Paper reference: Venkataraman VV, Yegian AK, Wallace IJ, Holowka NB, Tacey I, Gurven M, Kraft TS. 2018 Locomotor constraints favour the evolution of the human pygmy phenotype in tropical rainforests. Proc. R. Soc. B 285: 20181492.

Press Release, Institute for Advanced Study in Toulouse

November 07, 2018

The challenge of locomotion in dense rainforests may help explain why human pygmy populations around the globe independently evolved short stature, according to a new study. The footfall patterns and walking speeds of tall individuals were found to be significantly compromised during rainforest walking, whereas they were not for short individuals.

Adult men of pygmy populations, found in Africa, Southeast Asia, and South America, can be as short as 150 cm (4 ft 11 in). Scientists have puzzled over the evolutionary benefits of short stature in a rainforest, but no consensus has emerged.

“Rainforests are punishing environments for people: they are hot, humid, and have lots of pathogens. With obstacles everywhere, they are also incredibly difficult to move around in” says the study’s lead author Vivek V. Venkataraman, an anthropologist based at the Institute for Advanced Study in Toulouse, France. “If you’re traveling 10 km per day while you hunt and gather in a tropical rainforest, you need to move around efficiently.”

Based on time spent living with rainforest populations during their PhD training, Venkataraman and co-author Tom Kraft, postdoctoral scholar at University of California Santa Barbara, suspected that walking performance was worse among tall individuals such as themselves.

“We walked more clumsily in the rainforest compared to people of shorter stature. We were more tired because we were taking so many steps.” remarked Kraft. “So we thought of a mechanism and designed a study to test it.”

Venkataraman and Kraft traveled to Malaysia and Bolivia to study the walking behavior of Batek hunter-gatherers and Tsimane horticulturalists, respectively, two populations that regularly travel and hunt and gather food in the rainforest.

The researchers observed the footfall patterns of individuals in open fields and dense rainforest.

Their findings were identical in both populations. Tall individuals took longer steps in the open fields but everyone in the rainforest took steps of the same size. “This means that the clutter in the rainforest significantly constrains human gait,” said Venkataraman.

Because of this constraint, tall individuals traveled much more slowly than they did in the open environment. “Tall people can move fast or efficiently in the rainforest, but not both. People of pygmy stature don’t face the steep tradeoff that tall people do,” said Kraft. He adds that this will make tall individuals less efficient at finding food sources.

The authors emphasize that this new explanation is compatible with previous explanations for the evolution of short stature among pygmy populations. It may also help explain why some rainforest mammals, including elephants and hippos, have evolved smaller body sizes than their relatives on the savanna.

The research team has further plans to explore human movement in naturalistic environments and its implications for understanding human evolution.

“Human evolution didn’t happen on a treadmill,” remarked Andrew Yegian, an experimental biomechanist at Harvard and co-author of the study. “This study is a reminder that we actually move around in the real world and that the way we move is linked to our culture. I hope it inspires scientists to leave the comfort of the lab and increase the diversity of people and life experiences we study.”

Photo credit :Vivek Venkataraman

Photo credit : Vivek Venkataraman

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