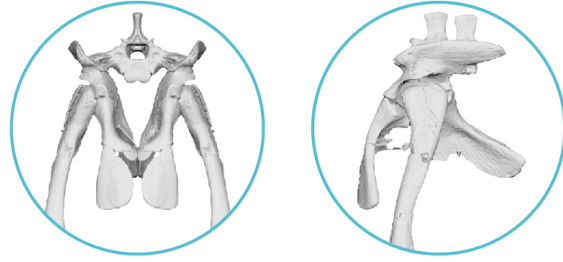


## ***Euparkeria* offers insights into the evolution of locomotion in the “ruling reptiles”**

The small Triassic reptile *Euparkeria capensis* is an ideal subject to study the modes of locomotion of early archosaurs, the group of animals that gave rise to both crocodiles and birds. *Euparkeria* is well known from numerous fossils and is a close relative of the last common ancestor of birds and crocodiles.

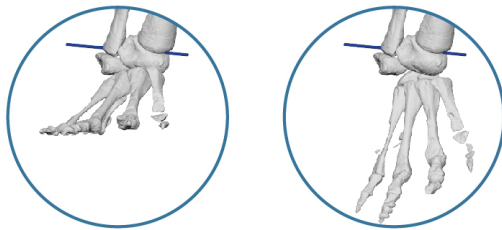
### **Hip structure**

The new 3D reconstruction of the hip bones of *Euparkeria* based on CT scans shows that it had a pronounced bony rim above the hip joint, which covered the top of the thigh bone and support the body with the limbs in a columnar arrangement; hence this type of joint is called ‘pillar-erect’. This feature was previously known only from later archosaurs on the line to crocodiles and often was used to infer a more erect posture for these animals.



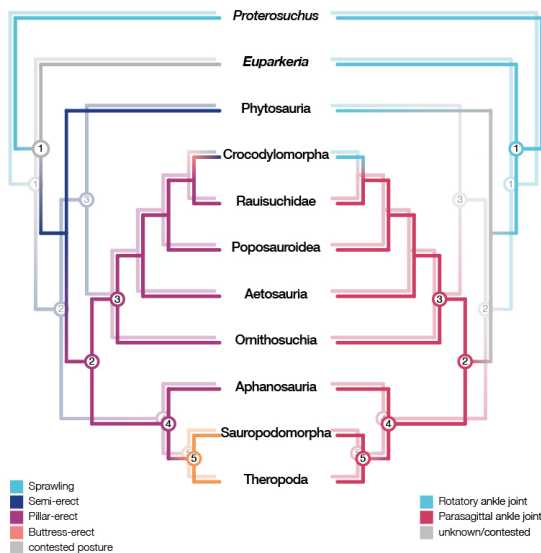
### **Ankle articulation**

The computer simulations suggested that while the thigh bone could have been held in an erect posture, the foot could not have been placed steadily on the ground due to the way the foot rotates around the ankle joint, implying a more sprawling posture.



### **Evolutionary implications**

While *Euparkeria* is so far the earliest reptile with this peculiar hip structure, an ankle joint allowing a more erect posture appeared later on in Triassic archosaurs. Previously it was thought that both were linked and evolved synchronously. However, these traits were in fact decoupled and evolved in a step-wise fashion. The mosaic of structures present in *Euparkeria* was a central stepping-stone in the evolution of locomotion in archosaurs.



### ***Euparkeria*'s posture? - It's complicated**

Traditionally the posture of terrestrial vertebrates has been classified into several distinctive groups, sprawling (like lizards) - 'semi-erect' (like crocodiles) - erect (like mammals or dinosaurs), based on the shape of the hip and limb bones. While the hip structure allowed *Euparkeria* to hold the thigh bone in an upright posture, the ankle joint was not suitable for an upright gait, implying a more sprawling posture. However, the bony rim covering the hip joint restricted the movement of the thigh bone in a way that is unknown from any living animal capable of a more sprawling gait, hinting at a more upright posture.

