Dataset

# 3D models related to the publication: Description of the first cranium and endocranial structures of *Stenoplesictis minor* (Mammalia, Carnivora), an early aeluroid from the Oligocene of the Quercy Phosphorites (southwestern France)

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**Abstract**

This contribution contains the 3D models described and figured in the following publication: Bonis, L. de, Grohé, C., Surault, J., Gardin, A. 2022. Description of the first cranium and endocranial structures of *Stenoplesictis minor* (Mammalia, Carnivora), an early aeluroid from the Oligocene of the Quercy Phosphorites (southwestern France). Historical Biology. https://doi.org/10.1080/08912963.2022.2045980

**Keywords:** Aeluroidea, bony labyrinth, brain endocast, stapes, Stenoplesictoid

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## INTRODUCTION

We present 3D models of the cranium and associated endocranial structures (brain endocast, bony labyrinths, left stapes) of *Stenoplesictis minor* (see Table 1), a carnivoran mammal recovered from an unknown locality of the Quercy Phosphorites, probably dated to the early Oligocene (Bonis et al., 2022). This species was previously only represented by mandibles and belongs to a group of early small-sized aeluroids called 'stenoplesictoids' based on its basicranial morphology (sensu Hunt, 1998). This cranium allows us to detail the anatomy of the auditory bulla of *Stenoplesictis*: in addition to an ectotympanic (not preserved here but in place in other specimens of *Stenoplesictis* [Teilhard de Chardin, 1915; Piveteau, 1942-1943; Hunt, 1998; Peigné and Bonis, 1999]), the bulla is composed of a bony caudal entotympanic and a triangular rostral entotympanic, the medial border of which forms a gutter opened ventrally. The caudal entotympanic, never fossilised until now in a 'stenoplesictoid', was previously considered cartilaginous, a primitive character state in Feliformia, currently present only in the African palm civet *Nandinia*, a close relative of the aeluroids. We also document the morpho-anatomy of the endocasts of the brain, as well as the inner and middle ears of *Stenoplesictis minor*; these are largely unknown in the 'stenoplesictoids' and will certainly contribute to improving our knowledge of the evolution of the sensory and cognitive capacities of early aeluroids in future studies.

## METHODS

The X-ray microtomography acquisition of the cranium was performed with a RX-solutions EasyTom XL Duo equipment at the University of Poitiers (France). Current was set at 210 µA and voltage at 100 kV. After back-projection, we obtained a volume with a voxel size of 21.1928 µm that we exported as 2D transverse sections (3084 images of 1718 × 1377 pixels in 16 Bits). The 3D segmentation and virtual reconstruction of the brain endocast, stapes, and bony labyrinths were performed with Avizo Lite 2002.2 (Konrad-Zuse-Zentrum für Informationtechnik Berlin / FEI SAS a part of Thermo Fischer Scientific) from half of the 2D transverse sections (42.3856 µm in the Z axis [skull length]) and using a threshold to select greyscale pixel values, manual selections, and interpolation tool. The size of the 3D surface models of the cranium and brain endocast was reduced in Geomagic Studio 2013 (3D Systems) using the decimate option (15% of decimation for the cranium and 12.5% for the endocranium). The 3D models are provided in .ply format and therefore can be opened with a wide range of freewares. Additionally, we used ISE-MeshTools 1.3.1 (Lebrun, 2014) to orientate each surface and to label them (.flg files) as annotated in Fig. 1.

| Inv nr. | Description |
|---|---|
| M3#961 | Endocranium |
| M3#962 | Right bony labyrinth |
| M3#963 | Left bony labyrinth |
| M3#964 | Cranium in transparency with endocranial structures |

**Table 1.** List of models derived from the specimen UM-ACQ 6705 (*Stenoplesictis minor*). Collection: University of Montpellier, Institut des Sciences de l'Evolution.

