72nd Pacific Fisheries Technologists Conference

The Hallmark Resort
Newport, OR, USA
February 20-23, 2022

Trim One's Sails

PFT 2022 PROGRAM BOOK

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Welcome to the 72nd PFT Conference!

It is my distinct pleasure to welcome you to the 72nd annual Pacific Fisheries Technologists (PFT) Conference. It is also my honor to serve as your president. This year PFT will be held at the Hallmark Resort in Newport, Oregon, USA from Sunday to Wednesday, February 20-23, 2022.

I have been attending PFT for over 20 years and it is hands-down my favorite conference to attend. Why you might ask? The reasons are as diverse as the conference itself! The PFT conference brings together attendees that represent academia, non-profits, agency, and industry from around the world. It includes not only students and young professionals on the cusp of their careers, but also professionals that bring a wealth and diversity of experience from across the seafood cold-chain spectrum. It is an opportunity to hear and see the transformational efforts colleagues are engaged in to further the safety, quality, and utilization of seafood. The theme of this year's PFT is "Trim One's Sails." This is a nautical term that means adapt or change to fit altered circumstances. This is something I believe I can say we all have been doing the past two years! We are planning an exciting lineup of speakers and presentations to stimulate discussions concerning technical, scientific, ecological, and regulatory matters important to the seafood and aquaculture industries worldwide.

The PFT conference is an annual international event that moves northward yearly from Mexico, through the Pacific States, to Canada and then Alaska. Our attendees include colleagues from around the globe as this conference represents an opportunity to exchange new ideas. The PFT conference has a reputation for being a friendly group, where old acquaintances are renewed and many new ones made. We hope that you will join us to share your knowledge, extend your professional networks, and build collaborative linkages with people that are passionate about "everything fish and seafood!"

The Hallmark Resort is one of the premier hotels in Newport where every room has a view of the beach and beautiful Pacific Ocean! Newport is also a wonderful location for family who may want to come with you. There is the Oregon Coast Aquarium, the Yaquina Bay Lighthouse, iconic Nye Beach, and Newport's Historic Bay Front with processors, restaurants, and seaside shops.

Christina DeWitt
72nd PFT President

ORGANIZING COMMITTEE

Christina DeWitt President 	Jung Kwon Director: Scientific Programs 	Rosalee Hellberg Student Competition Chair 	Lin Koh Treasurer 
Jae Park Special Advisor Past President, Oregon 	Alex Oliveira Past President, 2020 	Laurice Churchill Advisor for Regulatory Affairs 	Brianna Hurley Advisor for Regulatory Affairs 
Virginia Ng Hospitality Chair 	Joe Logan Sponsorship Trident SEAFOODS	Joe Frasier Holder of the Chips 	Alison Storms Logistics Manager 
Sue Hansell Eye on Finances 	Craig Holt Webmaster 	**Area Representatives:** Alaska - Chris LaCroix British Columbia – John Boyce Washington - Tracy Hare Oregon – John Lin California – Briana Hurley Mexico - Carmen Maria Lopez Saiz Representative at Large – Amit Morey	

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KEYNOTE SPEAKER

Jae Park, Ph.D.

Professor Emeritus
Seafood Research & Education Center
Oregon State University

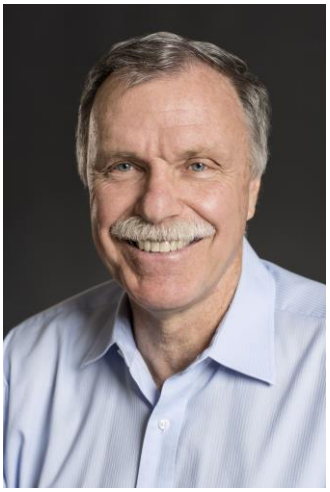
Dr. Park is a professor emeritus of Oregon State University. He retired from OSU in Dec 2020 after serving for 29 years. He was a technical director at the crabstick manufacturer (SeaFest/JAC Creative Foods, currently owned by Trident Seafoods) in 1987-1992. Having devoted his entire professional career to fish protein (surimi) research and education, Dr. Jae Park has distinguished himself as an internationally renowned scientist in surimi research, education, and technology transfer. He received numerous awards to recognize his accomplishment regionally, nationally and internationally including IFT Fellow and Bor S Luh International Award. His surimi textbook, *Surimi and Surimi Seafood* (2000, 2005, and 2014) is used as a production and technical guide by numerous manufacturers globally. As a mentor, he trained over 40 graduate and post-graduate students for their MS and Ph.D. degree along with 9 grand students (his former student's students). He hosted over 50 international researchers who conducted various research projects as a visiting scientist. He published over 200 refereed journal articles and book chapters. He founded the OSU Surimi School in 1993 and Surimi Industry Forum in 2001 and offered the programs annually in Oregon. His program extended to Thailand, France, Spain, Japan, China, and Korea. Through his 74 different programs (surimi forum and surimi school), over 7,000 attendees were trained since 1993. He continues to offer his surimi education programs internationally under Jae Park Surimi School (http://www.surimischool.org/).

INVITED SPEAKERS

Dave Love, PhD, MSPH

Senior Scientist
Center for a Livable Future
Johns Hopkins Bloomberg School of Public Health

Dave C. Love, PhD, MSPH is a Senior Scientist at the Johns Hopkins Bloomberg School of Public Health, Department of Environmental Health and Engineering and the Center for a Livable Future. Dave uses food systems, environmental science, and public health research methods to study the fisheries and aquaculture sectors. You can follow his work on Twitter (@davelove1).



Ray Hilborn

Professor, School of Aquatic and Fishery Sciences, University of Washington

Ray Hilborn is a Professor in the School of Aquatic and Fishery Sciences, University of Washington specializing in natural resource management and conservation. He authored several books including "Ocean Recovery: a sustainable future for global fisheries? (with Ulrike Hilborn) in 2019, "Overfishing: what everyone needs to know" (with Ulrike Hilborn) in 2012, "Quantitative fisheries stock assessment" with Carl Walters in 1992, and "The Ecological Detective: confronting models with data" with Marc Mangel, in 1997 and has published over 300 peer reviewed articles. He has received the Volvo Environmental Prize, the American Fisheries Societies Award of Excellence, The Ecological Society of America's Sustainability Science Award, and the International Fisheries Science Prize. He is a Fellow of the Royal Society of Canada, the American Academy of Arts and Sciences, the Washington State Academy of Sciences, and the American Fisheries Society.

John Oliva
General Manager, Kohala Mountain Fish Company LC

John Oliva has 35 years of experience in the fisheries and aquaculture industry. John has a B.S. in Aquatic Conservation Biology (Fisheries Management) from Arizona State University, M.S. in Ichthyology and Aquatic Animal Husbandry from Arizona State University. John Previously worked for the Alaska Department of Fish and Game and Kake NonProfit Fisheries Corporation. John has also worked closely with NMFS, USFWS, U.S. Bureau of Reclamation and the Arizona Game and Fish Department, to name a few. John is currently the General Manager for Kohala Mountain Fish Company LLC., on the Big Island of Hawaii. He specializes in aquaculture technologies and is responsible for both the aquaculture side and the processing side of the company's operations. John is a powerful force in the industry and uses his positive attitude and tireless energy to encourage others to work hard and succeed. John is inspired daily by his wife Debbie and their three children. In his free time, John likes to hike, fish, hunt and spend time with family and friends.

Charles Toombs

CEO/Founder of Oregon Seaweed

Charles Toombs is the CEO/Founder of Oregon Seaweed. Oregon Seaweed operates the largest on-land seaweed farm in the United States. We grow dulse, a seaweed that is high in protein and is very appealing as a fresh, negative footprint protein.

We have two farms, one in Bandon, and our newest farm in Garibaldi, Oregon. We extract very functional proteins, and sell our dulse fresh through foodservice distributors to restaurants all over the United States.

Chuck has an MBA from the University of Chicago specializing in marketing and has a deep background in sales & marketing. Chuck is also on the faculty of the Oregon State University College of Business.

Steven Wilson, M.B.A.

Office of International Affairs and Seafood Inspection, National Marine Fisheries Service

Mr. Wilson is a lead figure for seafood inspection in NOAA. He holds a BS degree in Food Science and Industry and a Master of Business Administration, and has worked in the seafood industry and as an inspector or manager in the Seafood Inspection Program for over thirty-five years including the positions of HACCP Program Manager, Deputy Director of Field Operations, Chief Quality Officer, Assistant Director for Quality and Technology and Deputy Director. He is now the Director of Seafood Commerce and Certification for the NMFS Office of International Affairs and Seafood Inspection. This position includes the duties of Director of the Seafood Inspection Program.

Mr. Wilson has served on the Conference for Food Protection and the HACCP Library Steering Committee for the National Center for Food Safety and Technology. He has also served as the representative of the United States in several international workshops and seminars as an expert in HACCP and Quality Systems for the seafood industry. He participates as one of the US experts in the development and maintenance of the ISO 22000 family of standards. Mr. Wilson is active in the Institute of Food Technologist and the American Society for Quality. He is an ASQ Fellow and a lifetime member of Phi Tau Sigma, the honorary food science society.

Michael G. McLendon
Sensory Specialist

ORA
Pacific Northwest Laboratory (PNL)
U.S. Food and Drug Administration

Michael G. McLendon is based in the Pacific Regional Laboratory NW, in Bothell, WA and has been with USFDA since 2002 and served as the Agency's National Seafood Sensory Expert from 2007 – 2021.

Mike was appointed as FDA's National Expert in Seafood Sensory in 2007. He was responsible for all seafood sensory training presented by FDA. This included sample selection and on-site preparation at locations around the world, course development and classroom instruction. He assisted as a technical expert on FDA Headquarters policy decisions, and on FDA Seafood HACCP Investigations. As a Technical Expert, he assisted FDA Headquarters, Compliance Officers, Laboratory Management, Field investigators and Lab Analysts on seafood sensory issues. Since resigning the National Expert title in 2021, Mike has continued to advise the current National Expert as well as mentor the Agency current National Expert Candidates.

Prior to joining FDA, Mike was with the U.S.'s National Marine Fisheries Service, Seafood Inspection program from 1990 to 2002 initially as a Consumer Safety Officer, then as a supervisor and finally as a sensory specialist. He also worked as a Quality Assurance Manager for a seafood processor from 1987-1989 and as a seafood Inspector for the Mississippi State Department of Health from 1985 – 1987.

PROGRAM OUTLINE

SUNDAY FEBRUARY 20, 2022

4:00 – 6:00 pm **Registration** – Main Upper Lobby

6:00 – 8:00 pm **PFT President's Reception** – Salon and Lower Lobby

8:00 – 9:00 pm **PFT Executive Meeting** – The Ward Room

9:00 pm - Midnight **Cards and Social Hour** – The Ward Room

MONDAY FEBRUARY 21, 2022

8:00 – 11:00 am **Registration** – Main Upper Lobby

8:00 – 9:00 am **Breakfast** – Salon and Lower Lobby

SESSION 1 – Keynote Address - Salon

Moderator – Christina DeWitt (Oregon State University)

9:00 - 9:05 am **Opening Remarks** - Christina DeWitt, PFT President

9:05 - 9:35 am **Our Circumstances are Ever-Changing** – Jae Park (Oregon State University), *Keynote Address*

9:35 - 10:00 am **The Five Keys to Building a Better Food Safety Culture** - Lone Jespersen (Cultivate Food Safety), John Boyce (Boyce Food Safety Consulting, Ltd.)

