National Shellfisheries Association Quarterly Newsletter

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President's Message



As we approach the end of the year, I know you are balancing even more responsibilities than usual. The holiday season often inspires great joy while also producing a lot of extra work. I want to encourage you to double down on your determination and dedication for a few more weeks. For many of you, a semester break is coming soon!

2024 Annual Meeting in Charlotte

We have some important deadlines coming up as we move closer to the 116th NSA Annual Meeting, March 17-21, 2024, in Charlotte, North Carolina.

December 15, 2023: Submit abstracts for the conference. This is an excellent opportunity to highlight your work and findings to our scientific community. Additionally, don't forget that applications for the Student Travel Award are also due on the same date. We encourage students to take advantage of this opportunity for financial support.

January 19, 2024: Early-bird registration for the conference concludes. Don't miss your opportunity to take advantage of reduced rates!

Newsletter Highlights

Allen Pattillo, who will be chairing a special session on robotics and emerging technology at the 2024 conference, has shared insights from a recent robotics summit. This promises to be one of many exciting sessions happening in Charlotte. This issue of the newsletter also includes a fascinating column focused on a taxonomic question – *Crassostrea vs. Magallana*?

Bob "Skid" Rheault, known as the "*Vibrio* Evangelist," has shared his invaluable perspective on the latest bacterial outbreaks. The Pacific Coast Section (PCS) has shared details about their recent annual meeting in September.

Staying Connected

As we prepare to meet in Charlotte in March, let's stay connected through our website, social media, and this *Newsletter*. We are seeking Honored Life Member biographies for potential use on the website. By submitting their bios, you will help us showcase the wealth of knowledge within our community.

Yours in service, Aswani K. Volety, President UNCW Chancellor

Meeting Deadlines

Abstract Submission: **December 15, 2023**

Early-bird Registration: January 19, 2024

Hotel Registration: February 16, 2024*

*prices will increase after this date



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- Annual Meeting Update
- Notes from the Taxonomic Frontier
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Notes from the Taxonomic Frontier: Who is Crassostrea (Magallana) gigas?

The Pacific oyster, *Crassostrea gigas* (Thunberg, 1793) is one of the most important species in global aquaculture. Species names transmit a huge amount of encoded information. The species epithet "*gigas*" – Latin for "giant" – immediately invokes a picture of a large oyster. The genus name "*Crassostrea*" places it with its nearest evolutionary relatives among global oyster species. Over the last few years, this genus name has become controversial, but not for the first time. The species authority indicates the species was first described in a publication by Thunberg (1793), and the parentheses show that this name has been revised; it was originally described as "*Ostrea gigas*" and only later recognised as part of a different genus.

In the case of *Crassostrea*, its name is not only an issue for *C. gigas* but for almost 30 oyster species living worldwide as well as other fossil species that are now extinct. It is well known that this bigger group includes two major sub-groups, more or less West and East. One group of species are mainly from Europe and North America, including *C. virginica*, those in the other have their native ranges mainly in Asia, including *C. gigas*. This has been known since the mid-1990s, from the earliest DNA analyses on oyster evolution. Recently, in 2017, this mainly Asian group was formally named a different genus: *Magallana*.

It is important to note that recognising Asian "*Crassostrea*" species as a separate group is not controversial *per se*, it has been proven by every molecular analyses since 1995. The problem is what to call them. Taxonomy has to reflect related-ness, but it also has to classify global species, including fossils, and new discoveries. It is absolutely impossible to apply a special exemption to *C. gigas*: what goes for one member of the Asian group of *Crassostrea*-like species has to go for all of them.

Although these two groups of "*Crassostrea*"-like oysters evolved separately, we cannot tell them apart from looking at the shell. The only way to decide to which of these groups a new species belongs is its DNA. But DNA is not available for the majority of new species described. When my colleagues and I recently named a new Asian oyster species, we decided that the best way to solve this was to formally change the taxonomic status of "*Magallana*" to the subgenus level, and we published this technical taxonomic revision as part of a larger paper. This subgenus approach reflects that *Magallana* is a separate group within *Crassostrea*, which is correct, but it leaves the taxonomic door open for new discoveries that lack DNA evidence.

On the basis of our work, the correct full name is: *Crassostrea (Magallana) gigas* (Thunberg, 1793). The middle part is not an option but instead indicates the sub-genus or subgroup within *Crassostrea*. Recognising the group name *Magallana* is important: it cannot be ignored or forgotten, even if it feels like an inconvenience. This name clearly and intuitively communicates that *Crassostrea* (*Magallana*) gigas is not closely related to the native species in Europe and North America, where *C. gigas* is grown extensively for aquaculture. It is also important because there are many more new species of oysters still to be found. New discoveries will bring more information about global oyster biodiversity, which will probably mean more taxonomic changes, but it may also bring us the food species of the future.

Julia Sigwart

Senckenberg Research Institute and Museum Queen's University Belfast j.sigwart@qub.ac.uk

Sigwart, J.D., Wong, N.L.W.S., and Esa, Y. (2021). Global controversy in oyster systematics and a newly described species from SE Asia (Bivalvia: Ostreidae: Crassostreinae). Marie Biodiversity, 51: 83. https://doi.org/10.1007/s12526-021-01203-x

10 Most Cited Papers from the Journal of Shellfish Research (2005-2023)

Most-referenced calculated by Altmetric which collects relevant mentions from social media sites, newspapers, policy documents, blogs, Wikipedia, and many other sources. Source: BioOne.

