

## **Speeds of dinosaurs from the Albian-Cenomanian of Patagonia and sauropod stance and gait**

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Estimates of locomotory speeds of small to large-sized Patagonian dinosaurs are presented for the first time. These estimates are inferred from trackways found on fine to coarse-grained brown sandstones located in the lower section of the Candeleros Member of the Río Limay Formation (Albian-Cenomanian), Neuquén Province, Argentina. The method used is based on the measurement of the stride length (distance between two successive prints of the same foot) and of the length of the hindfoot print, which in turn, allows us to estimate the height at the hip joint and, therefore, the approximate size of the animal. The hypothesis of dynamic similarity implies that the movements of geometrically similar animals, although of different sizes, are dynamically similar only when they move with the same Froude number. The dynamically similar movements (i.e., those with equal Froude number) require equal values of relative stride length (ratio between the stride length and the hip joint height). The relationship between the relative stride length and the Froude number allows us to estimate the speeds of dinosaurs. The dinosaurian ichnofauna studied reveals low speeds that range from 0.5 to 2.6 m s<sup>-1</sup>. Our analyses show that the sauropods responsible for these trackways were either walking very slowly in a bipedal stance or alternatively they were progressing quadrupedally on a slippery surface.

**Key words:** Dinosaur speeds, sauropod stance, palaeoichnology, Río Limay Formation, Albian-Cenomanian, Patagonia.

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