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## Nacre nanostructure as a T proxy

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Nacre, the iridescent inner lining of many mollusk shells, is widely studied due to its formidable fracture toughness. Nacre is iridescent because its structure alternates thin organic sheets and  $\sim 0.5\mu\text{m}$ -thick aragonite crystalline tablet layers. Mechanisms of nacre biomineralization have been documented: organic sheets form first [Bevelander et al., 1969] and these underpin aragonite polymorph selection [Belcher et al., 1996; Falini et al., 1996; Meltzer et al., 2010]; each nacre tablet starts growing from a single Nudelman site [Nudelman et al., 2006]; tablets form a Voronoi construction [Rousseau et al., 2005], with near-epitaxial crystal growth [Schäffer et al., 1997; Olson et al., 2012; 2013] through Checa bridges [Checa et al., 2011, Olson et al., 2012]; and c-axes gradually order away from the nacre-prismatic boundary [Gilbert et al., 2008; Olson et al., 2012]. What factors, biological or physical, determine nacre layer thickness (LT), however, remains unknown. Here we provide evidence that LT may depend on environmental temperature (T). We observe strong correlation of T and LT, measured with clumped isotopes [Eiler, 2007] and Polarization-dependent Imaging Contrast (PIC)-mapping [Gilbert et al., 2011], respectively, in Pinna shells from the Cretaceous, Eocene, Miocene, and modern.

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