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Unique bone histology in partial large bone shafts from Upper Triassic of Aust Cliff, England: An early independent experiment in gigantism

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TTwo giant partial bone shafts, possible femora, from the Rhaetian Bone Bed (Upper Triassic) of Aust Cliff in SW England continue to conceal their origin. The most striking characteristic of these bones is their size, showing that dinosaur-like gigantism had already evolved by the Late Triassic. Based on their characteristic, columnar shaft morphology, it was previously suggested they came from a prosauropod or stegosaur. The bone histology of both specimens is very similar: the cortex is always rather thin, not exceeding 10 mm, and is of fibrolamellar type with longitudinal primary osteons. The primary osteons show a rather unusual feature, the development of a secondary osteon inside the primary one. The bone surface in both specimens shows open vascular canals, suggesting that the animals were still growing at the time of death, but an external fundamental system (EFS) is visible in the outermost cortex of specimen BRSMG Cb3870. The external cortex shows dense growth marks, but their annual nature is difficult to ascertain. The bones are probably dinosaurian, as indicated by the fibrolamellar bone, and possibly belong to an unknown basal sauropodomorph lineage. Alternatively, some very large pseudosuchians may have evolved fibrolamellar bone independently as an adaptation for reaching giant size.

Key words: Reptilia, Dinosauria, bone histology, fibrolamellar bone, primary osteon, secondary osteon, Triassic, England.

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