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Carapace bone histology in the giant pleurodiran turtle *Stupendemys geographicus*: Phylogeny and function

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Stupendemys geographicus (Pleurodira: Pelomedusoides: Podocnemidae) is a giant turtle from the Miocene of Venezuela and Brazil. The bone histology of the carapace of two adult specimens from the Urumaco Formation is described herein, one of which is the largest of this species ever found. In order to determine phylogenetic versus scaling factors influencing bone histology, *S. geographicus* is compared with related podocnemid Podocnemis erythrocephala, and with fossil and Recent pelomedusoides taxa *Bothremys barberi*, *Taphrosphys sulcatus*, '*Foxemys* cf. *F. mechinorum*', and *Pelomedusa subrufa*. Potential scaling effects on bone histology were further investigated by comparison to the Pleistocene giant tortoise *Hesperotestudo* (*Caudochelys*) *crassiscutata* and the Late Cretaceous marine protostegid turtle *Archelon ischyros*. A diploe structure of the shell with well developed external and internal cortices framing interior cancellous bone is plesiomorphic for all sampled taxa. Similarly, the occurrence of growth marks in the shell elements is interpreted as plesiomorphic, with the sampled neural elements providing the most extensive record of growth marks. The assignment of *S. geographicus* to the Podocnemidae was neither strengthened nor refuted by the bone histology. A reduced thickness of the internal cortex of the shell elements constitutes a potential synapomorphy of the Bothremydidae. *S. geographicus* and *H. crassiscutata* both express extensive weight-reduction through lightweight-construction while retaining form stability of the shell. The bone histology of *A. ischyros* presents features likely related to an open marine lifestyle.

Key words: Testudines, Pleurodira, Pelomedusoides, Bothremydidae, Podocnemidae, *Stupendemys geographicus*, bone histology, Miocene, Venezuela.

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