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National Shellfisheries Association Quarterly Newsletter

2019 (2)

President's Message



Depending on where you live on our planet, it's either summer, winter, or somewhat similar for those in the equatorial region. What does this mean for you and your shellfish? For one, it's a reminder of our constantly changing world. But one thing that is not changing is that the National Shellfisheries Association is here for you. The Newsletter is a megaphone for industry and academic kudos and concerns, announcements of accomplishments, and informative articles.

What other megaphone should our Association use? Social media has become that megaphone for many. Please follow the "National Shellfisheries Association" on Facebook and "@NationalShellfisheries" on Instagram. If you are not on either of these social media sites, this is the time to start. Recruits co-chair, Erin Roberts, is the primary contact for Instagram posts, and I am the primary contact for Facebook posts. Please send us photos and a few lines, or links to material, for which our members would have an interest. We'll be posting whatever we can, such as the recent student NSA award winners.

If you have not been following NSA on Facebook, you may have not heard that two of our senior members passed away earlier this year: C. Austin Farley and Carl J. Sindermann. If you are a student, do an internet article search on these two scientists to see their contributions to shellfisheries. If you knew them, you know how they affected many and I am sure you have stories to tell.

I am pleased to announce that the Association has created a new professional award, the Galtsoff Industry Award. Any student or researcher working on oysters should know the name Paul S. Galtsoff and his 480-page monograph "The American Oyster *Crassostrea virginica* Gmelin" in the 1964 *Fishery Bulletin*. The Executive Committee hopes you agree with the creation of this new award recognizing outstanding contributions by our members (see description on p. 6).

The Executive Committee has a change. Treasurer, Dr. Nature McGinn, found that her professional demands were not allowing her enough time to fulfill her duties. She served the Association over the years in many facets as a student member, such selling raffle tickets at each meeting, as a Recruits chair, and on the ExCom in several positions. She is not leaving our Association, but has requested to step down a year early from her position. Until another Treasurer is in place, I will be fulfilling the Treasurer duties. We valued Dr. McGinn's service and expect that when her career demands ebb, she will be ready to step back into service for the Association. If you are good with numbers and have about 30 minutes a day (sometimes more, sometimes less) and would like to be considered for Treasurer now or in the next election, please contact me. All members contribute in some way to our Association; the Treasurer position requires a bit more time for that contribution.

Let us continue to make contributions to shellfisheries and the Association by publishing your research findings in our journal, recruiting new members, assisting the Association in any manner you can, and participating in the next annual meeting in Baltimore.

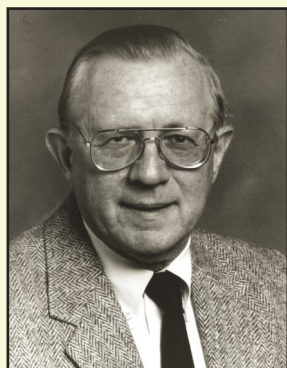
John Scarpa, President

In this issue:

- ***Student Research Awards Announced***
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IN MEMORIAM

Carl Sindermann



August 28, 1922 - April 26, 2019

Carl Sindermann was an Honored Life Member and a full bibliography and obituary will appear in a future issue of the *Journal of Shellfish Research*.

Student Endowment Fund Travel Award Now by Lottery

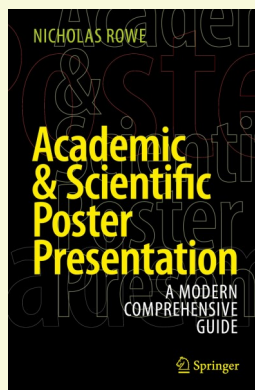
Beginning with the 112th Annual meeting in Baltimore, MD (Mar. 29 to Apr. 2, 2020), Student Travel Awards will be decided by a lottery system. Any graduate student who submits an abstract (as first author) for either an oral or poster presentation AND is a current member of NSA is eligible to apply. Please visit the student member section of the NSA website (<https://www.shellfish.org/student-members>) to download a lottery application. The deadline to be considered for the lottery is the same as the meeting abstract deadline (December 1, 2019). Students who apply will be notified of the lottery results by mid-December.

