

Giant roo 'could have walked on two legs'

[Dani Cooper \(http://www.abc.net.au/profiles/content/s2193255.htm?site=science \)](http://www.abc.net.au/profiles/content/s2193255.htm?site=science)
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Hopeless hoppers An extinct giant kangaroo that weighed up to 240 kilograms was hopeless at hopping, claims US and Spanish researchers.

An analysis of the ancient Sthenurinae kangaroo's anatomy shows its size and rigid upright posture would have made it anatomically difficult to hop, says lead author Professor Christine Janis, of [Brown University \(http://www.brown.edu/\)](http://www.brown.edu/) in the US.

Instead, she says, it appears to be well suited for bearing weight on one leg suggesting the giant kangaroo walked.

However Australian palaeontologist Professor Rod Wells, of [Flinders University \(http://www.flinders.edu.au/\)](http://www.flinders.edu.au/) in South Australia, disputes her claim and says Janis appears to have "selected data" to support her theory.

Janis says her interest in the locomotion of the Sthenurinae was heightened after seeing a skeleton and realising how different it appeared, especially in the very stiff back.

"I've looked at bones and how animals function all my life," she says, "and this animal just stuck out as weird, and unlike modern kangaroos."

For the study, published today in *PLOS One* (<http://dx.doi.org/10.1371/journal.pone.0109888>), Janis and her team undertook about 100 measurements of more than 140 individual kangaroo and wallaby skeletons from many genera and species.

Anatomically different

Among the key anatomical differences they discovered in the Sthenurinae was its stiff back, which Janis says, would limit "flexion" during hopping.

Janis points out the Sthenurines were adapted for a diet of browsing -- eating leaves and shrubs rather than grass. Their stiff back allowed them to stay upright, while specialised arms and hands with two long fingers helped them reach into vegetation.

But Janis says these same features would have made it difficult for them to bend their backs and support their weight on their hands for pentapedal walking -- using all four legs and the tail, as seen in modern kangaroos.

Also, the relatively shorter and less muscular tail of Sthenurines would have made it useless as the 'fifth leg' in pentapedal walking.

Sthenurines had proportionally bigger hip and knee joints and a broader pelvis that would have allowed



Whopper hopper? Could the giant kangaroo have walked on two legs rather than hopped? (Peter Trusler/ Australian Postal Corporation)

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for larger gluteal muscles. These in turn would have allowed the ancient marsupial to balance weight over just one leg at a time, the same function as in humans during walking.

"I would surmise that quite early in their evolutionary history they started to shuffle along on two feet to move slowly from bush to bush," says Janis.

"Later this form of locomotion would be improved, and would make it possible for them to evolve to body sizes where hopping would have been difficult if not impossible.

"There are anecdotal reports of (modern) tree kangaroos walking bipedally along branches, so what I'm suggesting is not completely unknown for kangaroos."

Janis says the size of the largest of the Sthenurines -- about 240 kilograms -- is also "problematic for hopping".

"Research on modern large kangaroos' hopping indicates they are pushing the limits in terms of tendon strain during hopping," she says.

Difference of opinion

Wells rejects many of Janis's assertions, but in particular the claim the largest of the Sthenurinae was 240 kilograms.

"I think 240 kilograms is really pushing it, but I would be happy with in excess of 100 kilograms," he says adding there were more than 20 species of Sthenurinae ranging from the giant kangaroo to a size similar to modern-day wallabies.

He says there are a variety of ways to interpret the data Janis has presented. For instance the widened pelvis could be related to the longer pouch time, the larger young would have required.

Janis' assertion that the ankles were stabilised to enable them to stand on one foot "doesn't negate the possibility they hopped whatsoever", Wells adds.

He says palaeontology requires researchers to look for modern-day equivalents to answer their queries. The modern-day red kangaroo of the plains has the most similar foot structure.

"The biggest of the Sthenurinae would have lived in flat country and fed on saltbushes and banksias," says Wells.

"My take on the paper is she started off with the idea that they were too big to hop and have gone through and tried to select data to support that," he says.

Wells is convinced they would have hopped but not in "high gear like a race horse, but low gear like a draught horse".

Extinction

Janis says the inability to hop may have played a role in the species' extinction despite the lack of large-animal predators in Australia at the time.

"At the same time as the Sthenurinae (in the Pleistocene) there were also some larger versions of the modern grey and red kangaroos, possibly up to twice their size (*Macropus titan* and *Macropus ferragus*)," she says.

"These guys also went extinct at the end of the Pleistocene, so the issue may have been size rather than locomotion."

She says the size of these ancient giant kangaroos may have affected their capacity for long distance travel.

"With increasing aridity, and greater distance needed to travel daily to find food and water, the less mobile big forms may have been at a disadvantage," says Janis.

While Janis is confident the evidence shows the Sthenurinae could walk on two legs, she says the issue

needs further research to determine the speed with which they walked and whether walking was their sole form of movement.

Key to that will be to find fossilised track marks showing the kangaroo's gait.

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