SESSION 2 – Novel Technologies - Salon

Moderator – Bruce Odegaard (Seafood Products Association)

10:00 - 10:30 am **Professional chefs' perceptions of a novel fermented green crab sauce** – Denise Skonberg (University of Maine)

10:30 - 10:50 am* **Computational Analysis of Digestive Lipase from Litopenaeus vannamei and the Potential Use in Organic Synthesis** - Ana María Bojórquez-Sánchez (Instituto Tecnológico de Sonora)
* *Student competition*

10:50 - 11:00 am **Coffee Break**

11:00 - 11:20 am* **The Incorporation of Novel Water-Soluble Potato Protein Extract in Pacific whiting (Merluccius productus) Fillets Through Brine Injection Technology to Improve Quality** – Duncan Pasewark (Oregon State University), *Virtual*
** Student competition*

11:20 – 11:30 am **Seafood Byproduct Utilization Project Supported by Public-Private Partnership** – Jung Kwon (Oregon State University)

SPECIAL SESSION: Workforce – *Salon*

Moderator – John Boyce (Boyce Food Safety Consulting Ltd)

11:30 – 11:45 am **Community College Maritime Programs can Benefit the Commercial Fishing Industry.** – Angee Hunt (Clatsop Community College).

11:45 – 12:00 pm **COVID Proof Your Space** - Chris LaCroix (Copper River Seafoods)

12:00 - 1:00 pm **Lunch** – Salon and Lower Lobby

SESSION 3 – Seafood Safety - Salon

Moderator – Virginia Ng (Seafood Products Association)

1:00 - 1:30 pm **The Identification of Potential Food Safety Hazards in Processed Seaweed** – Claire Winkel (Integrity Compliance Solutions), *Virtual*

1:30 - 2:00 pm **Building a Seaweed Safety Training Program to Enhance the US Seaweed Industry -** Michael Ciaramella (New York Sea Grant/Cornell Cooperative Extension)

2:00 - 2:20 pm* **Species Identification of Ceviche and Poke Products Utilizing DNA Barcoding Methodologies** – Courtney Kitch (Chapman University)
** Student competition*

SESSION 4 – Poster Session & Wine and Cheese – Salon & Lower Lobby
CONCURRENT – Tour of Gladys Valley Marine Studies Building (3:00-5:00pm)

Moderator – Jung Kwon (Oregon State University)

2:30 - 4:00 pm **Use of DNA Barcoding to Identify Species in Sushi Products Sold in Orange County** – Amanda Tabb (Chapman University)
** Student competition*

Antibacterial and Antimycobacterial Activity of White Shrimp (Litopenaeus Vannamei) By-Products Extracts: Chemical Profile of The Active n-Hexane Shrimp Head Extract – Carmen López Saiz (University of Sonora)

Influence of Lipidic Compounds Extracted from the Muscle of Pacific White Shrimp - Sandra Carolina De La Reé-Rodríguez (University of Sonora)
* *Student competition*

Antiproliferative Activity of White Shrimp (Litopenaeus vannamei) By-products Against Cancer Cell Lines – Dania Leal-Rodriguez (University of Sonora)
* *Student competition*

Microbiological Safety and Quality of Raw, RTE Seafood Sold in Orange County, CA – Grace Marquis (Chapman University)
* *Student competition*

Antimutagenic and Antioxidant Activities in White Shrimp (Litopenaeus vannamei) Cephalotorax - Héctor-Enrique Trujillo-Ruiz (University of Sonora)
* *Student competition*

Arginine (Natural Amino Acid) to Replace Sodium Phosphate in Seafood Processing - Hyung Joo Kim (Oregon State University)
* *Student competition*

Anti-inflammatory Potential of Alaska Pollock Roe Hydrolysate – Jung Kwon (Oregon State University)

Pilot-Scale Depuration of Three Species of Oysters Demonstrates Varying Rates of Reduction of Vibrio parahaemolyticus – Spencer Lunda (Oregon State University)
* *Student competition*

Effects of L-Arginine Treatment on Protein Structure and Texture Properties of Skate (Raja Kenojei) Muscle at Different pH Conditions– Jong-Bang Eun (Chonnam National University), *Virtual*

Texture Profile of Fish Balls Made from Over-Sized Catfish – Yan Zhang (Mississippi State University), *Virtual*

DINNER ON YOUR OWN

8:00 pm - Midnight **Cards and Social Hour** – The Ward Room

TUESDAY FEBRUARY 22, 2022

8:00 - 11:00 am **Registration** – Main Upper Lobby

8:00 – 9:00 am **Breakfast** – Salon and Lower Lobby

SESSION 5 – Nutrition and Health - Salon

Moderator – Jung Kwon (Oregon State University)

9:00 - 9:30 am **Seafood in the American Diet** – Dave Love (Johns Hopkins Bloomberg School of Public Health), *Invited Speaker - Virtual*

9:30 - 9:50 am* **Seaweed Pacific Dulse (*Devaleraea mollis*): A Promising Bioresource for Health Application** – Rufa Mendez (Oregon State University)
* *Student competition*

9:50 - 10:10 am* **Anticancer Potential of Isolated Compounds from Octopus Ink (Octopus vulgaris)** – Martin Hernandez-Zazueta (University of Sonora)
* *Student competition*

SESSION 6 – Seafood Safety - Salon

Moderator – Michael Ciaramella (New York Sea Grant, Cornell Cooperative Extension)

10:10 - 10:40 am **Investigating the Influence of Depuration System Scale on the Clearance of Non-Pathogenic Vibrio parahaemolyticus in Pacific Oysters (Crassostrea gigas)** – Joy Waite-Cusic (Oregon State University)

10:40 – 10:50 am **Coffee Break**

10:50 - 11:10 am* **Fitness and Transcriptomic Analysis of Pathogenic Vibrio parahaemolyticus stored in Seawaters at Different Oyster Harvesting Temperatures** – Zhuosheng Liu (University of California, Davis), *Virtual*
**Student competition*

11:10 - 11:30 am **The Impact of Florfenicol Treatment on the Microbial Populations Associated with Live Catfish** – Hongye Wang (University of California, Davis), *Virtual*

11:30 – 11:50 am* **Opening a Can of Worms: Historical Change in Infectious Disease Risk for Marine Mammals Revealed by Archived Canned Salmon** – Natalie Mastick (University of Washington) * *Student competition*

12:00 – 1:00 pm **Lunch** – Salon and Lower Lobby

SPECIAL SESSION - Sustainability *– Salon*

Moderator – Jung Kwon (Oregon State University)

1:00 - 1:30 pm **Current Challenges To Sustainable Food Production from Fisheries on the West Coast and Alaska** – Ray Hilborn (University of Washington), *Invited Speaker - Virtual*

SESSION 7 - Novel Technologies - Salon

Moderator – Denise Skonberg (University of Maine)

1:30 - 1:50 pm* **Adsorption of Methyl Orange onto Hydroxyapatite from Tilapia (Oreochromis niloticus) Bones: Kinetics, Isotherm and Thermodynamics Studies** - B.G. González-González (University of Sonora), *Virtual*
* *Student competition*

1:50 – 2:10 pm* **Application of Ohmic Heating for Fish Sauce Fermentation** – Hyung Joo Kim (Oregon State University)
* *Student competition*

2:10 - 2:30 pm* **Effect of High Hydrostatic Pressure (HPP) Technology on the Microbiological Quality of Ready-to-Eat Blue Crab Meat** – Olivia Gilstrap (University of Maryland - Eastern), *Virtual*
* *Student competition*

2:30-2:40 pm **Coffee Break**

SESSION 8 – Seafood Quality - Salon

Moderator – Alexandra Oliveira (Chicken of the Sea Int'l. a Thai Union Group Company)

2:40 – 3:00 pm **Consumer Acceptability and Shelf-life Assessment of Frozen Seafood: mid-project update** – Ann Colonna (Oregon State University)

3:00 - 3:20 pm **Analyzing Methods to Sell Fresh Fish for More Money** – Keith Cox (Certified Quality Foods)

3:20 - 3:40 pm	**Ensuring Product Quality with Strategies and Tools that Confirm Personnel Skills** – John Boyce (Boyce Food Safety Consulting, Ltd.); Peter Frankel (Marine Learning Systems)
3:40 – 4:00 pm	**Why High-Quality Seafood is Critical: from Fishermen to the Chef and How to Deliver It.** - Chuck Anderson (Certified Quality Foods).
4:00 – 5:00 pm	**PFT General Meeting** – Salon
6:00 – 7:00 pm	**Cocktails** – Salon and Lower Lobby
7:00 - 9:30 pm	**PFT Banquet & Student Awards** – Salon and Lower Lobby
9:30 - Midnight	**Cards and Social Hour** - Hallmark

WEDNESDAY FEBRUARY 23, 2022

8:00 - 9:30 am	**Registration** – Main Upper Lobby
8:00 - 9:00 am	**Breakfast** – Salon and Lower Lobby

SESSION 9 – Aquaculture - Salon

Moderator – Denise Skonberg (University of Maine)

9:00-9:30 am	**Kohala Mountain Fish Company - Ka i'a e ulu ana mai ke kuahiwi** - John Oliva (Kohala Mountain Fish Company), *Invited Speaker*
9:30-9:50 am	**Controlled Environment Aquaculture (CEA) - "Carbon Negative Proteins From Clonal Red Seaweeds", Challenges and Market Opportunities** – Chuck Toombs (Oregon Seaweed), *Invited Speaker*
9:50-10:00 am	**Coffee Break**

SESSION 10 – Regulatory Updates and Panel Discussion - Salon

Moderator – Alexandra Oliveira (Chicken of the Sea Int'l. a Thai Union Group Company)

10-10:30 am	**NOAA Seafood Inspection Program** – Steven Wilson (NOAA), *Invited Speaker*
10:30-11:00 am	**Determining the Presence of Decomposition in Seafood by the U.S. Food and Drug Administration – Past, Present, Future** - Michael McLendon (FDA), *Invited Speaker*

11:00-11:30 am	**Seafood HACCP Alliance Updates** – Fish and Fishery Products Hazard Guide Updates Christina DeWitt (Oregon State University), Virginia Ng (Seafood Products Association)
11:30 am-Noon	**Panel Discussion**
Noon	**Closing Remarks**

ORAL ABSTRACTS

Title: Our Circumstances are Ever-Changing

Presenter: Jae W. Park, Oregon State University, OSU Seafood Lab, 2001 Marine Drive #253, Astoria, OR 97103

Abstract:
Last two years we have dealt with tremendously difficult environments affecting our life and our seafood industry. COVID-19 was a game changer. Before the COVID, the US fishing and seafood industry had over $200 billion in annual sales and sponsored 1.7 million jobs. In Jan-Feb of 2020, there was a strong start with 3% increase in commercial fish landing revenues. However, it declined rapidly by 19% in March and 45% by July. As it started to recover beginning in fall, it averaged out as 22% decline in 2020. Losses in other sectors affecting the seafood economy were more than 100,000 restaurant closures, social distance protocols, and other safety measures.