Call for papers deadline: March 18, 2020



Contact: Jay Parsons, Co-Chair Organizing Committee (Jay.Parsons@dfo-mpo.gc.ca)

Book Review: Academic and Scientific Poster Presentation



2017. Springer International Publishing. 170 p. Softcover \$34.99; eBook \$24.99 ISBN 978-3-319-61280-5

Posters are now the most prevalent medium for dissemination of information at conferences, yet their impact is still underrated, as is often their position in the hierarchy of scientific communication. The author points out that in the early days, posters provided authors with a means to engage in meaningful dialogue;

however, now there is little direct engagement with the audience at large conferences. Delegates are often faced with 'too many presentations', cannot see all that they might like, and thus the poster presentations do not achieve their full potential. The goal of the book is to elucidate the basic aims of poster presentation, i.e. networking and sharing research findings, and how to do this more effectively. In short, there is far more to preparing a poster than "producing a clear and structured physical poster".

This book is far more than a 'how to' volume. It discusses the history and current acceptance of posters as an effective means of science communication. Rowe discusses not only the effectiveness of conference poster presentations, but also how to increase their impact, with several chapters devoted to practical discussions of design and content.

The book contains 13 chapters beginning with a very interesting history of the poster as a means of communication, and covers the objectives and function of posters, the concept of information exchange and interaction with readers, design and visual elements, and even a section on evaluation and assessment. There is an interesting presentation on reading rate and capacity which puts the amount of words that can practically be consumed and comprehended by the average reader in perspective, i.e. too many words defeats the purpose of the poster presentation and reduces the likelihood that readers will be able to spend the requisite amount of time on a given poster. There is discussion of delivery of posters as well as recommendations for conference organizers when planning poster sessions.

The book is very nicely illustrated including a photograph of an early 'trifold' with glued-on pages, generalist diagrams, examples of posters, and, one of my personal favorites, a color wheel with an explanation of colors, their meaning, and their use and misuse. There is a comprehensive reference list, checklists for presentations, a key bibliography on poster presentations given in a tabular format, and the entire book is pleasant read. This book will become a recommended text in my course, and I highly recommend it be the same for yours.

Sandra E. Shumway

NOAA Milford Lab Renews Commitment to Microalgal Starter Cultures

Last year, the NOAA Fisheries Lab in Milford, Connecticut, hired a highly qualified permanent curator to maintain the microalgal culture collection, renewing its long term commitment to providing high quality microalgal cultures to industry and training on their use. The lab will continue this free service to the shellfish aquaculture industry following the retirement of Jennifer Alix, who maintained the culture for 25 years.



Lisa Guy, the new Curator of the Milford Microalgal Culture Collection. Taken by: George Sennefelder (NOAA Fisheries)

Culture Curator Lisa Guy joined the Milford Lab in September 2018 after ten years with the Horn Point Oyster Hatchery in Cambridge, MD, where she served as head algologist for the last four years. She holds degrees in biology and environmental science. Her role directly supports the shellfish aquaculture industry and research community: in 2018 alone, Milford sent out more than 375 starter cultures.

The Milford Microalgal Culture Collection is both a resource to support shellfish research and an extension service. The lab provides starter cultures in vials with growing instructions to shellfish hatcheries, the commercial aquaculture industry, and the research community throughout the United States. The lab also convenes the Milford Microalgal Culture Workshop, which teaches participants to manage stock and production cultures, scale up cultures for feeding in the hatchery, and decide how much of each type of algae to produce to feed broodstock, larvae, and post-set shellfish. The workshop is free of charge, with participants responsible for their own travel. It has been on hiatus since Jennifer's retirement, but will resume in early 2020.

On her role, Lisa Guy said, "I'm excited for the opportunity to work closely with the aquaculture industry through providing quality starter cultures. I'm enjoying learning from and engaging with the Northeast shellfish community."

The Milford Microalgal Culture Collection, like the lab itself, has an illustrious history. The collection was first established by Dr. Robert R.L. Guillard in the mid-1950s and built by Dr. Ravenna Ukeles throughout the 1960s-1980s. Over 200 algal strains are currently archived, and the collection is kept in climate-controlled incubators and a "light room". Copies of all strains are perpetuated by periodic, serial subculture in three different media: enriched seawater, artificial seawater, and semi-solid media. This redundancy provides security in the event of equipment failures and other unforeseen challenges. The collection includes representatives from most of the major microalgal classes and essentially all strains used in aquaculture world-wide.

To learn more, please visit the Milford Lab's website: <https://www.fisheries.noaa.gov/about/milford-laboratory>

2019 NSA Student Research Awards

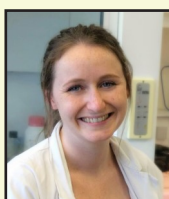
Congratulations to the student research awardees! These competitive grants provide \$1250 in support funding earmarked for student research projects as well as for the best student paper published in the *JSR*.

The **George R. Abbe Award** for student research recognizes a student's excellence in any research in the areas of crustacean biology and fisheries management. Winning this year was Jordanna Barley, Western Washington University, for his project entitled, "Exploring mechanisms underlying the range limit of a marine crab in a warming hotspot".



