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# Histological investigation of gerontic conodonts

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## Abstract

Conodont elements represent the earliest mineralized feeding structures in the vertebrate fossil record. Elements grew through discrete episodes of lateral accretion of lamellae, and conodonts were able to remodel and repair elements during the lifetime of the organism. Both of these processes created histological signatures that can be analyzed to understand the growth history and dynamics of the organism. Gerontic elements are relatively common in collections of conodont elements, but they are typically overlooked because they represent atypical morphology of the species they belong to. They are characteristically large and variably deformed, e.g., thickened or with unusual sculpture, but not obviously pathological. It is unclear why some specimens become gerontic, although a greater than typical age for the individual is implied. This research uses multiple techniques to observe histological signatures of gerontic elements. Hypotheses investigated include: spatiotemporal changes in rates of growth, spatial relationships of damage and remodeling/repair, intensity and frequency of damage, and amount and spatial relationships of growth centers. The specimens studied are both normal and gerontic P1 elements of *Idiognathodus* species from the Late Pennsylvanian (Missourian; Kasimovian; *I. cancellosus* Zone) Hushpuckney shale of the Swope cyclothem. Constraining the specimen set to a single genus and cyclothem allows assessment of gerontic histology without potential confounding effects due to phylogenetic signals or evolution of seawater chemistry.

**Keywords:** conodont, microstructure, histology, scanning electron microscopy, ontogeny, tissue remodeling

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