Dataset

3D models related to the publication: Sniffing out morphological convergence in the turbinal complex of myrmecophagous placentals.

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Abstract
This contribution contains the three-dimensional models of the turbinal complex of 10 myrmecophagous and 10 non-myrmecophagous placental species. These specimens were analyzed and discussed in: Wright et. al (2024), Sniffing out morphological convergence in the turbinal complex of myrmecophagous placentals. http://doi.org/10.1002/ar.25603.

Keywords: comparative anatomy, convergence, myrmecophagy, turbinals

Submitted: 13/09/2024, published online: 21/11/2024. https://doi.org/10.18563/journal.m3.237

INTRODUCTION

Myrmecophagous (ant- and termite-eating) mammals exemplify convergent evolution and are found in five placental orders: Cingulata (armadillos), Pilosa (anteaters), Tubulidentata (aardvarks), Pholidota (pangolins), and Carnivora (aardwolves). These mammals are highly specialized, relying almost exclusively on ants and termites for food, and share features such as elongated snouts, extensible tongues, reduced or absent dentition, and digging claws. They also exhibit convergent gut microbiota and very low metabolic rates. Olfaction is critical for prey detection, but the internal anatomy of the olfactory systems of myrmecophagous placentals has not been studied comparatively. The mammalian nasal cavity contains bones called turbinals that vary in function and morphology and are divided into three regions: the pars anterior (respiratory function), the pars intermedia, and the pars posterior (olfactory function). These structures evolve in response to selective pressures associated with thermoregulation and diet. In Wright et al. 2024, micro-CT scans were performed to examine turbinal morphology in ten myrmecophagous and ten non-myrmecophagous species, with the hypothesis that myrmecophagous species will have well-developed olfactory turbinals for detecting specific prey odors. Here, we provide the 3D models of the turbinals for these 20 species (see Fig. 1 and Table 1).

METHODS

X-ray micro-computed tomography (µCT) scans were performed on each specimen using either an EasyTom 150 or a Nikon Metrology HMX ST 225. Three-dimensional reconstructions were generated using AVIZO software (Thermo Fisher Scientific). For each specimen, the turbinals in the left side of the nasal cavity were segmented by manually selecting and outlining each turbinal slice by slice (2-dimensional selection). Three-dimensional surfaces were generated for each turbinal, and were exported in PLY format. As such, they can be visualized with a variety of freeware programs.

ACKNOWLEDGEMENTS

Thanks to A-L Charruault (Institut des Sciences de l'Evolution in Montpellier), Eleanor Hoeger (American Museum of Natural History), Géraldine Veron (Muséum National d'Histoire Naturelle in Paris), and R. P. Miguez (Natural History Museum of London) and Emmanuel Gilissen (Musée Royal d'Afrique Centrale) for their generous assistance in providing access to the mammal collections and for allowing to share the 3D models of these specimens. This research was supported by a European Research Council consolidator grant (ConvergeAnt; ERC-2015-CoG-683257), grants from the French National Research Agency (CEBA: ANR-10-LABX-25-01; CEMEB: ANR-10-LABX-0004; NUMEV: ANR-10-LABX-0020; Rhinograde: ANR-17-CE02-0005 RHINOGRAD 2017).

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Mark Wright, Quentin Martinez, Sérgio Ferreira-Cardoso, Renaud Lebrun, Benjamin Dubourguier, Frédéric Delsuc, Pierre-Henri Fabre, and Lionel Hautier 2024. Sniffing out morphological convergence in the turbinal complex of myrmecophagous placentals. The Anatomical Record. http://doi.org/10.1002/ar.25603

