FOSSIL PRESERVATION CONTROLLED BY WATER TABLE FLUCTUATIONS – A MODEL FOR PALEOENVIRONMENTAL RECONSTRUCTIONS IN SEMI-ARID FLOODPLAIN SETTINGS

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Nearby the city of Santa Cruz, in the central region of Rio Grande do Sul State, the so-called Schoenstatt outcrop shows both taxonomic as biostratinomical peculiar fossil content, forming a rather different taphocoenosis in comparison to other fossiliferous outcrops of the Santa Maria Formation (Triassic, Paraná Basin), because of the huge predominance of herbivorous and carnivorous cynodonts. Non-cynodont remains are restricted, until now, to a single specimen of Rhadinosuchidae (Archosauriformes: Proterochampsia). Biostratinomically the taphocoenosis is characterized by the accumulation of fossil bones within a restricted area (20 x 20 meters), showing a predominance of skull and mandible, usually disarticulated. The fossil bones are enclosed in red massive or finely laminated mudstone with some rhyzolites and melikarian nodules. This facies is interpreted as deposited in a fluvial floodplain setting. Frequently, huge bone elements occur side-by-side with small ones, and no evidence of selection and orientation by currents has been found. This taphonomic signature led us to the hypothesis of a biogenic concentration for this taphocoenosis. The main mechanism of concentration of bones was selective feeding of scavengers or predators. They would leave behind the less nutritious bone elements, an interpretation supported by the discrepancy between elements of scapular and pelvic girdles and the great number of skulls and lower jaws in the studied taphocoenosis. In addition, the observed lack of preferred orientation of the fossils supports the idea of biogenic concentration. Preservation of the fossil bones is very good, with only slight volumetric deformation. Some bones show external and internal precipitation of calcite and quartz, the latter in greater quantities than fossils from other localities of the south Brazilian Triassic. Calcite concretion also occurs in the fossil-bearing mudstone. The paragenetic association between quartz and calcite give a clue to the depositional history that controlled the fossil concentration and preservation. The pores of the bones were initially filled by calcite, which was partially replaced by quartz. This, and the presence of rhyzolites and melikarian nodules of the fossil-enclosing rocks, suggest a paleoenvironment characterized by an ephemeral lake controlled by the phreatic level where the variations of the level of the water table, due to the alternation of dry and wet seasons, controlled the formation of the concretions in the mudstone and the preservation of the fossil bones. During those intervals of high water table, the bones within the soil profile were close to or within the vadose zone, hence undergoing permineralization and formation of carbonate nodules. In times of low water table, calcite precipitation ceased and was replaced by incipient silicification. Hence, the biostratinomic signature of the taphocoenosis associated to diagenetic study led to a taphonomic model based on water-table variations, which may serve as a tool to paleoenvironmental reconstruction of similar taphocoenosis.