- 1. Mann, R., & Powell, E.N. 2007. Why oyster restoration goals in the Chesapeake Bay are not and probably cannot be achieved. *Journal of Shellfish Research*, 26(4): 905-917.
- Karatayev, A.Y., Boltovskoy, D., Padilla, D.K., & Burlakova, L.E. 2007. The invasive bivalves *Dreissena polymorpha* and *Limnoperna fortunei*: parallels, contrasts, potential spread and invasion impacts. *Journal of Shellfish Research*, 26(1): 205-213.
- 3. Tolley, S.G., & Volety, A.K. 2005. The role of oysters in habitat use of oyster reefs by resident fishes and decapod crustaceans. *Journal of Shellfish Research*, 24(4): 1007-1012.
- McKindsey, C.W., Landry, T., O'Beirn, F.X., & Davies, I.M. 2007. Bivalve aquaculture and exotic species: a review of ecological considerations and management issues. *Journal of Shellfish Research*, 26(2): 281-294.
- Taleb, H., Vale, P., Amanhir, R., Benhadouch, A., Sagou, R., & Chafik, A. 2006. First detection of Azaspiracids in mussels in northwest Africa. *Journal of Shellfish Research*, 25(3): 1067-1070.
- Watson, S.-A., Southgate, P.C., Tyler, P.A., & Peck, L.S. 2009. Early larval development of the Sydney rock oyster *Saccostrea glomerata* under near-future predictions of CO₂driven ocean acidification. *Journal of Shellfish Research*, 28 (3): 431-437.
- Brumbaugh, R.D. & Coen, L.D. 2009. Contemporary approaches for small-scale oyster reef restoration to address substrate versus recruitment limitation: a review and comments relevant for the Olympia oyster, *Ostrea lurida* Carpenter, 1864. *Journal of Shellfish Research*, 28(1): 147-161.
- Waldbusser, G.G., Steenson, R.A., & Green, M.A. 2011. Oyster shell dissolution rates in estuarine waters: effects of pH and shell legacy. *Journal of Shellfish Research*, 30(3): 659-669.
- Buestel, D., Ropert, M., Prou, J., & Goulletquer, P. 2009. History, status, and future of oyster culture in France. *Journal of Shellfish Research*, 28(4): 813-820.
- Rosa, M., Ward, J.E., & Shumway, S.E. 2018. Selective capture and ingestion of particles by suspension-feeding bivalve molluscs: A review. *Journal of Shellfish Research*, 37(4): 727-746.

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New Honored Life Member Bio Robert Ingle

Thank you, Steve Geiger, for providing an In Memoriam

This is an on-going plea to get biographical information for Honored Life Members posted on our web page. We are still seeking bios for the following individuals, several of whom are the namesakes of our major awards. All of these individuals deserve recognition and newcomers to the field should have the opportunity to learn of their contributions. It's not an onerous undertaking and can be fun – please give it some thought. If you are interested in doing some digging and writing a short biography on any of these folks, please get in touch with Sandy Shumway (Sandra.shumway@uconn.edu). The article does not have to be long, just informative. Some information can be found in *Taming of the Oyster* and contacting individuals who knew the members could also prove rewarding.

> Jarvey W. Wiley Trevor Kincaid Pieter Korringa Hugh Smith Cedric Lindsay Paul S. Galtsoff H. Butler Flower

J.L. McHugh Walter A. Chipman Philip Butler Wesley Coe Robert Lunz R.E. Coker Ronald Westley

To view the *In Memoriam* for HLM Robert Ingle (<u>https://www.shellfish.org/honored-life-member-award</u>)

NSA AT THE MOVIES



Do you have a shellfish-related video or movie you would like to share? Eric Heupel (eric@heupel.com)

Movies will be playing on a loop throughout the conference - pop in when you have time!

Northeast Bivalve Hatchery Health Consortium

With climate change and human impacts on water quality in our coastal estuaries, hatcheries worldwide have reported issues with larval crashes. The causes for many of these larval crashes have been baffling researchers and hatchery managers alike, and are likely complex. Thanks to funding from the Northeast Regional Aquaculture Center, a group of pathologists, ecologists, hatchery managers, and extension specialists has recently established the Northeast Bivalve Hatchery Health Consortium (NEBHHC).

This Consortium aims to identify the causes of bivalve hatchery larval mortalities and crashes along the US Atlantic coast through an integrated, collaborative, and proactive approach to sample collection and analysis. We hope to use this information to develop strategies and protocols to manage and minimize larval crashes in hatcheries. Though it is



called the Northeast Bivalve Hatchery Health Consortium, *any* bivalve hatchery on the US Atlantic coast willing to participate in the sampling process can enroll. We are fully aware that collaboration with hatcheries and institutions in other regions will help address a seemingly widespread issue affecting bivalve larval production and health; however, since the research is funded by the USDA Northeast Regional Aquaculture Center, we need to prioritize the analysis of samples from Maine to Maryland; we will expand the testing to other hatcheries based on availability of funds.

