

# 3D model related to the publication: The scaly skin of the abelisaurid *Carnotaurus sastrei* (Theropoda: Ceratosauria) from the Upper Cretaceous of Patagonia

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## Abstract

The present 3D Dataset contains the 3D model analyzed in Hendrickx, C. and Bell, P. R. 2021. The scaly skin of the abelisaurid *Carnotaurus sastrei* (Theropoda: Ceratosauria) from the Upper Cretaceous of Patagonia. *Cretaceous Research*. <https://doi.org/10.1016/j.cretres.2021.104994>

**Keywords:** Abelisauridae, Integument, non-avian Theropoda, Scales

Submitted:2021-06-28, published online:2021-08-14. <https://doi.org/10.18563/journal.m3.149>

Inv nr.	Taxon	Description
MACN-CH 894	<i>Carnotaurus sastrei</i>	Model: 3D reconstruction of the biggest patch of skin (~1200 cm <sup>2</sup> ) from the anterior tail region

**Table 1.** Related specimen. Collection: MACN, Museo Argentino de Ciencias Naturales 'Bernardino Rivadavia,' Buenos Aires, Argentina.

## INTRODUCTION

We here present a 3D model of the scaly integument from the tail of the abelisaurid theropod dinosaur *Carnotaurus sastrei* (MACN-CH 894, See Table 1 and Fig. 1). The skeleton and associated skin were found in a hematite concretion from the Campanian–Maastrichtian La Colonia Formation in Bajada Moreno, Chubut Province, Argentina. The material consists of a 3D reconstruction of the the biggest patch of skin (~1200 cm<sup>2</sup>) from the anterior tail region of the holotype of *Carnotaurus*, which is the largest single patch of squamous integument available for any saurischian. The skin consists of medium to large (up to 65 mm in diameter) conical feature scales surrounded by a network of low and small (~14 mm) irregular basement scales separated by narrow interstitial tissue. It is hoped that this 3D model, generated through photogrammetry techniques, will be useful for comparative purposes in the future.

## METHODS

The original specimen of the large patch of skin from the anterior portion of the tail of the holotype of *Carnotaurus sastrei* (MACN-CH 894) was examined first hand and imaged with a digital Canon PowerShot SX60 camera. The three-dimensional (3D) model was generated using photogrammetric data and the software Agisoft Photoscan 1.3.4 using the protocol detailed by Hendrickx *et al.* (2020). The batch process followed in

