Division of Agricultural and Food Chemistry of the ACS **Spring 2025**

CORNUCOPIA

including the AGFD program and abstracts for the 269th American Chemical Society (virtual & live) National Meeting on

March 23 - 27, 2025

in

SAN DIEGO

Jason Soares, Elizabeth Kreger & Coralia Osorio Roa
Program Chairs

Going to San Diego?
Join the AGFD Chair's Reception at Joe's Crab Shack, 525 E Harbor Drive
Tuesday, March 25 from 6:00-8:00 pm

10 minute walking directions from the Marriott Marquis – exit the Marriott and head toward the street (South Embarcadero) that borders the waterfront/marina. Once facing the marina continue left along South Embarcadero. At the end of the marina turn right into the parking lot along Marina Park Way. Joe's Crab Shack is on the opposite side of the parking lot.

Visit our website - www.agfoodchem.org - for a pdf of Cornucopia, job postings, awards and much more.
Check out our Facebook page - www.facebook.com/agandfood
We're on LinkedIn, too!

MESSAGE FROM THE CHAIR

I am pleased to be given the opportunity to serve as AGFD Division Chair. With honor I accepted this responsibility and will do my best to serve it with dignity during the year. I am taking over the role from Jason Soares, our past Chair, who has been a kind, patient and knowledgeable leader who I couldn't be more grateful for. The rest of the Executive Committee has been absolutely integral for this smooth transition and making sure every aspect of the ACS meetings and the AGFD run effectively and efficiently. Special thanks to Alyson Mitchell, Kathryn Deibler, Mike Morello, Youngmok Kim, Carl Frey, Steve Toth, Michael Tunick and Jonathan Beauchamp for supporting me and the AGFD.

I want to briefly address the historical time we are going through in the world and my sadness for how it affects the scientific community. Science is not a belief. It is a trust in reproducible data, shared out to achieve greater knowledge for us to continually improve the world in which we live. Science is nothing if it is not communicated. ACS meetings are a safe space in which us scientists communicate and discuss our data to our great minded peers. However, cutting off communication will halt the advancement of science whether that is from travel bans and inability to attend conference OR ceasing the cooperation with intergovernmental scientific agencies. My hope is that science and the scientific community rise above politics.

Thank you to all the AGFD members who continue to support the Division by attending and participating in our national meeting program. I especially appreciate the symposium organizers and presiders who continue to go above and beyond to provide the AGFD community with relevant and emerging research topics highlighting the latest state-of-the-art research and capabilities in the field of agriculture and food chemistry. These include sessions topics that align the AGFD sub-divisions: Food Bioengineering, Flavor, Food Safety, Functional Foods & Natural Products, Nutrition and Gut Microbiome, Sustainability and Green Technology, and Agriceuticals. Big Thank You to all the presenters, from whom we cannot continue to success without your invaluable contribution and your willingness and bravery to share your research with your AGFD and greater ACS community members.

Before I go into the details of this Spring 2025 meeting, I will highlight the success we achieved in 2024. Our Fall meeting in Denver was very exciting with 15 technical symposia comprising 33 total sessions with over 400 oral presentations and posters. This included the topics: Waste Upcycling, Indoor Farming & Sustainable Agriculture, Processing & Storage Induced Toxins, Bioproducts from Biomass: Renewable Chemicals & Polymers, Whole Grains Bioactives & Human Health, Sustainable Agriceuticals, Elevating Sustainability & Greentech in Agriculture & Plant-Based Foods, and Microbiome Research Consortium. Special sessions included Virtual Graduate Students Symposium in Asia-Pacific Region and Honoring Professor Chi-Tang Ho on the Occasion of His 80th Birth Year. Lastly, at the Fall National Meeting we honored dedicated AGFD members that have provided incredible contributions to agriculture and food chemistry. Lastly, we congratulated Dr. Tara H. McHugh, ARS-USDA, for winning the most honored Award for the Advancement of Application of Agricultural and Food Chemistry, Dr. Joonhyuk Suh, University of Georgia, for the Young Scientist Award, and myself, Dr. Elizabeth R. Kreger, for the Young Industrial Scientist Award.

The AGFD Spring 2025 program has 10 technical symposia, with 3 aligning with ACS's efforts for more co-sponsored programming. Food Security: Tackling World Hunger CCC: Highlighting Chemistry from Multiple Divisions: Advancement in Crop Protection and Nutrient Analysis, Microbial Food Safety: Emerging Technologies for Detection, Intervention, and Antimicrobial Packaging of Foodborne Pathogens and James Seiber Memorial Symposia. Other exciting symposia include; Breeding for Flavor Sensory Quality and Sustainability of Fresh and Fresh-Cut Fruits and Vegetables, Applying Mass Spectrometry and NMR Techniques in the Study of Plant and Food Metabolomics, Chemistry of Alcoholic Beverages, Extraction, Recombinant Production, and Function of Proteins of Food Safety and Food Manufacturing Importance, Flavor Preferences of Cats and Dogs, and General Papers sessions highlighting topics in Food Safety and Agriculture, Nutrition Topics, Protein Topics & Quality/Processing/Sustainability.

I close this message with gratitude for the AGFD and the greater ACS. I greatly appreciate the community that is provided as a way to connect scientifically but also just networking to make friends. I wish you an enjoyable meeting here in San Diego! I hope to see you at the symposia and at the Chair's Reception on Tuesday where we can enjoy the company of our peers and new friends and congratulate each other on all the hard work each of us does each day.

Liz Kreger AGFD Chair 2025

FUTURE PROGRAMS

WASHINGTON D.C. August 17 – 21, 2025 * Innovations in Chemistry *****

ACS Microbiome Consortium: Harnessing the Power of Agricultural Chemistry to Strategically Modify the Gut Ecosystem Jason Soares jason.w.soares.civ@army.mil Karley Mahalak Karley.mahalak@usda.gov Jenni Firrman Jenni.Firrman@usda.gov Laurel Doherty laurel.a.doherty.civ@army.mil Ida Pantoja Feliciano De Goodf ida.g.pantojafeliciano.civ@army.mil Tom Wang Tom.Wang@usda.gov Courtney Christopher Cchristopher@utk.edu

Advances in Food Technology for a Sustainable Future Anna Rulka ulkaa@rsc.org Audra Taylor taylorau@rsc.org

AGFD Awards - Young Scientist, Young Industrial Scientist, JAFC Best Paper Award and Sterling B Hendricks Memorial Lecture Youngmok Kim youngmok.kim@finlays.net Bhimanagouda Patil Bhimanagouda.Patil@ag.tamu.edu Thomas Hofmann jafc@jafc.acs.org William King WKing@acs-i.org Michael Appell Michael.appell@gmail.com Bosoon Park bosoon.park@ars.usda.gov Elizabeth Kreger Elizabeth.Kreger@sensient.com

Agnes Rimando International Student Symposium Roberta Tardugno roberta.tardugno@uniba.it Michael Tunick mht39@drexel.edu

Award for Advancement of Application of Agricultural and Food Chemistry Michael Morello mjmorello226@gmail.com Elizabeth Kreger Elizabeth.Kreger@sensient.com

Allergen Detection Limits Lauren Jackson lauren.jackson@fda.hhs.gov

Application of Renewable Chemicals and Polymers in Agriculture Jinwen Zhang jwzhang@wsu.edu Long Jiang long.jiang@ndsu.edu

Innovations in Natural Polymer Science for Sustainable Agriculture and Food Security Michael Appell michael.appell@gmail.com Lingyun Chen lingyun1@ualberta.ca Lucy Yu lyu5@umd.edu

Chemistry of Alcoholic Beverages Nick Flynn nflynn@wtamu.edu

Chemistry of Flavor Compounds in Quality, Safety and Sensory Properties of Foods and Food Products Joonhyuk Suh J.Suh@uga.edu Jeehye Sung jeehye@anu.ac.kr