There was a distinctively different market trends between retails and food services. While foodservices suffered significantly down by 34% on average in 2020, seafood retails were proliferated with frozen seafood up by 36%, fresh seafood up by 25%, and other grocery (canned, pouches) up by 21%.

There were trend's shifting with the COVID. As COVID forced countries to shut their borders, many fish buyers started to rethink how seafood could be processed. Investment ploughed into domestic or close-by processing as a new level of conservatism on the entire supply chain. Seafood processors started to decline their dependence on China, the largest seafood harvesting/processing country and to look for a new processing hub in other Asian countries or Eastern Europe. However, the shifting wasn't that easy as FDA-controlled HACCP and other certifications must be established newly. On-line became a new trend in seafood sales. 44% seafood purchased made in groceries was online in 2021.

Based on various interviews with upper managers in the US surimi and surimi seafood industry, consensus within the industry indicated labor shortage, global logistic issues with shipping cost increase by 10 times from Asia to Westcoast USA, and lots of money spent for the COVID prevention plan including quarantine and sanitation.

As we move toward to the end of the COVID tunnel hopefully, we have found a few positive outcomes: Consumption of surimi seafood increased significantly as people started cooking at home and as surimi seafood is an affordable commodity. As shipping problem overwhelmed within the industry, the US surimi seafood makers were able to penetrate the Asian food market in the USA. Shortage in labor has led the industry to explore automation with robotic operation. A significant growth of e-commerce was noted. And working remotely has become a new pattern. Let's keep our fingers crossed for the new paradigm.

Title: The Five Keys to Building a Better Food Safety Culture

Presenters: Lone Jespersen, *Cultivate Food Safety;* John Boyce, *Boyce Food Safety Consulting, Ltd.*

Abstract:
Maturing and maintaining a strong and positive food safety culture provides numerous benefits, including better retention of talent. But how does a company elevate the importance of food safety culture while balancing it with other business goals? We'll talk about how to define the five dimensions to a culture of food safety. We'll discuss some actionable tactics that can be applied to plan for and change food safety culture in your organization.

Title: Professional chefs' perceptions of a novel fermented green crab sauce

Authors: Holly Leung, Jennifer J Perry, **Denise Skonberg***, *School of Food and Agriculture, University of Maine, Orono, Maine 04469*

Abstract:

Introduction

Although invasive green crabs have caused considerable economic and ecological damage in the U.S., there is no well-established use for this abundant biomass. Developing a high-value food product such as fermented crab sauce may stimulate the commercial harvest of these crabs. Research has demonstrated the successful fermentation of green crabs to produce a condiment with appropriate microbial and physicochemical characteristics.

Objective

The specific objective of this study was to gain insight into chefs' perceptions of the crab sauce as a potential culinary ingredient for food service.

Materials & Methods

An online survey collected feedback from 59 professional chefs in May 2021. Chefs were asked about their attitudes towards fish sauce and their perceptions of a green crab sauce product concept. Demographic and professional experience data were correlated with ratings for frequency of use, likeliness to use, and willingness to purchase the condiment.

Results & Discussion

Preferred attributes of fish sauce included medium brown color, savory aroma, transparency, and umami flavor. The most important sourcing factors for restaurant ingredients were local, sustainability, and price. "Likeliness to use" and "willing to purchase" a commercially available green crab sauce were rated highly (≥7 on 9-point scale) by the majority (>70%) of chefs.

Conclusion

These results have important implications for the production and marketing of a fermented invasive green crab sauce. Chefs were very receptive of the product concept for the food service distribution channel; however, sensory evaluation of the crab sauce is necessary to characterize desirable flavor and odor attributes critical for commercial success of this unique condiment.

Presenter

Title: Computational analysis of digestive lipase from *Litopenaeus vannamei* and the potential use in organic synthesis

Authors: Ana María Bojórquez-Sánchez*[1], Raul Balam Martínez-Pérez[1,2], Tania Díaz-Vidal[3], Lourdes Mariana Díaz-Tenorio[1], Luis Alonso Soto-Leyva[1]

[1] Instituto Tecnológico de Sonora, 5 de febrero 818 sur, Col. Centro, 85000 Ciudad Obregón, SON, Mexico.
[2] Centro de Investigación y Asistencia en Tecnología del Estado de Jalisco, Camino Arenero 1227, El Bajío del Arenal, 45019 Zapopan, JAL, Mexico.
[3] Departamento de Ingeniería Química, Centro Universitario de Ciencias Exactas e Ingenierías, Universidad de Guadalajara, Guadalajara C.P. 44430, Mexico.

Abstract:

Introduction

In the shrimp industry, the hepatopancreas is discarded as waste; however, it results in an important source of biocatalysts such as proteases, carbohydrases, and lipases. Lipases are commonly used for the organic synthesis of cosmetics and drugs. Fatty acid esters are molecules with a wide range of food and pharmaceutical applications produced by chemical and enzymatic reactions. In this work, we study the specificity and capability of digestive lipolytic enzymes of *L. vannamei* for fatty acid esters synthesis.

Objective

To evaluate the acyl specificity characteristics by computational analysis and the capacity of lipolytic digestive enzymes from *L. vannamei* in organic synthesis.

Materials & Methods

The *L. vannamei* digestive lipase sequence (GenBank no. ACU57197.1) was used. SWISS-MODEL and C-I-TASSER servers were used for 3D structure modeling. Then, they were validated using Verify 3D, PROCHECK, and PROSA-WEB. Molecular docking was performed with AutoDock Vina and visualized by Pymol. The docked complex was analyzed in LigPlot. To corroborate the bioinformatic method, several esters were synthesized in anhydrous conditions using enzymatic extract of *L. vannamei* and monitored by thin-layer chromatography (TLC).

Results & Discussion

3D structures of *L. vannamei* digestive lipase were selected. The validation displayed a satisfactory score. The lowest affinity energies (kcal/mol) were obtained for the longer chain substrates. The synthesis of oleic esters with different alcohols indicates the preference of bulky short, medium, and long alcohol chains with unsaturation.

Conclusion

Both approaches suggest *L. vannamei* hepatopancreas as a value-added waste due to the potential of lipolytic enzymes in organic synthesis.

Presenter

Title: The Incorporation of Novel Water-Soluble Potato Protein Extract in Pacific whiting (*Merluccius productus*) Fillets Through Brine Injection Technology to Improve Quality

Authors: G. Duncan Pasewark*[1,2] and Christina A. Mireles DeWitt[1,2]

[1]Food Science & Technology, Oregon State University, Corvallis, OR, USA;
[2]Seafood Research & Education Center, Oregon State University, Astoria, OR, USA

Abstract:

Introduction

Pacific whiting is an abundant commercial fishery off the U.S. northwestern coast but has significant issues with flesh softening due proteolytic cathepsins from endogenous and exogenous sources, impacting domestic marketability. Previously, injected whiting with 3% potato concentrate/xanthan gum (to suspend inhibitor) and 3% egg white in base brine (BB, 3% salt, 3% sodium tripolyphosphate) both found myosin electrophoresis bands equally protected in cooked fillets, however with potato extract being insoluble and xanthan gum acting antagonistically toward texture, an alternative is needed.

Materials & Methods

Water-soluble potato protein extract (PPE, Avebe, Veendam, Netherlands) was explored. First, 3% PPE, egg white, or potato concentrate in BB at 10% by weight in high cathepsin whiting mince was blended and examined for cathepsin L activity and minimal efficacy (ME). ME was measured for cathepsin B, H, and L activity. The second injected ME or BB into 200 fillets and observed protein functionality through 12 freeze-thaw (F/T) cycles to mimic long-term frozen storage. Color of noncooked/cooked fillets were measured along with cooked texture.

Results & Discussion

PPE was more effective than egg white and potato extracts toward inhibiting cathepsin L and ME was 0.1% in BB. ME significantly inhibited cathepsins B and L but not H. Brine treatment showed no evidence of altering protein functionality. Cooked color was darker in PPE treatment (Lower L*, hue, and chroma). PPE fillets showed greater hardness and F/T 0 which diminished by F/T 3.

Conclusion

Results suggest PPE was effective at enzyme inhibition but potentially requires additional ingredients to improve protein functionality and texture.

****Presenter***

Title: Seafood byproduct utilization project supported by public-private partnership

Presenter: Jung Y. Kwon[1,2]

[1]*Food Science & Technology, Oregon State University, Corvallis, OR, USA;*
[2]*Seafood Research & Education Center, Oregon State University, Astoria, OR, USA*

Abstract:
Nutritional insecurity and environmental sustainability are the two primary challenges facing humanity in the 21st century. One highly promising and practical approach that can tackle both issues effectively is improving utilization of currently wasted dietary resources. The success of this approach will provide an influx of dietary resources to the global community while decreasing waste and associated environmental impacts. To this end, our research aims to develop technologies and platforms to promote the use of underutilized seafood by-products and wastes for viable food applications. Recently, societal interests on sustainable and alternative protein products are increasing, which originate from consideration for health and environment. However, despite the rising demands, the world has a long way to go to provide the growing population with a sufficient amount of protein that is affordable, sustainable, and optimal for health. Seafood processing by-products has been perceived as unappealing by consumers, which leads to the current practice of discarding a large portion of raw material during processing. This results in a substantial loss of nutritious edible resources as well as the generation of discards and waste causing environmental damage. But the perspective on food is rapidly changing around the world, and this presents an opportunity to transform seafood by-product and waste material into a feasible solution for providing affordable and high-quality protein. Our research proposes to improve the utilization of underused aquatic resources by developing viable and practical applications. The innovation of the current paradigm in seafood production and the market will serve as a sustainable solution to approach global food and nutritional security.

Title: Community college maritime programs benefit the commercial fishing industry.

Presenter: Angee Hunt, Executive Director, *Clatsop Community College Foundation*

Abstract:
Clatsop Community College (CCC) provides a one-year seamanship certificate and an Associate of Applied Science degree in vessel operations for students interested in maritime science careers. In addition to local pilot associations, shipping companies, and others, graduates from these programs contribute to the commercial fishing industry workforce.

The mission of the CCC Foundation (CCCF) is to ensure that cost is not a barrier to students working to complete certificate and degree programs. In 2020, the CCCF received a significant gift from the World of Speed Museum for automotive student education. This gift provides a case study of how scholarships can significantly grow student enrollments. Recently, the CCCF received a grant from The Roundhouse Foundation for critical maritime program equipment needs. To maximize the impact, the CCCF is leveraging this grant to fundraise for maritime student scholarships and help increase the number of maritime students at CCC. Students of today become the workforce of tomorrow.

