

3D models related to the publication: Springhares, flying and flightless scaly-tailed squirrels (*Anomaluromorpha*, Rodentia) are the squirrely mouse: comparative anatomy of the masticatory musculature and its implications on the evolution of hystricomorphy in rodents

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Abstract

This contribution contains the 3D model(s) described and figured in the following publication: Da Cunha, L., Fabre, P.-H. & Hautier, L. (2024) Springhares, flying and flightless scaly-tailed squirrels (*Anomaluromorpha*, Rodentia) are the squirrely mouse: comparative anatomy of the masticatory musculature and its implications on the evolution of hystricomorphy in rodents. *Journal of Anatomy*, 244, 900–928.

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INTRODUCTION

Anomaluromorph rodents are endemic to Africa and are characterized by an independent acquisition of hystricomorphy within the mouse-related clade (Wood, 1965). Hystricomorphy is characterized by the presence of an enlarged infraorbital foramen, which facilitates the passage of the anterior-most portion of the zygomaticomandibularis muscle onto the rostrum. Additionally, the absence of a zygomatic plate results in the origin of the anterior part of the deep masseter being located ventral to the zygomatic arch. In Da Cunha et al. (2024) both traditional and digital dissections were performed in order to document the anatomy of the masticatory apparatus in this clade (see Table 1 and Fig. 1). This study allowed us to perform a comparative analysis of the masticatory musculature in all extant genera of *Anomaluromorpha*, which led to a discussion on the use of muscular characters for phylogeny and function. Our findings suggest that the muscular characters associated with the hystricomorph morphotype differ in *Anomaluromorpha* compared to other hystricomorphous rodents.

METHODS

The specimens were scanned using the EasyTom 150 X-Ray microtomograph hosted at the Institut des Sciences de l'Évolution de Montpellier, University of Montpellier (MRI; ISE-M, Montpellier, France). The AVIZO 9.3 (FEI) software was used to extract the surface of skull and mandible semi-automatically with the segmentation threshold and magic wand tool. After following a diceCT protocol, the muscles were segmented manually

Inv nr.	Taxon	Collection
21804	<i>Anomalurus derbianus</i>	RMCA
29335	<i>Idiurus macrotis</i>	RMCA
5.5.23.27	<i>Zenkerella insignis</i>	NHMUK
UM_NA	<i>Pedetes capensis</i>	UM

Table 1. List of masticatory apparatus 3D models of anomaluromorph rodents. “RMCA” stands for the collection of the Royal Museum for Central Africa, Tervuren, Belgium; “NHMUK” for the collection of the Natural History Museum, London, UK; “UM” for the collection of the Institut des Sciences de l'Évolution, University of Montpellier, Montpellier, France

every 10 slices for *Anomalurus* and *Idiurus*, and every 20 slices for *Pedetes* and *Zenkerella*, then imported into Biomedisa (Lösel et al., 2020) for semi-automatic segmentation. The 3D surfaces of the bone were aligned with the muscles using the register images module in Avizo. Once the segmentation was complete, the surfaces were simplified and saved in a .ply format before labelling and tagging them with MorphoDig 1.5.6 (Lebrun, 2018). All the 3D surfaces can be visualized using a wide range of freeware.

