

Pathological phalanges in a camarasaurid sauropod dinosaur and implications on behaviour

Emanuel Tschopp, Oliver Wings, Thomas Frauenfelder, and Bruce M. Rothschild

Acta Palaeontologica Polonica 61 (1), 2016: 125-134 doi:<http://dx.doi.org/10.4202/app.00119.2014>

Several types of pathological bony overgrowth are known from various dinosaur taxa but, except for stress fractures, are rarely reported from appendicular elements. Herein we describe pathological manual and pedal phalanges of a camarasaurid sauropod (SMA 0002), which show features rarely recognised in non-avian dinosaurs. They include lateral osteophytes and smoothing of phalangeal articular surfaces, a deep pit, proximal enthesophytes in pedal unguals, distal overgrowth associated with a fracture, and a knob-like overgrowth lateral to the distal condyles of a pedal phalanx. Their causes were assessed by means of visual examination, CT scans, and bone histology, where possible. The lateral osteophytes are interpreted as symptoms of osteoarthritis. The ossified tendon insertions in the unguals are most probably the result of prolonged, heavy use of the pedal claws, possibly for scratchdigging. The distal overgrowth is interpreted to have developed due to changed stress regimes, and to be the cause for the fracture. The deep pit represents most likely a case of osteochondrosis, whereas the knob-like overgrowth likely represents a post-traumatic phenomenon not previously reported in dinosaurs. The study confirms that a rigorous assessment of pathologies can yield information about behaviour in long-extinct animals.

Key words: Dinosauria, Sauropoda, camarasaurids, paleopathology, osteoarthritis, enthesophytes, osteochondrosis, bone tumour, Jurassic, Morrison Formation, Wyoming, USA.

Emanuel Tschopp [tschopp.e@gmail.com] GeoBioTec, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, 2829-516 Caparica, Portugal; Museu da Lourinhã, Rua João Luis de Moura, 2530-158 Lourinhã, Portugal; Dipartimento di Scienze della Terra, Università di Torino, Italy. Oliver Wings [dr.wings@gmail.com], Niedersächsisches Landesmuseum Hannover, Willy-Brandt-Allee 5, 30169 Hannover, Germany; Museum für Naturkunde Berlin, Invalidenstraße 43, 10115 Berlin, Germany. Thomas Frauenfelder [thomas.frauenfelder@usz.ch], Institute of Diagnostic and Interventional Radiology, University Hospital Zurich, Rämistr. 100, 8091 Zürich, Switzerland. Bruce M. Rothschild [bmr@ku.edu], Carnegie Museum of Natural History, 4400 Forbes Ave, Pittsburgh, PA 15213, USA; Department of Geology, University of Kansas, Lawrence, Kansas 66045, USA; Department of Medicine, Northeast Ohio Medical University, Rootstown, OH 44272, USA.

This is an open-access article distributed under the terms of the Creative Commons Attribution License (for details please see creativecommons.org), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

 [Full text \(1,548.3 kB\)](#) |

 [Supplementary file \(65.9 kB\)](#)