

INTERPRETING THE ORIGINS OF THE HUMAN HIP: EVALUATION OF ARTICULAR CONTACT AREA IN THE ANCESTRAL HIP JOINT

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Understanding hip joint functional anatomy is critical to interpreting the origins of the human hip. A new pelvis of the 9 million year old ape *Rudapithecus*, argued to represent a close African ape-human relative, provides an opportunity to evaluate ancestral hip morphology.

Joint morphology represents a functional tradeoff between maximizing articular contact area and mobility. Terrestrial primates are expected to have deep acetabulae because their limbs are used primarily in flexion-extension. In contrast, arboreal primates use wide range of hip postures and should have mobile hip joints with shallow acetabulae.

We evaluated acetabular form using a novel analysis of continuous 3D laser scan data from a large sample of anthropoid pelvises. Using Rapidform software, a best-fit sphere fit to the lunate surface characterized overall joint size. It was cut with a polyline fit to the acetabular rim to quantify area inscribed within the acetabulum

Terrestrial primates do have significantly deeper acetabulae at all sizes than arboreal ones. *Rudapithecus* most closely resembles arboreal species, supporting the hypothesis that bipeds evolved from arboreal ancestors, although perhaps generalized ones.

Methods developed here could be useful in an orthopaedic setting for quantifying joint form and variability in normal and compromised patients, and for instrumentation design.