The **Melbourne R. Carriker Award** supports a student research project on any topic of shellfisheries. The 2019 Carriker Award was presented to Erin Roberts, University of Rhode Island, for her proposal entitled, "The role of apoptosis phenotype and gene expression in eastern oyster disease resistance".

The **Michael Castagna Award** for student research is an award devoted to the area of applied shellfisheries. Winning this year was Daniel Bowling, North Carolina State University, for his proposal entitled, "Research and extension in support of a stock assessment survey for oysters in North Carolina".



Judging of the **Sandra E. Shumway Award** for the Best Student Paper published in the *JSR* has specific selection and evaluation criteria: (1) The lead author must have been a student when the work was completed, (2) the paper must present the student's work, not that of a co-author, (3) it will be evaluated on the quality of science and writing, and (4) the importance of the work to the field of shellfish research. A panel of judges deliberated, and the award was presented to Daphne Cherel, University of Nante, for her manuscript:

Cherel, D. and Beninger, P. 2017. Oocyte atresia characteristics and effect on reproductive effort of Manila clam *Tapes philippinarum* (Adams and Reeve, 1850). *Journal of Shellfish Research*, 36(3): 549-557.

I wish to thank all the students for submitting their proposals as well as the reviewers for taking the time to evaluate each these proposals and student papers so thoughtfully.

Proposal are due annually by November 1st.

Start planning now! Details are available at www.shellfish.org.

Karolyn Hansen, Past-President



2018 George R. Abbe Student Research Grant Update

Awardee: Patrick Barnes

Western Washington University

*“Evidence of biotic resistance to invasion by
European green crab in Coos Bay, Oregon”*

Ecological research mainly focuses on species interactions, such as whether the non-native European green crab (*Carcinus maenas*) will develop large, dense populations in the Pacific coast that subsequently harm commercial shellfish production or damage structured eelgrass habitat via their feeding preference for juvenile bivalves. Researchers hypothesize that large, native species such as red rock crab (*Cancer productus*) and Dungeness crab (*Metacarcinus magister*) provide effective biotic resistance to invasion by keeping the green crab population size in check, and there is substantial evidence to support this claim; however, at the heart of this question is an untested assumption about the spatial ecology of crabs: does the spatial distribution of these species within estuaries allow for the types of agonistic interactions that would limit the population growth of green crabs?



Understanding how species interact with each other requires detailed knowledge of how individuals and populations use space, but there are limited methods available to researchers interested in collecting data to answer questions like this. Ultrasonic telemetry is one way researchers can gather data on the space use of benthic aquatic animals such as crabs, but the use of this technology is limited by the cost of equipment (~\$150 - \$500 per tagged animal). In addition, there have been no studies that verify that tagged crabs use space in the same way as untagged crabs. Therefore, the focus of my research has been the development of affordable, customizable ultrasonic telemetry and a simple experiment aimed at testing the validity of data collected using ultrasonic telemetry.

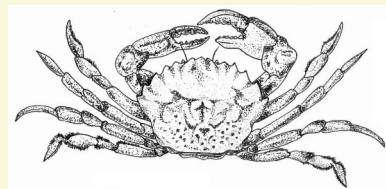
During the 2017-2018 academic year, I collaborated with electrical engineering faculty and computer science undergraduates to develop prototypes of the Crab Tracker. This system, like all ultrasonic telemetry systems, will use sound signals to help the user relocate tagged underwater animals. The Crab Tracker is much more affordable than commercially

available telemetry systems (~\$15 per tagged animal), and will allow a single user to relocate animals from a small watercraft such as a kayak or canoe. The Crab Tracker also improves upon current methods by using a touchscreen to display the direction to animals and including a built-in, user-customizable database that can be used for data entry and easily customized to suit specific needs of different studies. The system as a whole is not fully functional, and each individual component is currently in a different stage of prototype testing. All details and files needed to fabricate current Crab Tracker prototypes will be available in an online repository in August 2019.



During the fall of 2018, I supplemented the development of the Crab Tracker telemetry system with a manipulative experiment to determine whether prototype Crab Tracker emitters cause biases in the locomotion and burial habits of red rock crabs. To do this the total distance moved, proportion of time spent moving, total burial depth, and proportion of time spent buried were measured for 80 crabs – 40 fitted with dummy Crab Tracker emitters and 40 without. Also, whether telemetry tags hindered the crabs' ability to right themselves when flipped upside-down was tested.