Title: COVID Proof Your Space

Presenter: Chris LaCroix

Abstract:
ActivePure has been the global leader in active, 24/7 surface and air disinfection systems for healthcare and educational institutions, commercial and public facilities, hospitality and residential applications since 1924.

Patented ActivePure Technology has been proven in independent university and laboratory testing to effectively control and neutralize indoor contaminants. Units with ActivePure Technology pull free oxygen and water molecules in the air through ActivePure's patented honeycomb matrix. The technology creates oxidizers, which we call ActivePure Molecules, that are then released back into the room, where they quickly reduce DNA and RNA viruses

It is the only product in its class recognized by the Space Foundation as Certified Space Technology and inducted in the Space Foundation Hall of Fame. The ActivePure Medical Guardian is registered and cleared as an FDA Class II Medical Device. ActivePure was developed for use in space exploration and has since evolved for use in commercial and consumer products used to reduce exposure to pathogens in the air and on surfaces.

In unaffiliated third-party laboratory tests, ActivePure has been proven to reduce up to 99.99% of pathogens including SARS-CoV-2 (the virus that causes COVID-19), Avian influenza, E. coli, MRSA, Norovirus, Staph bacteria, Candida, Swine Flu, Hepatitis, Legionella, and more.

Title: The identification of potential food safety hazards in processed seaweed.

Presenter: Clare Winkel, B.App.Sc & MBA (Seafood Management), *Technical Solutions Manager at Integrity Compliance Solutions, Brisbane Qld 4172 Australia*
www.integritycompliance.com.au

Correspondence: clare.winkel@integritycompliance.com.au

Abstract:

Introduction

Annually there are over 36 recalls/import alerts for seaweed-based foods worldwide. Australia instigated 50% of these recalls/alerts in 2019. Australia imported AUD $40 million of seaweed products in 2017/18: 85% was for human consumption. There are a small number of Australian seaweed processors, making bulk wholesale ingredients or finished retail ready products in Australia, using grown or collected wild seaweeds.

Objective

It is a requirement that all Australian food processors implement Food Safety Programs, but most local authorities have little understanding of seaweed food safety hazards & do not inspect the premises. This session will look at some of the known food safety hazards within processed seaweed for human food consumption.

Materials & methods

Literature review of known food safety issues in seaweed sector using the following sources: https://horizon-scan.fera.co.uk/ that is an online subscription database of every food & packaging recall/border rejection in the world for the last 21 years.
-Published papers.
-Government publications.
-Media articles.

Results & Discussion

Food safety hazards identified in seaweed consumed as human food in the EU Rapid Alert system.

- 22 food safety hazards in the European seaweed chain ranked into major (4), moderate (5) & minor (13) hazards; Major: Arsenic, cadmium, iodine & Salmonella; Pathogens including norovirus & hepatitis E virus.

Identified from HorizonScan worldwide database (2000 – 2021).

- Iodine:254; Arsenic:63; USA Import refusals:35; Cadmium:13; Salmonella:11

Conclusion

Food safety hazards identified in actual Australian case studies:

- Allergens: crustaceans/mollusks; Physical: sand; Microbiological: Salmonella; Chemical: naturally occurring iodine.

Title: Building a Seaweed Safety Training Program to Enhance the US Seaweed Industry

Authors: Michael Ciaramella*, *New York Sea Grant/Cornell Cooperative Extension*; Anoushka Concepcion, *Connecticut Sea Grant*; Catherine Janasie, *The National Sea Grant Law Center*; Stephanie Otts, *The National Sea Grant Law Center*

Abstract:

Introduction

There is a growing seaweed industry in the US with increased interest in value-added production and expanding markets for edible seaweed products. With the industry still in its infancy many state and federal agencies are grappling with new producers coming to market and trying to better understand how to properly regulate seaweeds to ensure safe consumption. Through various regional and national seaweed efforts including the NOAA Sea Grant's Seaweed HUB, the lack of guidance and a formal training program were identified as significant hurdles to the growth and success of this emerging industry.

Objectives

This effort seeks to identify industry, agency, and academic professionals with an interest in seaweed production and safety to explore opportunities and needs for a seaweed specific food safety training program.

Materials and Methods

A team of industry, agency, and academic professionals will be coordinated to explore the development of a FSMA PC training specifically for seaweed producers and processors.

Results & Discussion

We are seeking interest from industry, agency, and academic professionals working with seaweed in developing a strategy for a national seaweed safety training program to ensure uniform training nationally and facilitate discussions around seaweed safety and technology.

Conclusion

Initially these efforts will seek to identify a team of professionals that is able and willing to collaborate on addressing the needs of the seaweed industry and the confusion surrounding seaweed safety and regulation. Ultimately, the team will seek to develop and implement a seaweed safety training program for the emerging US seaweed industry.

***Presenter**

Title: Species Identification of Ceviche and Poke Products Utilizing DNA Barcoding Methodologies

Authors: C. Kitch, A. Tabb, G. Marquis, R.S. Hellberg**;** *Chapman University, Schmid College of Science and Technology, Food Science Program, Orange, CA*

Abstract:
Seafood mislabeling and fraud have been identified using DNA barcoding techniques in numerous studies globally. DNA barcoding allows for fish species identification by extracting, amplifying, and sequencing a portion of the cytochrome *c* oxidase I (COI) gene, then analyzing with the Barcode of Life Data system (BOLD). A wide variety of fish products have been studied, but notably missing are ceviche and poke, particularly in the United States. The objective of this study was to investigate species labeling and use of acceptable market names for poke and ceviche sold at restaurants in Southern California. A total of 25 poke and 30 ceviche samples (n=55) were sequenced utilizing DNA barcoding and underwent species analysis using BOLD. The species identified were then compared against the menu name and the FDA Seafood List to ensure acceptable market names were used for each product. Poke was found to have an overall mislabeling rate of 44% (11/25), with 10 samples having unacceptable market names and 1 sample substituted based on species. For ceviche, an overall mislabeling rate of 60% (18/30) was detected, with 14 samples having unacceptable market names and 4 samples substituted based on species. These rates are consistent with findings from other studies investigating seafood mislabeling and suggest the need for outreach efforts to ensure proper labeling of fish using acceptable market names.

***Presenter**

Title: Seafood in the American Diet

Presenter: Dave Love, PhD, MSPH; Senior Scientist, *Center for a Livable Future, Johns Hopkins Bloomberg School of Public Health*

There is an urgent need to transition towards healthy, affordable diets that are part of sustainable food systems. Seafood can satisfy many of these goals—as a healthy protein that can be sustainably produced and some forms are affordable. However, the potential health benefits of seafood are not being achieved as 80-90% of American do not meeting minimum dietary intake levels. This presentation will describe the current status of seafood consumption in the U.S. with a special focus on downstream stages of the supply chain (retail and food service) and discuss seafood affordability and nutrition.

Title: Seaweed Pacific Dulse (*Devaleraea mollis)*: A Promising Bioresource for Health Application

Authors: Rufa L. Mendez[1*] and Jung Yeon Kwon[1,2]

[1]Department of Food Science and Technology, College of Agricultural Sciences, Oregon State University, Corvallis, OR 97331
[2]Seafood Research and Education Center, Oregon State University, Astoria, OR 97103

Abstract:
Algal functional foods and nutraceuticals is an expanding food product industry segment aimed at providing supplementary strategies for health promotion and disease prevention. Pacific dulse (*D. mollis*) is fast-growing macroalgal resource in the Pacific Northwest, originally used as aquaculture feed, but now increasing cultivated as human food. We employed *in vivo*, *in vitro*, and *in silico* strategies to evaluate the potential of this seaweed resource as a health food in its whole, hydrolyzed, or peptide-enriched form. Obese mouse fed with whole seaweed were significantly less inflamed and gained less weight despite high feed intake compared to the high fat control. Dulse hydrolysates exerted antioxidant, anti-inflammatory, antihypertensive and antidiabetic effects *in vitro*. By simulating gastro-intestinal digestion and fermentation *in silico*, we found bioactive peptides that were predicted to be stable, non-toxic, and potentially therapeutic in the context of lifestyle diseases like Type 2 diabetes (T2DM), hypertension, and chronic inflammation. This work provides an assessment strategy for algal functional food prospecting as well as opens more opportunities for PNW's resource utilization.

***Presenter**

Title: Anticancer Potential of Isolated Compounds from Octopus Ink (*Octopus vulgaris*)

Authors: Martin S. Hernandez-Zazueta[1*], Joel S. García-Romo[1], Ema C. Rosas-Burgos[1], Josafat M. Ezquerra Bauer[1], Ivan Luzardo-Ocampo[2], Angel Antonio Carbonell-Barrachina[3], Pablo Taboada-Antelo, Armando Burgos-Hernández[1]
[1]Deparment of Research and Postgraduate Studies in Food. University of Sonora. Hermosillo, Sonora, México. [2]Faculity of Chemistry. Autonomous University of Querétaro. Santiago de Querétaro, Querétaro, México. [3]Higher Polytechnic School of Orihuela, Miguel Hernández de Elche University, Alicante, Spain. [4]Department of Applied Physics, University of Santiago de Compostela, Santiago de Compostela, Spain.

Abstract:
This study aimed to take advantage of fish by-products, where secondary metabolites from marine organisms have been targeted with potential pharmacological applications against chronic non-communicable diseases such as inflammation and cancer. Therefore, freeze-dried octopus (*Octopus vulgaris*) ink was chemically characterized and screened for anti-inflammatory and anti-proliferative/pro-apoptotic potential on cancer cells. Chromatographic (Liquid-liquid phase transfer, open column, and TLC), spectrophotometric (FT-IR, ^{1}H-RMN, ^{13}C-RMN, and MS-MS), and biological assays were used. The results showed a newly unreported compound (Ozopromide, OPC) in the Hexane/Ethyl acetate ink fraction capable of upregulating anti-inflammatory cytokines. Besides, OPC downregulated pro-inflammatory cytokines, nitric oxide and reactive oxygen species production, and the NF-κB protein complex, analyzed by flow cytometry. In addition, OPC showed a high anti-proliferative effect on breast (MDA-MB-231, GI_{50}: 12 μg/mL) and prostate (22Rv1, GI_{50}: 28 μg/mL) cancer cells, displaying apoptotic cell death confirmed by flow cytometry and morphological membrane changes based on microscopic immunofluorescence. These experiments confirmed previous experiments showing the effect of ink extracts on membrane proteins from cancer cells. Results showed the feasibility of using OPC as a potential drug for cancer treatment.

***Presenter**

Title: Investigating the influence of depuration system scale on the clearance of non-pathogenic *Vibrio parahaemolyticus* in Pacific oysters (*Crassostrea gigas*).