Food Fraud: Chemistry Strategies for Detecting and Reducing Food Crimes Neil Da Costa neil.dacosta@iff.com

Micro/Nanoplastics in Food: Prevalence, Detection, and Toxicity Changqing Wu changwu@udel.edu Xuetong Fan Xuetong.Fan@usda.gov Timothy Duncan timothy.duncan@fda.hhs.gov Sadia Khan sadia.khan@fda.hhs.gov

Nutraceutical and Functional Food: Emerging Techniques for Characterization and Bioavailability Analysis Michael Appell michael.appell@gmail.com Lingyun Chen lingyun1@ualberta.ca Zhuohong (Kenny) Xie KYX@usp.org Xiaohong Sun xiaohong.sun@dal.ca

Sustainable Agriceuticals Linshu Liu Linshu.liu@usda.gov Yuzhu Zhang Yuzhu.zhang@usda.gov Ying Wu ywu@Tnstate.edu Wally Yokoyama wally.yokoyama@usda.gov Hyunsook Kim Hyunsk15@hanyang.ae.kr

Tackling World Hunger & Food Security Reducing Food Waste - Food Security CCC: Highlighting Chemistry from Multiple Divisions Christy Haynes chaynes@umn.edu Heidi Irrig heidi.irrig@syngenta.com Qing Li qingl@hawaii.edu Slawomir Lomnicki slomni1@lsu.edu Michael Morello mjmorello226@gmail.com Zhuohong (Kenny) Xie KYX@usp.org Michael Tunick mht39@drexel.edu Jonathan M. Deutsch jdeutsch@drexel.edu

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Using Artificial Intelligence to Improve Agriculture and Food Systems Yu Wang Yu.Wang@ufl.edu Boce Zhang boce.zhang@ufl.edu Po-Yen Chen checp@umd.edu

Virtual Graduate Students Symposium in Asia-Pacific Region on Agricultural & Food Chemistry Xiaohong Sun xiaohong.sun@dal.ca Joshua Blair J_Blair@acs.org Laura McConnell laura.mcconnell@bayer.com

Whole Grains Bioactives & Human Health Shengmin Sang ssang@ncat.edu

Withycombe-Charalambous Graduate Student Symposium Kathryn Deibler kdd3@cornell.edu Elizabeth Kreger Elizabeth.Kreger@sensient.com Coralia Osorio Roa cosorior@unal.edu.co

General Papers Elizabeth Kreger Elizabeth.Kreger@sensient.com Coralia Osorio Roa cosorior@unal.edu.co

General Posters and Undergraduate Poster Competition Kathryn Deibler kdd3@cornell.edu Elizabeth Kreger Elizabeth.Kreger@sensient.com Coralia Osorio Roa cosorior@unal.edu.co

Innovative Prog: Food Security George Cobb Laura McConnell

ATLANTA March 22 – 26, 2026 * Advances in Genetically Modified Crops *****

Chemistry and Health of Ultra-Processed Foods Fereidoon Shahidi fshahidi@mun.ca Roberta Tardugno roberta.tardugno@uniba.it

Citrus Flavor Xiaofen Du xdu@twu.edu Yu Fang yufang@coca-cola.com

Flavor Symposium Workshop - ACS Thomas H. Parliment Award in Flavor Chemistry Michael Morello mjmorello226@gmail.com

Food Flavor and Innovation, Analysis, Application, Generation Keith Cadwallader cadwlldr@illinois.edu Steven Toth Steven.Toth@iff.com Mike Morello mjmorello226@gmail.com Xiaofen Du xdu@twu.edu

Food Ingredients in Cosmetic Applications Roberta Tardugno roberta.tardugno@uniba.it Elizabeth Kreger elizabeth.kreger@sensient.com

Human Milk Oligosaccharides (HMOs): Synthesis and Gut Health

Withycombe-Charalambous Graduate Student Symposium

CHICAGO August 23-27, 2026

Bioproduct from Biomass Majher I. Sarker majher.sarker@usda.gov Brajendra Sharma brajendra.sharma@usda.gov Yadav Madhav madhav.yadav@usda.gov Helen Ngo helen.ngo@usda.gov

Climate-Smart Foods: Boosting Nutrition, Flavor, Resiliency and Consumer Acceptance Bhimu Patil b-patil@tamu.edu Deepakkumar Jha Vikas Dadwal

3rd Global Symposium on Chemistry and Biological Effects of Maple Food Products Hang Ma hang_ma@uri.edu Navindra Seeram nseeram@uri.edu

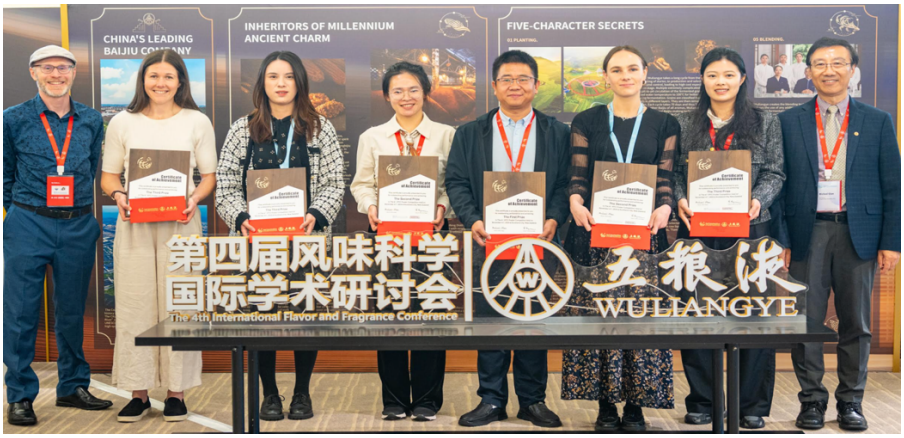
Progress Over the Last 100 years in Agricultural and Food Chemistry Michael Tunick mhtunick@gmail.com

All Award Symposia

OTHER SYMPOSIA OF INTEREST

Pacifichem - Honolulu, Hawaii, December 15-20, 2025, pacifichem.org; https://pacifichem.org/scientific-program/symposium-guidelines/

From the 4th International Flavor and Fragrance Conference



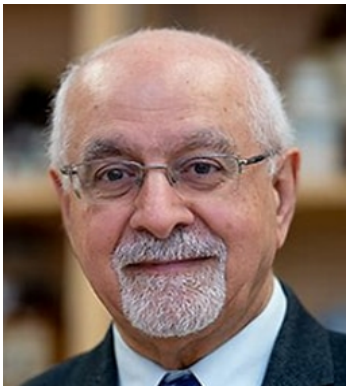
The 4th IFFC took place on Nov. 4-7, 2024 in Auckland City, New Zealand. Previous IFFC events took place in Cartagena, Colombia, Wuxi, China, and Vina del Mar, Chil. AGFD sponsors the IFFC which Michael Qian (Oregon State University) and Graham Eyres (Univ. of Otago) co-chaired. Other organizers included Gary Reineccius (Univ. of Minnesota) and Fereidoon Shahidi (Memorial Univ. of Newfoundland). Wuliangye Yibin Co. served as principal sponsor and strategic partner. The conference ended with poster competition awards sponsored by Gerstel Co. and Partners. The scientific committee awarded 6 prize winners, pictured above, flanked by Professors Eyres (left) and Qian (right). *photo/text credit, M. Qian*

AWARD NEWS

Chi-Tang Ho

recipient of a 2024 AGFD Exemplary Leadership Award
recognizing his substantial and extended service to AGFD, including -
--Member since 1982 and Division Chair 1996
--AGFD Flavor Subdivision: 1991
--Alternate Councilor: 2003-2010
--National Meeting Symposia: 23 since 1990
--Symposium Series Books: 20
--JAFC Editorial Advisory Board: 1995 -2008
--JAFC Associate Editor: 2009 – Present
--Student Award Coordinator: 1999 -2019
--AGFD Fellow: 1988 and ACS Fellow: 2011
--AGFD Distinguished Service Award: 2000
--2005 Advancement of Application of Ag & Food Chemistry Award

