Sauropod dinosaur tracks from South America: perspectives and paleobiological aspects

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Ichnology gives relevant information to understand the paleobiology of sauropod dinosaurs, particularly in relation with two main aspects: locomotion (stance, gait, speed, centers of mass) and behavior (gregarious behavior, 'herd structure', habitats and sedimentary environments). Until now, these studies have been applied to the best known types of tracks and conclusions have been extended to other sauropods, regardless of the extraordinary diversity of this clade. In South America, some titanosaur tracksites from Bolivia and Argentina (Humaca, and Agua del Choique, respectively) exhibit sets of parallel trackways suggesting that the trackmakers traveled in social groups. Only two ichnotaxa have been described in South America: Sauropodichnus giganteus Calvo (Candeleros Formation, early Cenomanian of Neuquén) and Titanopodus mendozensis González Riga and Calvo (Loncoche Formation, late Campanian-early Maastrichtian of Mendoza). Titanopodus trackways represent an excellent case study of the wide- gauge style of locomotion produced by Aeolosaurini or Saltasaurinae titanosaurs. In this case, speed of the trackmakers was calculated throughout accurate estimations of hip height and gleno-acetabular distance, using for comparison an articulated titanosaurian specimen collected in correlative strata (Allen Formation, Neuquén Basin). Traditionally, the presence of wide-gauge trackways in titanosaurs was associated to a low heteropody (e.g., manus:pes ratio between 1:1 to 1:2). However, Titanopodus trackways show a moderate heteropody (~1:2,6) associated with very wide trackways indicating that this general interpretation must be revised. It is probable that both heteropody and trackway ratio (ratio of the track width relative to the total trackway width) show variations during ontogenetic stages. Moreover, from an evolutionary perspective, variations of these parameters are related with the amazing diversity of the titanosaurs (represented by around 48 genera), a fact certainly ignored by most ichnological analyses.

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