

Why being big like an elephant puts a spring in your step

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African Bush Elephant in Mikumi National Park, Tanzania. Taken by Oliver Wright, via Wikipedia.

(PhysOrg.com) -- Large, lumbering animals such as elephants move much more efficiently than small, agile ones such as mice, University of Manchester scientists have shown.

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Dr Robert Nudds and colleagues Drs Jonathan Codd and Bill Sellers at the Faculty of Life Sciences have found that bigger animals move three and a half times more efficiently than smaller ones.

"The difference is down to having a more upright [posture](#)," says Dr Nudds.

"We believe the tendons in the legs of larger animals have better elastic storage than those in smaller ones. Tendons act as a spring. In larger animals such as an elephant, the tendons may be springier returning more energy into the next step, by ping-ponging the leg off the floor.

"In addition efficiency doesn't increase continuously with body size. There is a step change between large animals such as elephants and small animals such as mice. This is down to their posture - [elephants](#) are 'uprights', while mice are 'crouchers'.

"Standing up straight does have an impact."

He and the team, whose results are published in [PLoS ONE](#) today (Monday 7th September), analysed existing data to contribute to a larger study on [animal locomotion](#). They compared efficiency values (the amount of movement achieved compared to [metabolic energy](#) consumed) across a range of body sizes. Instead of finding a steady increase in efficiency as animals got larger, they found a step-change, whereby all small animals are 7% efficient and all larger animals 26% efficient.

Humans, which are also upright walkers, also have an efficiency rating of around 26%.

While it was known that large animals moved more efficiently than smaller ones, the step change and the impact of posture was a revelation.

"The big difference is that posture rather than body size determines the efficiency of locomotion," says Dr Nudds, whose study was funded by the Leverhulme Trust. "So your mother was right when she told you to

stand up straight and stop slouching!"

More information: 'Evidence for a mass dependent step-change in the scaling of efficiency in terrestrial locomotion'; Robert L. Nudds, Jonathan R. Codd and William I. Sellers; *PLoS ONE*.

Provided by University of Manchester ([news](#) : [web](#))

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