

Supplementary Information

Early Jurassic dinosaur fetal development and its significance for the evolution of sauropod dentition

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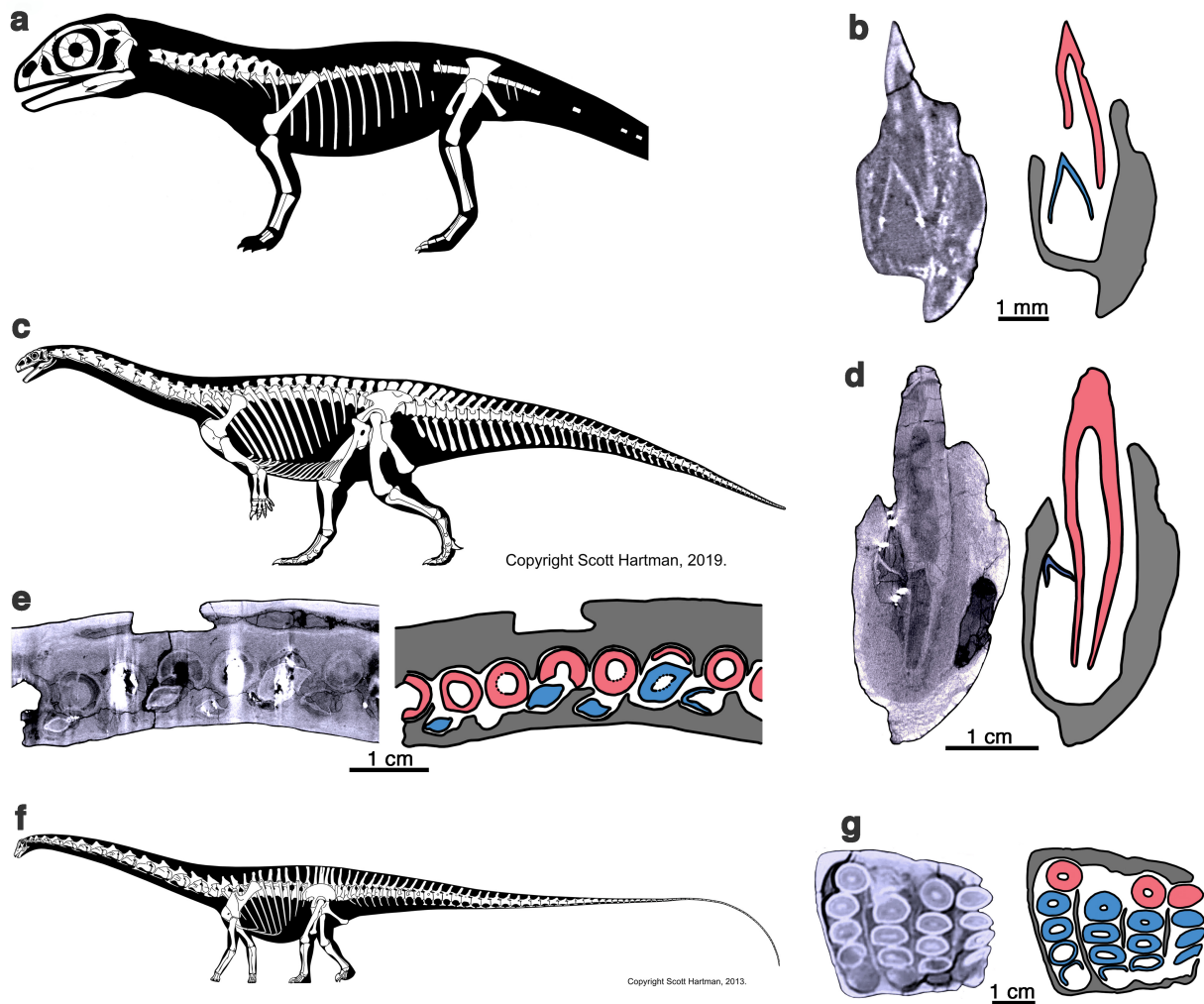