Authors: Samantha Burroughs*[1], Spencer Lunda[2], Hussein M. H. Mohamed[1], Bill Dewey[3], Andy DePaola[4], Carla Schubiger[2], and **Joy Waite-Cusic[1]**

[1]Department of Food Science and Technology, Oregon State University, 100 Wiegand Hall, Corvallis, OR 97331
[2]Carlson College of Veterinary Medicine, Hatfield Marine Science Center, Oregon State University, 2030 SE Marine Science Dr., Newport, OR 97365
[3]Taylor Shellfish Farms, Inc., 130 SE Lynch Rd., Shelton, WA 98584
[4]Angelo DePaola Consulting LLC, 12719 Dauphin Island Parkway, Coden, AL 36523

Introduction
Depuration is a wet storage process supporting natural oyster behavior which could result in clearance of *V. parahaemolyticus*. Depuration could be a critical process to improve the safety of oysters destined for raw consumption. Prior depuration research has been conducted at pilot-scale; however, demonstrating efficacy at commercial-scale will be necessary for validation and regulatory acceptance.

Objectives
Compare efficacy of depuration at pilot and commercial scale to reduce *V. parahaemolyticus* in oysters (*C. gigas*).

Materials and Methods
Oysters were batch-inoculated with a surrogate non-pathogenic cocktail of *V. parahaemolyticus* to achieve 6 log CFU/g. Oysters were depurated (12°C, 5 days) in a pilot-scale system (Hatfield Center, Newport, OR) or a commercial-scale system (Taylor Shellfish, Shelton, WA). Individual oysters (n = 5) were collected daily and analyzed for survivors using selective plating, non-selective plating, and standard MPN methods.

Results and Discussion
Initial levels of *V. parahaemolyticus* in oysters ranged from 5.37 to 6.53 log CFU/g. Rapid and significant depuration of *V. parahaemolyticus* occurred in the first 24 hours of depuration in both systems (1.9 log CFU/g). Continued depuration at 12.5°C for 5 days did not lead to further reductions in either system. Oysters remained contaminated at 2.98-3.84 log CFU/g.

Conclusion
Reduction of *V. parahaemolyticus* in Pacific oysters at 12.5°C for 5 days was comparable in pilot and commercial systems. Rapid *V. parahaemolyticus* clearance occurred during the first 24 hours; however, no further reduction was observed with continued depuration. Further research is needed to clarify depuration variables to support clearance of *V. parahaemolyticus*.
***Presenter**

Title: Fitness and transcriptomic analysis of pathogenic *Vibrio parahaemolyticus* stored in seawaters at different oyster harvesting temperatures

Authors: Zhuosheng Liu*, Chao Liao, and Luxin Wang; *Department of Food Science and Technology, University of California Davis*

Introduction
Vibrio parahaemolyticus (*Vp*) is a major bacterial pathogen associated with seafood outbreaks, especially raw and undercooked oysters. Additional information is still needed about the fitness and survival mechanisms of *Vp* in pre-harvest environment.

Objectives
The objectives of this study were to evaluate the survival of *Vp* in seawater at 10 or 30 °C (representing winter and summer water temperatures) and investigate its survival mechanisms at the transcriptional level.

Materials & Methods
Two strains of pathogenic *Vp* (*tdh*+ VP43996 and *trh*+ VP17802) were separately inoculated into autoclaved seawaters. Inoculated samples were stored at 10 or 30 °C for 10 days and 120 hours, respectively. The survival of inoculated *Vp* was evaluated every day at 10 °C and every 2-hour for the first 12 h, then at 24, 48, 72, and 120 h at 30 °C. RNA was extracted from *Vp* and the cDNA library was prepared and sequenced on the Illumina Hiseq 2500 v4 system.

Results & Discussion
Culturable *Vp* cells gradually decreased at 10 °C while increased at 30 °C. While *trh*+ VP17802 had higher survival rates at 10 °C, *tdh*+ VP43996 showed higher growth rates at 30 °C. More differentially expressed genes were detected at 30 than 10 °C. The virulence of *Vp* was temperature-dependent as illustrated by the upregulated virulence-associated genes and enriched metabolism pathways.

Conclusion
Pre-harvesting temperatures play impacts on the survival and virulence of *Vp*. Information generated from this study may of use for the design and optimization of post-harvest handling practices for oysters.

***Presenter**

Title: The impact of florfenicol treatment on the microbial populations associated with live catfish

Authors: Hongye Wang*[1], Lina Sheng[1], Xiran Li[1], Zhuosheng Liu[1], Sushumna Canakapalli[1], Yi Zhou[1], Chao Liao[1], Esteban Soto Martinez[2], and Luxin Wang[1]

[1]Department of Food Science and Technology, University of California Davis
[2]School of Veterinary Medicine, University of California Davis

Introduction
Florfenicol is commonly used to treat the enteric septicemia of catfish (ESC) caused by *Edwardsiella ictaluri*. However, there is limited information about the impact of such treatment on the native microbiota associated with catfish.

Objectives
The objective of this study was to investigate the impact of therapeutical florfenicol treatment on the microbial populations present on the skin and gill, and in the intestine of catfish.

Materials & Methods
Eight 35-gallon tanks were set up for this study with 25 fish per tank at 25 °C (a temperature at which ESC typically occurs). Five fish were taken from each tank before and after the treatment as well as at the end of withdrawal period. Microorganisms present on fish gill and skin, and in the intestine were collected using FLOQSwabs. Their abundance and diversity were analyzed by direct plating and 16S rDNA sequencing.

Results & Discussion
The total anaerobic count (AnPC) in the intestine significantly ($P > 0.05$) increased by 3.02-log at the end of treatment and continued increasing by another 1.6-log at the end of withdrawal period. In comparison, < 1-log increase of AnPC was observed from gill and skin. Similar trend was observed for total aerobic counts. Currently available sequencing results indicated that the abundance of bacterial phyla, such as *Firmicutes*, *Fibrobacterota*, and *Proteobacteria*, present in the intestine was significantly altered by the florfenicol treatment.

Conclusion
Results of current data indicated that the impact of florfenicol on the native microorganisms is site-dependent with bigger impacts observed in the intestine**.**

***Presenter**

Title: Opening a can of worms: Historical change in infectious disease risk for marine mammals revealed by archived canned salmon

Authors: Mastick, N.C.*, Welicky, R.L., Katla, A., Odegaard, B., Ng, V., and Wood, C.L.

Introduction

How has the risk of parasitism changed for marine mammals over the past several decades? Parasitological assessments of marine mammals are rarely performed and are biased toward unhealthy animals. A more practical method for assessing long-term change in risk might be to measure the abundance of parasite infectious stages in marine mammal prey, like salmon. Parasitic nematodes of the family Anisakidae (anisakids) use salmonids as intermediate or paratenic hosts in life cycles that terminate in marine mammal definitive hosts. These infections can cause acute gastritis and peritonitis in cetaceans.

Objectives

To assess whether anisakid burden – and infection risk for marine mammals – has changed in salmonids over time, we used a novel data source: salmon that were caught, canned and thermally processed in Alaska, USA for human consumption.

Materials and Methods

We examined canned filets of pink (*Oncorhynchus gorbuscha*, n = 58), red (*Oncorhynchus nerka*, n = 45), and chum salmon (*Oncorhynchus keta*, n = 35) processed between 1979 and 2019. We dissected each filet and quantified the number of worms per gram of salmon tissue.

Results and Discussion

Anisakid burden increased over time in chum ($p < 0.0001$) and pink ($p < 0.01$), but not red salmon ($p = 0.56$).

Conclusion

These results suggest that marine mammals consuming chum and pink salmon may have experienced an increasing risk of intestinal parasitism over the study period.

***Presenter**

Title: Current challenges to sustainable food production from fisheries on the West Coast and Alaska

Presenter: Ray Hilborn[1]

[1]*School of Aquatic and Fishery Sciences, College of the Environment, University of Washington*

Abstract:
The 1990s were an era of increased attention to the sustainability of fishing, spurred by the collapse of the Newfoundland Cod stock. This led to major foundations funding fisheries work, the formation of NGOs like Oceana and the Marine Stewardship Council, as well as the 1996 reauthorization of the Magnuson-Stevens Act and its mandate to identify and rebuild overfished stocks. Since that time U.S. fisheries have largely eliminated overfishing and there is little concern about the sustainability of the target stocks. The focus of the NGOs and conservation stakeholders now is largely on the environmental impacts of fishing, especially bycatch, vulnerable marine ecosystems and ecosystem changes impacting higher trophic level species. There continues to be strong pressure to reduce fishing more and this has surfaced in the form of the 30x30 proposal to close 30% of the oceans to fishing. I will briefly highlight how best to reduce the environmental impacts of fishing while maintaining fisheries production, and to compare the environmental impacts of fishing to agriculture and livestock.

Title: Adsorption of methyl orange onto hydroxyapatite from tilapia (*Oreochromis niloticus)* bones: Kinetics, isotherm and thermodynamics studies

Authors: B.G. González-González[1,*], H. Santacruz-Ortega[1], C.O García-Sifuentes[2], F. Brown-Bojórquez[1], R.E. Navarro-Gautrín[1], R. Sugich-Miranda[1], E. Carvajal-Millán[2]

[1]Department of Polymers and Materials Research, University of Sonora, Hermosillo Sonora 83000, Mexico.
[2]Fishery Products Quality Laboratory, Food and Development Research, A.C. (CIAD), Hermosillo, 83304, México.

Abstract:
Methyl orange (MO) is one of the most common dyes used in textile industry and its acute exposure can cause cyanosis, jaundice, quadriplegia, and tissue necrosis in humans. Therefore, the removal of MO before discharge of industrial effluent into water bodies is essential. The aim of this study was to evaluate the effect of the initial dye concentration, contact time, adsorbent dosage, initial pH, and temperature of the solution on MO removal efficiency and illustrate the mechanism of adsorption. For this, MO solutions were prepared at 50, 100, 150 and 200 mg/L and placed in contact with hydroxyapatite (HAp) in a batch system. Kinetics, isotherm and thermodynamics experiments were also conducted. The results indicated that the higher initial concentration of MO, a greater adsorption capacity was observed, whereas the equilibrium of the adsorption process was reached at 4 h. The highest removal achieved in this study was 85%. The optimum dosage of HAp was 15 g/L, the removal efficiency decreased with the increasing of temperature and, the pH did not have an important effect. The models with the best fit were the pseudo first order and Dubinin-Radushkevich for the kinetics and isotherm data, respectively. Thermodynamics findings revealed exothermic nature of the process and indicated that the instability activation complex of the adsorption reaction increased with the increasing of temperature. In conclusion, the HAp obtained from tilapia (*Oreochromis niloticus*) bones successfully removed MO from aqueous solution, thus it could be a promising material for the removal of dyes from textile effluents.

***Presenter**

Title: Application of Ohmic heating for fish sauce fermentation

Authors: Hyung Joo Kim*, Christina A. Mireles DeWitt, Jae W. Park; *Oregon State University, OSU Seafood Research and Education Center, 2001 Marine Dr., #253, Astoria, OR 97103, United States*

Introduction

Fish sauce fermentation is a time-consuming process as proteins need to be completely degraded into peptide/amino acids. Ohmic heating is a method that quickly and uniformly generates heat through electrical resistance. We hypothesize that ohmic heating can be utilized in the manufacture of fish sauce to accelerate fermentation. In addition, fish with endogenous proteases, like Pacific whiting, may be most suitable for an accelerated fish sauce fermentation process. The objective of this research was to measure the effectiveness of ohmic heating on accelerating fish sauce fermentation using Pacific whiting.

