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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.