How do we plan to do this? During the 2024 and 2025 hatchery seasons, we will be working with commercial and public/ research hatcheries wishing to participate in the project, as well as any researchers that would like to join us, to collect algae, water, and larvae from a variety of larval runs, including the "good" (successful performance) and the "bad" (lower performance or crashes). Since many issues in hatcheries occur very rapidly, we are planning to collect data and samples from the start of several production runs, before any issues are detected, to help identify potential problems before they quickly disappear. Hatcheries will also be asked to provide basic information about their protocols that would be relevant to determine the causes of issues affecting larval performance. All individual hatchery information collected will remain confidential, and hatcheries will receive a personalized pathology report along with management recommendations and overall findings. We will provide all supplies for the sample collections and will cover shipping fees and the cost of disease diagnosis. Participating hatcheries get a confidential individualized pathology report and management recommendations to improve larval production. Some of the methods used to analyze hatchery samples include, but are not limited to: microbiological examination using culture dependent and independent (sequencing) methods, visual examination of gross and histological signs, water quality analysis, detection of toxins and pollutants, and evaluation of clinical history (environmental conditions, patterns of growth and mortality, and so on). If you are interested in being part of the NEBHHC or would like more information, please contact Rob Hudson (rhudson@uri.edu) or Marta Gomez-Chiarri (gomezchi@uri.edu).

Vibrio in the News...Again Commentary by: Bob 'Skid' Rheault

Flesh-Eating Bacteria

Well, that got your attention! Every few years the media becomes fascinated with a few rare illnesses caused by Vibrios, and suddenly every news outlet, blogger, and food writer feels compelled to run attention-grabbing headlines and stories that kill our markets. This summer, three Connecticut (CT) residents (two of whom died), and one New York (NY) resident (who died) were hospitalized with *Vibrio vulnificus* (*Vv*) infections. One person diagnosed with vibriosis from CT had eaten oysters from out of state, and it is unclear if that person died. At least two of the three fatalities had open wounds or cuts and swam in warm or brackish waters in Long Island Sound.

In addition to cases in the Northeast, three *Vibrio* wound infections in North Carolina resulted in fatalities. All patients were exposed to warm, brackish water, and had open wounds, and one victim had eaten recreationally-harvested oysters. On September 1, the U.S. Centers for Disease Control and Prevention (CDC) issued an alert about hazards of swimming with open wounds. Naturally, this triggered another round of breathless reporting. The gruesome nature of the victims' wounds and the lethality of the infections kept the story on frontpages for weeks.

I have "Vibrio" in my Google alerts and received notifications of each these stories; over three weeks, more than 35 articles and TV-news outlets picked up the story. My phone was ringing off the hook for comments, and I fielded many complaints from growers and dealers who reported oyster sales were tanking.

When this happened several years ago after a few crabbers contracted vibriosis in Delaware Bay, I wrote a fact sheet on flesh-eating bacteria to deal with the deluge of requests for information. It came in handy again this year, but depressingly, only a few of the news writers used the information. They didn't seem placated by the facts or the perspectives. Nor were they concerned about the economic damage their words were having on hard-working shellfish farmers. I encourage everyone to visit our Vibrio Resources page (<u>https://ecsga.org/vibrio-resources/</u>) and be prepared if you get cornered for a quote from an intrepid reporter looking to make a splash. Better yet, send them to me! If you do talk to the media, be sure to remind them that Vv is primarily a wound-infection issue and if they mention oysters in the same sentence they are committing journalistic malpractice that will hurt hard-working shellfish farmers.

Fun facts about Vibrio

Vibrios are a large class of bacteria encompassing dozens of species and thousands of strains. Most occur naturally in seawater (they have nothing to do with pollution) and they all love warm water. A small subset are pathogens, but the vast majority are benign (they cause no illness and are just food for filter feeders). *Vibrio vulnificus* seems to attract a lot of attention because of the high mortality rates and the gruesome, disfiguring lesions and resulting amputations it can often cause (do not Google it).

Since 2007, when someone is diagnosed with vibriosis, the patient must be interviewed and a report filed with the CDC, which has a tracking program that tries to identify the cause of the illness. This Cholera and Other Vibrio Illness Surveillance (COVIS) system tracks trends and issues reports annually. The most recent 2014 survey seems to have been ignored by most news reports. (Note: how do you keep your job when you are nine years behind in your reporting?)

In 2014, COVIS data reported 1,252 Vibrio illnesses in the U.S. The chief culprit was Vibrio parahaemolyticus (Vp), (605

cases; 48%), which typically causes gastroenteritis and is usually self-limiting. Nevertheless, Vp did send 86 patients to the hospital and resulted in four deaths. Around 85% of Vp cases were confirmed as food-related (69% from oysters, 12% from shrimp and crab, 4% from clams, 10% from finfish).

Vibrio vulnificus (Vv) is far less common than Vp (124 total reported illnesses in 2014), but the outcomes can be far more serious, with 79% of patients hospitalized and 18% of illnesses (21) fatal. Only about 14% of Vv illnesses came from foods, while over 60% were the result of wound infections (and almost 24% unknown). If only 14% of the 21 deaths were from food the odds of dying from Vv in oysters are pretty remote. (I count about 215 million farmed oysters harvested from the East Coast annually).

