Dataset

# 3D models related to the publication: Anatomical correlates and nomenclature of the chiropteran endocranial cast

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**Abstract**

The present 3D Dataset contains the 3D models of extant Chiropteran endocranial casts, documenting 16 of the 19 extant bat families. They are used by Maugoust & Orliac (2023) to assess the correspondences between the brain and brain-surrounding tissues (i.e., neural tissues, blood vessels, meninges) and their imprint on the braincase, allowing for eventually proposing a Chiroptera-scale nomenclature of the endocast.

**Keywords:** angiology, bats, brain, endocast, neuroanatomy

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## INTRODUCTION

Endocranial anatomy of bats has mostly been investigated by ancient works (e.g., Tandler 1899, Grosser 1901, Schneider 1957), as well as bat paleoneurology (e.g., Edinger 1926, Dechaseaux 1962). Most more recent studies investigating bat brain evolution paid attention to brain and brain parts volumes (e.g., Mann 1961, Jolicoeur et al. 1984, Safi et al. 2005); studies looking at the global anatomy of the bat brain mostly compared extant taxa (e.g., Baron et al. 1996) but anatomical evolution has only been addressed by few old works (e.g., Dechaseaux 1962, Edinger 1964). The advances of imaging techniques eased the virtual extraction of internal structures, such as the mold of the braincase ("endocast"). With the generalization of such procedure, it became even more obvious that there is a discrepancy between the actual brain of an individual and its endocast (e.g., Balanoff & Bever 2017). Surprisingly, this bias has been little investigated in mammals (see Benoit 2015). In the associated manuscript, Maugoust & Orliac (2023) synthesize the available literature about chiropteran braincase anatomy, angiology, and neuroanatomy in order to obtain exhaustive expectations about the structures that could be retrieved on an endocast. Then, they test these expectations using the 3D dataset presented here (Figs. 1-2, Table 1). Though pending further assessments that could arise from other modern techniques (such as diceCT, e.g., Gignac et al. 2016), Maugoust & Orliac (2023) derive a first nomenclature of the endocast at the Chiroptera scale.

## METHODS

Of all 19 crania, 14 were downloaded from the Morphosource (Boyer et al. 2017) repository of Shi et al. (2018) (see Table 1). The other specimens underwent micro-CT using a SkyScan 1076 (for *Hipposideros armiger*) or a EasyTom 150 (all other species) at the University of Montpellier (Institute of Evolutionary Sciences of Montpellier) and were derived from different museum collections (Table 1). Endocasts were extracted from micro-CT data of crania using the software Avizo® 9.3.0 (Thermo Fisher Scientific-FEI) and its "lasso" and "brush" tools together with grayscale thresholds. Visualization was performed using MorphoDig® (Lebrun 2018). Information about curation, taxonomy, scanning parameters, and segmentation parameters is provided in Table 1. All segmented endocasts are shown in Figures 1 and 2 in dorsal, lateral right, lateral left, and ventral views (clockwise).