Materials & Methods

Whole Pacific whiting (500-700g) was obtained and chopped using Stephan silent cutter and the mince was mixed with salt at 3:1 ratio. The salted mince was subjected to two heating treatments: 1) ohmic; 2) water bath. Both samples were treated at 25°C and 35°C for a week consecutively, and 55°C for 6 weeks. The soluble fraction was collected and filtered before measuring sodium chloride, nitrogen, and histamine content.

Results & Discussion

Total nitrogen content of fish sauce fermented using ohmic heating was significantly higher ($p<0.05$) indicating higher degradation of fish proteins. Sodium chloride and histamine content were not impacted by heat treatment. Sodium chloride of both samples was approximately 24%. Both samples contained approximately 10 mg of histamine in 100 g fish sauce which was significantly below the suggested limit offered by the regulation.

Conclusion

Ohmic heating significantly accelerated fermentation and maintained its characteristics and quality. It is our plan to develop a large scale ohmic device for fish sauce fermentations.

***Presenter**

Title: Effect of High Hydrostatic Pressure (HPP) Technology on the Microbiological Quality of Ready-to-Eat Blue Crab Meat

Authors: Olivia Gilstrap[1]*, Salina Parveen[1], Caleb Nindo[1], and Chengchu Liu[2]

[1]University of Maryland Eastern Shore, Princess Anne, MD 21583
[2]University of Maryland Extension, Princess Anne, MD 21583

Introduction
Recent increase in seafood consumption has accelerated the growth of the crabmeat industry due to its palatability and nutritional richness. However, fresh crabmeat, a perishable ready-to-eat (RTE) food, has limited shelf life in refrigerated storage. High hydrostatic pressure (HPP) process is a non-thermal technology that has come to the forefront for enhancing microbiological quality of various foods including juice, milk, and RTE meat.

Objective
This study aims to evaluate (1) the integrity of different containers against HPP, and (2) the effectiveness of HPP to enhance the microbiological quality of fresh RTE crabmeat packed in the selected container.

Materials & Methods
Live blue crabs (*Callinectes sapidus*) were pressure-cooked (≥115°C for 4-6 min). The crabmeat was picked and packed in plastic containers, and subjected to HPP treatment and stored at 4 °C. Container integrity and water leakage issues were examined by observation along with weight comparison before and after HPP treatment. Aerobic plate count, total coliform and *E. coli*, and yeast and mold were examined during storage using AOAC protocols.

Results & Discussion
The container sealed with OTR 10k film could stand high pressure without water leakage issue; the shelf life of control (non-HPP crabmeat) was about 7-10 days while the HPP products could last beyond 3 weeks without significant changes in sensory characteristics (taste, texture and flavor).

Conclusion
HPP technology could significantly enhance the microbiological quality and extend the shelf life of RTE crabmeat without affecting its sensory properties, which will be of immense benefit to the seafood industry.

***Presenter**

Title: Consumer Acceptability and Shelf-life Assessment of Frozen Seafood: mid-project update

Authors: Ann Colonna*, *Oregon State University/Food Innovation* Center; Christina A. Mireles DeWitt, *Oregon State University/COMES*; **Jamie Doyle***, *Oregon State University/Oregon Sea Grant*
Tyson Rasor, Ecotrust

Abstract:
Introduction
Past research shows that consumers find frozen seafood to be as good as, if not better, than fresh (never frozen) products. This information is not reaching/influencing the general consumer, chefs, or seafood retailers.

Objectives
Our research seeks to determine shelf life (nutrient density, oxidation, texture) and consumer acceptability of frozen seafood stored in two different freezers, commercial/industrial (-30C) and home (-18C). This information will help chefs, retailers, and consumers make informed decisions about storing frozen seafood products.

Materials and Methods
The project timeline is two years from January 2021-January 2023, with the shelf-life testing over an 18-month period starting in September 2021. Six seafood samples are being stored in two different freezers.

Results & Discussion
The project team will share a mid-project update covering the project design, which fish we are studying, how we are using our advisory committee, research results and lessons-learned to date.

***Presenter**

Title: Analyzing Methods to Sell Fresh Fish for More Money

Presenters: Keith Cox and Chuck Anderson, *Certified Qualified Foods*

Introduction
Wild capture fisheries are by nature, finite resources. Commercial fishermen have limited access to additional volume of catch to increase revenues and profits. Generating higher sales and profits requires selling each highly valuable fish for more money into the seafood supply chain. A primary way to increase the value of catch is to improve the quality and shelf life of fish offered into the seafood supply chain.

Objectives
The objective of this study is to determine handling and production methods to increase the value of commercially harvested wild capture sockeye salmon from Bristol Bay Alaska.

Materials and methods
Bristol Bay Regional Seafood Development Association (BBRSDA) is a fisherman founded nonprofit with the goal to improve the value and financial returns for Bristol Bay fishermen. BBRSDA and select seafood processors contracted Certified Quality Foods to help analyze various harvesting and handling processes to identify better handling practices that result in higher quality fish which can be sold into the seafood supply chain for maximum shelf life for maximum prices.

Results & Discussion
The 2021 study conducted by BBRSDA and Certified Quality Foods (CQF) definitively identified better harvesting and handling practices to maximize shelf life and product quality.

Title: Ensuring Product Quality with Strategies and Tools that Confirm Personnel Skills

Presenters: John Boyce, *Boyce Food Safety Consulting Ltd.*; Peter Frankel, *Marine Learning Systems*

Abstract:
Confirmation of skillsets is a key responsibility for those involved in Food Safety and Quality Assurance. Many daily tasks are critical to ensuring a safe product; as a result, this responsibility is mandated by regulations, standards, and customers. For example, what if the person doing a seam teardown in a cannery does not understand how to do their job? Are personnel consistently following procedures when confirming the functionality of the x-ray machine? With changing protocols, the potential for disaster is huge if these tasks are not performed correctly, particularly at critical control points. How can we ensure our personnel are reliably following prescribed procedures?

While the industry is familiar with methods like periodic audits and checklists, there are solutions available today that provide richer data on employee skills, with consistency and objectivity. Such tools not only save time and money; they also ensure a standardized level of quality across the organization and encode company best practices.

In this presentation, we discuss mandated requirements that involve skill assessment. We explore how advances in technology can help organizations exceed these requirements and objectively measure personnel competency. The presentation will highlight how other operators assess observable skills without bias and how new tools could be used to address the complex assessment problems present in the highly regulated environment of Food Processing. Attendees will learn strategies to ensure that their employees have the skills they need and that they use those skills consistently, regardless of how the industry and work environment changes around them.

Title: Why High-Quality Seafood is Critical: from Fishermen to the Chef and How to Deliver It.

Presenter: Chuck Anderson, *Certified Quality Foods*

Abstract:
According to the most recent FMI Power of Seafood report, quality is the number one factor that seafood consumers are concerned about when buying seafood. It is the number one concern every year. Grocery shoppers feel confident they can buy fresh chicken twenty times in a row and get a good quality product twenty times in a row. Do your seafood customers feel sure they will get twenty excellent quality seafood experiences in a row? Our quality assurance and procurement experts will explain why quality is essential for all levels of the seafood supply chain, why seafood quality is inconsistent, and how to improve operations to deliver premium quality seafood consistently.

Title: Kohala Mountain Fish Company - Ka iʻa e ulu ana mai ke kuahiwi

Presenter: John Oliva, General Manager, *Kohala Mountain Fish Company*

Abstract:
Kohala Mountain Fish Company (KMFC) is in Kapaau Hawaii, on the side of an ancient volcano. We are one of the few remaining intact ancient large scale agricultural/aquaculture projects in Hawaii and are completely off grid. Supplied by spring water, our recirculating system is certified potable water. Waste is used to irrigate and fertilize orchards.

Annual production is approximately 2.5 million pounds. We can grow and harvest year-round and are looking to double our production in the next year with plans to double again in the following years. Entirely vertically integrated from egg to fillet, our hatchery, grow out, and processing facilities are all on site, saving time, resources and allowing for higher quality control standards.

Our pricing has been consistent with the imports in our industry. Response from customers has been overwhelmingly positive. We can play a large role in the tilapia market, supplying a US product with traceability that is sourced responsibly and sustainable.

Our challenges, as with all leading-edge aquaculture is permitting, logistics, and personnel. Permission to bring into a new species had proven difficult but not impossible. Logistically being in the middle of the ocean convenience, economy and expedient product and resource availability are always challenging. The pandemic has exacerbated personnel issues as labor prospects have evaporated with unemployment benefits increasing and large corporations able to provide unreasonable wage increases to retain and recruit new workers.

Title: Controlled Environment Aquaculture (CEA) - "Carbon Negative Proteins From Clonal Red Seaweeds", challenges and market opportunities.

Presenter: Chuck Toombs, *Oregon Seaweed*

Abstract:
The science community has been debating the optimal level of proteins for human consumption for over a century. The PDCAAS score was proposed by the FAO in 1991 and accepted two years later. Terrestrial agriculture has been identified as a major source of greenhouse gas emissions and markets have begun to react by demanding more plant-based proteins in their diets. As both protein values and greenhouse gas emissions become more understood, consumers will begin to evaluate their food choices based on this information, and that will open up significant new opportunities for products that can maximize the value of the proteins consumed and these proteins impact on climate. This talk will focus on the emergence of high protein seaweeds as a major future protein source and how that market will be structured.

Title: NOAA Seafood Inspection Program Update

Presenter: Steven Wilson; *Director, Seafood Commerce and Certification Division Office of International Affairs and Seafood Inspection*

Abstract:
Over the past two years the Seafood Inspection Program has experienced challenges in providing services, just as many other businesses. Instead of simply maintaining status quo, we have been working to improve and adapt. Virtual audits have become more prevalent and we have adapted tools to use this technique to maintain agility in certification to our stakeholders. We have also worked to modify and improve our U.S. Grade Standards and other methods in an effort to improve the acceptability of seafood domestically and abroad. A new division has also been instituted in the office to focus on facilitating market access for fish and fishery products. We are emerging from the pandemic conditions ready to move as quickly as possible to service the needs of the industry.

Title: Determining the Presence of Decomposition in Seafood by the U.S. Food and Drug Administration – Past, Present, Future

Presenter: Michael McLendon, Sensory Specialist*, ORA, Pacific Northwest Laboratory (PNL), U.S. Food and Drug Administration*

Abstract:
Sensory analysis has been the primary method for determining the presence/absence of decomposition in seafood since FDA began examining for this defect. Changes in Compliance Programs have greatly reduced the tolerance levels of this defect and this process is continuing with proposed reductions in Defect Action Levels for certain chemical analytes. FDA research into chemical mechanisms of determining decomposition has greatly accelerated since 2018 and while some of this work is promising, no conclusive method has been developed to replace sensory analysis at a time the Agency's sensory analysis capability is declining.