Fereidoon Shahidi



recipient of a 2024 AGFD Exemplary Leadership Award
recognizing his substantial and extended service to AGFD, including -
--Member since 1987 and Division Chair 2002
--Chair Flavor Subdivision: 2000
--Alternate Councilor: 2010-2016
--National Meeting Symposia: 33 since 1990
--Symposium Series Books: 10
--JAFC Editorial Advisory Board: 2003 -2011
--AGFD Fellow Award Coordinator: 2003 -date
--AGFD Fellow: 1994 and ACS Fellow: 2010
--AGFD Distinguished Service Award: 2008
--2007 Advancement of Application of Ag & Food Chemistry Award
--Sterling B. Hendricks Memorial Lecture: 2021

Recognize an AGFD Colleague with an Award

AGFD and ACS awards programs, summarized below, provide many opportunities to recognize a colleague for technical and organizational excellence. Find more details regarding each award – purpose, eligibility, prize, nomination deadline, application form - on the Division's awards webpage - https://www.agfoodchem.org/programs-1 and on the final pages of this issue of *Cornucopia*

Awards described on the webpage

Advancement of Application of Agricultural and Food Chemistry (sponsored by International Flavors & Fragrances, Inc.) - recognizes and encourages outstanding contributions to pure and/or applied agricultural and food chemistry. The winner receives $3000 and traveling expenses to the ACS Fall Meeting.

Young Scientist - recognizes outstanding scientific contributions of scientists early in their careers to the field of agricultural and food chemistry. The winner receives $1000 and traveling expenses to the ACS Fall Meeting.

Young Industrial Scientist – recognizes contributions of junior industrial scientists to commercial fields of agricultural and food chemistry. The winner receives up to $1000 in traveling expenses to the ACS Fall Meeting.

AGFD Fellow - recognizes outstanding scientific contributions of AGFD members (w/>10 years of service) to the field of agricultural and food chemistry.

Roy Teranishi Graduate Fellowship in Food Chemistry – provides $2500 for research expenses to a student with an outstanding grade point average and showing promise of an excellent graduate research career.

Withycombe–Charalambous Excellence in Graduate Research in Agricultural or Food Chemistry – a competition designed to showcase the research talents of up to 6 graduate degree candidates to prospective employers. Participants receive up to $1000 in travel expenses and a chance to win an award of $500, $250 or $100.

Undergraduate Poster Competition - showcases the research talents of undergraduate students in a professional forum and promotes their continuance of education in food and agricultural chemistry. Participants receive up to $1000 in travel expenses and a chance to win an award of $500, $250 or $100.

Distinguished Service to AGFD - recognizes substantial and sustained service to the Division.

Exemplary Leadership - recognizes substantial and extended (>25 years) service to AGFD.

Books – recognizes editors whose books (published under division auspices) achieve high sales volume, providing a royalty income to subsidize future Division Symposia.

Sterling B. Hendricks Memorial Lectureship - recognizes scientists who have made outstanding contributions to the chemical science of agriculture. The winner presents a lecture at the ACS Fall Meeting and receives an honorarium of $2000, a bronze medallion and travel expenses.

Kenneth A. Spencer - recognizes work in education, industry or research that meritoriously contributed to the advancement of agricultural and food chemistry. The award consists of a medal and an honorarium of $6,000.

ACS Fellow - recognizes ACS members for their outstanding achievements in and contributions to science, the profession and the Society.

JAFC Research Article of the Year Lectureship – recognizes authors of a particularly impactful JAFC article published within the last year.

Thomas H. Parliament Advances in Flavor Chemistry – recognizes significant contributions to the advancement of flavor chemistry with an emphasis on the aroma aspects. The winner receives a $20,000 cash award.

AGFD DIVISION MEMBERSHIP APPLICATION

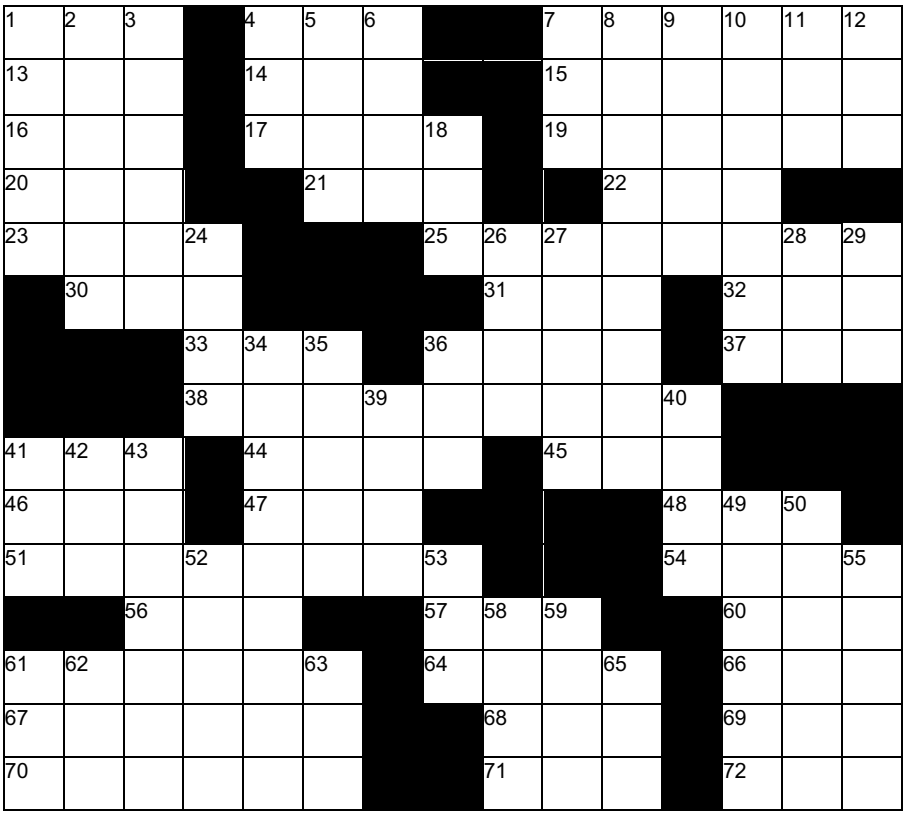
The Agricultural and Food Chemistry Division (AGFD) of the American Chemical Society (ACS) is a non-profit organization dedicated to the technical advancement of all aspects of agricultural and food chemistry. AGFD encourages technical advancement in the field by -
- organizing symposia/workshops on agricultural/food chemistry at ACS national meetings and other venues
- publishing proceedings of AGFD symposia
- publishing the *Cornucopia* newsletter
- updating members several times a year via e-mail blasts
- hosting social and networking gatherings at ACS national meetings
- providing cash awards and recognition to leading undergraduate and graduate students, young scientists and established scientists in the field of agricultural and food chemistry

At ACS National Meetings you can discuss division activities at the AGFD information table located near the AGFD technical session rooms. Join ~2100 AGFD members via the application form (below) or on-line at www.agfoodchem.org or www.acs.org (click on Communities, Technical Divisions, Technical Division List) or call ACS (800)333-9511 (in US) or 616-447-3776 (outside US). Payment by Visa/MasterCard or AmEx.