Necrotizing fasciitis

Necrotizing fasciitis is the medical term for flesh-eating disease. It results from infection with any type of bacteria that destroys the connective tissue (fascia) under the skin, and is treated with antibiotics and surgery to remove the damaged tissue. *Vibrio vulnificus* is only one of many types of bacteria that can cause gruesome and fatal wound infections in people who bathe in fresh and salt water (and hot tubs). But for some reason, even though the vast majority of the cases of necrotizing fasciitis are from wounds or scratches, every article I read mentioned oysters in the headline.

It is important to remember that healthy individuals are usually able to tolerate *Vibrio* infections with just a few days of unpleasant gastroenteritis. On the other hand, immunecompromised people are susceptible to serious infections that can quickly become septic and turn fatal. This includes those with liver disease or those taking immune-suppressive medications, cancer survivors, young children, and others with certain health complications. These individuals need to be very careful eating any raw foods, but especially raw oysters from warm waters. They should always cook their food!

The other point raise routinely is that hundreds of millions of oysters are eaten each year without any illnesses at all. We see a few hundred cases of gastroenteritis a year, with only a few dozen serious cases in immune-compromised individuals. The fact that there are 43,000 traffic fatalities in the U.S. each year does not seem to deter people from driving or riding in cars. So why are our sales plummeting?

Just when I thought this was dying down this wonderful piece came out in September.....grrrrr....

https://nationworldnews.com/vibriosis-the-disease-caused-by-

<u>flesh-eating-bacteria-found-in-raw-seafood/.</u> Note the typo in the 6^{th} sentence stating there at 800,000 cases of vibriosis and the oyster pic next to the gruesome wounds - the conflation of incredibly rare Vv with vibriosis of all types of which the CDC reports about 1,500 confirmed cases and from that extrapolates 80,000 cases (the paper that make this extrapolation is a magnificent piece of crap). I wrote a strongly worded response - but I can ensure you there will be no retraction or correction.

I have rarely, if ever, found media reporting about our industry to be reliable, but their credibility slipped a few more notches during this last bout of illnesses. Reporters rarely use the info provided, but instead seem intent on disparaging oysters. The worst culprits are people who hate oysters to begin with. As I am learning over and over that no good deed goes unpunished, my advice to anyone contacted by a reporter is to just say "no comment." If you feel compelled to respond, focus on one or two talking points and repeat them until they give up. Reporters can be quite charming, but they are paid to sell papers and page views with alarming and misleading headlines that will make your blood boil. Now it's time to go take my blood pressure meds.

CHARLOTTE IS JUST AROUND THE CORNER!



Everything is falling into place for a grand time in Charlotte, North Carolina at the 116^{th} Annual Conference, March 17 - 21, 2024 (<u>www.shellfish.org</u>). How many organizations can boast 116 years? Come and celebrate, participate in the many new sessions and workshops, catch up with old friends, make new ones, and learn about the latest research and developments in the shellfish world.

NSA at the MOVIES was a big success in Baltimore and will be on the agenda again this year. Many new films have been added to the collection and will be shown continuously throughout the conference. A great opportunity to take a break and enjoy a movie – students took advantage last year and held pizza parties in the evening! To submit a film: Eric@heupel.com

Don't forget your AUCTION donations – if you can't make it to the meeting, you can send your contributions with a friend or ship to Sandy to arrive before March 1, 2024. It's a great chance to do a little spring cleaning – foist those valuables off on someone else!

REMEMBER TO BOOK YOUR HOTEL early.

EARLY-BIRD REGISTRATION ends JANUARY 19, 2024. Check the web page for cancellation policy.

ABSTRACT DEADLINE is DECEMBER 15, 2023. PLEASE get your abstracts in on time, there is a lot to do after submission and a lot of juggling to assemble a program before it can be sent to the printer.

The 5th Scallop Gallop will take place under the tutelage of our professional jogger Lewis Deaton (lewis.deaton@lusfiber.net). Remember to bring your wildest socks.

If you have any questions or suggestions, please send them along. We look forward to seeing you all in Charlotte.

The Conference Management Team

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David Fitzpatrick (left) and Chris Peary (right) in the print shop next to the digital machines.

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Bottles and Snifters: Shellfish Sanctuaries and Shrouds

While collecting molluscan samples near commercial harbors and from former passenger ferry docking areas as a marine research microbiologist, I found that early American glass bottles were abundant. Tourists in popular vacation spots who arrived or departed via ferries, disposed of their empty soda, beer, or harder liquor bottles into the water. Many of these bottles have historical interest in themselves, dating to prior to the US Civil War. It soon became apparent, however, that some of the bottles served as home for some molluscs to include clams, oysters, and snails.

Donning SCUBA gear, I often dove to collect live specimens using conventional collection methods, I was unaware that more exotic collection devices were right before me on the bottom of harbors and embankments. I eventually noted that discarded glass bottles deposited on the ocean floor sometimes contained hard clams (*Mercenaria mercenaria*), soft clams (*Mya arenaria*), oysters (*Crassostrea virginica*) or whelks (*Busycon spp.*). Accordingly, these mollusc-containing bottles were gathered and content identifications were verified at the Smithsonian Natural History Museum.

