



Structural characterization of the rocker bone in *Onuxodon fowleri* (Carapidae): insights into a possible convergent mineralized tissue

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The “rocker bone” is a skeletal element located at the anterior end of the swimbladder in some ophidiiform fishes, where it plays a role in sound production. However, despite its name, a previous study on the Ophidiidae species *Ophidion barbatum* demonstrated that the rocker bone cannot be considered an actual bony structure, but appeared to be novel type of mineralized tissue called “frigolite.” Within Ophidiiformes, some Carapidae species also possess a rocker bone anterior to the swimbladder. Consequently, it has been suggested that the rocker bones of certain Carapidae and Ophidiidae species may be homoplastic structures that evolved independently through convergent evolution. These structures may result from modifications of the swimbladder wall under mechanical stress from sonic muscle contractions. Yet, their nature in Carapidae has received little attention, and their evolutionary origin remains unclear. Here we examined the rocker bone and sonic muscle–induced stresses in the Carapidae species *Onuxodon fowleri*. Specifically, we estimated the theoretical maximum force of the primary sonic muscles and compared these values between sexes. Analytical techniques, including electron microscopy and energy-dispersive X-ray spectroscopy, were used to examine the ultrastructure and mineralization pattern of the rocker bone. The carapid rocker bone appears also to be mineralized and composed of tissues that are analogous to those found in *Ophidion barbatum*. These findings support the hypothesis of evolutionary convergence, indicating that rocker bones in Carapidae and Ophidiidae probably evolved independently under similar constraints.