Dataset

3D models related to the publication: Taxonomy and evolutionary history of peradectids (Metatheria): new data from the early Eocene of France.

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Abstract
This contribution contains the three-dimensional models of the most complete and/or informative fossil materials attributed to *Peradectes crocheti* Gernelle, 2024, the earliest peradectid metatherian species of Europe, from its type locality (Palette, Provence, ∼55 Ma). These specimens were analyzed and discussed in: Gernelle et al. (2024), Taxonomy and evolutionary history of peradectids (Metatheria): new data from the early Eocene of France. https://doi.org/10.1007/s10914-024-09724-5

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INTRODUCTION

Peradectidae are an assemblage of extinct and small Cenozoic stem-metatherians, likely arboreally adapted, with a superficially "opossum-like" unspecialized tribosphenic dentition (e.g., Rose, 2012; Ladevèze et al., 2020). A set of phylogenetic analyses supports a single dispersal of peradectids from North America to Europe, during or immediately after the Paleocene-Eocene Thermal Maximum (PETM; at or just after ∼56 Ma) (Gernelle et al., 2024). The early Eocene fossiliferous locality of Palette (Provence; ∼MP7, ∼55 Ma) yielded a mammalian fauna composed of 17 species (Godinot et al., 1987; updated in Gernelle et al., 2024: table 1), of which the eutherians have been extensively studied, notably through works focused on three-dimensional (3D) digital models of iconic specimens from this locality (i.e., of the adapiform primate *Donrussellia magna* and the artiodactyl *Diacodexis* cf. *gigasei*; Ramdarshan et al., 2015; Orliac et al., 2018). Palette is the type locality of the earliest-diverging European peradectid metatherian, *Peradectes crocheti* Gernelle, 2024, a species which was widespread in Western Europe during the MP7-MP8+9 interval (Gernelle et al., 2024). We present here the 3D digital models of the most complete and/or informative specimens of *Peradectes crocheti* from Palette (Table 1). The fossils figured here were found after the field expeditions conducted between 2017 and 2019 by some of us (GB, EG and RT) in Palette. The specimens labelled "MHN.AIX.PV.2017" were isolated by one of us (KG) after processing the sampled sediment by careful acid etching, use of screen-washing, and sorting methods. The height relationships of stylar cusps (which are small cusps pointing ventrally along the labial margin of upper molars) are informative regarding the systematics of peradectids (Gernelle et al. 2024). Such a height relationship can be observed on the labial view of the well-preserved MHN.AIX.PV.2017.6.7 M3 (Fig. 1F), in addition to M2 and M3 of the maxilla holotype (Fig. 1A). The new fossils revealed the ancestral morphology of European peradectids, and their differences with Herpetotheriidae, the other Paleogene Laurasian "opossum-like" family. For example, the present left and right mandibles of *Pd. crocheti* (MHN.AIX.PV.2017.6.8 and MHN.AIX.PV.2017.6.9; Fig. 2), possibly representing a single individual, have curved lower premolar roots, differing from the roots of their molars and the roots of lower premolars in herpetotheriids, which are straight (Gernelle et al., 2024: table 6). The astragalus MHN.AIX.PV.2017.6.14 (Fig. 3), by its nearly ungrooved trochlea and strong similarity with Wyoming peradectid astragali (see Rose, 2012), suggests that *Pd. crocheti* was arboreally adapted, like its close relatives from North America (Gernelle et al., 2024). The peradectid specimens from Palette are permanently housed in the collections of the Muséum d'Histoire Naturelle of Aix-en-Provence (France).

METHODS

The six peradectid specimens were scanned using a µ-CT-scanning station EasyTom 150/Rx Solutions (Montpellier RIO Imaging [MRI], ISEM, Montpellier, France). All specimens were scanned with a resolution between ∼5 and 7 µm. The segmentation of the cheek teeth and dentary of MHN.AIX.PV.2017.6.8 (Fig. 2C-E) was performed with the Avizo 9.3 blow selection tool, in order to clarify the morphology and positioning of the peradectid premolars on the dentary, with transparency applied in the figuration of the latter (Fig. 2E; see also Gernelle et al., 2024: fig. 6b). The segmentation of the holotype of *Peradectes crocheti*, MHN.AIX.PV.2018.26.14 (Fig. 1A-B), required the