Bottles from the seafloor were examined for the presence of molluscs for three years. Data were collected from one site on the North Shore of Long Island, New York as well as data from one 5-day study in the Upper Harbor, Halifax, Nova Scotia, Canada. The site on the North Shore of Long Island is at the site of a sunken ferry and measures 1500 square feet (30 feet by 50 feet). Over the years, the area has experienced some severe storms and it is frequented by swimmers, fishermen, and boaters in the warmer months. Generally, waters were calm during the dives made there. The site in Halifax measures 150 square feet (10 feet by 15 feet) and is located in an area of the Upper Bay that is not heavily used. The weather and waters were calm throughout the five days under examination.

Rarely, a living animal enters through the neck of a bottle as a larva and then thrives in the protected and controlled environment of the bottle, free from predation and excesses of temperature or storms. What initially was a sanctuary eventually becomes a glass prison for the animal as it grows and becomes unable to exit the narrow neck of the bottle. It should also be noted that the bottle provided a closed cycle in that the waste from the animal fertilizes the water for phytoplankton growth resulting in oxygen production.



Crassostrea virginica shells inside glass bottles collected from the Upper Harbor, Halifax, Nova Scotia, Canada. Photo credit: Walter Blogoslawski

In the North Shore, Long Island, NY site, a total of 110 bottles were collected and four of them contained molluscs, with the percentage of bottles recovered containing molluscs of 3.6. This is in contrast to the site in Nova Scotia where the recovery of bottles with molluscs was 8% of the total bottles collected (50), more than twice the rate of recovery than the bottles from the North Shore of Long Island. One possible reason for the discrepancy is that the site on Long Island is a busier and more trafficked site in terms of swimmers and boating than the relatively isolated site in Halifax. Other reasons could be spawning times and success, water temperature, orientation of the bottles, pollution, and wave action, all of which could have an impact on larval settlement. Future studies might include a more directed collection of bottles to assess the percentage of bottles serving as sanctuary, then prison, to molluscs from the total number of discarded bottles in the area as well as the orientation of such bottles relative to wave action at the time of spawning.

An observation in the course of routine collection work led to noting the rare chance selection of discarded glass bottles as home to some molluscs. The protection and controlled environment of the bottle that permitted the mollusc to thrive and grow eventually became a limiting and ultimately fatal factor as the animal would become too large to exit the narrow neck of the bottle. It would be interesting to determine the particular effects at spawning time such as tide, wave action, availability and orientation of bottles, etc. that cause larvae to enter a bottle as opposed to freely swimming and settling on a natural substrate as well as the percentage of larvae that enter and thrive for a while in a bottle as opposed to those that do not. Studies on the balance of phytoplankton to waste and available oxygen for the mollusc in the bottle would also have value.

Walter Blogoslawski

REFERENCE:

Letter from Martha Nizinski, PhD, Smithsonian Museum of Natural History. Division of Invertebrate Zoology, June 2016.

2023 Smart Shellfish Aquaculture Summit



Kaustubh Joshi showing Dr. Miao Yu how to pilot the BlueROV. Photo credit: Allen Pattillo

The 2023 Smart Shellfish Aquaculture Summit was held August 22-24, 2023 at the Hyatt Place in Grasonville, Maryland (USA). The venue was perfectly positioned on Kent Narrows inlet next to an active commercial fishing fleet, remote setting operation, and near active oyster leases in the upper Chesapeake Bay. The event combined the research, teaching, and extension efforts from the USDA NIFA–funded Smart, Sustainable Shellfish Aquaculture Management (S3AM) project (www.S3AMoysters.com) and the NSF-funded Smart Precision Aquaculture Network (SPAN) project (www.SPAN.umd.edu). There was a total of 29 inperson attendees registered from 19 organizations. A video overview of the 2023 Smart Shellfish Aquaculture Summit can be viewed at https://www.youtube.com/watch?v=hdZJ6zim9FE.

The hybrid in-person and online meeting kicked off with internal team updates and strategic planning for activities in the coming year for the S3AM project. The first evening featured the graduate student research, showcasing the various technologies and methods they use for detecting oysters. The next day was devoted to formal reports of the team's efforts to our National Advisory Board (NAB), which includes members from research and extension from

the Atlantic, Gulf, and Pacific regions. The project team and NAB participated in a

program evaluation survey to assess how the project efforts are progressing and identify areas for improvement. Then the Summit shifted gears into the SPAN project, where the invited speakers gave presentations on following topics: Dr. John Reid, University of Illinois (Precision Agriculture), Dr. Anna Michel, Woods Hole Oceanographic Institute (Marine Robotics and Sensors), Dr. Jerry Ault, University of Miami (Artificial Intelligence for Fisheries Management), Dr. Bob Rheault, East Coast Shellfish Growers Association (Improving Aquaculture Efficiency), Dr. Dale Leavitt, Blue Stream Shellfish (Robotics Fun on the Farm), and Mr. Rob Nicholson, University of Delaware (UD Blue Tech Program & Project ABLE). Presentations are available in the conference shared drive at: https://drive.google.com/drive/



Group discussions with the S3AM team. Photo credit: Allen Pattillo

<u>folders/1H52xPGHarSIUH4NYI96RM8jcHTdlCJZP?usp=sharing</u>. The Summit also included a boat tour of Orchard Point Oyster farm in Eastern Bay. Nineteen passengers gained the perspective of the Chesapeake Bay watermen and oyster farmers, and even got to sample some oysters fresh out of the water.

