

Free-runners explore orang-utans' ease in the trees

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University of Birmingham scientists are using parkour athletes - also known as free runners - to discover how orang-utans and other tree-dwelling primates maximise energy efficiency as they move through the forest canopy.

Using a simulated arboreal habitat, the free runners are mimicking the primates' movements, including commonplace practices such as 'tree swaying' and vertical climbing.

They hope their findings will provide valuable insights into energy consumption which can be translated into improvements in human performance.

The NERC-funded study is a joint investigation between the Universities of Birmingham and Roehampton. Senior Lecturer in the School of Biosciences at Birmingham [Dr Susannah Thorpe \(/staff/profiles/biosciences/thorpe-susannah.aspx\)](#) said little was known about how animals move in complex habitats, such as a forest canopy, where compliant branches and canopy gaps pose energetic problems for arboreal animals.

'Methods to measure primate locomotion energetics are limited; most data are based on mathematical models. We propose a novel and more direct method to assess how costs of orang-utan arboreal locomotion are modulated by the environment,' she said.

Dr Lewis Halsey, Senior Lecturer in the Department of Life Sciences at the University of Roehampton, added: 'We will study the energetic costs of orang-utan locomotion by measuring the oxygen consumption of athletic humans undertaking similar movements. Our subjects are a particularly appropriate model for the fluid nature and wide range of movements employed during orang-utan arboreal locomotion; professional parkour practitioners (free runners) who display elite gymnastic and athletic abilities.'

Dr Halsey said the relative differences in energy expenditure in free runners undertaking different movements and in different environments would provide important insights into how the costs of arboreal locomotion by primates change with locomotion type, tree compliance and habitat familiarity.

'We focus on three key orang-utan locomotor behaviours: tree swaying, because of its role in reducing locomotion cost; vertical climbing, since this requires the animal to oppose gravity, and leaping, since while probably energetically efficient, orang-utans only leap in extremis.

'We create simple assault courses for the athletes that mimic typical locomotor problems faced by orang-utans. Rate of oxygen consumption are measured using a portable respirometer and subjects wear an accelerometer logger to record extraneous movement.'

The study will help to identify crucial habitat requirements for orang-utans, which are pertinent to conservation and reintroduction strategies, and also the likely impact of climate instability and increased habitat degradation on orang-utan foraging and locomotion. Since wild Sumatran orang-utans are critically endangered, this data is vital.

The study's findings will also be relevant outside primate ecology. Analysis of elastic energy storage systems is directly relevant to basic biosciences and analysis of the parkour athletes will be of interest to those studying maximal human performance and energetics.



Free-runner mimicking the primates'

movements