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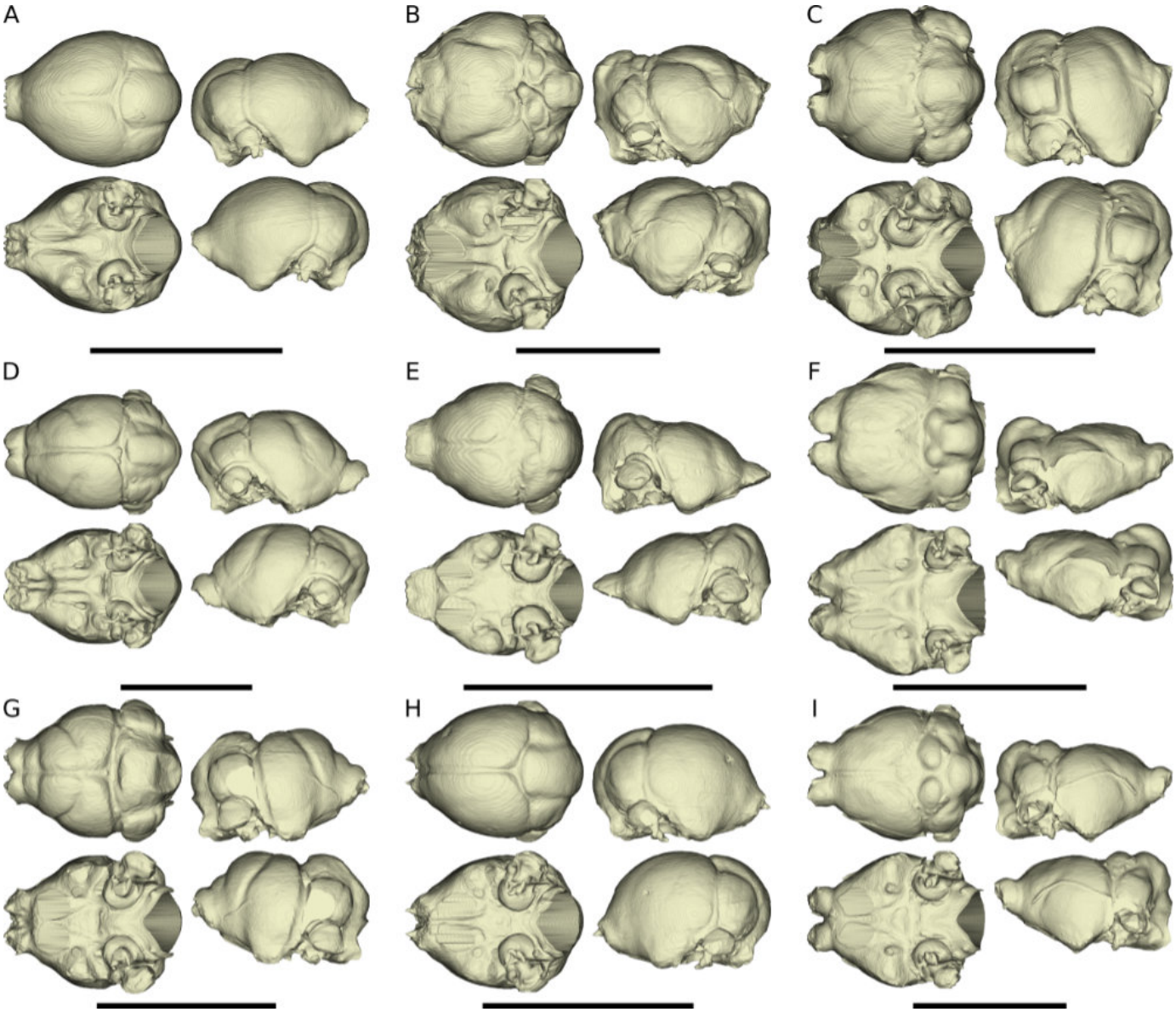


**Figure 1.** Virtual endocasts of the sample showing noctilionoids (A, *Thyroptera tricolor*, Thyropteridae; B, *Noctilio albiventris*, Noctilionidae; C, *Mormoops blainvilli*, Mormoopidae; D, *Macrotus waterhousii*, Phyllostomidae) and vespertilionoids (E, *Nyctiellus lepidus*, Natalidae; F, *Cheiromeles t*orquatus, Molossidae; G, *Miniopterus schreibersii*, Miniopteridae; H, *Kerivoula pellucida*, Vespertilionidae; I, *Scotophilus kuhlii*, Vespertilionidae), each in dorsal (top left), ventral (bottom left), lateral right (top right), and lateral left views (bottom right). Scale bar in each specimen corresponds to 1 cm.