The third day featured three invited presentations, which the attendees used as inspiration in the breakout and group discussions. Ultimately, the teams proposed five priority areas for research directions in the coming years and identified team



Farm tour at Orchard Point Oysters. Photo credit: Allen Pattillo

Allen Pattillo University of Maryland - Extension ty areas for research directions in the coming years and identified team leaders to shepherd those ideas into funded research projects. The priority areas are: Automation in Oyster Harvesting (lead Dr. Yang Tao); Environmental Monitoring (lead Dr. Miao Yu); Oyster Planting Strategies (lead Dr. Matt Gray); Food Quality and Safety (lead Dr. Cathy Liu); and Computer Vision for Hatchery and RAS (lead Dr. Yiannis Aloimonos).

The 2023 Summit concluded with an evaluation. The top three topics of interest were: 1) oyster harvesting tools, 2) relevant technologies and technology gaps, and 3) sensors for detecting oysters. Participants wanted to hear more about farmer needs, field testing, technology gaps, advanced oyster harvesting, marine robotics applications, and ecosystem restoration.

Make sure to check out the special session on Robotics and Emerging Technology in Charlotte in 2024. If you have any questions about the session, contact Allen (dapatt@umd.edu) or Yang Tao (ytao@umd.edu). Abstracts are due by December 15, 2023.

Bivalve Hinge Teaches Scientists about Material Fatigue Resistance

More and more flexible and foldable devices are appearing in people's lives. Long-term use requires the folded parts to endure repeated deformation which might cause fatigue damage to the devices.

Inspired by the hinge of the bivalve, *Cristaria plicata*, which experiences hundreds of thousands of repeating opening-andclosing valve motions throughout the bivalve's lifetime, a research team led by Professor Yu Shuhong collaborating with Professor Wu Hengan from the University of Science and Technology of China (USTC) investigated how to improve the fatigue resistance of structural materials.

The team found that the folding fan-shaped region (FFR) in the hinge can sustain large deformation during repetitive opening-and -closing valve motions and maintain its structure and function for a long period. The tissue still functions well and shows no signs of fatigue behaviors even after 1,500,000 cycles. The hinge is composed of two regions, the outer ligament (OL) and the folding fan-shaped region (FFR). Through observation and finite element analysis, the researchers uncovered the roles of each hinge region during the valves' motion. When closing, the stretched OL undertakes the circumferential stress dominantly and stores most of the elastic strain energy, while the FFR is deformed circumferentially and provides strong radial support to fix the OL under the limited radial deformation.



Cristaria plicata and the sectional structure of the hinge. Image credit: Yu Shuhong and team.

They revealed that the hierarchical structures which span from the macroscale level down to the lattice level endow the FFR with notable deformability and load translation capability.

This work provided a novel biomimetic model for designing artificial materials with brittle components and brings a new perspective for elongating materials' longevity. The multi-level design strategy sheds light on development of the future fatigueresistant materials.

For more information:

Meng, X.-S., Zhou, L.-C., Liu, L., Zhu, Y.-B., Meng, Y.-F., Zheng, D.-C., Yang, B., Rao, Q.-Z., Mao, L.-B., Wu, H.-A., and Yu, S.-H. (2023). Deformable hard tissue with high fatigue resistance in the hinge of bivalve Cristaria plicata, Science, 380(6651): 1252-1257. <u>DOI: 10.1126/ science.ade2038</u>.



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Recruits Corner

Fellow Recruits,

We hope you are enjoying the cooler weather and we are looking forward to seeing you in Charlotte for the 116th Annual Meeting!

The meeting will be held at the Sheraton-Le Meridien Hotel Complex in Charlotte, North Carolina, from March 17 - 21, 2024. The abstract deadline is **December 15th**, so make sure to submit your abstracts on time! Students presenting at the conference are also strongly encouraged to apply for



Student Endowment Fund Travel Awards. Travel Awards are given in the form of either shared lodging or registration waivers and are awarded based on a lottery system. The deadline to apply is also **December 15th**. Students who receive a Travel Award are expected to volunteer their time

during the conference to help at the registration table, loading talks, or work the sales booth. For more information on how to apply check out the NSA website: <u>https://</u> www.shellfish.org/sef-student-presentation-and-travel-

awards. Students must renew their 2024 membership prior to applying in order to be considered for the Travel Award. For those who do not receive a Travel Award and would be interested in sharing a room, we will be sending out a Google form to student members, so keep an eye out for that.

Early-bird registration for the annual meeting ends January 19, 2024, so make sure to register by then to take advantage of the discounted registration price. On that note, discounts are also available for members of NSA, so make sure to renew your NSA student membership. Memberships run the calendar year and will expire on December 31st.



We are planning a number of popular student-centered events, including the Mentor-Mentee Breakfast, a student field trip, and a student night out in Charlotte, so keep an eye on your inbox and the Student Recruits Facebook group for more details to come (<u>https://www.facebook.com/</u>groups/2216454881732029)!

Please feel free to contact your Recruit Co-chairs with ideas, questions, or concerns!

Hannah and Fiona hannah.i.collins@uconn.edu fcboard@uw.edu

Student Presenters!