This experiment determined that telemetry devices do not cause changes in the movement and burial patterns of crabs kept in small aquariums. The results of this study suggest that the 5% tag-to-body mass ratio currently used as an unofficial guideline in telemetry studies of benthic crustaceans is unnecessarily conservative, at least for short-term studies: tags did not affect the behavior of smaller rock crabs differently than larger rock crabs through a range of tag-to-body mass ratios from 1% - 11%. Results of this study also show that, for red rock crabs, the smallest crabs that can be tagged without affecting their behavior are crabs that can right themselves after being tagged – this benchmark will provide a quantitative and repeatable size guideline for future telemetry studies. Tagging smaller crabs will allow researchers to study different life stages of animals and investigate interactions between different life stages of different species in much more detail.



2018 Michael Castagna Student Research Grant Update

Awardee: Caitlin O'Brien

Western Washington University

"Genetic evaluation of pinto abalone, Haliotis kamtschatkana, at long-term restoration sites in the San Juan Island Archipelago, Washington"

The pinto abalone, *Haliotis kamtschatkana*, provides important benefits to the rocky reef habitat by grazing upon micro- and macro- algae that would otherwise overtake the reef. The abalone clears habitat for new species recruitment, which in turns, improves overall health and diversity. Overharvesting of abalone populations in Washington State led to a fishery closure in 1994. Populations are still on the decline, and it is becoming harder to find these culturally and ecologically significant snails. The WDFW estimates a 98% decline in populations since 2002. As broadcast spawners, the snails must be close enough in proximity for egg and sperm make contact. Without human intervention, it is unlikely that pinto abalone populations will successfully reproduce in the wild as remaining individuals are sparse.

The Puget Sound Restoration Fund (PSRF) and WDFW have collaborated to rebuild natural populations of pinto abalone through conservation aquaculture which is predicated on genetic diversity being maintained to limit introduction of deleterious traits. The PSRF uses single-parent crosses of wild-caught broodstock to produce first-generation progeny for restoration sites in the San Juan Archipelago; however, maintaining genetic diversity, while necessary, can be a hindrance to hatchery production. In a highly reduced population, replenishing wild-caught broodstock becomes more difficult each year. In addition, during a hatchery spawning event, it is unlikely that all animals selected will produce viable gametes, thus limiting available single-parent cross options. Occasionally, only one sex produces gametes, or, alternatively, no new crosses are formed, resulting in wasted sperm and eggs. With so much care, time, and cost going into producing pinto abalone, there is little room for inefficient practices such as wasted gametes during a short breeding season. One solution to improving production while maintaining genetic diversity is to preserve gametes for future use.

Cryopreservation allows for the preservation of gametes by exposing cells to extremely low temperatures without causing damage. Cryoprotectants, add macromolecules that reduce the formation of damaging ice crystals on the cell membrane during the freezing process, and were evaluated using a series of freeze/thaw temperatures, and methods of quality assessment specific to male pinto abalone sperm developed. Sperm quality was assessed by motility, using a computer-assisted sperm analysis (CASA) system. The cryopreservation technique developed was then evaluated by fertilization.

Cryoprotectants, while useful, can be toxic if administered incorrectly. Determining the threshold between toxicity and effectiveness during the freezing and thawing process is imperative. The toxic effects of three cryoprotectants were tested: dimethyl sulfoxide (DMSO), glycerol (GLY), and

propylene glycol (PG). To date, DMSO is the most successful cryoprotectant in marine invertebrate sperm cryopreservation. DMSO has been used to cryopreserve sperm in other abalone species such as: *H. rufescens*, wild and farmed *H. laevigata*, farmed *H. rubra*, *H. diversicolor*, and *H. discus*. Not surprisingly, DMSO at 5% was the least toxic for pinto abalone, yielding the highest percent motile sperm.

The effectiveness of the selected cryoprotectant during the freezing/thawing process using a programmable freezer was tested. Freezing rates, endpoint temperatures, and thawing temperatures were evaluated to determine the highest percent motile sperm post-thaw. A freezing rate of $-3\text{ }^{\circ}\text{C min}^{-1}$ to an endpoint temperature of $-60\text{ }^{\circ}\text{C}$, preserved in liquid nitrogen (-196°C), then thawing in a 40°C water-bath yielded the highest percent motile; however, only endpoint temperature had a significant effect on percent motility, with no significant interaction between the three factors.



Using the developed cryopreservation technique, the percentage of eggs fertilized with cryopreserved sperm was much lower than with untreated sperm. This is likely due to the greater proportion of inactive sperm versus active sperm in cryopreserved samples. The highest percentage fertilized using cryopreserved sperm was 12.2% using a concentration of 1×10^6 sperm mL^{-1} with 14.2% post-thaw motility; however, for PSRF to use this technique reliably there needs to be higher fertilization and more overall consistency. In a review of marine invertebrate cryopreservation, other abalone studies have seen fertilization success ranging from 48% up to an impressive 94%. These studies support the thought that optimization of my existing methods will likely show an increase in fertilization.

