

Small primate ancestors had a leg up

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Smaller primates expend no more energy climbing than they do walking, Duke University researchers have found. This surprising discovery may explain the evolutionary edge that encouraged the tiny ancestors of modern humans, apes and monkeys to climb into the trees about 65 million years ago and stay there.

The researchers compared the energy consumed by five different primate species while negotiating vertical and horizontal treadmills. Their work appears in the May 16 issue of the journal *Science*.

“We assumed it would be more energetically expensive for all of them to climb than to walk, so this finding was unexpected,” said Jandy Hanna, a faculty member at the West Virginia School of Osteopathic Medicine in Lewisburg who was a Duke graduate student at the time of the study. “There’s this longstanding assumption that it should cost more to go up,” she added.

Hanna had to design and build a novel climbing treadmill -- essentially a loop of rope around two pulleys -- to measure the animals' efforts. As the animals moved at their highest sustainable speed, sensors measured oxygen level changes within a chamber to derive the primates' energy consumption.

While climbing was not significantly more demanding for heftier primates than lighter ones, “the energetic cost of walking decreased with size,” said Timothy Griffin, a medical instructor at the Duke Medical Center's Orthopaedic Bioengineering Laboratory. Consequently, species

weighing more than half a kilogram (about 1 pound) may have more incentive to walk than to climb. But for those weighing less, “there was no difference,” he added.

The common assumption is that a transition to life in the trees helped lead to modern primates and our own up-right, two-legged walking.

Scientists think our earliest primate ancestors, which were only the size of large rats, underwent a number of fundamental evolutionary changes as they adapted to moving and feeding on thin branches of trees 65 million years, said Daniel Schmitt, a Duke associate professor of biological anthropology and anatomy who was Hanna's doctoral dissertation advisor. “Those changes included developing grasping hands with nails instead of claws,” Schmitt said. “They were climbing up into the canopy and staying there. What we have shown is that they could have made this shift into a rich environment with insects and fruits without increased energetic cost.”

The eight primates evaluated for energy consumption during climbing and walking were the slender loris (*Loris tardigradus*), fat-tailed dwarf lemur (*Cheirogaleus medius*), pygmy slow loris (*Nycticebus pygmaeus*), Bolivian squirrel monkey (*Saimiri boliviensis*) and mongoose lemur (*Eulemur mongoz*). The squirrel monkey studies were done at the University of South Alabama in Mobile, and the others at the Duke University Lemur Center.

Source: Duke University

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