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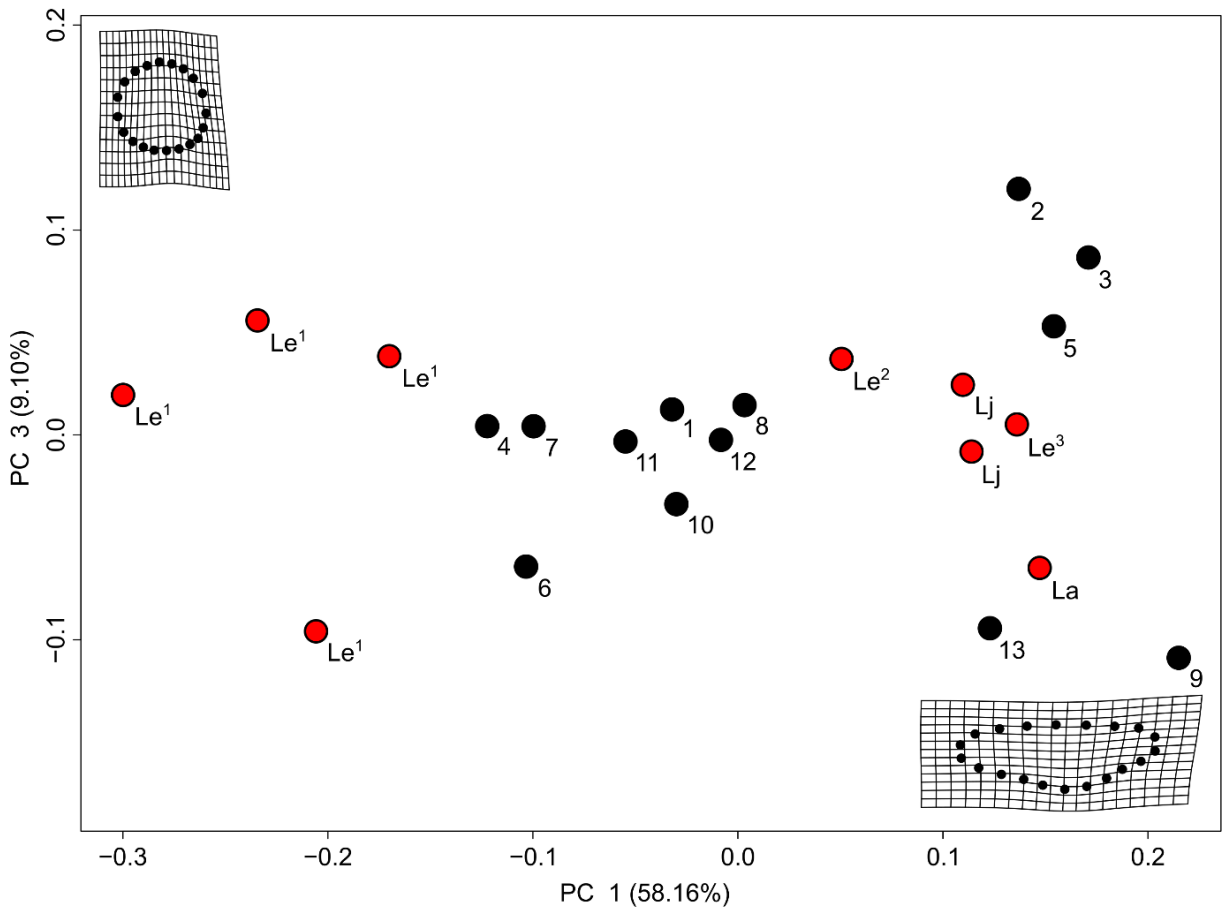
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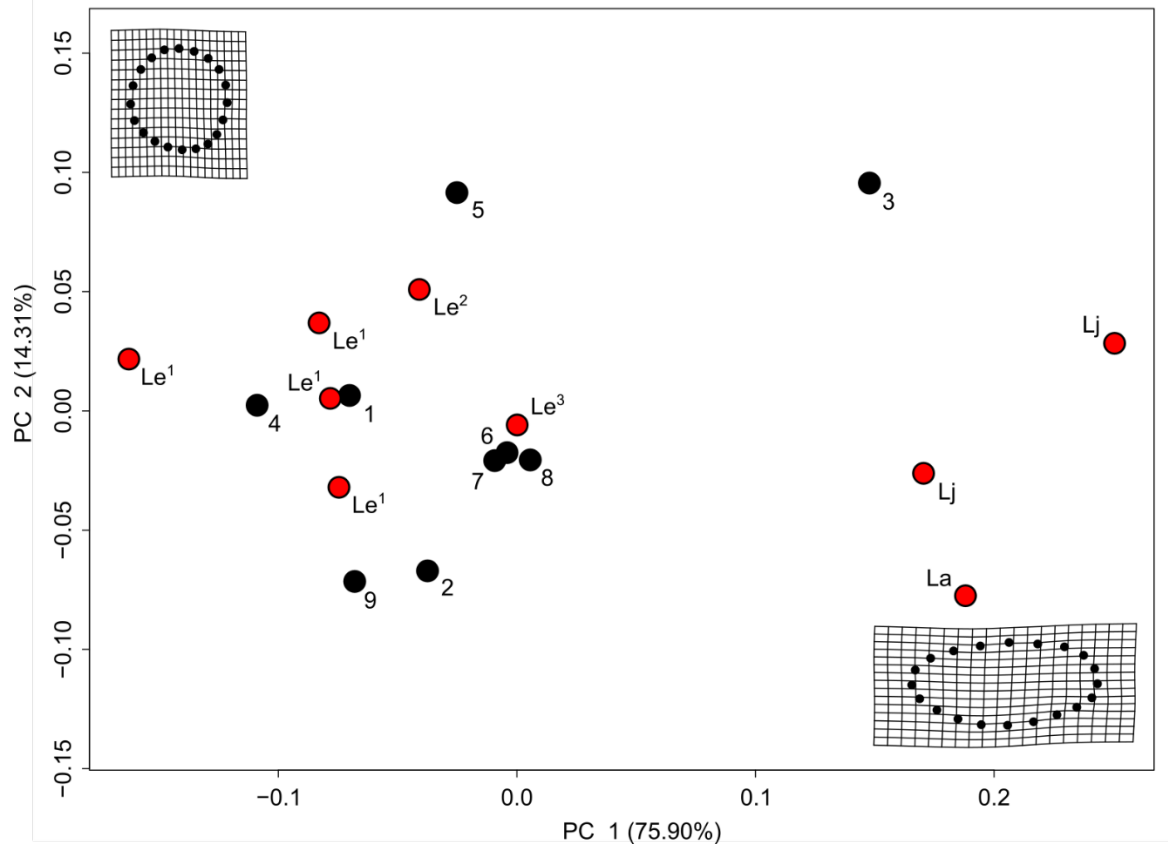
Supplementary Figures