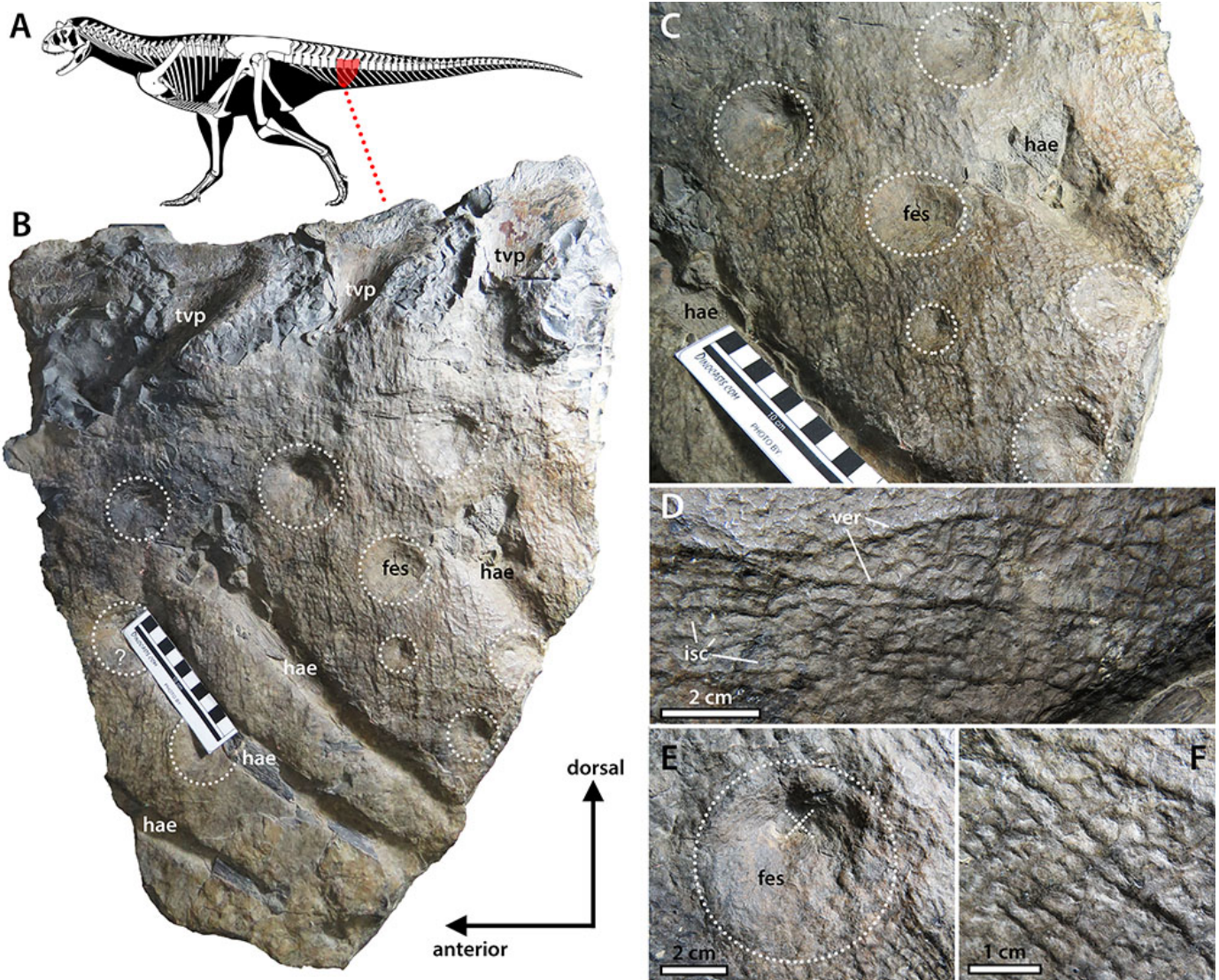
Agisoft Photoscan to reconstruct the skin impression from the holotype in 3D consisted of four steps: i) photos taken in all views were aligned using the standard options (i.e., with generic pre-selection and 40,000 and 4,000 key point limit and tie point limit, respectively) and with a medium accuracy; ii) a dense cloud was built in high quality with an aggressive depth filtering and no reuse depth map; iii) the mesh was then built with a high face count and default options (i.e., a custom face count of 200,000 faces, arbitrary surface type, interpolation enabled and vertex color calculated); iv) the texture was finally added using the default options (i.e., generic mapping mode, texture from all cameras, mosaic blending mode, texture size and count of 4,096 and 1, respectively, no color correction and using the hole filling option). The 3D model was prepared in Agisoft Photoscan and exported as a .ply file with texture as a .jpeg file. It was finally exported, oriented, and scaled in Meshlab version 1.3.4BETA (Cignoni *et al.*, 2008).

## ACKNOWLEDGEMENTS

We thank Martín Ezcurra (MACN) for access to the specimens of *Carnotaurus* with skin under his care and editor Renaud Lebrun for reviewing the manuscript. This research was supported by the Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET) and Agencia Nacional de Promoción Científica y Tecnológica, Argentina to C.H. (Beca Pos-doctoral CONICET Legajo 181417). P.R.B. was supported by an Australian Research Council Discover Early Career Researcher Award (DE170101325).

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**Figure 1.** Natural mould (negative epirelief) of skin from the right side of the anterior tail region of *Carnotaurus sastrei* (MACN-CH 894), and used to create a 3D-model of the scaly skin impression. (A) Position of the specimen on the skeleton of *Carnotaurus* (© Scott Hartman; used with permission). (B, C) Natural mould of the large patch of skin with feature scales in dotted lines. (D-F) Close ups of the skin showing the area of vertical ridges (D), the largest feature scale (central feature scale from the dorsal row) (E), and basement scales (F). Abbreviations: **fes**, feature scale; **hae**, haemal arch; **isc**, irregular basement scales; **tvp**, transverse process of the anterior caudal vertebra; **ver**, vertical ridges.

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Hendrickx, C. and Bell, P. R. 2021. The scaly skin of the abelisaurid *Carnotaurus sastrei* (Theropoda: Ceratosauria) from the Upper Cretaceous of Patagonia. *Cretaceous Research*. <https://doi.org/10.1016/j.cretres.2021.104994>

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