

ABSTRACT

The Upper Gondwana stratigraphy comprises three Triassic formations, namely the basal Pali Formation, an intermediate and newly designated Karki Formation and the overlying mud-dominant Tiki Formation. These were overlain unconformably by the Parsora Formation of Jurassic age. Within a fluvial setting, considerable variations in depositional environment were noted, especially during the transition from Triassic to Jurassic. A new low-diversity, mono-dominant multitaxic mixed bonebed was discovered from the Tiki Formation, where the dominant component was the rhynchosaurs. Taphonomic studies suggest gregarious behaviour, possibly herding, for the rhynchosaurs. The herd succumbed to death due to sudden flooding events during high seasonal rainfall when they were entrapped in the thick Tiki mud. The Tiki rhynchosaur accumulation is a combination of biogenic concentration with fluvial hydraulic overprint leading to a mixed-origin concentration. The specimens show bone degradation from fungal attack, which stopped during arid and dry climate resulting in their fossilisation. Detailed osteological study, comparison and phylogenetic analysis show that the Tiki rhynchosaurs pertain to a new species of *Hyperodapedon*, which is more basal in comparison to the other Upper Triassic forms such as *H. huenei*, *H. gordonii* and *H. huxleyi*. Two morphotypes based on differences in maxillary tooth plates were noted, which is attributed to ontogenetic variation. *Hyperodapedon* was a short-statured animal with large head and long tail. The abducted humerus and nearly adducted femur resulted in a postural dichotomy where *Hyperodapedon* shows similarity with the high walk of the crocodylians. Microanatomy of the premaxilla shows that it was a dynamically-growing bone covered by a protective covering, which was used to dig up molluscs, arthropods and soft plant items. *Hyperodapedon* had an overall fast growth, which slowed considerably later in ontogeny suggesting an indeterminate growth strategy. This growth pattern deviates from the slow-growth regime suggested for the basal archosauromorphs by earlier studies. The Tiki ecosystem is reconstructed to show similar trophic structure as in present day terrestrial ecosystem. Based on the vertebrate fossil fauna, the Tiki Formation is correlated with other coeval horizons and a Carnian (Otischalkian) age is proposed for the formation.

Keywords: Bone histology, Functional anatomy, Gondwana, Palaeobiology, Rewa, Rhynchosaur, Triassic.