Supplementary Fig. 1 Additional data on tooth development and tooth replacement in sauropodomorph dinosaurs. **a, b,** Skeletal reconstruction of presumed hatchling of *Lufengosaurus*, with cranial and dental data provided by the hatchling CUP 2037 (Catholic University of Peking, now housed in the Field Museum of Natural History), previously *Fulengia youngi*¹⁸. Note that by this stage of its ontogeny, the older tooth is fully erupted and functional (in red), and the replacement tooth is ventral to it (in blue), and has penetrated the pulp cavity through root resorption of the functional tooth. **c-e,** Skeletal reconstruction of adult *Lufengosaurus* for references, and CT data of dentary bone showing tooth development and replacement patterns that are typical of basal adult dinosaurs. **d,** Note the formation of a new tooth below the edge of the dentary bone, lingually. At this early stage of tooth development root resorption has not started yet, but in **e**, various stages of tooth development and root resorption are observed in this transverse CT sectional view of the dentary, with older teeth in red and replacement teeth in blue. **f, g,** Skeletal reconstruction of adult *Diplodocus* for reference, and dental battery in transverse CT section, showing functional teeth in red, replacement teeth in blue at various stages of development. Note that there is no evidence of resorption between teeth.



Supplementary Fig. 2 Geometric morphometric analysis of embryonic and adult sauropodomorph dentition. PC1 versus PC3 of crown cross-section (90.21% of the total variation). Deformation grids represent morphologies at the positive and negative extremes of PC1 in each plot. Numbers indicate: 1, *Abydosaurus*; 2, *Amygdalodon*; 3, *Bellusaurus*; 4, *Bonitasaura*; 5, *Camarasaurus*; 6 and 7, *Diplodocus*; 8, Kem Kem Titanosaur; 9, *Mamenchisaurus*; 10, MML PV 1030; 11, *Nemegtosaurus*; 12, *Rapetosaurus*; 13, *Shunosaurus*. Letters indicate: Le¹, *Lufengosaurus* embryonic t1; Le², *Lufengosaurus* embryonic t2; Le³, *Lufengosaurus* embryonic t3; Lj, *Lufengosaurus* juvenile; La, *Lufengosaurus* adult.



Supplementary Fig. 3 Geometric morphometric analysis of embryonic and adult sauropodomorph dentition. PC1 versus PC2 of root cross-section (90.21% of the total variation). Deformation grids represent morphologies at the positive and negative extremes of PC1 in each plot. Numbers indicate: 1, *Abydosaurus*; 2, *Bonitasaura*; 3, *Camarasaurus*; 4 and 5, *Diplodocus*; 6, Kem Kem Titanosaur; 7, MML PV 1030; 8, *Nemegtosaurus*; 9, *Rapetosaurus*. Letters indicate: Le¹, *Lufengosaurus* embryonic t1; Le², *Lufengosaurus* embryonic t2; Le³, *Lufengosaurus* embryonic t3; Lj, *Lufengosaurus* juvenile; La, *Lufengosaurus* adult.