9th International Conference and Workshop on Lobster Biology and Management

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A Summary of the Special Session and Workshop on Disease

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It seems the anticipation of the 9th ICWL in Norway lasted forever – then it was over! We saw many regular faces and quite a few new ones, but I think all would agree it was a grand time. The quality of presentations was superb, but the Session and Workshop on Disease was a true highlight.

The effect of disease is increasingly recognized as a major driving force in marine organism abundance, population and community structure, and fishery dynamics. Lobsters are model organisms to study these processes. Several diseases have major impacts on lobsters from different families (Nephropidae and Palinuridae), different latitudes (tropical and temperate), and different habitats (coral reef, rocky, and soft sediment). These diseases, *Panulirus argus* virus 1 (PaV1), epizootic shell disease (ESD), *Hematodinium*, and others were showcased in a dynamic and intriguing series of talks that culminated in a vibrant discussion of various disease topics during the workshop.

Keynote addresses

Mark Butler set the stage for the disease theme with a keynote address outlining the importance and ramifications of disease on fisheries, populations, communities, and even ecosystems. He noted the direct effects, but brought attention to the subtle, indirect effects of disease through examples such as the effect of marine protected areas on disease dynamics. Kathy Castro followed this introduction with a keynote that focused on ESD infecting American lobsters in southern New England and the issue of managing disease in fisheries. Her presentation underscored the need to take a comprehensive approach to studying disease from pathogen identification and pathobiology to population-level effects, ecological alterations, and fishery impacts.

Disease session

The broad overviews prepared us well for the varied suite of talks that answered many long-standing questions, but posited many more. Nina Sutherland kicked us off with a homegrown study of the American lobster *Homarus americanus* in Norway and the potential for shell disease infecting the European lobster *H. gammarus*. Although shell disease was observed in some of the American lobster specimens discovered in Norway, transmission to the European lobster does not appear to have occurred. However, *H.*

gammarus does appear susceptible to Gaffkemia caused by the bacteria *Aerococcus viridians*, which Paul Stebbing described infecting European lobsters around the UK, and may have originated from *H. americanus* imports.

Rick Wahle then brought attention back to the original home of *H. americanus* and discussed a remarkably strong linkage between ESD and recruitment failure in the southern New England stocks so heavily impacted by the disease. Grant Stentiford then swept us down to New Zealand to introduce us to *Myospora metanephrops*, the first microsporidian parasite described from a Nephropid lobster in *Metanephrops challengeri*. Joseph Kunkel and Barbara Somers followed with their "100 Lobster Project" research on ESD in American lobsters during the morning session. Joe's work on mineralization and the structural defense of the exoskeleton has taken us a leap forward in understanding how the cuticle structure itself might moderate susceptibility to shell disease, and opened up numerous new channels to explore. Barbara's presentation capped the shell disease talks by giving us an overview of the New England Lobster Research Institute (NELRI) and their mission to address the problem of ESD. The NELRI, funded through a $2.3 M Congressional appropriation, is a fine example of how resources can be brought to bear on an issue if there is political and scientific will.

Standing in for Brian Jones, Nick Caputi gave a brave performance regarding disease in Australian and New Zealand lobsters, before we moved to the tropics for a series of talks on PaV1 in *P. argus*. Andrew Keogh (Paul Kanciruk Award recipient) gave a provocative presentation evaluating Caribbean lobster population connectivity and the potential for PaV1-infected lobster larvae to act as vectors of disease. Patricia Briones-Fourzán and Enrique Lozano-Álvarez then teamed up for a pair of presentations evaluating the effect of casitas on PaV1 prevalence and transmission in juvenile lobsters. Due to their large size compared to natural shelters, casitas appear to permit more cohabitation than would otherwise be expected in a system where healthy animals avoid sheltering with disease conspecifics, and although preliminary, there is evidence of density-dependent prevalence in some areas where casitas were experimentally deployed. The fisheries theme continued as I presented work we have done on PaV1 in the Florida trap-based fishery. We found a surprising 11% of lobsters in the fishery were PCR-positive for PaV1, other lobsters avoid traps that contain PaV1-infected lobsters, and PaV1-infected lobsters have the potential to transmit the virus to other lobsters confined with them. Finally, Nancy Herrera-Salvatierra (Paul Kanciruk Award recipient) and I discussed the physiological and ecological effects of PaV1, respectively. Nancy showed that PaV1 infection has significant effects on lobster metabolism and potentially depresses the immune system of infected lobsters, while I showed that PaV1 has significant ecological effects, reducing movement of juvenile lobsters, excluding some lobsters from shelter, and potentially raising the rate of predation on diseased and healthy lobsters. We all then took a collective breath and a coffee before heading into the workshop!

Disease workshop

Jean Lavallée launched the workshop with a fascinating crime scene investigation of sporadic mortalities in *H. americanus* from large lobster pounds. Jean's presentation and the stimulating prior series of disease presentations whet the appetite to talk about how to manage fisheries and culture in the face of disease. Despite the waning time (not light, as

it never gets dark in Norway in June!), the discussion was vibrant and included ideas on how to reduce ESD, such as the culling of infected lobsters and not returning them to the water, and the controversial suggestion of harvesting all the reproductive females in southern New England to eliminate the host with the highest prevalence! Possible causes of ESD were discussed at length, including hypoxia, oil spill contamination, and rising ocean temperature. Discussion then moved to the question of emergence and the difficulty in establishing it in diseases, such as PaV1, which have their greatest effect on juveniles. Grant Stentiford concluded the workshop with a presentation on the recently formed European Union Reference Laboratory for Crustacean Diseases and the role they play in monitoring and controlling the spread of crustacean diseases to the EU and world-wide.

Disease posters

The poster session was a great casual affair that fostered discussion and hatched new collaborations. Disease featured prominently with eight disease-themed posters. Nick Beevers gave an update on *Hematodinium* infection in *N. norvegicus* around Scotland, Nathan Rycroft presented his work on the effects of ESD on *H. americanus* female mate choice and male dominance, and Andrea Battison showed an odd case study of a “lumpy” American lobster with numerous subcuticular uric acid accumulations. The remaining posters focused on PaV1, where Josh Anderson displayed his work on olfactory detection of PaV1 by *P. argus*, Jess Moss revealed the discovery that PaV1 has been found in post-larvae and shows high genetic variability, Tom Dolan detailed his modeling work on PaV1 avoidance behavior, and Juan Huchin-Mian presented the details of work focused on the effects of casitas on PaV1.

As the curtain closed on the 9th ICWL and we all said farewell to our gracious Norwegian hosts, colleagues, and the fair city of Bergen, plans were already afoot for a disease session at the next ICWL. See you on the sunny shores of Cancun, Mexico in 2014!

Hasta luego!

Don