3D models related to the publication: The endocranial anatomy of protocetids and its implications for early whale evolution.

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Abstract

The present 3D Dataset contains the 3D models of *Protocetus atavus* described and figured in the following publication: Berger et al. (2025). The endocranial anatomy of protocetids and its implications for early whale evolution.

Keywords: Archaeoceti, Brain, Cetacea, Endocast, Protocetidae

M3 nr.	Description
M3#1654	Textured model of the whole skull
M3#1655	Brain endocast

Table 1. List of models of *Protocetus atavus* derived from specimen SMNS-P-11084. Collection: State Museum of Natural History Stuttgart, Germany

INTRODUCTION

The two 3D models presented here (see Table 1) both concern the skull of the holotype of *Protocetus atavus* (type species of the family, Protocetidae), which comes from the Lower Building Stone Member of the Mokattam Formation (Gebel Mokattam, northern Egypt; Fig. 1). One model captures the outer morphology of the skull (Fig. 2A-C), the other is the result of the segmentation of the brain endocast (Fig. 2D-F). The latter was used to discuss encephalization and relative size of the olfactory bulb.

METHODS

The textured model of the whole skull was made with a SHINING EinScan Pro HD and its accompanying software EXScan Pro 3.7.0.3. The model of the endocast stems from the segmentation of μCT data. The skull was scanned with a Nikon XT H 320 system. A five-fold multiscan (changing object's position along the Z-axis) was performed using the following settings: 225 kV, 220 μA, 1.5 mm-thick copper filter, 4476 projections, 354 milliseconds exposure time. The resolution (isometric voxels) at acquisition was 53.2 μm. Subsequently, the stack was downgraded to 8-bit-images and to a resolution of 0.16 mm, and its contrast was enhanced with Imagej2/Fiji (Rueden et al., 2017) and its plugin CLAHE to help the segmentation. The segmentation was performed with Avizo 3D

2021.2 (Thermo-Fisher-Scientific) and Biomedisa (Lösel et al., 2020). The models were rendered with Blender 4.1 (2018) in orthographic views for the figure. They were simplified and exported in .ply format with Meshlab (quadratic edge collapse decimation; Cignoni et al., 2008).
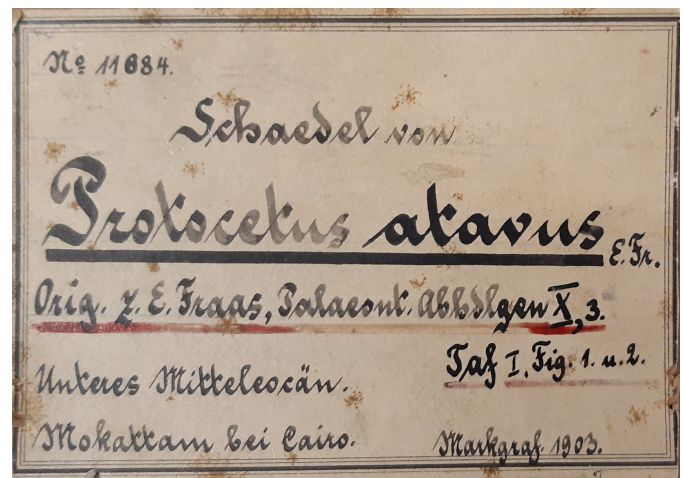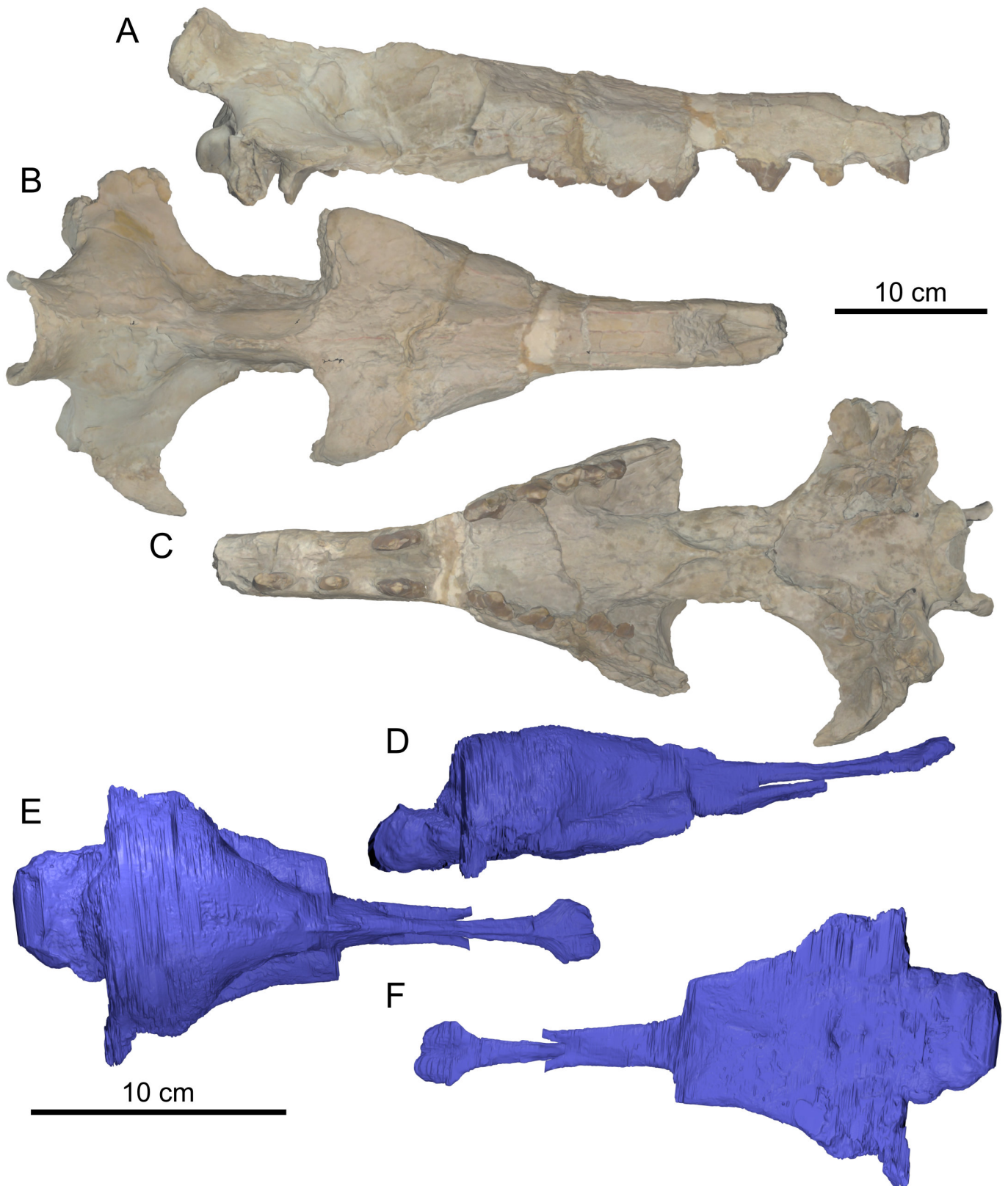

Figure 1. Historical label for the skull of *Protocetus atavus* (SMNS-P-11084, holotype).

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Figure 2. 3D surface models of *Protocetus atavus* (SMNS-P-11084, holotype). Entire skull (A-C) and brain endocast (D-F) in right lateral (A, D), dorsal (B, E) and ventral (C, F) views. Scale bars apply to A-C and D-F, respectively.

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