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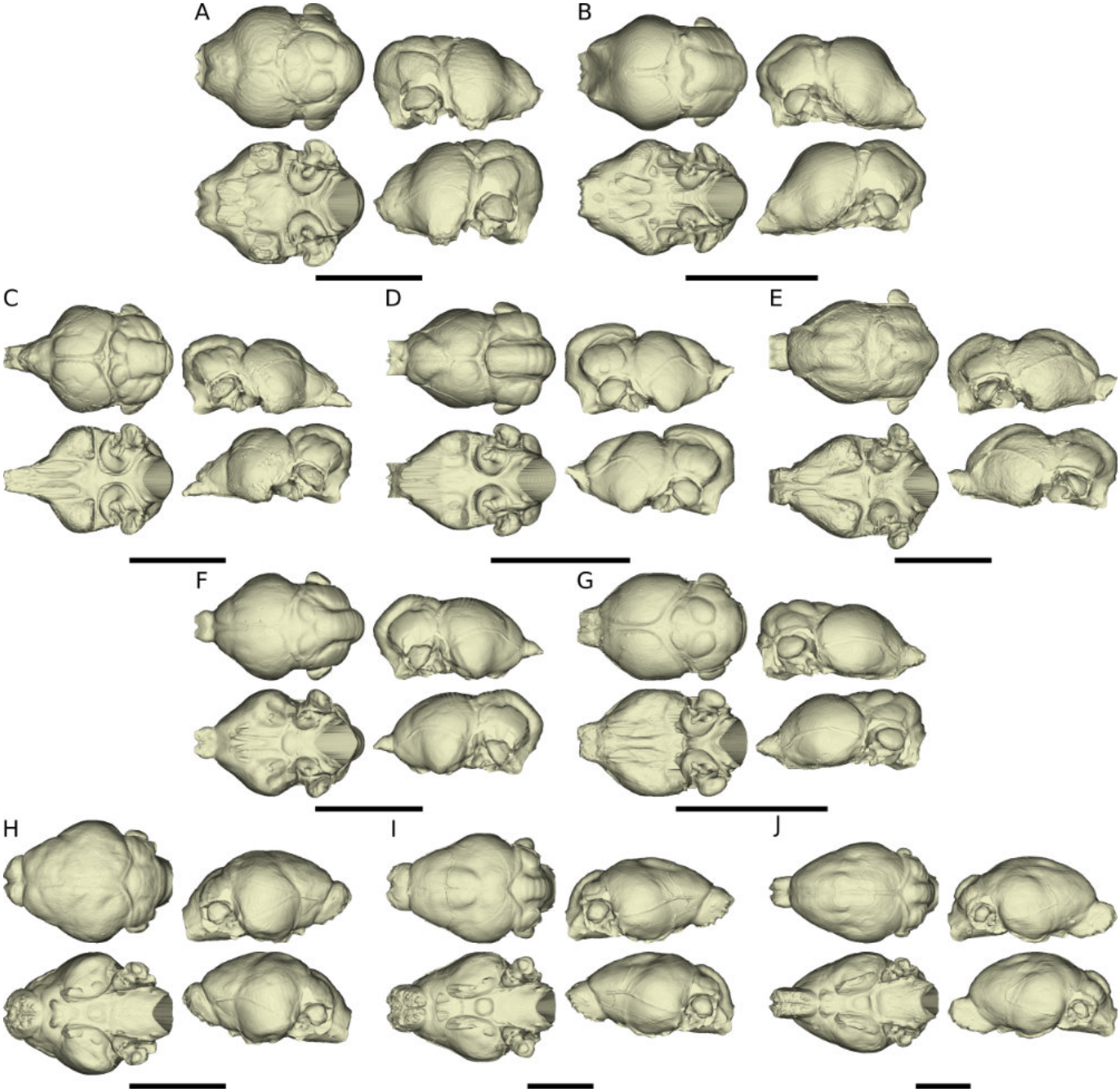


**Figure 2.** Virtual endocasts of the sample showing emballonuroids (A, *Balantiopteryx plicata*, Emballonuridae; B, *Nycteris macrotis*, Nycteridae), rhinolophoids (C, *Rhinolophus luctus*, Rhinolophidae; D, *Triaenops persicus*, Rhinonycteridae; E- *Hipposideros armiger*, Hipposideridae; F, *Lavia frons*, Megadermatidae; G, *Rhinopoma hardwickii*, Rhinopomatidae), and pteropodids (H, *Sphaerias blanfordi*; I, *Rousettus aegyptiacus*; J, *Pteropus pumilus*), each in dorsal (top left), ventral (bottom left), lateral right (top right), and lateral left views (bottom right). Scale bar in each specimen corresponds to 1 cm.