Check out AGFD on You Tube: https://www.youtube.com/watch?v=CyBMAnOuFKE

	APPLICATION FOR AGFD DIVISION MEMBERSHIP (7623P)
Title	
Name	
1st address line	
2nd address line	
City	
State	
Zip code	
Country	
e-mail address	
Phone	
check one	**MEMBERSHIP FEE**
[ ]	I am an ACS member and wish to join AGFD ($10.00)
[ ]	I am not an ACS member and wish to join AGFD ($15.00)
[ ]	I am a full-time student and wish to join AGFD ($10.00)
Be cool **J O I N** **A G F D**	Return application, with payment (payable to American Chemical Society), to AGFD Membership Chair: Michael Qian, Professor Department of Food Science and Technology Oregon State University Corvallis OR 97330

ACROSS & DOWN in SAN DIEGO TOWN



A prize to the first send a correct solution to Carl Frey (via smartphone photo/e-mail) to - cfreyenterprise@gmail.com

Kudos to Fall 2024 *Cornucopia* puzzle solver Chelsea Harrod of Atlanta

ACROSS

1 Type of noisy shoe
4 Budd__ or nud__
7 E.g. triangle & circle
13 Genetic info messenger
14 Congo red or eosin
15 North Africa desert
16 Lexicon of 600K words
17 You can't fool me, I'm __ you
19 Ski trail vehicle
20 Toddler multi-vaccine
21 Sanka coffee: de-__
22 551 in old Rome
23 Pizzas, to some
25 With great power
30 Crucible residue, often
31 Largest US labor union
32 Be with you __ minute!
33 US federal tax agency
36 Contented feline sound
37 Corn ear core
38 Home of 3 DOWN
41 __, you're it!
44 Uttered
45 Shorthand for 12/31 of any year
46 Chicken __ King
47 Savings plan for many
48 1st aid pro
51 Road trip break area
54 Pre-Euro Roman currency
56 Illuminated
57 Gator__
60 *The Da Vinci Code* author: __ Brown
61 Black sheep call
64 Potato chip powerhouse
66 You can't __'em all
67 Under consideration
68 Golf ball support
69 Chicken __ king
70 San Juan shoe
71 Enzyme suffix
72 Luxury French designer

DOWN

1 Walk with a heavy tread
2 Low red blood cell count
3 San Diego MLB players
4 Altar declaration
5 Work in harmony
6 Formerly The Facebook Co.
7 Trouble sound for bike rider
8 Deliver in person
9 Golf ace: __ in one
10 San Diego water boundary
11 Significant history period
12 Took a chair
18 Light switch option
24 Sloop or schooner
26 Where TV's *The Jeffersons* were moving
27 Vied again for office
28 Game with SKIP card
29 Chemist workplace, often
34 Prone to not change
35 Begin, commence
36 I-__ or __-cast
39 Roman 'Hi!'
40 Lowest timber of 24 DOWN
41 Cate Blanchette starring role
42 Hoppy fermented brew
43 San Diego historic district
49 San Diego aircraft carrier/ museum: USS __
50 Roy Rogers' *Happy __ to You*
52 Shinbone
53 Friend, buddy
55 Historical record
58 Lab notebook contents, often
59 Vision organs
61 'That's show __!'
62 *Knives Out* actress __ de Armas
63 *Much __ About Nothing*
65 Observe, date, understand

AGFD OFFICER & COMMITTEE LEADERSHIP ROSTER

Chair - Serves 1 year. Presides over Division meetings/appoints committees
Liz Kreger Sensient Flavors & Extracts
Elizabeth.Kreger@sensient.com

Chair-Elect - Serves 1 year. Substitutes for Chair as needed. Organizes technical programs at national meetings.
Coralia Osorio Roa UNAL
cosorior@unal.edu.co

Vice-Chair - Serves 1 year. Assists Chair-elect. Develops future technical programs. Karley Mahalak USDA-ARS
karley.mahalak@usda.gov

Secretary - Responsible for Division correspondence and meeting minutes.
Alyson Mitchell
University of California, Davis
aemitchell@ucdavis.edu

Treasurer - Responsible for Division finances.
Stephen Toth III
International Flavors & Fragrances, Inc.
R&D Union Beach NJ
stephen.toth@iff.com

Cornucopia Editor - Edits newsletter.
Carl Frey cfreyenterprise@gmail.com

Councilors - Represent Division for 3 years on ACS council.
Alyson Mitchell (thru '26)
aemitchell@ucdavis.edu
Lauren Jackson (thru '26)
lauren.jackson@fda.hhs.gov
Michael Tunick (thru '27)
mht39@drexel.edu

Website Editor - Maintains web site.
Michael Appell
michael.appell@ars.usda.gov

Student Activities – Attract/retain graduate/undergraduate student membs.
Ethan Lee (thru '27) elee1212@umd.edu
Jiayi Hang (thru '26) jhang1@ualberta.ca

Nominations - Develops officer slate. Served by immediate past chair. Jason W. Soares jason.w.soares.civ@army.mil

Finance - Monitors Div. finances. Served by immediate past chair. Jason W. Soares jason.w.soares.civ@army.mil

Hospitality - Organizes receptions and banquets. Alyson Mitchell
aemitchell@ucdavis.edu

Alternate Councilors - Substitute for Councilors. Serve 3 years.
Kathryn Deibler (thru '27)
kdd3@cornell.edu
Michael Qian (thru '27)
Michael.qian@oregonstate.edu
Brian Guthrie (thru '26)
Brian_Guthrie@cargill.com

At-Large Executive Committee Members - Assist in Div. management. Serve 3 years.
Jane Leland (thru '26)
JLelandEnterprises@gmail.com
Robert McGorrin (thru '26)
robert.mcgorrin@oregonstate.edu
Keith Cadwallader
cadwlldr@illinois.edu (thru '27)
Jonathan Beauchamp (thru '27)
jonathan.beauchamp@ivv.fraunhofer.de

Awards – Oversee awards process.
Chair Michael Morello
mjmorello226@gmail.com
AGFD Fellow Awards
Fereidoon Shahidi fshahidi@mun.ca
Young Scientist Award
Youngmok Kim
youngmok.kim@finlays.net
Young Industrial Scientist Award
Bhimanagouda (Bhimu) Patil
b-patil@tamu.edu
AGFD Distinguished Service Award
Michael Tunick mht39@drexel.edu
Roy Teranishi Graduate Fellowship
Liangli (Lucy) Yu lyu5@umd.edu
Grad/Undergrad Student Awards
Kathryn Deibler kdd3@cornell.edu

Multidisciplinary Program Planner
Helps coordinate nat'l mtg programs
Neil Da Costa International Flavors & Fragrances, Inc. neil.dacosta@iff.com

Membership – Recruits/retains members. Michael Qian
michael.qian@oregonstate.edu

Agriceutical Sub.Div.
Chair Yuzhu Zhang
yuzhu.zhang@usda.gov
Chair-elect Ying Wu ywu@Tnstate.edu
Vice-chair Bailiang Li
15846092362@163.com
Secretary
Songtao Li lisongtao@vip.126.com

Food Bioengineering Sub.Div.
Chair Hongsik Hwang
hongsik.hwang@usda.gov
Chair-elect Changqing Wu,
changwu@udel.edu
Vice-chair Jinwen Zhang
jwzhang@wsu.edu
Secretary Hye-Seon Kim
hyeseon.kim@usda.gov

Flavor Sub.Div.
Chair Joonhyuk Suh J.Suh@uga.edu
Chair-elect Yun Yin yunyin2@vt.edu
Vice-chair Yu Fang
yufang@coca-cola.com
Secretary Clare Jiang
clare.y.jianf@gmail.com

Food Safety Sub.Div.
Chair Boyan Gao gaoboyan@sjtu.edu.cn
Chair-elect Vivian Wu
vivian.wu@usda.gov
Vice-chair Yanhong Liu
Yanhong.liu@usda.gov
Secretary Jinsong Feng
jinsongf@zju.edu.cn

Functional Food/Nat Product SubDiv
Chair Yingdong Zhu yzhu1@ncat.edu
Chair-elect Khizar Hayat
khizaraura@gmail.com
Vice-chair Xiaohong Sun
Xiaohong.sun@dal.ca
Secretary Yanfang Li yanfang.li@usda.gov