The hatchery program is, first and foremost, a restoration effort used to reach the minimum density needed for successful reproduction in wild abalone, but not at the cost of damaging the existing population. My results show that cryopreserved pinto abalone sperm can fertilize eggs; however, optimization is still needed to utilize cryopreservation as a restoration tool. Through this study, I have outlined the first attempt at cryopreservation for pinto abalone sperm and provided a foundation for further refinement of this method. I thank the National Shellfisheries for their generous award and contribution to completion of my M.S. in Biology at Western Washington University. My completed thesis and progress can be found at <https://cstarob.wixsite.com/portfolio/research>.

The 22nd International Pectinid Workshop: An Overview



The setting was perfect for scallop aficionados and enthusiasm was high at the 22nd International Pectinid Workshop held in Santiago de Compostela, Spain from April 24-29, 2019. Three participants arrived via the El Camino de Santiago de Compostela Pilgrimage, two on foot and one via bicycle. Other pilgrims arrived from 15 countries to present 40 contributed presentations and 15 posters. The meeting was dedicated to two long-standing Scallop Fondlers and past organizers, Neil Bourne and Norm Blake.

The conference organizers (uncles and aunts) Luz Pérez-Parallé, Jose Luis Sánchez, and Antonio J. Pazos were most gracious hosts and provided the attendees with a solid program, scrumptious meals, and a delightful day trip - the requisite bus ride and then a boat trip to the wine country in Cañones del Sil.

Participants were treated to four invited lectures on the state of aquaculture in the European Union by the General Deputy Director of Aquaculture, Xunta de Galicia, Spain, Ángeles Vázquez, 'Great scallop, coquille Saint-Jacques or Viera, Symbol, meaning and design in Santiago de Compostela by Juan Monterroso, of the Art History Department at the Universidad de Santiago de Compostela, the marine biotoxin monitoring program in Galicia by Covadonga Salgado, Director of INTECMAR, Spain, and management of the scallop fishery and commercialization in the Ria de Arousa by R. Costa and J.C. Mariño, Confraria Cambados, Spain. The scientific program was heavily focused on commercial fisheries and management, with other contributions on aquaculture, genetics, physiology, biochemistry, and ecology.

The gala dinner consisted of a scrumptious menu of local fare and was followed by the usual presentation of awards, both serious and otherwise. Awards were presented to students Camilo Merino von Brand (Chile) and Ana Lopez Diéguez (Spain) for Outstanding Posters, Hunter Tipton (USA) received Honorable Mention and Pablo Ventoso (Spain) received the award for Outstanding Oral Presentations.

While the attendance was limited, the conference can only be classified as a success on all fronts. Mark your calendars now - the 23rd International Pectinid Workshop will be held in 2021 in the Isle of Man.

Sandy Shumway



NSA ANNOUNCES NEW AWARD

The Paul Galtsoff Industry Award

for outstanding leadership and contributions to the shellfish industry



The Association recognizes accomplishments of its members through a number of awards, such as the Honored Life Member Award, Neil Bourne-Kenneth Chew Award, and David H. Wallace Award. Over the last few years the Executive Committee has seen many applicants deserving of an award that did not fit any of the current award criteria, particularly for those whose activities link science and outreach to solve industry needs. Discussion during the past two Executive Committee meetings has resulted in the proposed Galtsoff Industry Excellence Award. Paul Simon Galtsoff was a Russian immigrant whose scientific contributions still assist the U.S. oyster industry. Most of us know his name through his 1964 monograph *The American Oyster*, although he did much more.

NOMINATIONS WILL BE REQUESTED IN THE FALL.

Smart material made from squid teeth a potential plastic alternative

By Alice Lipscombe-Southwell



A newly-discovered material made from squid teeth could one day replace man-made fibres like nylon and polyester. According to the recent review in *Frontiers in Chemistry* by Abdon Pena-Francesch and Melik C. Demirel, this would help reduce microplastic pollution in the oceans, as well as paving the way for new possibilities such as self-repairing safety clothing, or garments with built-in, flexible screens.

The smart materials in question are made from a material found in the suckers on a squid's tentacles. In some species, these suckers have a ring of 'teeth' to help the squid grip onto a

surface. Referred to as SRT – squid ring teeth – it is the proteins they're made of that have scientists excited.

