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DEEP THEROPOD UNDERTRACKS LOOK LIKE ORNITHOPOD TRACKS. A CONCLUSION FROM A THREE-DIMENSIONAL STUDY OF DINOSAUR FOOTPRINTS

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The “Dinosaur Coast” of Asturias (N Spain) has provided numerous dinosaur footprints (sauropods, theropods, stegosaurs, ornithopods) and other reptile footprints (pterosaurs, crocodiles, turtles and lizards) in the last forty years. Several of these dinosaur tracks (cast) are associated with the undertracks (cast).

The Upper Jurassic siliciclastic successions from Asturias exposed on the present sea cliffs consist mainly of sandstone and marl alternations. These successions (Lastres Formation) represent a fluvial-dominated deltaic system and show many sandstone casts of ornithopod-like tracks which were actually made by theropods (Figs. 1, 2). The Jurassic Museum of Asturias (MUJA) houses, at least, 31 undertracks (sandstone casts) with this particular preservation.

On some occasions, deep true tracks and undertracks were made by medium and large size theropods walking on a firm substrate, which consisted of thin alternations of sand and mud layers.

The case more frequent seen in these outcrops is a footprint (under-track) preserved as deep convex hyporelief in a sandstone bed located between two mudstone beds. The dinosaur stepped on the firm mud upper level, frequently with mud cracks, displacing it downwards together with the intermediate sandstone bed; this last was intruded in the lower mud level. Finally, the track hole was filled by new sandy sediments.

The final outline of the theropod undertracks (lacking of digital pad impressions) looks like ornithopod footprints (high interdigital angles, broad and blunt toes and sometimes no postero-medial indentation behind digit II); see Figures. 1 and 2. Only 3-D studies or vertical sections of the prints let us to make a correct interpretation. The two outlines of the

same footprint are completely different, and prove unequivocally that the undertrack is of theropod origin despite its misleading appearance.

The abundance of these peculiar footprints in many levels of the Lastres Fm. let suppose that it is a quite frequent case in the geological record leading to mistaken interpretations.

Similar cases of “misleading” tracks were recognized in a Lower Jurassic tracksite from the Moenave Formation at southwestern Utah.

Keywords: dinosaurs, misleading tracks, Upper Jurassic

Fig1. Dinosaur footprints associated with their respective undertracks. Medium size (A and B) and large size (C) theropod footprints, with ornithopod-like undertracks.

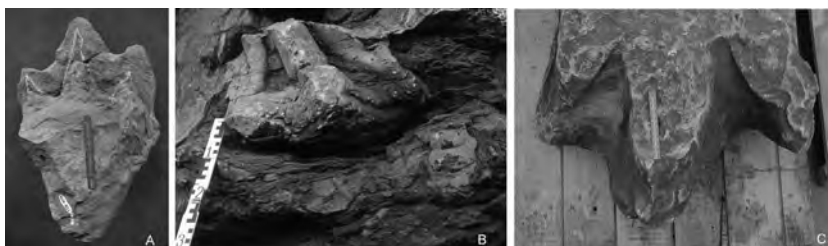


Fig2. True tracks and undertracks. On the left, it observed (in upper view) two true tracks belonging to a theropod with slender toes and claw marks. On the right, the two undertracks (in lower view) with broad and blunt toes resemble to an ornithopod footprint.