Title: Seafood HACCP Alliance Updates – Fish and Fishery Products Hazard Guide Updates

Presenters: Christina A. Mireles DeWitt, *Seafood Research & Education Center, Oregon State University*, Virginia Ng, *Seafood Products Association*

Abstract:
The US FDA has been updating many chapters in the Fish and Fishery Products Hazards and Controls Guidance. Notably, updates were made to Ch. 3 Species and Process Related Hazards, Ch. 11 Aquaculture Drugs. There were both minor and significant updates also made to the Appendices and Addendums. The US FDA is currently working on updating Chapter 9. Environmental Chemicals and Pesticides. We expect this update to post sometime this Spring. This presentation will review key points for the updates.

POSTER ABSTRACTS

Title: Use of DNA Barcoding to Identify Species in Sushi Products Sold in Orange County, CA

Authors: A. Tabb*, C. Kitch, G. Marquis, R.S. Hellberg, *Chapman University, Schmid College of Science and Technology, Food Science Program, Orange, CA*

Abstract:
DNA barcoding is widely used to identify commercial fish species sold in the U.S and internationally. This method is based on DNA sequencing of a standardized region of DNA from a sample. Sequences can then be analyzed against the Barcode of Life Data system (BOLD) for species identification. Additional analysis of samples by a method called DNA mini-barcoding can be used for samples that cannot be correctly identified to the species level by the traditional DNA barcoding method. While relatively high levels of seafood mislabeling have been reported nationally for sushi dishes, there is a lack of information on sushi mislabeling in Orange County, CA. The objective of this study was to evaluate the presence of species mislabeling in sushi products sold in Orange County, CA. DNA barcoding and mini-barcoding were used to investigate 37 samples of sushi collected from various locations in Orange County. All samples underwent DNA barcoding, followed by species identification using the BOLD database. Six samples underwent further analysis with mini-barcoding. The FDA Seafood List was used to identify common and acceptable market names. The results showed that 12 samples were substituted on the basis of species, and 6 samples did not have an acceptable market name. The overall mislabeling rate for all samples combined was 51.4% (18/35). These results indicate a need for greater scrutiny of labeling practices for sushi products sold in Orange County, CA.

***Presenter**

Title: Antibacterial and antimycobacterial activity of white shrimp (*Litopenaeus vannamei*) by-products extracts: chemical profile of the active *n*-hexane shrimp head extract

Authors: Carmen M. López Saiz[1]*, Martin S. Hernandez-Zazueta[1], Enrique W. Coronado-Aceves[2], Rosario Tavera-Hernández[3], Clara I. Espitia-Pinzón[2], Manuel Jiménez-Estrada[3], Patricia G. Morán-Corrales[4].

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Abstract:
The aim of the study was to evaluate the antibacterial and antimycobacterial potential of the by-products of white shrimp (*Litopenaeus vannamei*). Sonora is the main shrimp producer state in Mexico. The head, shell, and tail portions of shrimp, considered by-products in shrimp processing, represent about half the weight of raw materials. The following extracts were obtained: exoskeleton hexanic, methanolic and aqueous extracts (ExHex, ExMe, ExAc); muscle aqueous extract (MuAc); and head hexanic, acetonic and methanolic extracts (HeHex, HeAce, HeMe). Antibacterial effect was determined by the broth microdilution method against Gram-positive bacteria: *Enterococcus faecalis* American Type Culture Collection [ATCC] 51299, *Staphylococcus aureus* ATCC 25293, and *Staphylococcus epidermidis*; Gram-negative bacteria: *Escherichia coli* ATCC 25922, *Klebsiella pneumoniae, Pseudomonas aeruginosa* ATCC 10145, and *Salmonella typhimurium*; and *Mycobacterium bovis* bacillus Calmette-Guérin (*M. bovis* BCG) Danish strain. HeHex resulted active against all gram-positive and gram-negative bacteria (MIC_{50}= 400 ug/mL) and against *M. bovis* BCG (MIC_{100}= 250 ug/mL). HeAce was active against *E. faecalis*, *E. coli* and *K. pneumoniae* (MIC_{50}= 100, 400 and 400 ug/mL, respectively). While ExMe and MuAc were active against *E. faecalis* (MIC_{50}= 50 and 400 ug/mL, respectively). HeHex was submitted to chromatographic fractionation and analyzed by nuclear magnetic resonance (NMR) where oleic acid and triacylglycerols were identified. Further, gas chromatography (GC) identified the presence of seven fatty acids. The potential antibacterial activity of HeHex and the identification of its main chemical constituents justify further studies on the clinical applications of this marine natural product against different bacteria species.

***Presenter**

Title: Influence of Lipidic Compounds Extracted from the Muscle of Pacific White Shrimp (Litopenaeus vannamei) on the Proliferation and Morphology of Human Cancer Cell Lines.

Authors: De La Reé-Rodríguez Sandra Carolina*[1], Ezquerra-Brauer Josafat-Marina[1], López-Saiz Carmen-María[1], Martinez-Cruz Oliviert[1], Santacruz-Ortega Hisila[2], Plascencia-Jatomea Maribel[1].

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[2]Departamento de Investigación en Polímeros y Materiales, Universidad de Sonora.

Marine organisms are a significant source of bioactive compounds such a chemoprotective agents, including white shrimp (Litopenaeus vannamei), since it possesses compounds that may exert antiproliferative activity. The objective of this study was to evaluate the effect of these compounds on the proliferation and morphology of human cancer cell lines. Shrimp muscle was subjected to a process of extraction with chloroform and fractionation (open column chromatography). The effect of fractions on lung adenocarcinoma (A549), prostate carcinoma (22 Rv-1), invasive breast adenocarcinoma (MDA MB 231), colon carcinoma (HTC 116), cervix adenocarcinoma (HeLa) and non-cancerous retinal cells (ARPE-19) on cell viability (standard MTT assay) was determined; morphological changes were evaluated by fluorescence microscopy. Seven fractions were obtained by chromatography from which C5 achieved the lowest percentages of viability in HCT-116 and MDA-MB-231 cell lines, with 39.93 ± 11.18 and 36.88 ± 6.85 %, respectively, at a concentration of 200 µg/mL, without significantly affecting the control cells. Therefore, C5 was divided into six sub-fractions, and C5-3 and C5-4 presented significant antiproliferative potential in MDA-MB-231 with 14.12 ± 4.44 and 18.42 ± 4.86 % viability, respectively, at a concentration of 100 µg/mL. The effect of these fractions was evaluated by fluorescence microscopy where, after 24 h of exposure to treatment, plasmatic membrane protrusion and reduction of cell volume was observed; these is associated to apoptosis. These results are promising; therefore, it is important to chemically characterize the components in C5-3 and C5-4 sub-fractions.

***Presenter**

Title: Antiproliferative Activity of White Shrimp (Litopenaeus vannamei) By-products Against Cancer Cell Lines

Authors: Leal-Rodriguez D.G.[1]*, Plascencia-Jatomea, M.[1], Silva-Campa E.[2], López-Meneses A.K.[3], López-Saiz C.M[1].

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[3]Departamento de Ciencias Químico-Biológicas, Universidad de Sonora. Hermosillo, Sonora, México.

Abstract:
In recent years, marine organisms have been studied as a source of alternative treatments for cancer. Different compounds isolated from these sources have the capability to modify biological processes related to cancer prevention and treatment. White shrimp (L. vannamei) by-products are a viable option to obtain bioactive compounds. In Mexico, only half the weight of shrimp production is used for human consumption and the other half is considered by-products; therefore, the aim of this research was to isolate antiproliferative molecules extracted from the shrimp by-products. Cephalothorax and exoskeleton from shrimp were subjected to a serial extraction process using solvents with different polarities (hexane, acetone, methanol, and water); extracts were then filtered and dried. Antioxidant activity (DPPH and ABTS) and the cell viability (MTT assay) of human cancer cell lines (HCT-116, A-549, 22Rv1, MDA-MB-231 and HeLa) were analyzed to select the extract with the highest antiproliferative activity. Hexanic and acetonic extract of exoskeleton showed the highest activity on prostate carcinoma cell line (22Rv1), with a viability of 32.36 ± 6.27 % and 30.34 ± 4.92 %, respectively, at 200 µg/mL. From the acetone extract, a partition was made with hexane and methanol, finding that the compounds with antiproliferative activity are present in the methanolic sub-fraction. The bioactivity detected can be attributed to carotenoids and polyunsaturated fatty acids found in shrimp by-products; nevertheless, a higher degree of purification is required to carry out the identification of the responsible compounds. Consider for poster presentation and student competition.

*__Presenter__

Title: Anti-inflammatory Potential of Alaska Pollock Roe Hydrolysate

Authors: David Kemp [1,2] and **Jung Kwon** [1,2]

[1]Department of Food Science and Technology, College of Agricultural Sciences, Oregon State University, Corvallis, OR
[2]Seafood Research and Education Center, Oregon State University, Astoria, OR

Abstract:
The therapeutic potential of peptide pharmaceuticals in alleviating chronic inflammation is a topic of interest in the biomedical field. Various dietary proteins have been shown to release bioactive peptides and elicit beneficial health effects in various *in vitro* and *in vivo* models. Alaska pollock is one of the largest fisheries in the world, and its fillets are widely used for commercial applications. Alaska pollock fishery is sustainable, and its harvest has a relatively low environmental impact. However, similar to other seafood products, Alaska pollock processing generates a large amount of byproducts that currently have limited applications. Alaska pollock roe and milt are materials of particular interest given their existing use as dietary products. However, the market for both Alaska pollock roe and milt is dwindling in recent years and the need for new applications is increasing for these abundant fishery byproducts. In this study, we assessed the anti-inflammatory potential of Alaska pollock roe and milt hydrolysates generated by several different commercially available proteolytic enzymes. The resulting hydrolysates were assessed for anti-inflammatory potential in LPS-stimulated RAW 264.7 cells. Our evaluation found the roe Alcalase digest (RAD) to be the most promising candidate. RAD decreased nitric oxide (NO) production of LPS-stimulated cells by up to 60% without exhibiting cytotoxicity. The effect of RAD on proinflammatory cytokines and mediators was evaluated by quantitative RT-PCR. RAD treatment significantly decreased the gene expression of TNF-α, IL-6, IL-1β, iNOS, and COX-2 in LPS-stimulated cells in a dose-dependent manner. This preliminary study demonstrated the potential of Alaska pollock roe hydrolysates to exert an anti-inflammatory effect in RAW cells by reducing NO production and modulating inflammatory cytokines and gene expression. Further work is being done to identify the particular peptide(s) that are responsible for the observed activity and determine the physiological impacts in *in vivo* models.