SRT proteins are made up 'building blocks' that can combine in different ways to produce materials with different properties. Depending on the arrangement of the blocks, the material that results may be electrically conductive, or have self-healing properties, for instance.

"Nature produces a variety of smart materials capable of environmental sensing, self-healing and exceptional mechanical function," said Melik Demirel, Director of Penn State's Center for Research on Advanced Fiber Technologies, who led the research. "These materials, or biopolymers, have unique physical properties that are not readily found in synthetic polymers like plastic. Importantly, biopolymers are sustainable and can be engineered to enhance their physical properties."

Microfibres becoming detached from items of clothing in the washing machine are currently one major source of microplastic pollution, whereas clothing coated with SRT protein-based materials would be more durable.

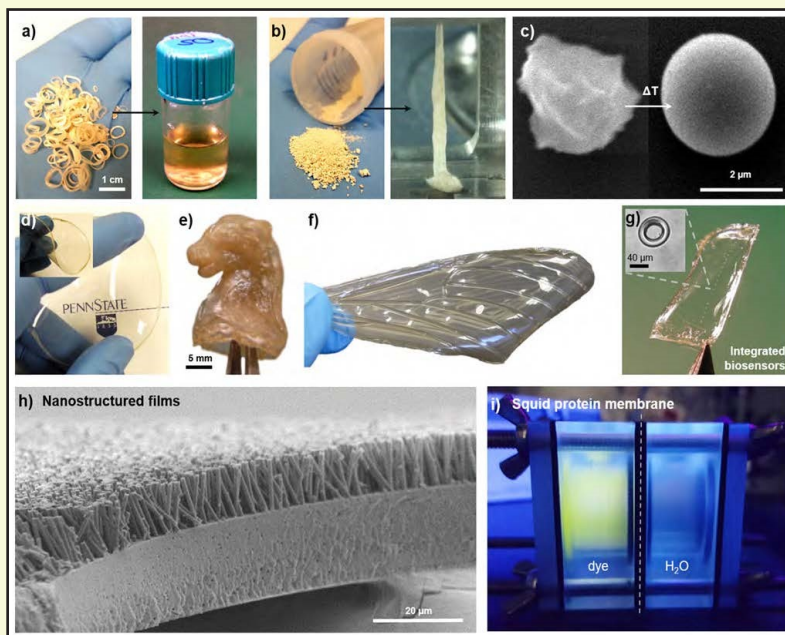
Similarly, self-healing smart materials could be used to manufacture better safety wear, such as hazmat suits, say the researchers. By using layers of different SRT materials, interwoven with other layers, you could even create garments that change color when air pollution hits dangerous levels, or with a built-in, flexible display.

"SRT photonics are biocompatible and biodegradable, so could be used to make not only wearable health monitors but also implantable devices for biosensing and biodetection," adds Demirel.

Best of all, there's no cruelty to animals involved, either – the SRT proteins can be grown in a lab, using genetically modified *E.coli* bacteria, without needing to trouble the already dwindling squid population. Indeed, it's far more efficient to grow them from scratch than it would be to 'harvest' them from nature.

"We don't want to deplete natural squid resources, and hence we produce these proteins in genetically modified bacteria. The process is based on fermentation and uses sugar, water and oxygen to produce biopolymers," Demirel explains.

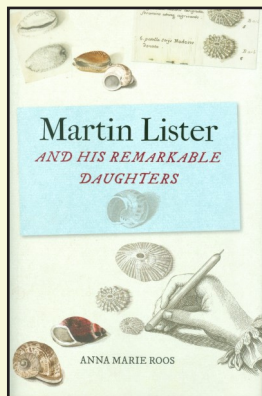
"Scaling up these materials requires additional work," he continues. "We are now working on the processing technology of these materials so that we can make them available in industrial manufacturing processes."



Multifunctional films fabricated from squid-derived proteins. SRT proteins are processed via (a) solution-based and (b) thermal-based methods into a variety of materials. (c) Colloids. (d) Free-standing transparent flexible films. (e) Complex 3D geometries. (f) Biomimetic materials. (g) Optical microresonators. (h) Nanostructured surfaces. (i) SRT-based membranes. (Pena-Francesch and Demirel 2019).

Reprinted from *Science Focus*, March 3, 2019.

Book Review: Martin Lister and his Remarkable Daughters



Martin Lister and His Remarkable Daughters. Anna Marie Roos. 2019. Bodleian Library, University of Oxford. 182 p.

The author, supported by the Royal Society, is Professor of the History of Science and Medicine at the University of Lincoln (England), and has captured a fascinating and important story in the history of molluscan science - the 17th century efforts of Martin Lister and the unprecedented role of his daughters in creating the first comprehensive, illustrated account of the biology of molluscs.