Nutrition & Gut Microbiome Sub.Div.
Chair Ida Pantoja-Feliciano
ida.g.pantojafeliciano.civ@mail.mil
Chair-elect Tom Wang
Tom.wang@usda.gov
Vice-chair Jenni Firrman
Jenni.firrman@usda.gov
Secretary Jianghao Sun
jianghao.sun@usda.gov

Sustainability/Green Tech. Sub.Div.
Chair Lingyun Chen
lingyun.chen@ualberta.ca
Chair-elect Omowunmi "Wunmi" Sadik
sadik@njit.edu
Vice-chair Yi-Shu Tu
georgetu@gmail.com
Secretary Yixiang Wang
yixiang.wang.mcgill.ca

Public Relations – Publicizes Division.
Alyson Mitchell aemitchell@ucdavis.edu

AGFD Executive Committee Meeting Minutes

Monday, August 19 5:00- 8:00 PM
Colorado Convention Center, Room 608

Attendees: Jason Soares, Liz Kreger, Coralia Osorio Roa, Alyson Mitchell, Elyse Dorie, Mike Tunick, Xiaofen Du, Steven Toth, Brian Guthrie, Mike Morello, Lauren Jackson, Mike Appell, Karley Mahalak, Lucy Yu, Fereidoon Shahidi, Keith Cadwallader, Bhimu Patel, LinShu Liu

AGFD Chair Jason Soares called the meeting to order at 5:08 PM (MDT). The **Minutes** of the previous Executive Committee meeting were approved with no changes and are published in the Fall 2024 *Cornucopia*.

Steve Toth gave the **Treasurer's Report**. Revenue for the year was $54,948 and expenditures were $96,619. The Division has $1,107,645 in total assets and is financially healthy. Mike Morello presented a motion to create a bank account to accommodate electronic fund transfers at meetings. Mike Appell seconded the motion. The motion passed. Steve Toth will investigate opening a separate bank account and report findings to the Executive Committee. The Spring 2023 meeting in New Orleans was expensive (~$61,000). Part of the increased cost (~$11,000) was associated with the AGFD Communicating Culinary Chemistry Competition (C4). Continuing support for this competition was discussed as the competition received only 3 submissions from two schools. The Executive Committee decided to wait until the next request to hold a C4 competition to discuss continued funding. A budget of $50,000 was set and approved by the Executive Committee for the Spring 2025 meeting in San Diego. An additional budget was approved at a rate of $333/session in support of the Pacifichem meeting to be held December 2024. Kathryn Deibler requested increasing the swag budget for the 2025 Spring meeting from $2,500 to $3,000. The request was discussed and approved. The Executive Committee suggested that the swag be brightly colored items that clearly displayed the AGFD logo that members could wear or carry to help advertise the Division. Ball caps with AGFD logo were suggested for the upcoming meeting in San Diego. Mike Morello suggested adding pins to the swag handed out at the meetings. A request to add a general sticker with AGFD logo and badge ribbons be included in orders for each meeting.

In the **Program Report**, Liz Kreger indicated that there are 32 in-person and 4 virtual sessions being presented in Denver. The poster session was smaller than usual with only 40 posters being presented due to expansion of General

oral sessions. Of these, 9 were withdrawn and there were several no-shows. ACS is encouraging in-room and digital posters for future Fall meetings. Managing the logistics of digital and in-room poster presentations was discussed. Mike Appell suggested encouraging poster presenters to submit webinars for posting on the AGFD YouTube webpage. Coralia Osorio Roa and Liz Kreger will contact ACS to learn more about the various platforms and logistical support offered by ACS. Alyson Mitchell suggested forming a committee to review the posters at the Spring 2025 meeting with the goal of identifying posters for webinar development. Mike Tunick and Brian Guthrie will head this committee. Liz Kreger will investigate setting up digital or flash presentations in conjunction with the Food Security CCC symposia in Fall 2025. There are at least 21 symposia proposed for the Spring 2025 National Meeting. It was noted that the number of hybrid sessions for the Spring meeting is limited to one as ACS is moving back to in-person programming.

Subdivision Reports: Daxi Ren gave the **Agriceuticals Subdivision** report on behalf of Hyunsook Kim and indicated that although there are no symposia being organized for the Spring 2025 meeting, one is planned for the Fall 2025 meeting. Jason Soares reminded everyone that the symposia need to be planned well ahead. For the Fall meeting, the symposia deadline is the December prior to the meeting, and for Spring meeting the symposia deadline is the July prior to the meeting. Xiaofen Du gave the **Flavor Subdivision** report and indicated that in Spring 2024 two symposia were organized and featured a total of 11 presenters. One symposium with two sessions was organized for the Fall 2024 meeting and one symposium will be organized for the Fall 2025 meeting. No reports were given for the **Food Bioengineering and Food Safety Subdivisions**. Kenny Xie indicated, via email, that the **Functional Foods & Natural Products Subdivision** programed two symposia at the Fall 2024 meeting in conjunction with the CCC and that one was hosted by AGRO. Jason Soares gave the report on behalf of Laurel Doherty for the **Nutrition & Gut Microbiome Subdivision**. This Subdivision is holding 5 sessions at the Fall 2024 meeting in conjunction with the CCC Gut Microbiome Consortium grant. The **Sustainability & Green Technology Subdivision** report was given by Yufeng Tseng. The subdivision programmed 3 sessions at the Fall 2024 meeting and is working with POLY on

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developing a CCC grant proposal on natural polymers for Fall 2025. All subdivisions have secretaries nominated for incoming positions. Jason Soares will send out an email reminder to all subdivision chairs regarding their duties with respect to programming and reporting. This information is in the communications manual. Subdivisions are not aligned with the meetings and participation of subdivision leaders is low.

The **Awards Committee Report** was given by Michael Morello. All awards winners are posted in the Fall 2024 Cornucopia with exception of the *Exemplary Service Award*. This award was given to Chi-Tang Ho for his over 25 years of service to the Division. Mike asked for ACS Fellow nominations and reminded members that a candidate must have service to both the profession as well as service to ACS (Division or Local Sections) to be considered for this award. Mike Morello indicated that he and Bob McGorrin were active in helping secure the Thomas H. Parliment Award. This national award will be given through ACS and will have a $20,000 prize. The first award will be given at the Spring 2026 meeting. The committee discussed changing the name of the "General Papers" symposium to something more appealing. There was agreement and a new name will be proposed for consideration at the Spring meeting. Mike Morello also indicated that we may want to clarify what the Division considers "mid-career" for the AGFD Fellow Award as this has caused some confusion with applicants. The awards committee will review the language of all Division awards and update the AGFD

Fellow Award requirement to increase division membership to 10 years as part of the definition of "mid-career". Kathryn Deibler indicated via email that there were only two entries in our undergraduate poster competition. Kathryn will be consulted on new approaches to engage more students, such as awarding the best undergraduate poster and graduate poster, in lieu of holding a poster competition.

The **AGFD Past Leaders Committee** report was given by Michael Appell. LinShu founded this committee in 2023 to help maintain Divisional knowledge and to provide guidance to new leadership when needed. It is composed of past AGFD leaders who are no longer on the Executive Committee but want to remain active in AGFD leadership. The committee will meet during the Fall 2024 meeting and during the year via Zoom.

The **Student Committee Report** was given by Elyse Doria who indicated that she organized a tour of the Hammond Candy Factory in conjunction with the Fall 2024 meeting, which was attended by 5 students. Elyse indicated that there were about 12 students who came to the Student Leadership lunch. The committee suggested changing the name from Student Leadership Lunch to Student Networking Lunch. All approved this name change.