Inv nr.	Description
MHN.AIX.PV.2018.26.14	fragmentary left maxilla with C-P1, anterior root of P2, and M1-M3
MHN.AIX.PV.2017.6.6	left P2
MHN.AIX.PV.2017.6.7	left M3
MHN.AIX.PV.2017.6.8	right hemi-mandible fragment with canine alveolus, posterior root of p1, partial p2, p3, partial m1, and m2-m3
MHN.AIX.PV.2017.6.9	left m1-m4 row with fragments of dentary
MHN.AIX.PV.2017.6.14	right astragalus

Table 1. List of 3D models of *Peradectes crocheti* specimens from Palette (Provence). Collection: Muséum d'Histoire Naturelle of Aix-en-Provence, Southern France.

threshold selection tool. An attempt was made to position the segmented fragments of the maxilla MHN.AIX.PV.2018.26.14 in anatomical position, using the MorphoDig open-source 3D freeware (Lebrun, 2018; https://morphomuseum.com/morphodig), with comparison to the complete maxilla of the peradectid-like "*Peradectes*" from Messel (Kurz and Habersetzer, 2004: figs. 2-3) and accounting for the typical crushing of fossil bones from Palette, which may have suffered from synsedimentary compression (e.g., Vautrin et al., 2020). The threshold selection tool was also used for (i) segmenting the isolated M3 MHN.AIX.PV.2017.6.7 (Fig. 1E-F), as a way to numerically assemble its lingual and labial halves, and (ii) extracting semi-automatically the 3D surfaces of the isolated P2 MHN.AIX.PV.2017.6.6 (Fig. 1C-D), the lower molar row MHN.AIX.PV.2017.6.9 (Fig. 2A-B) and the astragalus MHN.AIX.PV.2017.6.14 (Fig. 3). The 3D surface models are provided in .ply format, and can therefore be opened with a wide range of software programs (e.g., MorphoDig).

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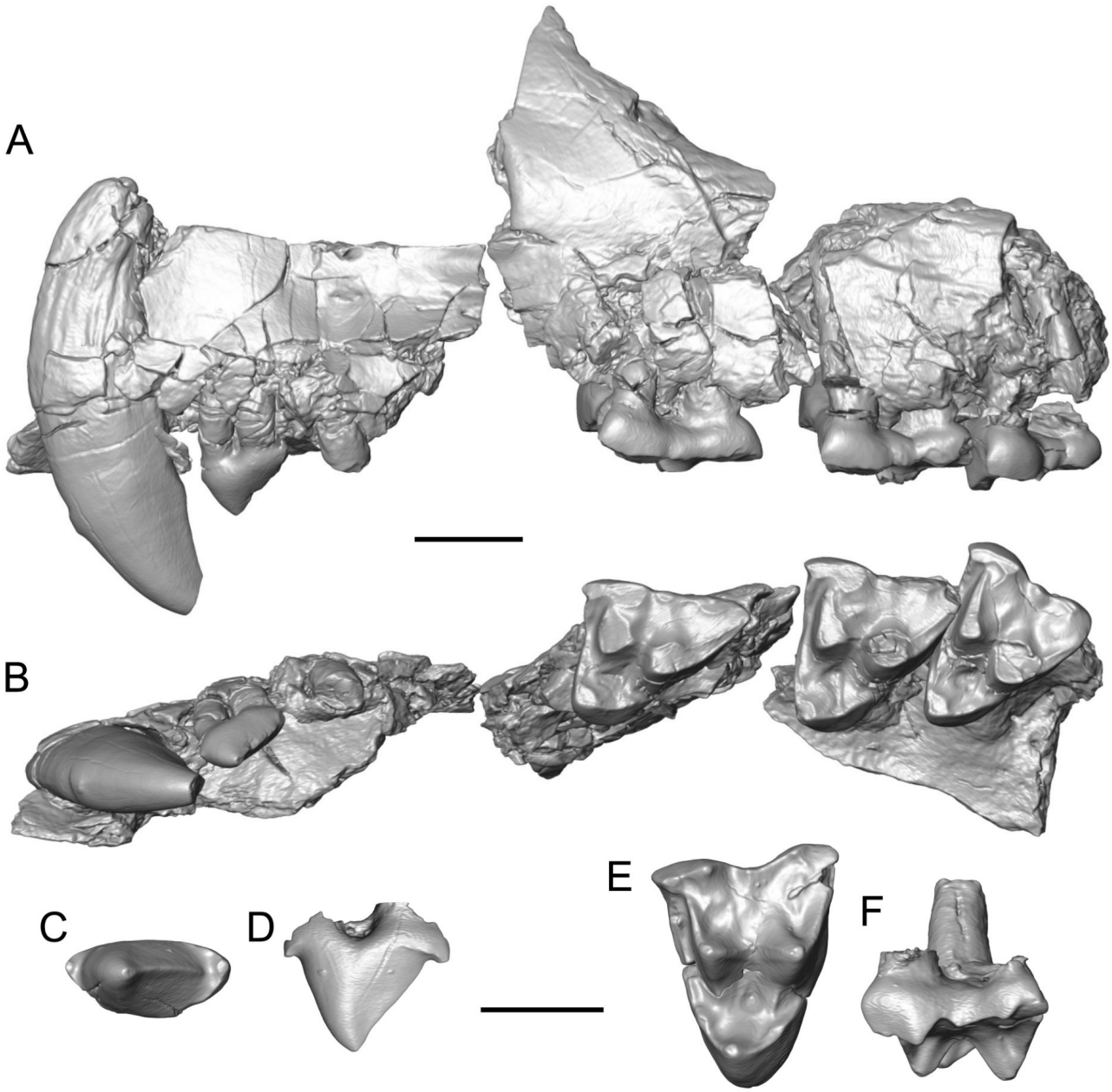

