Dataset

3D models related to the publication: First Eocene–Miocene anuran fossils from Peruvian Amazonia: insights into Neotropical frog evolution and diversity

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Abstract
The present contribution contains the 3D models of fossil humeri and ilia of anurans from various Eocene-Miocene deposits of Peruvian Amazonia. These fossils were described and figured in the following publication: Jansen *et al.* (2023), First Eocene–Miocene anuran fossils from Peruvian Amazonia: insights into Neotropical frog evolution and diversity. Papers in Palaeontology, The Palaeontological Association.

Keywords: Amazonia, Anura, Brachycephaloidea, Cenozoic, Pipidae

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INTRODUCTION

Anurans are one of the most diverse vertebrate groups, particularly in Amazonia, where species richness exceeds that of anywhere else (Jenkins *et al.* 2013; Vacher *et al.* 2020). Amazonian frogs belong to three main lineages (Hyloidea, Microhylidae, and Pipidae), each of which has diversified during the Cenozoic (Feng *et al*. 2017; Hime *et al*. 2021). However, due to the virtual absence of anuran fossil record in that area, the evolutionary history of modern lineages has so far remained only accessible via molecular data (e.g., Feng *et al*. 2017; Hime *et al*. 2021). During the last decades, a series of field campaigns in Peruvian Amazonia led to the discovery of an unparalleled set of anuran bone fragments, scattered across different sites spanning the Eocene–Miocene time interval (Antoine *et al*. 2016, 2021). Those fossils were collected from twelve localities spread across four scattered areas of Peruvian Amazonia (Contamana and Atalaya, Ucayali Basin; Tarapoto and Balsayacu, Huallaga Basin) mostly Palaeogene in age, except for an Early Miocene locality (CTA-63) and a late Middle Miocene one (TAR-31; Antoine *et al*. 2016, 2021; Marivaux *et al.* 2020). The sediments collected in the different localities were dried then screen-washed in river water using two sieves of different mesh sizes (2mm and 1mm, respectively). Medium-sized fossils ($>$ 2mm) were collected by naked eye in situ while smaller fossils (between 1 and 2 mm) were sorted from the fine residues under stereomicroscopes during the field seasons (field laboratory) and the post-field seasons.

We present here the 3D digital models of the 12 partial humeri and 9 partial ilia of fossil anurans from Peru (Fig 1, 2) corresponding to the best preserved and diagnostic specimens. Five humeral and five ilial morphotypes were identified based on the careful analysis of those specimens (Fig. 1, 2; Table 1) which are among the first fossil anurans ever discovered in Western Amazonia and as such, they are of high interest.

METHODS

All the fossil specimens are permanently housed at the Vertebrate Palaeontology Department of the *Museo de Historia Natural of the Universidad Nacional Mayor San Marcos* (MUSM) in Lima, Peru. Each fossil specimen was scanned to obtain three-dimensional digital models of the fossils hence simplifying the manipulation and identification processes. Before the scan, the samples were separated by locality and placed in medicine pills filled with cotton wool. X-ray microtomography (µCT) was performed using a µCT-scanning station EasyTom 150/Rx Solutions with a resolution of 5 µm in the technical facilities of the Montpellier RIO Imaging (MRI) platform (ISEM, Université de Montpellier). The software Avizo 2019.1 was then used for visualisation, segmentation, and surface rendering by placing each specimen in independent label fields with the segmentation threshold selection tool. The 3D surfaces were reconstructed with a smoothing value of 3, using the surface rendering module. The 3D models are provided in .ply format, and thus can be opened with a wide range of freewares. The .ply files were generated with the software MorphoDig v.1.6.7., an open-source 3D freeware (Lebrun 2018).