Most know Martin Lister as a royal physician, Fellow of the Royal Society, and a natural historian with a penchant for shells and molluscs. His other talents are highlighted in the introduction, e.g. his travel guide to Paris republished for three centuries, his contributions as the first scientific arachnologist, and service as royal physician for Queen Anne among many others. As he pursued his studies as the first scientific conchologist, he became increasingly frustrated and disappointed with the work of established artists and, a gifted artist himself, decided to teach his daughters to be illustrators. The two sisters, Susanna and Anna, soon became highly skilled artists and were engaged by their father to provide the drawings for the first comprehensive study of conchology, *Historie Sive Synopsis Methodicae Conchyliorum*, a multi-year effort published between 1685 and 1692. This effort included over 1000 drawings and copper plates of species collected globally, a monumental task at any time, but all the more so then.

Roo presents a very readable, informative, and entertaining history of Lister. Every page provides material more interesting than the prior and paints a portrait of an extraordinarily talented and brilliant man well ahead of his time. There is a detailed description of the often tedious efforts undertaken to collect specimens via friends, colleagues, and field trips to foreign lands. He was “part of a global Republic of Letters of specialists who exchanged ideas and specimens. The Republic was considered a form of imaginary space where thinkers could freely exchange their thoughts through correspondence” and ran a “literal ‘in-house’ press, teaching his two teenage daughter, Susanna and Anna, how to limn, and likely how to etch and engrave” - sounds a bit like the internet and self-publishing efforts of today!

The role of Lister’s daughters is covered in great detail and is a thread throughout the book. From young girls who learned their art at their father’s knee, to accomplished natural historians, illustrators, and engravers, Susannah and Anna scored their place in history, and this book assures their talent and contributions will be remembered. It is impossible to separate the father from the daughters.

This book also illustrates the trials and tribulations, discoveries, and practices of a scientific historian. Roo gives the reader a fascinating account with examples throughout the book of her scavenger hunt for information and weaves it together as a fine tapestry.

There are those who argue the relative value of Lister’s works in terms of science versus decorative arts, but this reviewer sides with the talent and insight that made natural history available to the public and the scientific community of the time, and that has stood for centuries and continues to amaze and educate. This book leaves the reader with a renewed and deep appreciation for the efforts of one of the earliest examples of scientific genius. Lister’s contributions set the stage for so many others, consider that Darwin was still 200 years in the future!

The book is beautifully illustrated with not only the Listers’ artwork, but photographs of sample pages from sketchbooks, and photographs of original specimens from the Sloane Collection (Natural History Museum, London) set alongside their respective drawings for comparison, showing the intricate detail captured by the Lister sisters. It is deeply referenced with very small numerals that do distract the reader. Readers from different backgrounds will take away their own pearls, but I guarantee they will all enjoy the read.

Sandra E. Shumway

Note - the author, Anna Marie Roos, will be the opening speaker at the 112th annual meeting in Baltimore

Recruits' Corner

Fellow Recruits,

We hope you are having a productive field season. Before the summer gets away from us, here are a few reminders of key deadlines and opportunities.

The NSA awards three grants every year to students, all of which provide \$1,250 towards student research. The Melbourne R. Carriker Student Research Grant supports a research project in any area of shellfisheries, the Michael Castagna Student Grant for Applied Research supports applied shellfisheries projects, and the George R. Abbe Student Research Grant supports crustacean biology and fisheries management projects. **Applications for all three research grants are due November 1st, 2019.** We highly encourage you to apply, and past awardees are still eligible. See the student page on the NSA website for details and to apply: <https://www.shellfish.org/student-members>.



Save the date for the 112th Annual Meeting, March 29th through April 2nd, 2020, in Baltimore, Maryland. The NSA provides travel support for lodging, registration, travel, or all of the above from the Student Endowment Fund. As opposed to the prior competitive process, this year support will be awarded via lottery. To be eligible, you must be a current member of the NSA, be presenting original research, and be the first author of an oral presentation or poster. Current graduate students, and former graduate students within one year of graduation, can apply. Application details are on the NSA website, and the **deadline for the SEF travel awards is December 1st, 2019.**

NSA is now on Instagram! Please follow @nationalshellfisheries for research highlights, grant awardees, current industry advances, and also see images from meetings and other member activities. We have started by highlighting current NSA award recipients, so make sure to check them out. We want to show case YOU! Please email us photographs of your research in action and a short description, and we will show case your work on the Instagram page. See an exciting new advance in shellfisheries research or industry you think everyone should know about? Send that to us too!



