

An Apatite for American Lobster

JOSEPH G. KUNKEL¹, BRIAN TARBOX², SABINE HILD³,

ALI N. BAHADUR⁴, MICHAEL J. JERCINOVIC⁵

¹ Marine Sciences, UNE Biddeford, ME 04005, (*correspondence:
[joe@bio.umass.edu])

² Marine Sciences SMCC, S. Portland ME,
[btarbox@smccme.edu]

³ Polymerwissenschaft Institut, JKU Linz AT,
[sabine.hild@jku.at]

⁴ Bruker BioSpin Corp., Billerica MA 01821,
[Ali.Bahadur@bruker.com]

⁵ Geosciences, UMass Amherst, MA 01003, [mjj@geo.umass.edu]

Focal use of carbonate apatite in heavily used cuticular structures such as mandibles and claws has been described in many crustaceans but we describe a more general use in cuticular gland canals, sensory neuron canals and trabeculae in the large clawed lobsters and in cuticular canals of other decapods. Different identifiable stoichiometries are found in stages of canal construction. Modification of apatite canal linings by fluoride occurs at environmentally apposed surfaces of canals. The regular use of apatite canals and the way they and trabeculae interleave with the Bouligand lamellae of the chitin/protein cuticle may provide toughness and resistance to fracturing for those decapods that use this structural strategy. Study with electron micro probe, Raman spectrophotometry, non-invasive ion probes and microCT have provided understanding of the microstructure and solubility of the layered mineralised cuticle. MicroCT allowed the 2D interpretations obtained with Electron micro probe, Raman spectrophotometry and non-invasive ion probes to be generalised to 3D structures. Understanding the temporal development of the cuticle structures is essential to discovering how vulnerability to epizootic shell disease (ESD) develops. ESD is a major threat to populations of lobsters and perhaps other decapods.

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