Locomotion of bipedal dinosaurs might be predicted from that of ground-running birds

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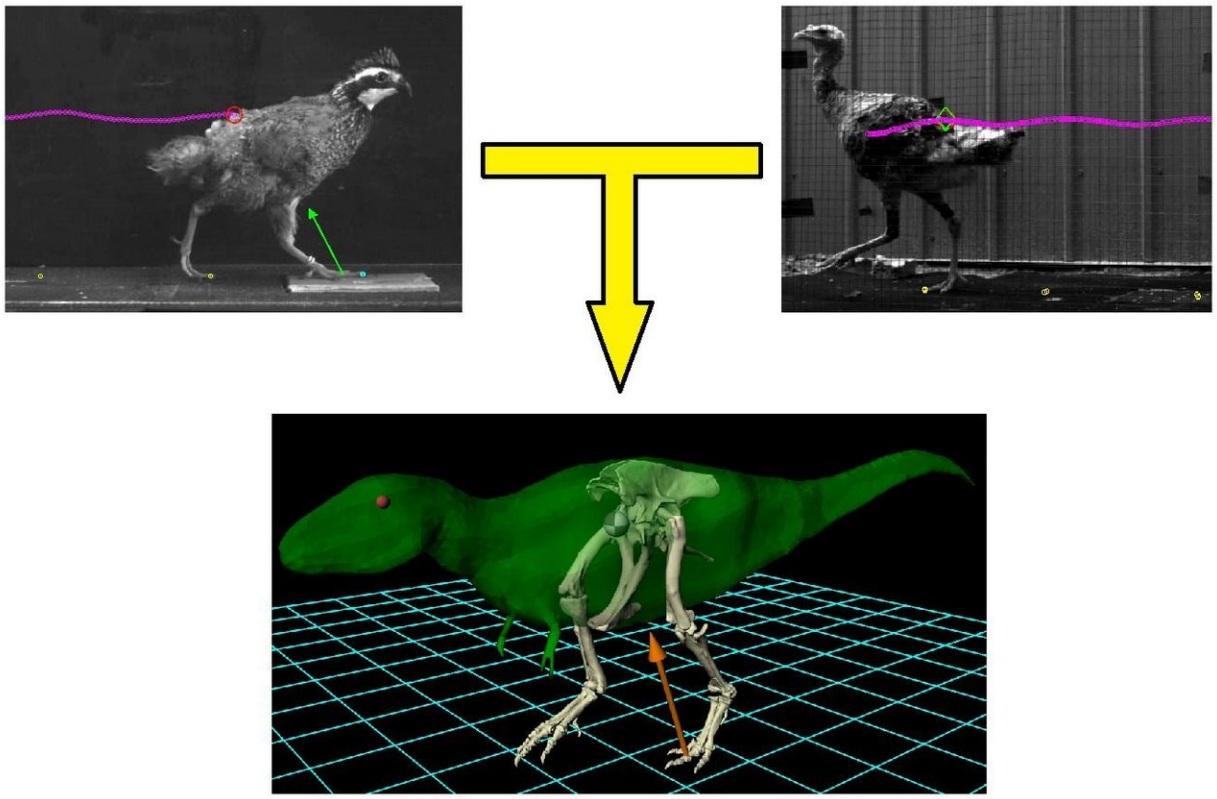

Ground-running bird model may predict bipedal dinosaur locomotion. Credit: Peter Bishop, Queensland Museum

A new model based on ground-running birds could predict locomotion of bipedal dinosaurs based on their speed and body size, according to a study published February 21, 2018 in the open-access journal *PLOS*

ONE by Peter Bishop from the Queensland Museum, Australia and colleagues.

Previous research has investigated the biomechanics of ground-dwelling birds to better understand the how bipedal non-avian dinosaurs moved, but it has not previously been possible to empirically predict the locomotive forces that extinct dinosaurs experienced, especially those species that were much larger than living birds. Bishop and colleagues examined locomotion in 12 species of ground-dwelling birds, ranging in body mass from 45g to 80kg, as the birds moved at various speeds along enclosed racetracks while cameras recorded their movements and forceplates measured the forces their feet exerted upon the ground.

The researchers found that many physical aspects of bird locomotion change continuously as speed increases. This supports previous evidence that unlike humans, who have distinct "walking" and "running" gaits, birds move in a continuum from "walking" to "running". The authors additionally observed consistent differences in gait and posture between small and large birds.

The researchers used their data to construct the biomechanically informative, regression-derived statistical (BIRDS) Model, which requires just two inputs - body mass and speed - to predict basic features of bird locomotion, including stride length and force exerted per step. The model performed well when tested against known data. While more data are needed to improve the model, and it is unclear if it can be extrapolated to animals of much larger body mass, the researchers hope that it might help predict features of non-avian dinosaur locomotion using data from fossils and footprints.

More information: Bishop PJ, Graham DF, Lamas LP, Hutchinson JR, Rubenson J, Hancock JA, et al. (2018) The influence of speed and size on avian terrestrial locomotor biomechanics: Predicting locomotion

in extinct theropod dinosaurs. *PLoS ONE* 13(2): e0192172. doi.org/10.1371/journal.pone.0192172