Finally, encourage your classmates to become a member of NSA. Members receive the *Journal of Shellfish Research* in the mail, access to digital copies online, the *Quarterly Newsletter*, and are eligible for research and travel grants. **Those who recruit 5 new members receive one year of free membership!**

As usual, please email Erin (erin_roberts@my.uri.edu) or Laura (lhs3@uw.edu) with any questions. Have a great summer!

Laura & Erin

This is your Newsletter

If you have news items – please send them to the QNL team -

LeRoy Creswell
(creswell@ufl.edu)
and

Noreen Blaschik Favreau
(Noreen.blaschik@uconn.edu)



The Membership Drive Continues...

It's simple, just recruit five new members (not renewals). Be sure to let Linda Kallansrude know that you recruited that person (secretariat@shellfish.org).

Remember, the NSA is only as strong as its membership, and its continued success depends on you. It's an easy sell - access to the *Journal of Shellfish Research* (print and on-line), the *Quarterly Newsletter*, reduced registration at annual conferences, and a strong and friendly group of like-minded individuals to share their interests in all things shellfish. Encourage your students and post-docs to become members.



112th ANNUAL MEETING

Crowne Plaza Hotel Baltimore Downtown - Inner Harbor

March 29 – April 2, 2020

ABSTRACT SUBMISSION DEADLINE: DECEMBER 15, 2019

EARLY BIRD REGISTRATION DEADLINE: JANUARY 18, 2020

HOTEL REGISTRATION CUT-OFF: FEBRUARY 28, 2020



Plan to attend the annual NSA conference as we return to one of our most popular locations, Baltimore, Maryland. It is easy travel by air, train, bus, and car, and registration and hotel costs have been kept level. Registration and hotel links are available at www.shellfish.org. Book your hotel rooms early, it will fill fast. There is an outstanding group of plenary speakers and the program is under development – still time to step up and organize or suggest a session!

Questions, contact the conference manager: sandra.shumway@uconn.edu, and watch the web page for details.

PLENARY SPEAKERS

João Ferreira, New University of Lisbon (Portugal)

Luz Pérez-Parallé, Universidade de Santiago de Compostela (Spain)

Anna Marie Roos, Lincoln University (UK)

J. Evan Ward, University of Connecticut (USA)

TENTATIVE SESSIONS:

(see the web page for organizer contact information)

Robotics, blue crab genomics, spatial planning, ONEHEALTH epigenomics, green crabs, modelling, disease, OsHv1, coastal acidification, shellfish restoration and conservation, socioecological approaches to management, genetics/genomics, sequencing workshop (back by popular demand!), blue crabs, mussels, scallops, oysters, clams, IMTA, freshwater mussels and ecosystem services, echinoderms, *Vibrio*, 'Down on the Farm', seagrass bivalve interactions, offshore aquaculture, public perceptions and shellfish aquaculture, undergraduate research colloquium, emerging contaminants, hatcheries, big data, general ecology/biology, SAV/water quality modelling/remote sensing, nitrogen removal, leasing and permitting, commercial shellfisheries, and a dedicated poster session on marine field stations.

There is still time to add your session!

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Upcoming Events

19th International Conference on Diseases of Fish and Shellfish: Sept. 9-12, 2019. Porto, Portugal. For more information: www.eafp2019.com

12th International Conference on Molluscan Shellfish Safety: Sept. 9-13, 2019. Ensenada, Baja California. For more information: <http://icmss2019.cofepris.gob.mx>

2019 PCSGA/NSA-PCS Conference: Sept. 17-19, 2019. Red Lion Hotel on the River, Portland, OR. For more information: www.pcsga.org/annual-conferences

Aquaculture Europe 2019, "Our Future - Growing From Water". Oct. 7-10, 2019. Berlin, Germany. For more information: <https://www.aller-aqua.com/events>

112th Annual NSA Meeting: Mar. 29 - Apr. 2, 2020. Crowne Plaza Hotel Baltimore Downtown-Inner Harbor. For more information: www.shellfish.org

If you would like to announce a meeting, conference, workshop, or publication that might be of interest to NSA members, please contact the *QNL* Editor, LeRoy Creswell (creswell@ufl.edu).

For more information on these conferences: www.was.org

Aquaculture 2020: Feb 9-12. Honolulu, Hawaii USA

Aquaculture Canada/WAS North America 2020: Aug 30-Sept 2. St. John's, Newfoundland, Canada

Aquaculture 2022: Feb 27-Mar 3. San Diego, California, USA

Aquaculture America 2023: Feb 19-22. New Orleans, Louisiana, USA