Kinetics of running on arboreal versus terrestrial substrates in Siberian chipmunks

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Kinetics of running on arboreal versus terrestrial substrates in
Siberian chipmunks

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Abstract

Many mammals travel on both tree branches and flat ground in their natural
habitat. Branches are narrow and cylindrical in shape whereas the ground is
not; therefore we expect to find differences in the way an animal moves on
arboreal versus terrestrial substrates. Force is a good way to measure such
differences. We trained five Siberian chipmunks (Tamias sibiricus) to run
across two different trackways. We filmed them running on a cylindrical
trackway (2 cm diameter) as well as a flat trackway (10 cm wide), emulating both
arboreal and terrestrial conditions. A portion of each trackway measured force
in vertical, fore-aft, and side to side directions. We found that the peak vertical
force of the forelimbs was always greater than that of the hindlimbs. We also
found that there was generally a shorter step duration time for both limbs on the
terrestrial trackway, which could be due to a quicker pace while traveling on a
flat surface. Forelimbs were found to have the dominant role in braking on both
substrates, while hindlimbs had the dominant role in propulsion on both
substrates. However, the forelimb aided in propulsion more so than the
hindlimbs contributed to braking on both substrates.