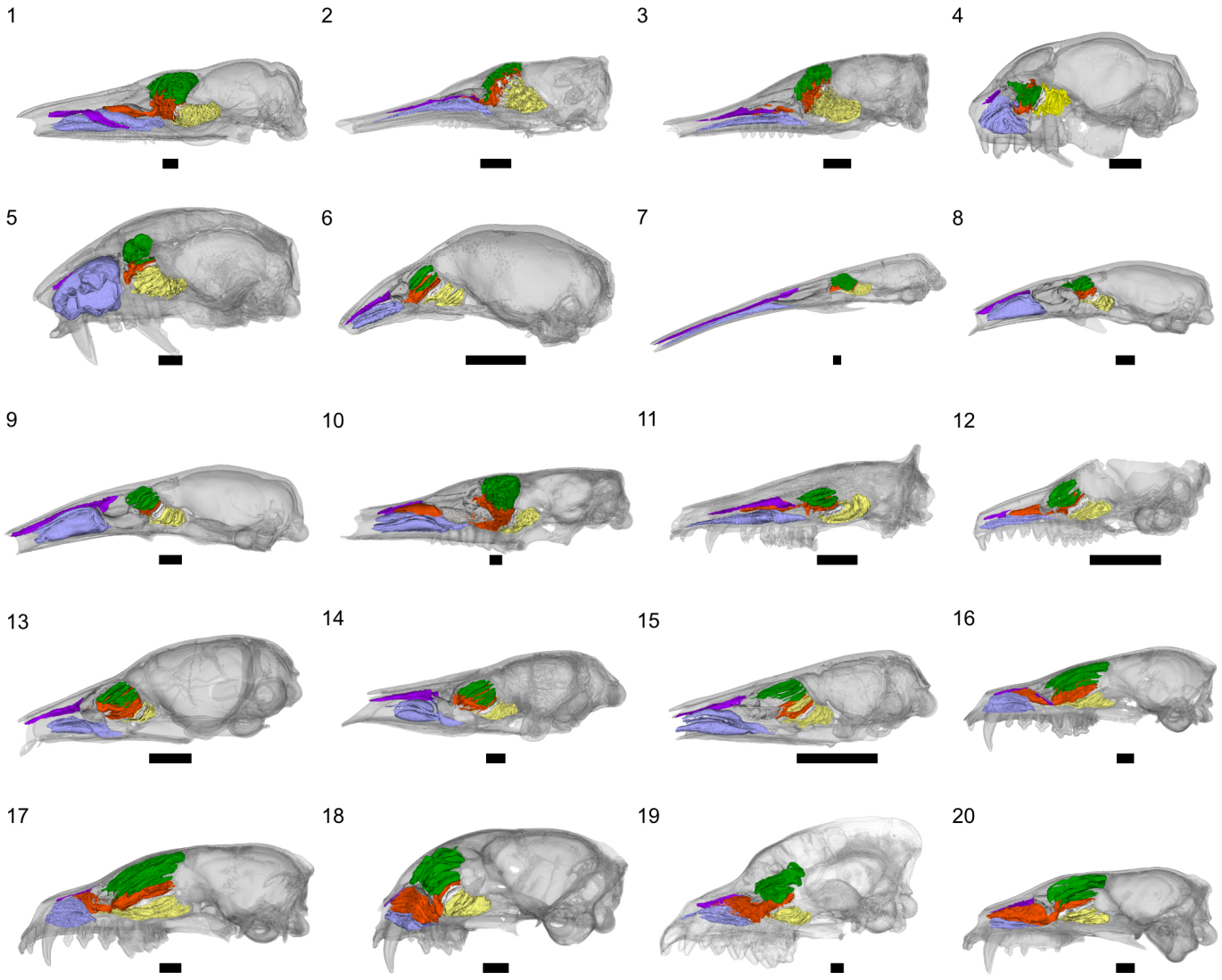

Figure 1. Lateral perspectives of the segmented and reconstructed 3D surfaces of the investigated species : (1) *Priodontes maximus*; (2) *Dasypus pilosus*; (3) *Dasypus novemcinctus*; (4) *Bradypus tridactylus*; (5) *Choloepus didactylus*; (6) *Cyclopes didactylus*; (7); *Myrmecophaga* tridactyla; (8) *Tamandua tetradactyla*; (9) *Tamandua mexicana*; (10) *Orycteropus afer*; (11) *Tenrec eucaudatus*; (12) *Elephantulus rozeti*; (13) *Phataginus tetradactyla* ; (14) *Smutsia gigantea* ; (15) *Manis culionensis* ; (16) *Vulpes vulpes* ; (17) *Alopex lagopus*; (18) *Felix sylvestris*; (19) *Hyaena hyaena*; (20) *Proteles cristata*. Orange : ethmoturbinal I ; Yellow : other ethmoturbinals ; Green : frontoturbinals ; White : "true" interturbinal; Indigo : maxilloturbinal; Purple : nasoturbinal; Grey : semi-circular lamina. Scale bar : 1cm

ISSN: 2274-0422

Inv nr.	Taxon	Collection	Scan resolution (mm)
NHMUK 732-a	*Priodontes maximus*	NHM, London	0.1
NHMUK 94-10-1-13	*Dasypus pilosus*	NHM, London	0.102
AMNH 263287	*Dasypus novemcinctus*	AMNH, New-York	0.036
UM 789N	*Bradypus tridactylus*	ISEM, Montpellier	0.056
UM 767V	*Choloepus didactylus*	ISEM, Montpellier	0.045
NHMUK 88-8-8-14	*Cyclopes didactylus*	NHM, London	0.034
UM 065V	*Myrmecophaga tridactyla*	ISEM, Montpellier	0.074
NHMUK 3-7-7-135	*Tamandua tetradactyla*	NHM, London	0.074
NHMUK 79-1-6-1	*Tamandua mexicana*	NHM, London	0.072
NHMUK 2-9-9-58	*Orycteropus afer*	NHM, London	0.118
UM N439	*Tenrec eucaudatus*	ISEM, Montpellier	0.036
UM N227	*Elephantulus rozeti*	ISEM, Montpellier	0.052
NHMUK 1-11-21-35	*Phataginus tetradactyla*	NHM, London	0.046
KMMA 25479	*Smutsia gigantea*	MRAC, Tervuren	0.036
MNHN ZM-MO 1884-1822	*Manis culionensis*	MNHN, Paris	0.036
UM N140	*Vulpes vulpes*	ISEM, Montpellier	0.056
UM N110	*Alopex lagopus*	ISEM, Montpellier	0.045
UM N149	*Felis silvestris*	ISEM, Montpellier	0.045
UM N109	*Hyaena hyaena*	ISEM, Montpellier	0.019
NHMUK 4-3-1-58	*Proteles cristata*	NHM, London	0.074

Table 1. List of models of turbinals. AMNH : American Museum of Natural History, New-York, USA. ISEM: Université de Montpellier, Institut des Sciences de l'Evolution, Montpellier, France. MNHN: Muséum National d'Histoire Naturelle, Paris, France. MRAC: Musée royal de l'Afrique Centrale, Tervuren, Belgium. NHM: Natural History Museum, London, United Kingdom.

ISSN: 2274-0422