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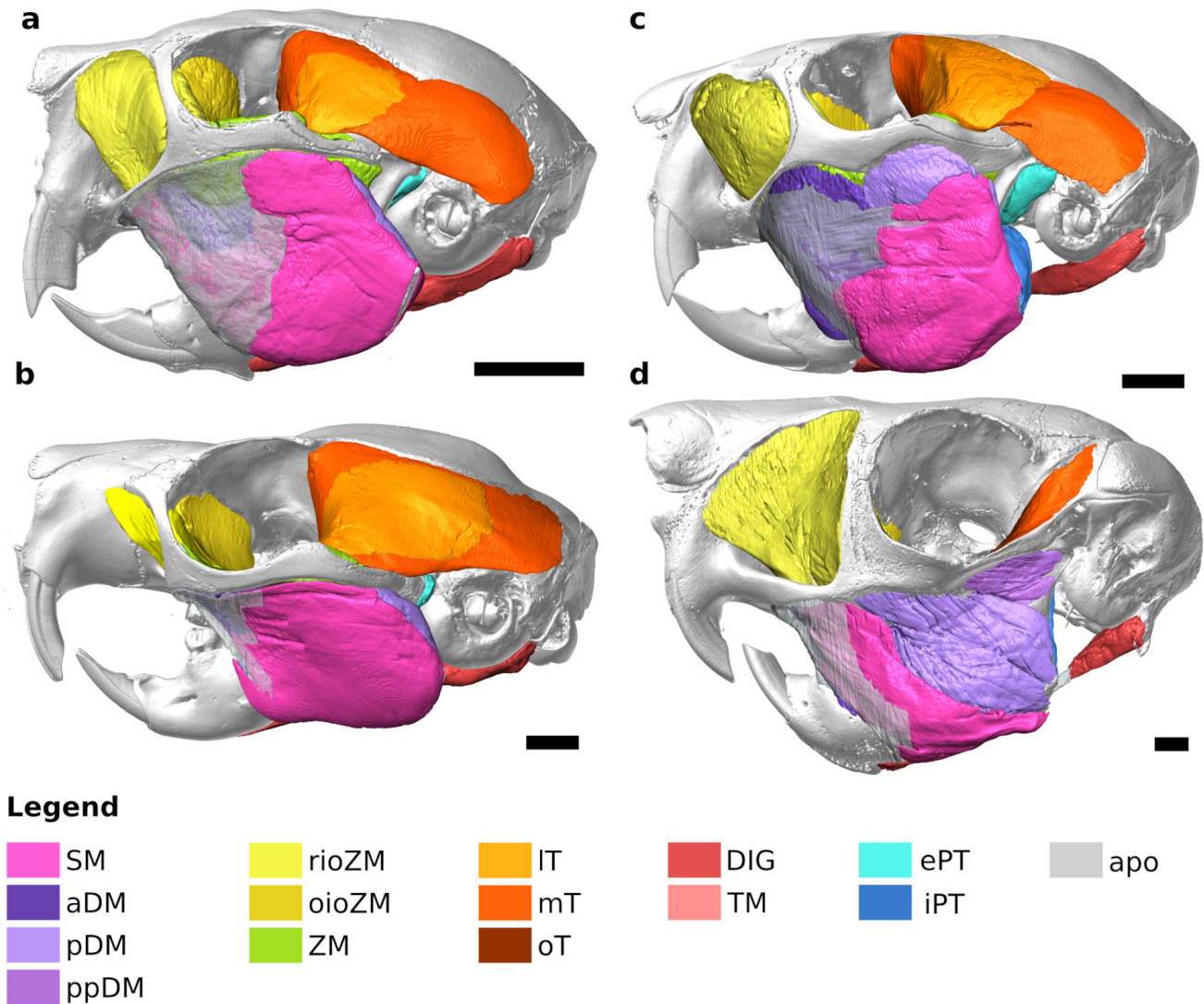


Figure 1. Three-dimensional models of the skull, jaw, and masticatory muscles of (a) *Idiurus macrotis*; (b) *Anomalurus derbianus*; (c) *Zenkerella insignis* and (d) *Pedetes capensis* in lateral view. Scale bars are 5 mm. aDM, anterior deep masseter; apo, aponeurosis; DIG, digastric; ePT, external pterygoid; iPT, internal pterygoid; IT, lateral part of the temporalis; mT, medial part of the temporalis; oioZM, orbital portion of the infraorbital part of the zygomaticomandibularis; oT, orbital part of the temporalis; pDM, posterior deep masseter; ppDM, posterior portion of the posterior deep masseter; rioZM, rostral portion of the infraorbital part of the zygomaticomandibularis; SM, superficial masseter; TM, transverse mandibular; ZM, main part of the zygomaticomandibularis

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