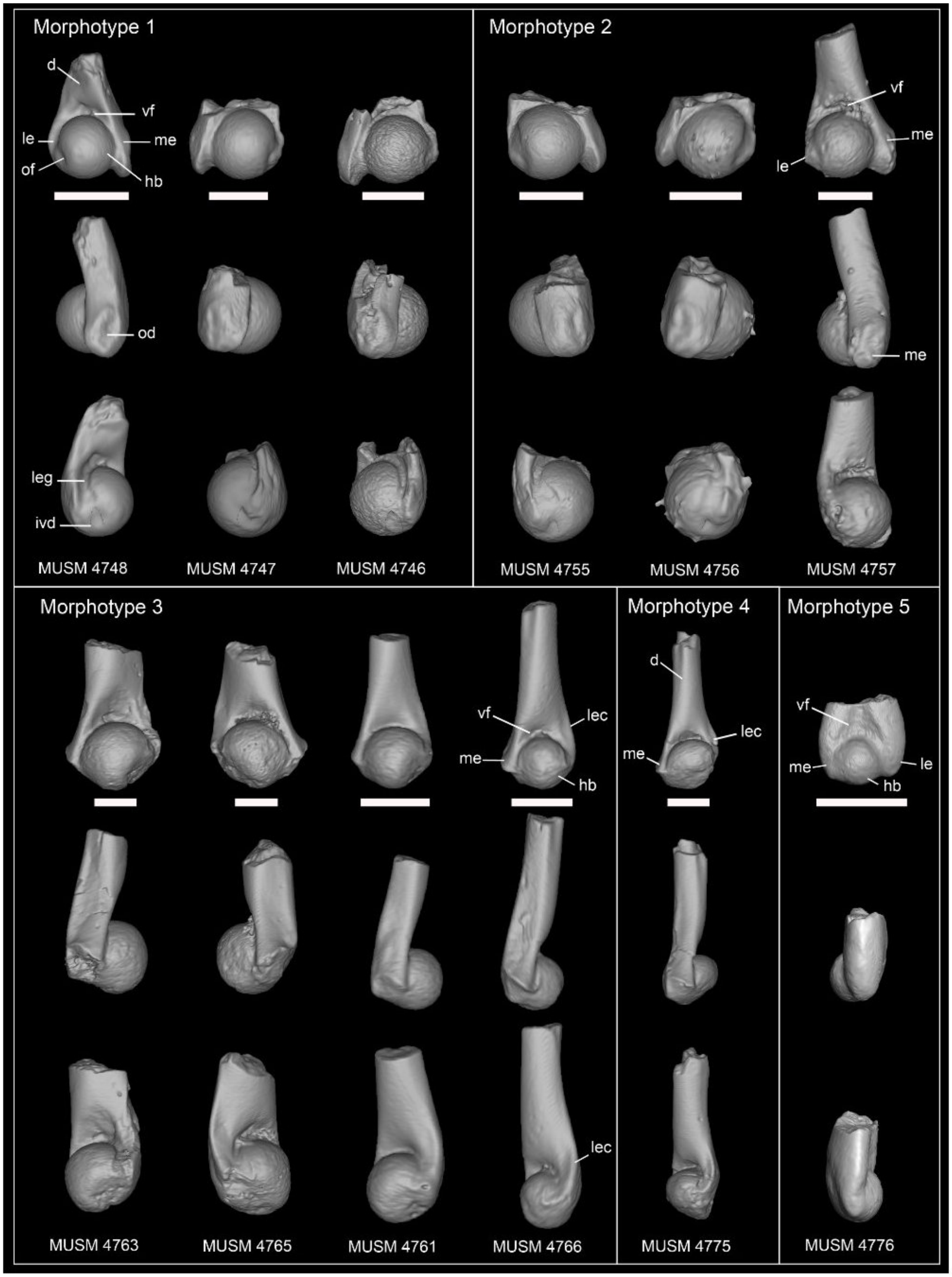

Figure 1. Anatomical plate of humeral morphotypes of Eocene–Miocene anurans from Peruvian Amazonia. From top to bottom: ventral, medial and lateral views. MUSM 4748, MUSM 4755, MUSM 4757, MUSM 4765 and MUSM 4776 correspond to right humeral fragments, whereas the others are left humeral fragments. Abbreviations: d, diaphysis; hb, humeral ball; ivd, inverted v-shaped depression; le, lateral epicondyle; lec, lateral epicondylar crest; leg, lateral epicondylar groove; me, medial epicondyle; of, oblique fold; od, oval depression; vf, ventral fossa. The dashed lines delineate the inverted-shaped depression. Scale bars represent 1 mm.