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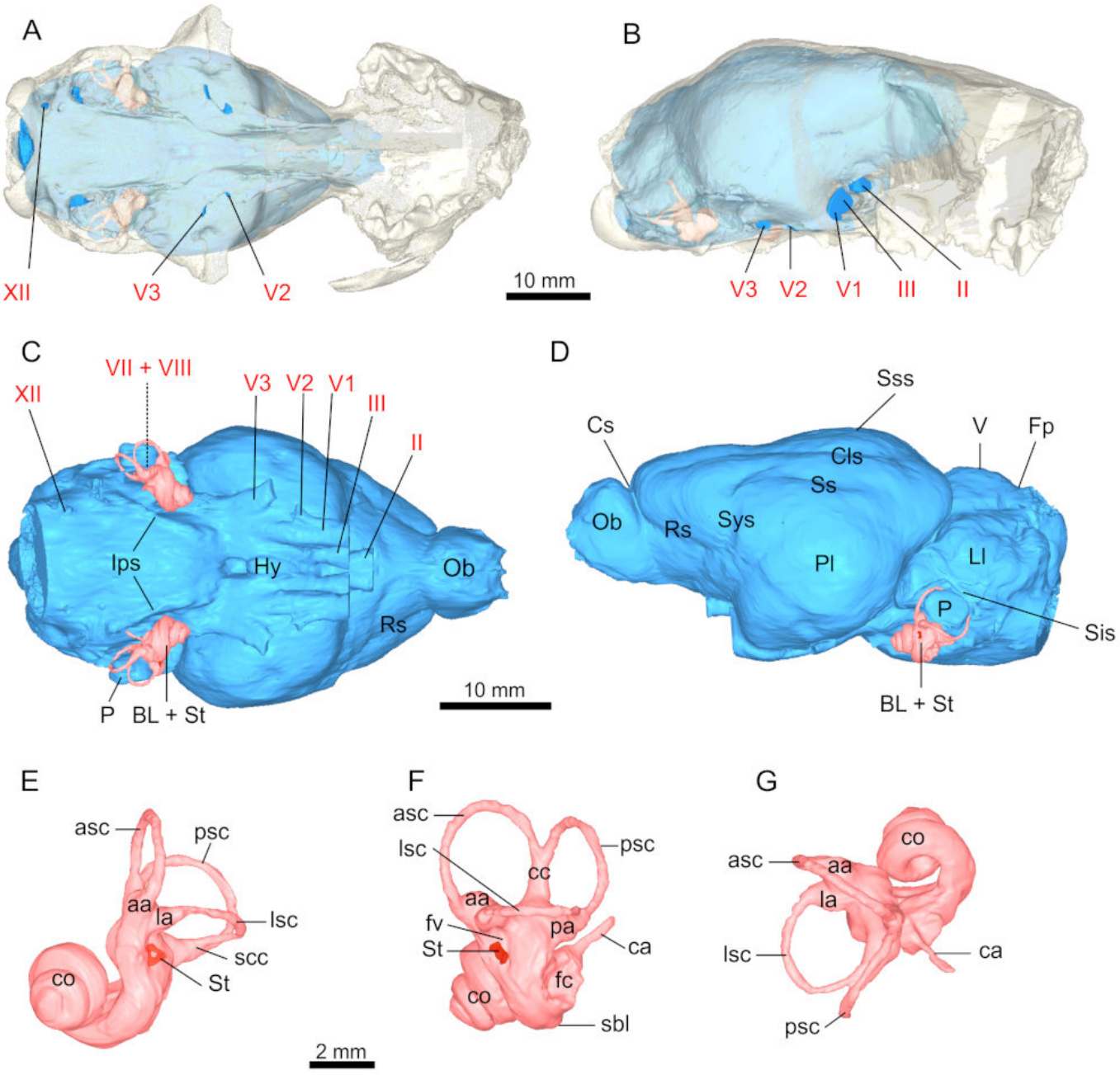


**Figure 1.** UM-ACQ 6705, cranium and endocranial structures of *Stenoplesictis minor*. Digital cranium in transparency with brain endocast (blue), bony labyrinths (pink) and left stapes (red) in ventral (A) and right lateral (B) views where cranial nerves are labeled in red. Endocranial structures in ventral (C) and left lateral (D) views with labeled endocranium. Positions of the cranial nerves VII and VIII are indicated and are labeled on the 3D model of the endocranium. Labeled left bony labyrinth in anterior (E), lateral (F) and dorsal (G) views. **Abbreviations: aa**, anterior ampulla; **asc**, anterior semicircular canal; **ca**, cochlear aqueduct; **BL**, Bony labyrinth; **Cls**, Coronolateral sulcus; **co**, cochlea; **cc**, common crus; **Cs**, circular sulcus; **fc**, fenestra cochleae; **Fp**, Fissura prima; **fv**, fenestra vestibuli; **Hy**, Hypophysis; **Ips**, Inferior petrosal sinus; **la**, lateral ampulla; **Ll**, Lateral lobe of cerebellum; **lsc**, lateral semicircular canal; **Ob**, Olfactory bulbs; **P**, Paraflocculus; **pa**, posterior ampulla; **Pl**, Piriform lobe; **psc**, posterior semicircular canal; **Rs**, Rhinal sulcus; **sbl**, secondary bony lamina; **Sis**, sigmoid sinus; **Ss**, Suprasylvian sulcus; **Sss**, Superior sagittal sinus; **St**, Stapes; **Sys**, Sylvian sulcus; **V**, Vermis; **Cranial nerves (in red): II**, Optic nerve; **III**, Occulomotor nerve; **V1**, Ophtalmic nerve (trigeminal nerve V1); **V2**, Maxillary nerve (trigeminal nerve V2); **V3**, Mandibular nerve (trigeminal nerve V3); **VII**, Facial nerve; **VIII**, Vestibulocochlear nerve; **XII**, Hypoglossal nerve.


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