***Presenter**

Title: Microbiological Safety and Quality of Raw, RTE Seafood Sold in Orange County, CA

Authors: G. Marquis, S. Covaia, A. Tabb, C. Kitch, R.S. Hellberg; *Chapman University, Schmid College of Science and Technology, Food Science Program, Orange, CA*

Abstract:
Raw, ready-to-eat (RTE) seafood can pose health threats due to the lack of a terminal heat application to destroy microbial hazards. Listeria monocytogenes is a known microbiological hazard associated with raw, RTE seafood. While Salmonella enterica has not traditionally been recognized as a hazard in seafood, it is an emerging concern, with 5 outbreaks in seafood from 2011 to 2021. The presence of E. coli and total coliforms can indicate fecal or environmental contamination. The objective of this study was to evaluate the microbiological safety and quality of raw, RTE seafood sold in Orange County, CA. A total of 103 raw, RTE samples of sushi, ceviche, and poke were collected from restaurants in Orange County, CA. Samples were tested for Salmonella and Listeria utilizing the Food and Drug Administration (FDA) Bacteriological Analytical Manual (BAM). E. coli and total coliforms were tested utilizing the AOAC method 991.14 with 3M Petrifilm plates. Upon conclusion, the results showed that 2 samples (1.9%) were positive for generic E. coli, with a range of 101 CFU/g to 50 CFU/g. Coliforms were detected in 85 samples (82.5%), with a range of 5 CFU/g to 1.7x103 CFU/g. None of the samples tested positive for Salmonella or Listeria monocytogenes; however, other microorganisms were detected in 17 samples, including non-pathogenic Listeria spp, Proteus mirabilis, Providencia rettgeir, and Morganella morganii were detected with API test kits (bioMérieux). These results indicate low levels of microbiological contamination in raw, RTE seafood.

***Presenter**

Title: Antimutagenic and antioxidant activities in white shrimp *(Litopenaeus vannamei)* cephalotorax

Authors: Héctor-Enrique Trujillo-Ruiz[1]*, Carmen-María López-Saiz[1], Alejandro-Monserrat García-Alegría[2], Idalia Osuna-Ruiz[3], Armando Burgos-Hernández[1].

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[3]Maestría de ciencias aplicadas, Unidad Académica de Ingeniería en biotecnología Universidad Politécnica de Sinaloa, Apartado Postal 82199, Mazatlán, Sinaloa, México.

Abstract:
Cancer is a process that appears from mutations in genes, which causes cells to grow and spread in an uncontrolled way and being able to invade any part of our body. The high mortality and morbidity of this disease makes a great priority. A number of studies have reported the presence of bioactive compounds in seafood, but only few have been done in seafood by-products; therefore, the search for chemopreventive compounds by-products form marine organisms is the objective of this research. By-products form white shrimp (*Litopenaeus vannamei)* are alternative sources of bioactive compounds. In this work, shrimp heads were serially extracted using organic solvents (hexane, acetone, methanol and water). The antioxidant and antimutagenic activities of these extracts was determined by the DPPH and ABTS radical scavenging assays and Ames test respectively. Results showed that the methanolic extract had the highest antioxidant activity and showed the antimutagenicity *Salmonella typhimurium* TA100 tester strain. A partition of this extract was made, using ethyl acetate and water to subsequently evaluate the antimutagenic activity. Again, the results of this determination showed that the ethyl acetate soluble partition had the highest antimutagenic potential. Based on the above, the head of white shrimp is a promising source of bioactive compounds, however further studies are needed to achieve full characterization of theses bioactivities and the responsible molecules.

***Presenter**

Title: Arginine (Natural Amino Acid) to Replace Sodium Phosphate in Seafood Processing

Authors: Hyung Joo Kim*, Christina DeWitt, Jae W. Park, *Oregon State University, OSU Seafood Research and Education Center, 2001 Marine Dr., #253, Astoria, OR 97103, United States*

Abstract:

Introduction

Sodium phosphate is commonly used in seafood processing as it not only increases the pH, but also reduces moisture loss during frozen storage and chelates metal ions which contribute to protein denaturation and oxidation. However, there are a few countries where the use of phosphate in foods is not considered as healthy or natural processing. Therefore, our objective was to test whether arginine can be a viable alternative to sodium phosphate in seafood processing.

Materials & Methods

Two experiments were conducted. In experiment 1, Atlantic salmon fillet and frozen shrimp were soaked in L-arginine solution (2% or 5%) for 20 min, 1, 3, or 24 hrs. Brine uptake and final pH were determined. For experiment 2, L-arginine was added at 0, 0.15%, or 0.3% to Pacific whiting screw press meat. Treated surimi was subjected to 9 freeze and thaw cycles (F/T). Cooked gels were prepared after 0, 3, and 9 F/T cycles. Color, texture profile analysis and pH were measured.

Results & Discussion

For experiment 1, both higher arginine treatment level and longer soaking time significantly increased pH ($p<0.05$). Average brine uptake did not have a significant difference based on arginine concentration ($p>0.05$). For experiment 2, incorporation of arginine also increased final pH. Texture attributes of cooked surimi gels after 9 cycles increased significantly 0.3%>0.15%>0% ($p<0.05$). For color, whiteness value of the 0.3% arginine treatment sample was significantly lower than the other two treatments ($p<0.05$).

Conclusion

Optimum concentration of arginine (i.e., 0.15%) can be used to replace sodium phosphate in seafood processing.

*__Presenter__

Title: Pilot-Scale Depuration of Three Species of Oysters Demonstrates Varying Rates of Reduction of *Vibrio parahaemolyticus*

Authors: Spencer L. Lunda[1]*, Samantha Burroughs[2], Jennifer Hesser[1], Bill Dewey[3], Andy DePaola[4], Joy Waite-Cusic[2], Carla B. Schubiger[1]

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[2]Oregon State University, Department of Food Science and Technology, 100 Wiegand Hall, Corvallis, OR 97331
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[4]Angelo DePaola Consulting LLC, 12719 Dauphin Island Parkway, Coden, AL 36523

Introduction
Oysters are often consumed raw; however, they harbor *Vibrio parahaemolyticus*, a foodborne bacterial pathogen. Shellfish producers have proposed using depuration to support the oyster's natural biological function and reduce pathogen levels. For industrial application, efficacy of depuration must be validated in relevant oyster species.

Objective
Compare clearance rates of three oyster species (*Crassostrea gigas*, *C. sikamea*, *C. virginica)* to reduce *V. parahaemolyticus* during depuration.

Materials and Methods
Oysters of each species were individually inoculated with a cocktail of either pathogenic or non-pathogenic strains of *V. parahaemolyticus* at concentrations of 6 log CFU/g. Oysters were depurated at 11°C, for 5 days in a pilot-scale system. Individual oysters from each treatment were collected daily (n = 5), and *V. parahaemolyticus* was enumerated by plating on TCBS agar.

Results and Discussion
Depuration resulted in rapid declines in *V. parahaemolyticus* during the first 24-48 hours, followed by a subsequent decrease in clearance rate. Average reductions of >3.0 log CFU/g were achieved for *C. gigas* and *C. sikamea*. Clearance of *V. parahaemolyticus* from *C. virginica* was slower, with final average reductions of 2.82 (non-pathogenic) or 2.92 log CFU/g (pathogenic).

Conclusions
Depuration at 11°C for 5 days achieved significant reduction of *V. parahaemolyticus* levels in three species of oysters. This study supports use of a non-pathogenic *V. parahaemolyticus* cocktail as a suitable surrogate for commercial-scale studies. As clearance rates for *C. virginica* were significantly slower than the other two species tested, further research is needed to investigate parameters (temperature, time) for this species.

***Presenter**

Title: Effects of L-arginine treatment on protein structure and texture properties of skate (*Raja kenojei*) muscle at different pH conditions

Authors: Yin-Zi Piao and **Jong-Bang Eun*;** *Department of Integrative Food, Bioscience and Biotechnology, Chonnam National University, Gwangju, 61186, South Korea*

Abstract:

Introduction

Fermented skate is one of favorite traditional foods in Southeast area in Korea and its important quality parameter is texture. Addition of L-arginine (Arg) has been reported that it shows a positive relationship with water-holding capacity and hardness of muscle food. Its addition to skate muscle might improve its texture for better product.

Objective

The objective of this study was to evaluate the texture parameters and myofibrillar protein structure properties of skate muscle treated with Arg solutions.

Materials & Methods

Skate muscle was mashed and washed with 10 folds 0.05 mol/L PBS solutions to remove the urea concentrations and mixed urea concentrations (0.20 mol/L) were dissolved in 0.05 mol/L PBS solution (pH 7.0/10.0) as the simulation of pH values and urea conditions on the skate muscle during actual fermentation at 10℃. After that, mixtures treated with 0.01 M Arg solutions (0.10%, g/g) to obtain the samples. Their structural characteristics and textural properties were measured.

Results & Discussion

Arg addition reduced the ionic and hydrogen bonds of skate myofibrillar protein, which could be due to protein unfolding. SDS-PAGE indicated that Arg could affect the skate myofibrillar protein conformation at different pH conditions. Additionally, the structure of α-helix of the skate myofibrillar proteins was altered due to decrease of hydrogen bonds. Based on these results, pH treatment affected the structural properties of the myofibrillar proteins, and the ability to combine hydrophobic groups with Arg increased, thereby increasing the hardness of skate muscle.

Conclusion

Arg treatment would save the fermentation process as well as increase the hardness of skate muscle, resulting in achieving the desired quality of the fermented skate product.

***Presenter**

Title: Texture profile of fish balls made from over-sized catfish

Authors: Y. Zhang[1*], S. K. C. Chang[1], S. Kundu[2]

[1]Coastal Research and Extension Center, Mississippi State University, MS, USA
[2]Dave C. Swalm School of Chemical Engineering

Abstract:
Over-sized catfish is of low commercial value. In order to improve the profitability of catfish industry, it is imperative to develop value-added products, such as fish balls. The study's objective was to investigate the effect of potato starch on the texture profile of fish balls made from over-sized catfish fillet.

Fresh over-sized catfish fillets were ground into mince and then cut in to paste with cryoprotectant added before freezing. Frozen paste was thawed and mixed thoroughly with 0, 1, 2, 3, 4, and 5% potato starch added. In addition, 30, 35, 40, 45, and 50% ice water were added to determine solid effect on texture. After cooling with ice water, TPA was conducted. Fish balls were cooked by two methods: setting at 40 °C for 30 min followed by heating at 90 °C for 20 min; boiling for 7 min.

Resilience, cohesiveness, springiness, chewiness, and hardness increased with the increase of starch until 2%, but when 3% starch was added, all these parameters decreased and fracture occurred at 11 mm deformation. When starch added was increased to 4%, they increased again. Direct boiling resulted in higher textural strength than cooking with setting step. With 4 or 5% starch added, catfish balls showed higher chewiness than commercial products. Temperature sweep showed lowest storage modulus appeared at 50 °C. With the increase of water added, cooking loss increased especially when 50% water was added, at which point, fracture occurred at around 9 mm deformation.

Fish ball making from over-sized catfish is feasible.

***Presenter**

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