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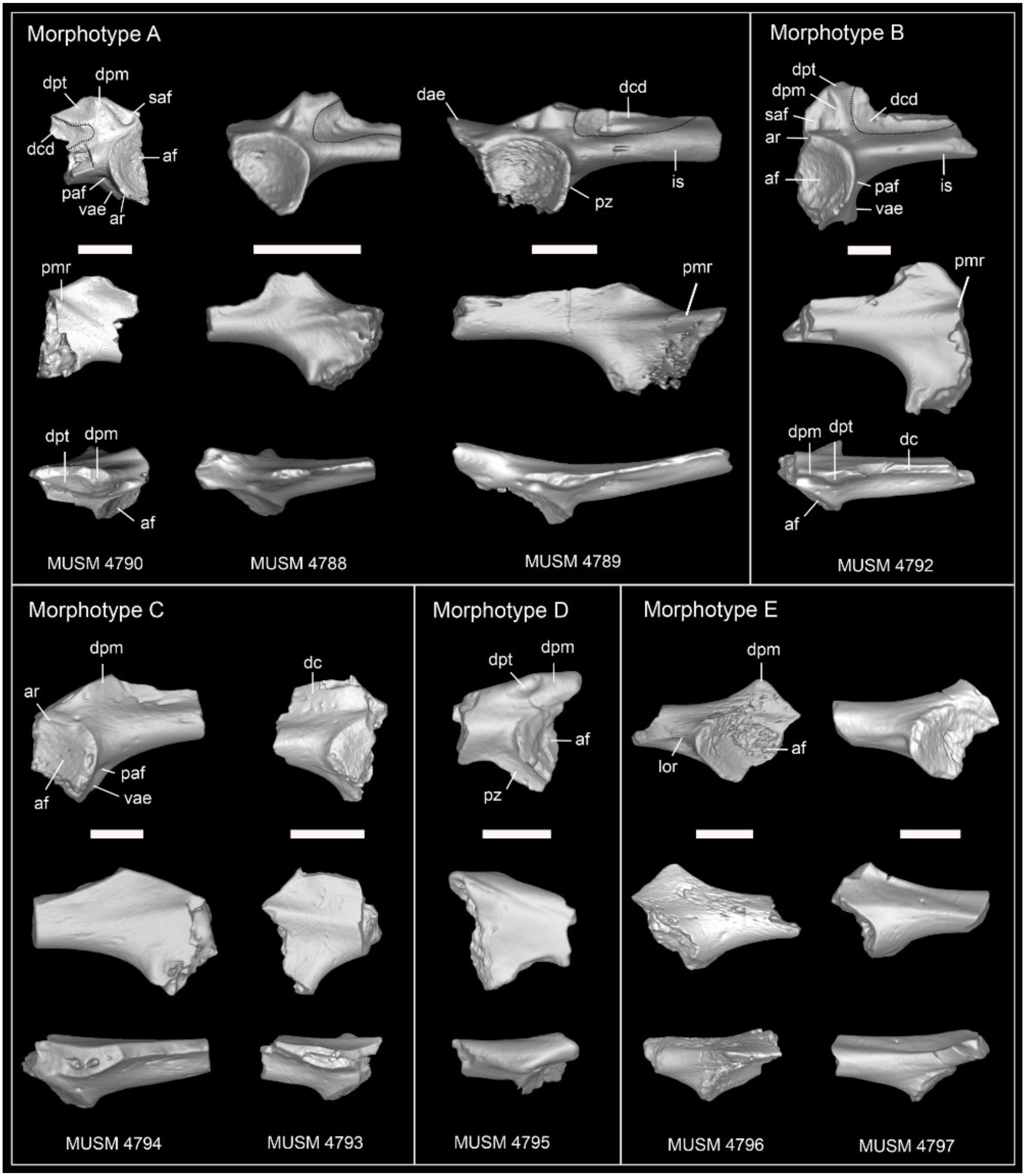