Figure 1. Three-dimensional models of maxilla and upper cheek teeth of *Peradectes crocheti* from Palette (Provence, ~55 Ma). A-B, MHN.AIX.PV.2018.26.14, holotype, fragmentary left maxilla with C-P1, anterior root of P2, and M1-M3, in lateral (labial) (A) and ventral (occlusal) (B) views. C-D, MHN.AIX.PV.2017.6.6, left P2, in occlusal (C) and labial (D) views. E-F, MHN.AIX.PV.2017.6.7, left M3, in occlusal (E) and labial (F) views. Scale bars (A-B, C-F) equal 1 mm.

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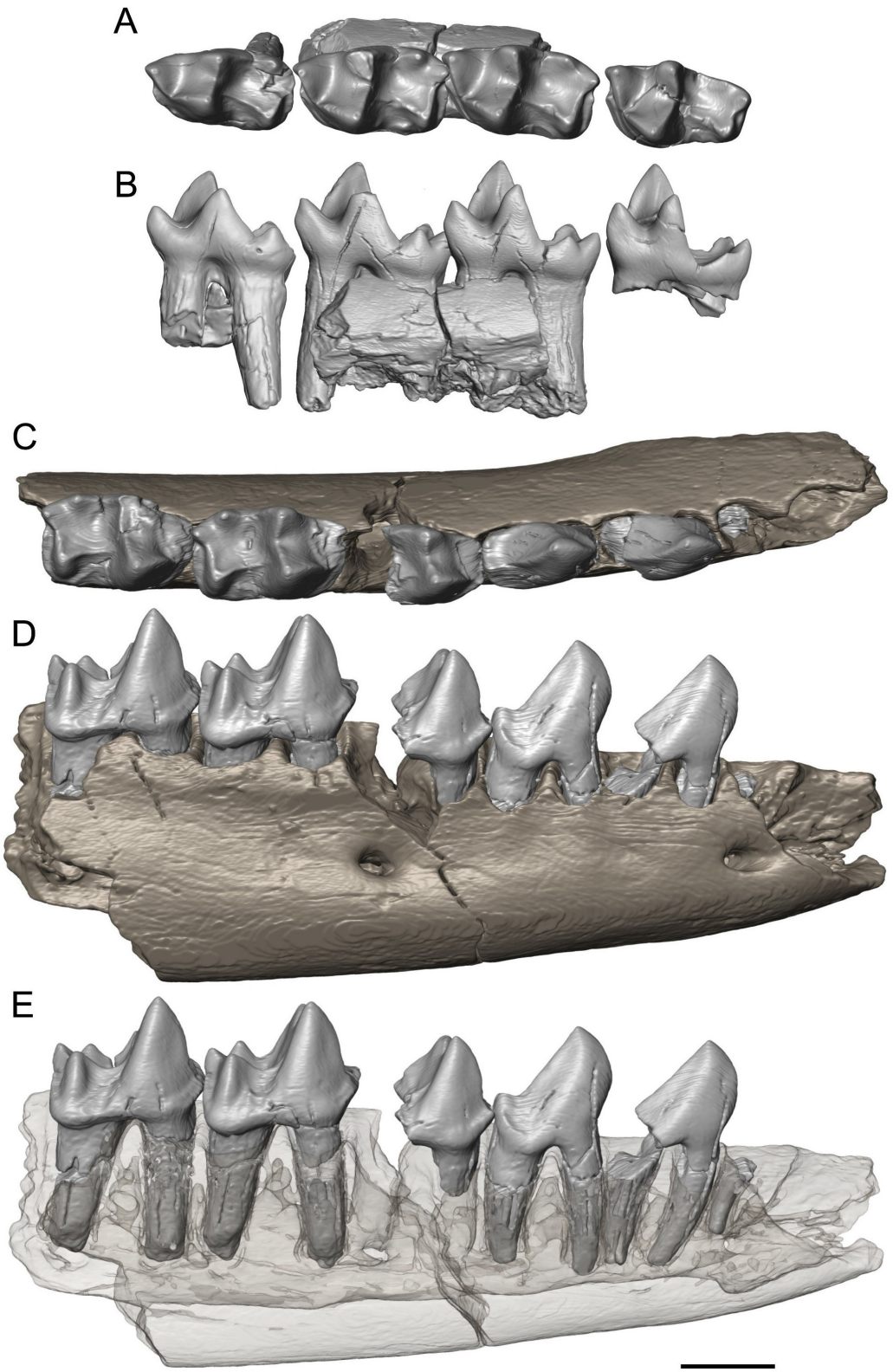

