during the past 4–5 million years. Fossils preserve bones and teeth but lack muscle, skin, fat, and organs. To understand the evolution of the human form, information about both soft and hard tissues of our ancestors is needed. Our closest living relatives of the genus Pan provide the best comparative model to those ancestors. Here, we present data on the body composition of 13 bonobos (Pan paniscus) measured during anatomical dissections and compare the data with Homo sapiens. These comparative data suggest that both females and males (i) increased body fat, (ii) decreased relative muscle mass, (iii) redistributed muscle mass to lower limbs, and (iv) decreased relative mass of skin during human evolution. Comparison of soft tissues between Pan and Homo provides new insights into the function and evolution of body composition.