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**Table 1.** Information regarding curation, taxonomy, scanning parameters, and segmentation parameters of the comparative sample used here. Institution abbreviations: UMMZ- University of Michigan, Museum of Zoology, Ann Arbor, USA; AMNH- American Museum of Natural History, New York, USA; AM- Africa Museum, Tervuren, Belgium; UM- University of Montpellier, Montpellier, France; MNHN- Muséum National d'Histoire Naturelle, Paris, France

| Curation | | | | Taxonomy | Scanning | | | Segmentation |
|---|---|---|---|---|---|---|---|---|
| MorphoSource DOI | MorphoMuseuM DOI | Museum | Number | Binom | Voltage (kV) | Frames/second | Intensity (µA) | Used voxel size (µm) |
| 10.17602/M2/M34751 | 10.18563/m3.sf.1132 | UMMZ | 102659 | Balantiopteryx plicata | 70 | 4 | 114 | 20 |
| | 10.18563/m3.sf.1133 | AMNH | M-187705 | Nycteris macrotis | 70 | 4 | 114 | 20 |
| 10.17602/M2/M35748 | 10.18563/m3.sf.1134 | UMMZ | 53240 | Thyroptera tricolor | 70 | 4 | 114 | 20 |
| 10.17602/M2/M35320 | 10.18563/m3.sf.1135 | UMMZ | 105827 | Noctilio albiventris | 70 | 4 | 114 | 20 |
| | 10.18563/m3.sf.1136 | AMNH | M-271513 | Mormoops blainvilli | 70 | 4 | 114 | 20 |
| 10.17602/M2/M35068 | 10.18563/m3.sf.1137 | UMMZ | 95718 | Macrotus waterhousii | 70 | 4 | 114 | 20 |
| 10.17602/M2/M36755 | 10.18563/m3.sf.1138 | UMMZ | 105767 | Nyctiellus lepidus | 70 | 4 | 114 | 20 |
| | 10.18563/m3.sf.1139 | AMNH | M-247585 | Cheiromeles torquatus | 70 | 4 | 114 | 40 |
| 10.17602/M2/M35103 | 10.18563/m3.sf.1140 | UMMZ | 156998 | Miniopterus schreibersii | 70 | 4 | 114 | 20 |
| 10.17602/M2/M35006 | 10.18563/m3.sf.1141 | UMMZ | 161396 | Kerivoula pellucida | 70 | 4 | 114 | 20 |
| 10.17602/M2/M35692 | 10.18563/m3.sf.1142 | UMMZ | 157013 | Scotophilus kuhlii | 70 | 4 | 114 | 20 |
| | 10.18563/m3.sf.1143 | MNHN | CG-2006-87 | Rhinolophus luctus | 70 | 7 | 142 | 23.82 |
| | 10.18563/m3.sf.1144 | AM | RG-38552 | Triaenops persicus | 80 | 6 | 110 | 35.72 |
| | 10.18563/m3.sf.1145 | UM | ZOOL-762-V | Hipposideros armiger | 59 | - | 167 | 18.08 |
| | 10.18563/m3.sf.1146 | AM | RG-12268 | Lavia frons | 80 | 4.5 | 125 | 23.82 |
| | 10.18563/m3.sf.1147 | AM | RG-M31166 | Rhinopoma hardwickei | 80 | 6 | 110 | 35.72 |
| | 10.18563/m3.sf.1148 | AMNH | M-274330 | Sphaerias blanfordi | 70 | 4 | 114 | 40 |
| 10.17602/M2/M35680 | 10.18563/m3.sf.1149 | UMMZ | 161026 | Rousettus aegyptiacus | 70 | 4 | 114 | 40 |
| 10.17602/M2/M35634 | 10.18563/m3.sf.1150 | UMMZ | 162253 | Pteropus pumilus | 70 | 4 | 114 | 40 |

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