Contextualizing newly discovered dinosaurian assemblage in the Mussentuchit Member of the Cedar Mountain Formation, Central Utah, USA: insights from the sedimentary record

***Symons, R.C.R.*[1,*], Tucker, R.T.[1], Jonk, L.[1], Makovicky, P.J.[2], Zanno, L.E.[3]**

*1) Stellenbosch University, Stellenbosch, RSA, *E-mail: nybor.sa@gmail.com*
2) Science & Education, Museum of Natural History, Chicago, USA
3) Research & Collections, North Carolina Museum of Natural Sciences, Raleigh, USA

The paleobiota of the Upper Cretaceous (Cenomanian) Mussentuchit Member is key to understanding a period of dramatic faunal reorganization in western North America characterized by the extirpation of sauropods and allosaurs and the rise of Late Cretaceous assemblages dominated by hadrosaurs, ceratopsians, and tyrannosaurids. Discovery of a previously undocumented dinosaurian fauna in the Mussentuchit including the first Late Cretaceous allosaur (*Siats meekerorum*), as well as at least four additional, as of yet unnamed, dinosaurs including an orodromine, a basal iguanodontian, and two new coelurosaurians, together with new data from the Lower Cretaceous Cloverly Formation including the ceratopsian *Aquilops* (FARKE et al., 2014) and advanced tyrannosauroids (ZANNO & MAKOVICKY, 2011) suggests that this transition was more complex than previously appreciated. Specifically, newly emerging data indicates a prolonged, step-wise transition that resulted in the mixing of taxa with Asian ties and endemic North American clades over more than 10 million years. However, teasing out fine scale patterns and macroevolutionary rates of turnover requires fine-scale temporal resolution, which to date, is lacking for the Mussentuchit assemblage.

Due to the relative proximity of coeval volcanic and plutonic source rocks along the developing Western Cordillera during the Sevier Orogeny, the Mussentuchit Member is ideal to obtain near-synchronous detrital zircons. Foundational studies by Cifelli et al. (1997) and others provide a regional-scale temporal framework, yet by age dating the in-situ, newly discovered fossil assemblage, we can gain much more precise temporal resolution. This study ablated eight (8) samples [~1000 grains] obtained from throughout the stratigraphy and at key fossil localities, including all new dinosaurian holotype quarries. To compliment these results, this study coupled radiometric age dating with palaeoenvironmental reconstruction and taphonomic analysis. As a result, this study identified a mosaic of marginal marine to inland deltaic (distal alluvial) continental alluvial depo-centres that provided sites for skeletal accumulation and preservation. Taphonomic work indicated these flood-prone mudflats trapped and preserved many parautochthonous mixed-fossil concentration(s). These results provide a significant advancement in understanding the more precise age of the Mussentuchit Member flora and fauna, and emphasize the utility of detrital zircon geochronology for better constraining terrestrial faunas.

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