The 4th **International Flavor and Fragrance Conference** in New Zealand will be held this year in November. Michael Qian is organizing this meeting. Coralia Osorio Roa is organizing the next IFFC to be held in Panama. Coralia asked for an official letter from the Division to indicate the support for this effort. It was determined that this letter needs to come from ACS.

The **Councilors Report** was given by Michael Tunick and Alyson Mitchell. Michael indicated that council plans to increase the councilors to 450 but keep the 80:20 split between Local Section and Divisions. Councilors will vote on a petition aimed at allowing all ACS members to have global representation on Council. This petition creates *Zones* for election of new Councilors globally. This petition does not change processes for authorizing Councilors from Local Sections or Division, or the ability of an ACS member to join a Section, or a Local Section to annex territory. Currently 80 Councilors are elected by Local Section and 20 Councilors are elected by Divisions. The formula will change to 80 Councilors elected by Local Section + Councilors elected by Zones and 20 Councilors elected by Divisions.

The **Nominations Report** was given by Jason Soares. The nomination of Karley Mahalak as the 2025 Vice-Chair was approved. The Division approved the nomination of Jonathan Beauchamp, Keith Cadwallader as At-Large EXCOM members, Michael Tunick as Councilor, and Michael Qian, Kathryn Deibler and Yu Wang as Alternative Councilors. The only position not filled is the Student Representative to AGFD. Applications for this position will be due in late Fall. The new representative will be selected in December and will be expected to attend the Spring 2025 meeting.

Cornucopia editor Carl Frey reported that the ACS Webmaster posted *Cornucopia* to the website one week before the meeting. One hundred copies of the short (no abstracts) version were sent to the Secretary for distribution in Denver. The issue is also now on the AGFD website. Thanks to all that contributed content.

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The **Hospitality/Public Relations Report** was given by Alyson Mitchell who indicated that 65 tickets were made available for the *Division Awards Dinner* being held Tuesday at the Buckhorn Exchange from 6:00-8:30 PM. A dinner for the Executive Committee was also organized for Monday at 8:00 PM at Ruth Chris Steakhouse in Denver.

The **Membership Report** was provided partly via email by Michael Qian, who indicated that AGFD support of the 4th IFFC in New Zealand is expected to secure 20-30 new ACS-AGFD members. A General Division membership report was not provided.

Coralia Osorio Roa gave the **Journal Report**. The ACS agricultural and food portfolio of journals continue to perform very well in 2024. Submissions to *Journal of Agricultural and Food Chemistry* are expected to surpass 10,000. Published article output at JAFC also continues to grow significantly. Submissions to the daughter journals, *ACS Food Science & Technology* and *ACS Agricultural Science & Technology*, are also continuing to skyrocket since they received their first Impact Factor in June last year. The ACS Food Science & Technology impact factor increased from 2.3- 2.5. JAFC is excited for the Research Article of the Year Award Lecture which will take place from 2:00-3:10 pm on Tuesday August 20th in Room 403 of the Colorado Convention Center and invited everyone to attend this lecture to hear about the award-winning science behind cell-culture coffee. Coralia expressed the journal's appreciation of the partnership with the AGFD Division on this award and thanked those who represented the AGFD Division on the Award Committee.

The **Communications Report** was given by Michael Appell who indicated that the in the past month the Website had 462 unique visitors: 370 from the US, China 18, and Germany 17. In the past year, we have had 2475 unique visitors, 2024 of whom were from the USA, China 136, Germany, 113 Canada 111, India 71, and Russia 68. Our E-mail list, which currently stands at ~2,400 people, has shown promising engagement. Alyson's newsletter has been a hit, with over 1,000 people opening and reading it—a testament to its success. *Cornucopia* was a hit, with over 1100 people clicking and reading it, and 385 downloading it, a clear indication of its popularity. In terms of student engagement, 1100 clicked on and read the student event flyer. Additionally, 1300 read the webinar announcement for H.N. Cheng and 445 clicked on the link. The Inaugural AGFD Webinar had 30 attendees, and 81 registrants. The Webinar is now posted on the YouTube channel.

LinShu Liu gave an update on **AGFD Strategic Planning.** Three goals were set for the Division at the Strategic Planning Retreat including Strategy, Membership and Communication. LinShu indicated that increased webinars were a target within the Strategy goal and that one webinar had already been created and is now available on the AGFD YouTube channel. Lucy Yu gave the update for the Membership goal. A mentoring program committee was formed composed of members from government, industry, non-profit organization and academics. The committee members include Kanjana Mahattanatawee, Liangli (Lucy) Yu, Lauren Jackson, Youngmok Kim, and Kenny Xie. Kanjana and Lucy identified three potential mentoring activities for the committee to discuss and finalize. One new activity included recruiting both volunteer mentors and mentees at the Fall ACS national meeting. Michael Appell and Alyson Mitchell indicated that the email Listserve is now migrated to the new AGFD Wix website. The first electronic newsletter went out this month and was very successful. The committee has identified new members to help with content creation and will be meeting in September via Zoom to develop a strategy for increasing our social media presence at the Spring 2025 meeting. Alyson Mitchell proposed handing out Visa gift cards each day for the top 1-2 short format videos to encourage social media posting and help create content during the Spring meeting.

In **Outstanding Business**, Jason Soares indicated that he and Fereidoon Shahidi worked with DAC to get approval for IUFoST Adhering Body membership. The request is currently with the Constitutional Bylaws Committee of ACS. Michael Appell gave a report on the activities of the Past Leaders Committee. Although the committee is new, they have put together a social event on Wednesday, and will meet through Zoom before the Spring meeting.

In **New Business**, Liz Kreger indicated that the Division has been allotted 19 half-day sessions, two of which have to be jointly programmed for the Spring 2025 meeting. The allocation for Fall 2025 is 23 half-day sessions; two of which have to be jointly programmed sessions. Mike Morello suggested that Executive Committee consider consolidating the awards symposia at national meeting into one half-day session instead of having a half-day session for each individual award. Extra programming could always be considered around an individual. Liz proposed forming a Slack channel or Google drive to serve as a repository for all information for the Executive Committee members to share. A motion was

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approved to have Liz, Alyson and Mike Appell meet via Zoom and develop a plan to create this this platform by November 2024. To address any ambiguity in the AGFD Procedures Manual, it was agreed that we need to change the language to ensure that all Subdivision members need to be Division members. Jason Soares gave an update on AGFD participation in support of ACS Regional Meetings and indicated that at this time these are only supported if the topic is within the AGFD portfolio and funding is determined on an ad hoc basis.

The meeting adjourned at 7:54 PM. *Submitted by Liz Kreger.*

AGFD Business Meeting Minutes

Wednesday, August 21, 2024
Colorado Convention Center Denver, CO
Takes place at each ACS Fall National Meeting

Attendees: Michael Appell, Lingyun Chen, Elyse Doria, Xuetong Fan, Boyan Gao, Elizabeth Kreger, Yonghui Li, LinShu Liu, Alyson Mitchell, Jason Soares, Michael Tunick, Chibuike Udenigwe, Lucy Yu, Kenny Xie, Xuan Xu

AGFD Chair Jason Soares called the meeting to order at 12:04 p.m. (MDT). Jason mentioned that subdivision officers should be AGFD members. The bylaws do not require this once the initial officers are appointed. The Procedures Manual, which includes the bylaws, can be placed on the website. The Past Leaders Committee, chaired by Mike Appell, can work on best practices for the manual. LinShu Liu pointed out that this committee can work on revising the bylaws.

Alyson Mitchell summarized the Executive Committee meeting minutes. Poster and oral paper no-shows and withdrawals were discussed. The banquet at the Buckhorn Exchange went well. The petition for international representation on Council passed overwhelmingly. AGFD is looking for a new student representative. Our website is very active, and we have two new volunteers for it. Mike Appell and Alyson Mitchell will consolidate our social media onto the Wix platform.

