Decay and conservation trial of Late Jurassic sandstone with dinosaur tracks in a museum environment (Museum of Lourinhã, Portugal)

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Abstract

Late Jurassic dinosaur footprints were found on a coastline cliff in Lourinhã, Porto das Barcas, Lagido do Forno (coordinate 39°14.178'N, 9°20.397'W, Portugal) in June 2001. The locality is characterized by steep cliffs with high slopes that are composed of gray and red sandstones/ siltstones. The location belongs to the successions of Lusitanian Basin representing the Porto Novo Member of the Lourinhã Formation.

Three natural infills of tridactyl tracks, possibly ascribed to ornithopod, a bipedal herbivore were found, representing a left foot movement, a right and a left one, respectively. Footprints are 300-400mm wide and have a height of 330-360mm. The footprints are characterized by round fingers, which are elongated due to some degradation/ erosion. The footprints were collected from the field in 2001 and subsequently cleaned, consolidated and glued in the laboratory of the Museum of Lourinhã before being exhibited in a museum display. Stone matrix was removed and a consolidation product was applied, probably a polyvinyl acetate.

The footprint with broken central digit was glued with an epoxy resin, Araldite. Both applied products were confirmed by analysis of μ- FTIR and both presented colour change and detachment surface problems. The footprints have been exposed in the palaeontology hall of the Museum of Lourinhã, Portugal from 2004 without climate controlling. These trace fossils form an important part of the palaeontological collection of Late Jurassic vertebrate fossils from Lourinhã Formation. Presently, it is considered a unique heritage in danger of disappearing due to high decay level of disaggregation of its geological structure. The footprints display several pathologies, such as "Blistering", "Powdering", "Exfoliation"' as well as "Dirt", "Fracture"', "Inscriptions", "Consolidants" and "Adhesives" and are now in very poor conditions. Laboratorial analysed were made to evaluate the presence of salts.

Moreover a microclimatic study was conducted inside the museum to evaluate the influence of thermo-hygrometric parameters on the decay processes. The future interventions will depend on the results of consolidation trials that are currently under progress by using stone samples taken from the same layer and location from Porto das Barcas applying different commercial consolidation products.