**Title: Biomechanical Analysis of the Structure and Function of the Ankylosaurus Tail Club**

**Abstract:**

The Ankylosaurus is a dinosaur that lived in the Late Cretaceous period, going extinct in the Cretaceous–Paleogene extinction 66 million years ago . Ankylosauria compose a sub-group of the Thyreophora clade, a class of dinosaurs defined by osteoderms, parallel rows of special bones which run along the animals’ neck, back, and tail, exemplified famously in the kite-shaped back plates of the Thyreophoran subgroup Stegosauria. While the Ankylosauria possessed smaller osteoderms, the Ankylosauridae subgroup is renowned for its distinctive tail club, composed of interlocking vertebrae (forming the handle) and large terminal osteoderms (forming the knob). This club piques interest from a biomechanical point of view, for which elucidating the mechanical properties and biological structure may illuminate the evolutionary significance and functional hypotheses of how and why the tail club was used. Conclusions indicate feasible tail swinging and sufficient force generation to break bone during impacts and point towards their use in intraspecies competition To this end several methods have been employed since the dinosaur’s discovery, including Finite Element Analysis, mechanical simulation tests, analysis of evolutionary patterns, fossilization records and analysis, tomographic scans, and anatomical comparison, highlighting the structure and impact force prediction of the tail club.

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(Arbour, 2009; Arbour & Currie, 2011, 2015; Arbour & Evans, 2017; Arbour & Zanno, 2020; Botfalvai et al., 2021; Condamine et al., 2021; Lida et al., 2009; Zheng et al., 2018)