TRAVEL AWARD APPLICATIONS ARE DUE



For more information or to apply:

www.shellfish.org

The Scallop Gallop

NSA 5K in Charlotte



Contact Lewis Deaton: Lewis.deaton@lusfiber.net

NEW PAID LIFE MEMBER

Thank you, Enrique Gonzalez Ortegon

Log-in to renew and update your membership status (<u>www.shellfish.org</u>), or contact the Secretariat with any questions (secretariat@shellfish.org)

NSA Pacific Coast Section News

Hello from the west coast where Fall is coming in slowly and bringing some much-needed rains. The 77th Annual Shellfish Conference and Tradeshow of the Pacific Coast Shellfish Growers Association (PCSGA) and the National Shellfisheries Association Pacific Coast Section (NSA-PCS), was held on September 18-21, 2023, in Seaside Oregon at the Seaside Convention Center. The conference was well-attended with about 360 registrants and the weather was great for some late afternoon surfing. The tradeshow had 26 vendors showcasing the latest technologies in aquaculture. The NSA-PCS new table cover looked great and brought folks over to buy our merchandise.

The conference included over 58 oral presentations across 18 sessions, and 3 workshops. This year, workshop topics included social licensing, social media, and OsHV-1 and the west coast industry. The plenary speaker was Emily Whitmore from the Maine Aquaculture Innovation Center who spoke on "Working Toward Social License to Operate". The John Lentz Featured Speaker was Carissa Maurin, the Aquaculture Program Manager at the Gulf of Maine Research Institute, who enlightened us about the Aquaculture Apprenticeship Program. The lunchtime speakers were authors Samantha Larson and Maryann Barron Wagner who co-authored the second edition of "Heaven on the Half Shell", giving us a sneak peek at the new edition.

The NSA-PCS provided funding to support the participation of students at the conference. Student participation was up this year compared to the conference last year, with 21 students attending and 18 of those presenting. The 2023 NSA-PCS Outstanding Student Presentation Award went to Eileen Bates (University of Washington,) for her presentation, "Can coralline algae habitat bolster the climate resilience of Washinton's endangered pinto abalone?". The runner up was Julianne Grenn (Virginia Institute for Marine Science) for her presentation "Effects of biofouling and stocking density on microclimate in off-bottom oyster culture grow-



Photo credit: Sandy Zeiner

out bags". The students did a wonderful job presenting their research and we look forward to their presentations next year. Additional support for students to attend the meeting was generously provided by the Molluscan Broodstock Program/Oregon State University, Arcadia Point Seafoods, Chelsea Farms, Chuckanut Shellfish, Pacific Shellfish Institute, Rock Point Oyster Company, LLC, SEAPA, Jorstad Creek Oyster Co., Whiskey Creek Shellfish Hatchery, Hama-Hama, and Gooey Duck, LLC. I want to encourage students to think about presenting their research next year and reach out if you have any questions. This year the NSA-PCS and PCSGA presented the first Ken Chew Research Grant Award, in honor of the late Dr. Ken Chew. The inaugural recipient was Hollis Jones (University of California Davis) who is investigating heatwave effects on Pacific oysters. Congratulations Hollis and good luck with your research.

The PCSGA/NSA-PCS silent auction fundraising was a success. Many thanks to the NSA-PCS board members Annie Raymond (Jamestown S'Klallam Tribe) and Margaret Homerding (Nisqually Tribe) for organizing the auction and items at the conference, and thank you Alicia Burns of the PCSGA who helped make checkout go smoothly. The NSA-PCS proceeds from the auction, individual donations, the student

fundraiser, and registration fees totaled more than \$5,000. This will help the NSA-PCS sponsor more students to attend future meetings. Thank you to all who donated, participated, and ran those bids up.

The NSA-PCS held its annual business meeting during the 2023 conference. Elections were held for the Chair, Secretary, and Member-at-Large positions. The results are Sandy Zeiner will continue as Chair, Laura Butler is our new Secretary and continuing as Member at Large #3 is Matt Nelson. The current board officers are, Chair: Sandy Zeiner (Northwest Indian Fisheries Commission); Vice Chair: Jodie Toft (Puget Sound Restoration Fund); Secretary: Laura Butler (WA Department of Agriculture); Treasurer: Laura Spencer (Washington University); and Members-at-Large: (1) Margaret Homerding (Nisqually Indian Tribe) (2) Derek Epps (Seattle Shellfish Inc.), and (3) Matt Nelson (Swinomish Indian Tribal Community). Thank you fellow board members for your time and support.

The NSA-PCS Executive Committee met on May 24, 2023 to discuss budget, student volunteers, and the 2023 conference logistics. The 2024 Conference Planning Committee will begin planning the 78th Annual Shellfish Conference and Tradeshow (NSA-PCS/ PCSGA joint meeting) in January, so save the date for September 10-12, 2024. The conference will be held in Lynnwood, Washington at the Lynnwood Event Center. The call for presentations will open April 1st. You can find more information at: <u>https://pcsga.org/annual-conference</u> or follow the NSA-PCS on Facebook (<u>https://www.facebook.com/</u> pages/Pacific-Coast-Section-of-the-National-Shellfisheries-Association/1438569826443936).

Have a wonderful winter, and I hope to see you at the 116thNSA Annual Conference in Charlotte, NC next spring.