Figure 2. Three-dimensional models of hemi-mandibles and lower cheek teeth of *Peradectes crocheti* from Palette (Provence, ~55 Ma). A-B, MHN.AIX.PV.2017.6.9, left m1-m4 row with fragments of dentary, in occlusal (A) and reversed lingual (B) views. C-E, MHN.AIX.PV.2017.6.8, right hemi-mandible fragment with canine alveolus, posterior root of p1, partial p2, p3, partial m1, and m2-m3 in dorsal (occlusal) (C), lateral (labial) (D) and lateral with transparent dentary (E) views. Scale bar equals 1 mm.

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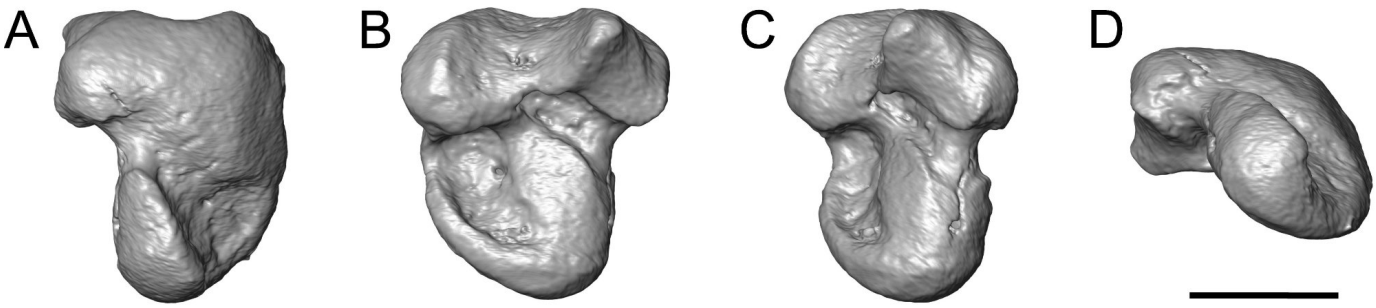

Figure 3. Three-dimensional model of right astragalus of *Peradectes crocheti* from Palette (Provence, ~55 Ma), MHN.AIX.PV.2017.6.14, in dorsal (A), ventral (B), ventrolateral (C) and distal (D) views. Scale bar equals 1 mm.

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