Mike Tunick gave attendance figures for this meeting (over 10,200 in person and over 1200 virtual). Starting in 2026, the Sundays of the meetings will be devoted to special programming (Kavli and Plenary sessions, etc.) and regular talks and posters will be on Mondays through Thursdays.

Jason Soares announced the slate of officers, which was approved. As always, AGFD members vote on Councilor and Alternate Councilor candidates. Jason also asked about financial support for Regional Meetings. This can be done on a case-by-case basis. Mike Appell said that ACS now encourages organizers of these meetings to seek funds from divisions. He said that the requestors should be AGFD members to receive our support. Lucy Yu said that we should also think about support for international meetings. Jason suggested that the Past Leaders Club also provide best practices on supporting Regional Meetings, defining benefits to AGFD, suggesting financial support and guidelines on the extent of support for each regional meeting when multiple requests are submitted.

Liz Kreger will look into flash presentations (less than 5 minutes) and handling General Paper sessions. We may rename them something like Advances in Agricultural and Food Chemistry and group the presentations by subject.

The meeting adjourned at 1:00 p.m. *(submitted by Liz Kreger)*

CORNUCOPIA EDITORIAL STAFF & CONTACT INFORMATION	
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General Manager	P. White
Staff	C. Kent, L. Lane, J. Olsen

AGFD TECHNICAL PROGRAM

Abstracts for these presentations appear at the end of this section.

SUNDAY MORNING March 23
Marriott Marquis San Diego: Salon B
James Seiber Memorial Symposium
Hosted by AGFD, AGRO
K. L. Armbrust, J. Finley, M. D. Pazcarpio-Obeso, J. M. Van Emon, S. S. Walse, *Organizers* M. Hengel, A. E. Mitchell, *Organizers, Presiding*
8:00 Introductory Remarks.
8:30 . Encouraging young chemists into agricultural chemistry: Jim's legacy. **S.S. Walse**
8:55 . Perspectives on the use of liquid chromatography-high resolution mass spectrometry for chemical residue and contaminant analysis in foods. **J.W. Wong**, J. Wang
9:20 . Using the tools of chemistry to produce novel, healthy, value-added foods. **T.H. McHugh**
9:45 Intermission.
10:10 . Odds and ends: Research projects under the supervision of James Seiber as an emeritus professor. **D. Lay**
10:35 . Seiber wisdom I applied to the environmental and analytical chemistry applied to PFAS. **S.A. Mabury**
11:00 . Vegetation as a vector for transfer of mercury from the atmosphere to organisms in terrestrial food webs. **M.S. Gustin**
11:25 . Accolades for odors and the agricultural opportunities they afford. G.T. Broadhead, C.C. Rering, **J.J. Beck**

SUNDAY AFTERNOON
Marriott Marquis San Diego: Salon B
James Seiber Memorial Symposium
Hosted by AGFD, AGRO
J. Finley, M. Hengel, A. E. Mitchell, J. M. Van Emon, S. S. Walse, *Organizers* K. L. Armbrust, M. D. Pazcarpio-Obeso, *Organizers, Presiding*
2:00 . Jim Seiber's positive impact on science and students. **J.M. Van Emon**, A.W. Coates
2:25 . Love and hate are in the air. **Q.X. Li**
2:50 . Dissipation of pesticides under California rice field conditions. **R.S. Tjeerdema**, D. Bonnar, A. Gunasekara, T. Jabusch, R. Mulligan, Z. Redman, C. Rering, P.L. Tomco, M. Vasquez, K. Williams
3:15 Intermission.
3:35 . Ingested chemicals influence fitness: Lessons learned from butterflies, nightshades, human birth cohorts, and PFAS-contaminated farms. **D.D. Jones**
4:00 . Almond quality research from the orchard to the winery. **A.E. Mitchell**
4:30 A Remembrance of James Seiber.

Beyond the Beaker: Where Can Chemistry Take You?
Spons. SOCED, Cospons. AGFD, PROF

SUNDAY EVENING 7PM
Convention Center Hall B2/C

AGFD General Posters & Undergraduate Poster Competition & Graduate Student Competition
K. Deibler, E. Kreger, C. Osorio Roa, *Organizers*
684. Development of benchtop NMR techniques for kombucha analysis. **A.G. Morgan**, J.L. Perrin, L. Melara, J.N. Richardson, J. Kegerreis
685. Comparison of lignan content and antioxidant activity in five perilla varieties cultivated in Korea. **Y. Kim**, M. Kim, J. Kim, Y. Kim
686. Strawberry shield: Unveiling the antimicrobial paper defenses. **C. Pruitt**, E. Almenar, P. Khule
687. Molecular dynamics simulations of *Trans* fatty acid formation in various oils during high-temperature frying. **C. Lee**, L. Hong, L. Hwang, C. Liu, J. Zhao
688. DNA delivery by virus-like nanocarriers in plant cells. **M. Youngblood**, H. Kim, J. Giraldo, N. Steinmetz, G. Lowry, A. Caparco
689. Xanthan gum- based edible coatings enriched with grape stalk extract for prolonging the shelf life of white grapes *(Thompson seedless)*. **V. Bodana**, V. Katiyar
690. Development of a kinetic model for the dynamics of kombucha fermentation. **J.L. Perrin**, A.G. Morgan, L. Melara, J.N. Richardson, J. Kegerreis
691. Hydrophobic plant protein-polysaccharide blend facilitates low-temperature production of sustainable meat alternatives. B. Devnani, **N. Tan**, L. Grossmann
732. Comparison of phenolic composition, flavonoid content, and antioxidant properties among cacao nibs sourced from different origins. **S.J. Hazen**, H.P. Lawson, E.D. Niemeyer
733. Protecting crop health: Machine learning for weed detection with hyperspectral imaging. **S. Gandhok**, **T. Pollock**, E. Lopez, A.K. Sharma, A. Jani
734. Almond shells: An innovative solution for phenolics in winery wastewater. **P. Zhang**, E. Doria, L.A. Lerno, A.E. Mitchell
735. Nitrite content in cured meats commercialized in Costa Rica: A comparative study from 2022 to 2024. J. Ramírez Alfaro, K. Hernandez Ugalde, **M. Porras Fonseca**, J.A. Rodriguez Corrales
736. *Annona muricata* leaves and stem as an antibacterial agent against Gram-positive and Gram-negative bacteria. **J.E. Santiago-Martell**
737. Optimized fermentation conditions of whole pulses using *Lactobacillus plantarum* and its effect on scavenging capacity and markers of type 2 diabetes. **A. Valdes Alvarado**, D. Castaneda Reyes, E.G. Demejia
738. Almond shells as a natural biosorbent for the removal of phenolics in winery wastewater. **E. Doria**, L.A. Lerno, A.E. Mitchell
739. Distinctive sterol profiles in two species of morel mushrooms: *Morchella tomentosa* and *Morchella americana*. **T.W. Nalli**, A. Overgard, S. Quint, N.Y. Walker, C. Chu

740. Training a machine learning algorithm to estimate plant biomass from single agricultural images. T.A. Cristales, D. Rakijian, **M.M. Allard**

741. Evaluating concentrations of five PFAS in agricultural soils of Puerto Rico. **J. Torres Ruiz**, I.E. Popova, D. Bair

742. Effects of parental nutrition on offspring development of Alzheimer's Disease. **N. Boehly**, B. Brown, M. Hale

743. Quantification of steroid hormones in grocery store meat samples via LC-MS/MS. **C.C. Huffman**, S.E. Jaynes, N. Duncan, D. Crain

744. Evaluation of chemical attributes and volatile markers of extra-virgin avocado oils extracted from different California varieties. **F. Kulapichitr**, D. Wannasin, D. Obenland, S. Wang, M. Arpaia

745. Investigating the impact of lactic acid bacteria fermentation on the physicochemical properties of plant based protein. T. Parveen, **D. Wang**