Sandy Zeiner Pacific Coast Section Chair

Officers, Committee Chairs, & Staff of the National Shellfisheries Association

EXCOM Members

Aswani Volety President UNCW 601 South College Rd Wilmington, North Carolina 28403 Email: voletyak@uncw.edu

Kevin Stokesbury President-Elect SMAST/UMASSD 836 South Rodney French Blvd New Bedford, MA 02744 Email: kstokesbury@umassd.edu

Brian Beal Vice President University of Maine at Machias Downeast Institute 116 O'Brien Avenue Machias, ME 04654 Email: bbeal@maine.edu

Jay Parsons Treasurer 68 Ch Du Barrage Chelsea, QC Canada J9B 1N2 Phone: (613) 290-5333 Email: Jay.Parsons007@gmail.com

Peter Kingsley-Smith Secretary; Co-Chair, Student Endowment Awards Marine Resources Research Institute South Carolina Dept. of Natural Resources 217 Fort Johnson Road Charleston, SC 29412 Phone: (843) 953-9840 Email: kingsleysmithp@dnr.sc.gov

Lewis Deaton Past-President Chair, Past-Presidents, Elections, and Awards Committees 815 Genevieve Dr Lafayette, Louisiana 70503 Email: lewis.deaton@lusfiber.net

Steven M. Allen Senior Past-President Editor, *NSA Quarterly Newsletter* 32 Towle St Auburn, ME 04210 Phone: (443) 994-5164 Email: stevenmallen@gmail.com Maureen Krause 2021-2024 Member-at-Large Chair, Resolutions Committee Dept. of Biology 114 Hofstra University Hempstead, NY 11959-1140 Phone: (516) 463-6178 Email: maureen.k.krause@hofstra.edu

Stephen Geiger 2022-2025 Member-at-Large Florida Fish & Wildlife Research Inst. 100 8th Avenue S.E. St. Petersburg, Florida 33701 Email: steve.geiger@myFWC.com

Ed Catapane 2023-2026 Member-at-Large 2105 Gerritsen Ave Brooklyn, New York 11229 Email: catapane@mec.cuny.edu

Sandra E. Shumway Editor, JSR; Conference Manager; Chair, Membership Committee University of Connecticut Dept. of Marine Sciences 1080 Shennecossett Road Groton, CT 06340 Phone: (860) 405-9282 Email: sandra.shumway@uconn.edu

John N. Kraeuter Chair, Audit-Budget-Finance Committee 1 Hills Beach Road Biddeford, ME 04005 Email: kraeuter@hsrl.rutgers.edu

Sandy Zeiner Chair, Pacific Coast Section Northwest Indian Fisheries Commission 6730 Martin Way East Olympia, WA 98516 Phone: (360) 528-4370 Email: szeiner@nwifc.org

Other Contacts

Roger Mann Co-Chair, Publications Committee Virginia Institute of Marine Science P.O. Box 1346 Gloucester Point, VA 23062 Phone: (804) 684-7360 Email: mann@vims.edu

Juliana Harding Co-Chair, Publications Committee Coastal Carolina University Department of Marine Science P.O. Box 261954 Conway, South Carolina 29528-6054 Email: jharding@coastal.edu

Melissa Southworth Co-Chair, Student Endowment Awards VIMS PO Box 1346 1208 Greate Rd Gloucester Point, VA 23062 Phone: (804) 684-7821 Email: melsouth@vims.edu

Hannah Collins Recruits, Co-Chair University of Connecticut Dept. of Marine Sciences 1080 Shennecossett Rd Groton, CT 06340 Email: hannah.i.collins@uconn.edu

Fiona Boardman Recruits, Co-Chair University of Washington Department of Biology Box 351800 Seattle, WA 98195 Email: fcboard@uw.edu

Noreen Blaschik Favreau, Secretariat Associate Editor, NSA Quarterly Newsletter Webmaster University of Connecticut Dept. of Marine Sciences 1080 Shennecossett Rd Groton, CT 06340 Email: secretariat@shellfish.org



Noreen Blaschik Favreau, *QNL* Associate Editor University of Connecticut Marine Sciences Department 1080 Shennecossett Rd Groton, CT 06340 USA *Forwarding Service Requested*

RENEW YOUR DUES

Be sure to review your membership profile. Contact secretariat@shellfish.org with questions.

www.shellfish.org

Upcoming Events

Northeast Aquaculture Conference & Exposition/43rd Milford Aquaculture Seminar (NACE/MAS): Jan. 10-12, 2024, Providence, Rhode Island. For more information: https://www.northeastaquaculture.org

Aquaculture America 2024: Feb. 18-21, 2024. San Antonio, Texas. For more information: www.was.org

116th NSA Annual Meeting: Mar. 17-21, 2024. Charlotte, North Carolina. For more information: www.shellfish.org

23rd International Pectinid Workshop: Apr. 24-30, 2024. Douglas, Isle of Man. For more information: www.internationalpectinidworkshop.org

Aquaculture 2025 (Triennial): Mar. 6-10, 2025. New Orleans, Louisiana. For more information: www.was.org

118th NSA Annual Meeting: Mar. 22-26, 2026. Portland, Oregon. For more information: www.shellfish.org

If you would like to announce a meeting, conference, workshop, or publication of interest to NSA members, please contact the *QNL* Editor, Steven Allen (stevenmallen@gmail.com).

