

Study reveals why our ancestors switched to bipedal power

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A chimpanzee moving bipedally during the study. Credit: Prof. W C M McGrew.

(PhysOrg.com) -- Our earliest ancestors may have started walking on two limbs instead of four in a bid to monopolise resources and to carry as much food as possible in one go, researchers have found.

A study published in the journal *Current Biology* this week, investigated the behaviour of modern-day chimpanzees as they competed for food resources, in an effort to understand why our “hominin”, or “human-like” ancestors became bipedal.

Its findings suggest that chimpanzees switch to moving on two limbs instead of four in situations where they need to monopolize a resource, usually because it may not occur in plentiful supply in their habitat, making it hard for them to predict when they will see it again. Standing

on two legs allows them to carry much more in one go because it frees up their hands.

The joint University of Cambridge and Kyoto University team of biological anthropologists, led by PhD student Susana Carvalho and Professor Tetsuro Matsuzawa, conclude that our earliest hominin ancestors may have lived in shifting environmental conditions in which certain resources were not always easy to come by. Over time, intense bursts of bipedal activity may have led to anatomical changes that in turn became the subject of natural selection where competition for food or other resources was strong.

Professor William McGrew, from the Department of Archaeology and Anthropology, University of Cambridge, said: “Bipedality as the key human adaptation may be an evolutionary product of this strategy persisting over time. Ultimately, it set our ancestors on a separate evolutionary path.”

Lack of evidence in the fossil record means that researchers remain divided over when these ancestors became bipedal. It is widely believed that they did so because of climatic changes, which reduced forested areas and forced them to move longer distances across open terrain more often.

The new research digs deeper, however, by attempting to explain what particular pressures within that context forced those hominins to modify their posture and resort to moving on their legs.

The team theorized that the reason for this change may have something to do with the need to transport resources with maximum efficiency. Because bipedal movement is sometimes observed in modern great apes, they decided to monitor the behaviour of chimpanzees and, if possible, determine when and why they resorted to moving on two legs.

Two surveys were carried out. The first was in Kyoto University's "outdoor laboratory" of a natural clearing in Bossou Forest, Guinea. Here, the researchers allowed the chimpanzees access to different combinations of two different types of nut – the [oil palm](#) nut, which is naturally widely available, and the coula nut, which is not, so the latter is an "unpredictable" resource.

Their behavior was monitored in three different situations: (a) when only oil palm nuts were available, (b) when a small number of coula nuts was available, and (c) when coula nuts were the majority available resource.

When the rare coula nuts were available only in small numbers, the chimpanzees transported far more in one go. Similarly, when coula nuts were the majority resource, the chimpanzees ignored the oil palm nuts altogether. Clearly, the chimpanzees regarded the coula nuts as a more highly-prized resource and competed for them more intensely.

In such high-competition settings, the frequency of cases in which the chimpanzees started moving on two legs increased by a factor of four. Not only was it obvious that bipedal movement allowed them to carry more of this precious resource, but also that they were actively trying to move as much as they could in one go by using everything available – even their mouths.

The second survey was a 14-month study of Bossou chimpanzees crop-raiding, a situation in which they have to compete for rare and unpredictable resources. Here, 35% of their activity involved some sort of bipedal movement, and once again, this behaviour appeared to be linked to a clear attempt to carry as much as possible in one go.

The study concludes that unpredictable resources, like the coula nut in the field survey, are seen by [chimpanzees](#) as more valuable. When these resources are scarce and access to them is on a "first-come, first-served"

basis, they are more prone to switch to bipedal movement, because it allows them to carry more of the resource at once.

For our early ancestors, unpredictable access to vital resources may have been a frequent occurrence because of climatic shifts and rapid environmental change. Those who resorted to bipedal movement may have had an advantage, and gradually, anatomical change may have taken place as they used this strategy again and again. Once that happened, ability to move more easily on two legs may have become a selection pressure, so that over many generations, it became the norm.

More information: The full report, Chimpanzee carrying behavior and the origins of human bipedality, is available in the March 20 issue of *Current Biology*: www.cell.com/current-biology/

Provided by University of Cambridge

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