Figure 2. Anatomical plate of ilial morphotypes of Eocene–Miocene anurans from Peruvian Amazonia. From top to bottom: lateral, medial, and dorsal views. MUSM 4790, MUSM 4793, MUSM 4795, MUSM 4796, and MUSM 4797 correspond to left ilium fragments, while the others are right ilium fragments. Abbreviations: af, acetabular fossa; ar, acetabular rim; dae, dorsal acetabular expansion; dc, dorsal crest; dcd, dorsal crest depression; dpm, dorsal prominence; dpt, dorsal protuberance; is, ilial shaft; lor, lateral oblique ridge; paf, pre-acetabular fossa; pmr, proximal medial ridge; pz, pre-acetabular zone (of the ventral acetabular expansion); sf, supra-acetabular fossa. The dashed lines delineate the dorsal crest depression. Scale bars represent 1 mm.

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Inv nr.	Taxon	Description	Morphotype
MUSM 4746	Brachycephaloidea indet.	Humerus	1
MUSM 4747	Brachycephaloidea indet.	Humerus	1
MUSM 4748	Brachycephaloidea indet.	Humerus	1
MUSM 4755	Brachycephaloidea indet.	Humerus	2
MUSM 4756	Brachycephaloidea indet.	Humerus	2
MUSM 4757	Brachycephaloidea indet.	Humerus	2
MUSM 4761	Brachycephaloidea indet.	Humerus	3
MUSM 4763	Brachycephaloidea indet.	Humerus	3
MUSM 4765	Brachycephaloidea indet.	Humerus	3
MUSM 4766	Brachycephaloidea indet.	Humerus	3
MUSM 4775	Brachycephaloidea indet.	Humerus	4
MUSM 4776	cf. *Pipa* sp.	Humerus	5
MUSM 4788	Brachycephaloidea? indet.	Ilium	A
MUSM 4789	Brachycephaloidea? indet.	Ilium	A
MUSM 4790	Brachycephaloidea? indet.	Ilium	A
MUSM 4792	Brachycephaloidea? indet.	Ilium	B
MUSM 4793	Brachycephaloidea? indet.	Ilium	C
MUSM 4794	Brachycephaloidea? indet.	Ilium	C
MUSM 4795	Brachycephaloidea? indet.	Ilium	D
MUSM 4796	cf. *Pipa* sp.	Ilium	E
MUSM 4797	cf. *Pipa* sp.	Ilium	E

Table 1. List of models of humeral and ilial fossils from Peru. Collection: Vertebrate Paleontology Department of the Museo de Historia Natural of the Universidad Nacional Mayor San Marcos (MUSM) in Lima, Peru.

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Institutional abbreviations.
AMNH -, American Museum of Natural History; CAS -, California Academy of Sciences; CM -, Carnegie Museum of Natural History; FMNH -, Field Museum of Natural History (Zoology); ISEM -, Institut des Sciences de l'Evolution de Montpellier; KU -, University of Kansas Biodiversity Institute; LCAM -, Natural History Museums of Los Angeles County; MCZ -, Museum of Comparative Zoology, Harvard University; MUSM -, Museo de Historia Natural of the Universidad Nacional Mayor San Marcos (Vertebrate Palaeontology Department), Lima, Peru; MVZ -, Museum of Vertebrate Zoology, Berkeley Natural History Museums; RBINS-, Scientific Heritage, Royal Belgian Institute of Natural Sciences, Scientific Survey of Heritage (SSH); UF -, University of Florida, Florida Museum of Natural History; USNM -, National Museum of Natural History, Smithsonian Institution; YPM -, Yale Peabody Museum, Yale University.

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