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## Shell Disease in the American Lobster, *Homarus americanus*, Involves Disolution of a Calcium Apatite Cuticular Layer

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While the majority of the calcium in the cuticle of the American lobster is found as other compounds of calcium, there is a significant layer of high phosphate calcium that appears to be calcium apatite. Empoundment shell diseased lobster examined at the periphery of active lesions was seen to exhibit erosion of the apatite layer that lines the superficially healthy dermal gland pores, which are likely sites for the attack of the as yet unidentified pathogen. The mineral content of the cuticle is determined at submicron resolution by the use of freeze substitution and embedding of the cuticle in Epo-Thin low viscosity epoxy resin. The embedded cuticle was ground down and polished using only organic solvents and polishing media to a 0.25 micron diamond limit. The cuticle was viewed in a Cameca SX50 Electron Microprobe. Plots of pixelwise calcium vs phosphate revealed distinct layers of calcium and phosphate associated with the epi-, exo- and endocuticles. In addition there was a specialized layer of apparently calcium apatite associated with the dermal gland pores, which traverse the entire cuticle from epidermis to the exterior cuticle surface. It is suggested that this apatite structure provides a security barrier at this vulnerable interface which might be an avenue of attack by microorganisms. Nonetheless, dermal gland pores close to active shell disease lesions had this apatite layer eroded of its phosphate content.

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