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Assessment of Oyster Shell Structural Properties for the Development of 'Green' Composite Materials

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CRYOPRESERVATION OF GAMETES, EMBRYOS, AND LARVAE IN SHELLFISH. **Huiping Yang** and **Terrence R. Tiersch.** Aquaculture Research Station, Louisiana State University Agricultural Center, 2410 Ben Hur Road, Baton Rouge, LA, 70803, USA.

Cryopreservation is a useful technique that can be applied to preservation of endangered species, maintenance of specific strains or lines for breeding programs, and preservation of genetic resources for biodiversity. The first successful sperm cryopreservation was in fowl in 1949. For shellfish, sperm cryopreservation was first reported in the Pacific oyster *Crassostrea gigas* in 1971. To date, there are a total of 44 research papers published on cryopreservation in molluscan species, and 17 in crustacean species. The mollusks include oysters, mussels, clams, and abalones, and the crustaceans include shrimps and crabs. The materials used for cryopreservation were sperm, oocytes, embryo, and early swimming larvae. As a general rule, cryopreservation involves a series of steps including sample collection, sample extension (dilution), cryoprotectant selection, cooling, storage, thawing, use for fertilization and viability evaluation. Development of protocols for cryopreservation requires suitable choices at each step and consideration of the interactions among factors. Currently, the protocols described in the published reports of shellfish cryopreservation vary significantly, and there are no reports of application in commercial production. Future research should focus on development of standardized and reliable protocols for high post-thaw viability and high-throughput application.

POPULATION GENETICS OF BENTHIC CRUSTACEANS: CAN WE TALK ABOUT SELECTION NOW? **Bree K. Yednock** and **Joseph E. Neigel.** University of Louisiana at Lafayette, 300 East St. Mary Boulevard, Lafayette, LA, 70504, USA.

For the past 25 years, the paradigm for the population genetics of benthic crustaceans has been that gene flow resulting from planktonic dispersal is the dominant microevolutionary force acting on genetic population structure. One corollary of this assumption is that gene flow overpowers selection such that local adaptation cannot occur. A second corollary is that genetic differentiation among populations with planktonic dispersal is caused by physical oceanographic barriers that prevent dispersal. Challenges to this assumption have come from two directions. First, it is now widely recognized that planktonic larvae do not necessarily imply widespread, effective dispersal. Larval behavior, coupled with spatial and temporal heterogeneity in oceanographic conditions, can result in much shorter dispersal distances than would be expected from passive particles. Second, population genetic surveys of crustacean species have revealed genetic patterns that are difficult to explain under a paradigm of high gene flow. We review these findings, present the evidence for natural selection as an explanation, and consider the implications for conservation and management.

ASSESSMENT OF OYSTER SHELL STRUCTURAL PROPERTIES FOR THE DEVELOPMENT OF 'GREEN' COMPOSITE MATERIALS. **Yuhchae Yoon[1], Andrew S. Mount[2], Douglas C. Hansen[1],** and **Karolyn M. Hansen[1].** [1]University of Dayton Research Institute, Dayton, OH, 45469, USA; [2]Clemson University, Clemson, SC, 29634, USA.

The delicate and extremely efficient natural materials produced by organisms in the process of bio-mineralization are widely recognized as inspiration for new novel materials because of their unique properties and their hierarchical order often over several length scales. The molluscan shell formation process is a promising model for development of bio-inspired composites for a wide variety of applications in fields as varied as adaptive surface coatings, corrosion inhibition, hybrid composite materials and more. Recently, a novel mechanism for biomineralization and shell formation in the Eastern oyster (*Crassostrea virginica*) has been elucidated that involves a cellular-mediated process that had previously been unknown. Polycrystalline calcitic mineral deposition by oyster blood cells has been demonstrated in the laboratory with the resultant formation of ceramic films and multilayer coatings on various metallic substrates. In the present study, we now characterize the native oyster shell material in terms of electrochemical and thermal properties in order to determine the potential for using oyster composite material as 'green' environmentally-friendly coatings.

A SEXUAL COMPARISON OF PROSTAGLANDIN E TITERS IN DIPLOID VERSUS TRIPLOID *CRASSOSTREA VIRGINICA*. **Esther Young, Shana Garrett, John Supan,** and **John Lynn.** Louisiana State University, 107 LSB, Baton Rouge, LA, 70803, USA.

Prostaglandin E (PGE) titers have been correlated with ovarian maturation and estradiol concentrations in diploid *Crassostrea virginica* (Lynn *et al.*, 2006). In this research, prostaglandin E (PGE) titers associated with male and female diploid and triploid non-reproductive *C. virginica* were assayed using Prostaglandin E Metabolite EIA kits (Cayman Chemicals). Diploid and triploid *C. virginica* were grown to the same average height and weight at the Sea Grant Bivalve Hatchery in Grand Isle, LA. In March, hemolymph was taken from 23 diploid and 23 triploid *C. virginica*. Hemolymph samples were frozen in liquid nitrogen, and transported to a laboratory in Baton Rouge, LA for analysis of PGE titers. Sampled oysters were measured for height, weight, sex and assessed for gonadal condition. In both diploid and triploid *C. virginica*, females predominated the sex ratio. There was a higher incidence of indifferent gonads in the triploid cohort and a greater number of diploid males. Triploid male and female oysters showed decreased PGE titers than diploid males or females. In indifferent *C. virginica*, PGE titers were higher for triploids than diploids, but approximately equal to triploid females. We hypothesize lower PGE levels in triploid *C. virginica* may reflect low fecundity observed in triploid populations.

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