746. Antioxidant dendrons. **S. Medes**, A. Lapratt, C.Y. Lee

747. Comparative metabolomics and neuroprotective potential of pomegranate cultivars. **Y. Wang**, H. Lee, J. Chater

788. Low-pressure air plasma seed surface modification to expedite seed germination. **P. Aguilera**, M.J. Hawker

789. Effects of Papaya ringspot virus on organic molecules in squash leaves. **G. Palomar**, P. Taylor, R. Sheaff, A. Ali

790. Analysis of lead and cadmium in dark chocolate bars and cocoa powders. V. Pipinich, **R.C. Dudek**

791. Investigation on separation and analysis of stereoisomeric flavonolignans from milk thistle using chiral HPLC columns. **D. Hahn**, S. Yu, T. Cao, S. Lee

792. Tissue distribution and metabolism of polymethoxyflavones from orange peel. **Y. Wang**

793. Analysis of lignan content and volatile compounds in the Korean wild chive (*Allium monanthum*). **Y. Kim**, J. Yu, J. Lee, K. Kim, J. Sung, Y. Kim

794. Blooming solutions: Transforming eutrophic algal blooms into biofertilizers. **A. Moore**, T. DeBellis, R. Brague, N.K. Knowlton

795. Analysis of biotin content in commonly consumed foods in Korea. **J. Yu**, J. Lee, Y. Kim, E. Park, Y. Choi, Y. Kim

796. Lignan contents of frequently consumed agro-foods in Korea. **J. Lee**, Y. Kim, J. Yu, H. Kim, Y. Kim

797. Measurement of urinary magnesium in domestic swine by conductometric titration. **L.D. Schultz**, R. Srinivasan, L. Jackson, M. McAfee

798. Enhancing nutritional science with molecular dynamics: A focus on the Maillard reaction. **W. Mathers**, L. Hwang, J. Zhao, C. Liu, C. Lee, L. Hong

799. Chemical inhibition of enzymatic browning during mealworm (*Tenebrio molitor*) protein extraction. K. Tran, J.J. Love, J. Zhao, **C. Liu**

800. Applying FT-ICR MS with formula assignment algorithm on the Chinese Medicine Characterization. **K.Y. Chow**, X. Mo, L. Zhang, C.Y. Lau, D.T. Chan, P. Shaw, A.T. Chow

801. Characterization of organic acids in fruited sour beers. **N. Tiwari**, M. Holle

802. Reaction of ergothioneine with redox active dyes: Implications for the redox potential and detection of ergothioneine. **C.T. Cao**, D. Keltner, W.E. Geiger, R. Hondal

803. Creepy carrots: A biocatalyst for reduction reactions. **P.A. Horsley**, A.M. Wilson

850. Use of various energy molecular orbitals in the AI design of new herbicides. **M. Shaver**, J.A. Darsey

851. Antidiabetic activity screening of Costa Rican plant extracts: Inhibition of advanced glycation-end products. **M.B. Gomez**, D. Arrieta, P. Chivi Ramirez, E. Gamboa, C.M. Martinez Mora, A.F. Carballo-Arce, J.A. Rodriguez Corrales

852. Shellac-based microgels for enhanced probiotic delivery. **K. Calumba**, Q. Zhong

853. Effects of L*antana camara* L. leaves extracts and essential oils in the production and protection of tomato (*Solanum lycopersicum* L.) Roma VF. **A.A. Sotade**

854. Production, physicochemical and sensory quality of bottled and sterilized tigernut milk: Exploring the future of plant-based beverage from an underutilized crop. **C. Okorie-Humphrey**

855. Physicochemical characterisation and investigation of antioxidant properties of Southwest Missouri floral honey and honey related product Propolis using FRAP, GC/MS, GPC, XRF and DSC. **L. Milam**, G. Fernando

856. Avocado oil based oleogels: a comparative analysis of the physical characteristics of various structuring agents. **C. Carter**, R. Silva

857. Comparing the flavour profiles of gin using high-capacity sorptive extraction and GC×GC–TOF MS. L. McGregor, K. Murtada, M. Gaida, **M. Edwards**, B. Green

858. Physicochemical properties, quality, and characteristics of traditional Bulgarian artisanal cheese from raw sheep's milk during ripening. **H. Fidan**, S. Ibrahim, S. Stankov, T. Balabanova

859. Designing research diets using USDA food composition tables and ICP-OES. **C.N. Vialva**, S. Cao, C. Weaver

860. Quantitative analysis and thermal stability of cannabinoids in commercial hemp products using Q-ToF LC-MS/MS. **A. Duzan**, S. Ibrahim, M. Basti

861. Nutrient composition and functional properties of microalgae as food ingredients. **C. Williams**, J. Rockwell, L. Feng, C. Liu, C. Zuniga, J. Zhao

862. Withdrawn

863. Antioxidant activities of limu extracts in a beverage system. **B. West**

864. Production of Maillard reaction intermediates during mashing and boiling of a single malt, single hop (SMaSH) beer. **A. Lo Presti**, C.A. Hughey

865. Importance of water-induced molecular organization in petfood aromatic and the selection done by pets. **M. Trehiou**

925. Effect of soy-based textured vegetable protein and textured pea protein mixtures on the physicochemical properties of hybrid beef burger patties. **S. McBride**, H. Khouryieh, L. Pereira Silva

926. Esculetin inhibited fat accumulation in *Caenorhabditis elegans* through insulin/insulin-like growth factor and AMP-activated protein kinase pathways. **A.T. Kim**, Y. Park

927. Sommelier training of an artificial nose. **L. Negom**, **L. Crumb**, E.A. Jarvis

929. Evaluation of antioxidant activity in Costa Rican plants using the oxygen radical absorbance capacity (ORAC) method. **E. Gamboa**, M.B. Gomez, M. Avalos, S. Ruiz Mena, V. Álvarez Valverde, A.F. Carballo-Arce, J.A. Rodriguez Corrales

931. Acute toxicity of chemical compounds on the biocontrol agent Cryptolaemus montrouzieri in citrus orchards. **A. Kaspi-Kaneti**, S. Singh, A. Protasov, G. Yaacobi, R. Kaspi

933. Improving acidic stability of casein via glycation with hydroxypropyl methylcellulose. **B.A. Castellanos**, Q. Zhong

934. Zein nano-carriers for the delivery of genetic materials to plants. **P. Maiti**, S. Santra, J. Pereira, E.A. Davidson

935. Synthesis and evaluation of d-mannitol-based antioxidant dendrimers. **B. Agbemade**, C.Y. Lee

936. Structure of anthocyanin complex with flavonoids and metals to form blue coloration under acidic conditions. **X. Fan**, M. Giusti

937. Predicting protein gelation properties through modeling using published literature results. **J. Zhao**, D. Hecht, R. Roni, M. Esmaeelian, A. Raza, D. Grabinski
938. Sensory similarity and consumer preferences of plant-based seafood analogues. **J. Wadman**, L. Feng, S. Lehrer, A. Raza, C. Liu, J. Zhao
997. Using the AI program AlphaFold to engineer transient tertiary structure (TTS) tags to enhance αS1-casein solubility. **S. Murrell**, J.J. Love, M. Bartolovich, C. Liu, J. Zhao
998. Antioxidant activities of different microalgae species. **K. Kemenes**, D. Norena-Caro, C. Liu, C. Zuniga, J. Zhao

MONDAY MORNING March 24
Marriott Marquis Grand Ballroom: Section 6
Food Security: Tackling World Hunger CCC - Highlighting Chemistry from Multiple Divisions: Advancement in Crop Protection and Nutrient Analysis
Hosted by AGFD, AGRO, ANYL
C. L. Haynes, H. B. Irrig, M. J. Morello, *Organizers* S. M. Lomnicki, Z. Xie, *Organizers, Presiding*
8:00 Introductory Remarks.
8:05 . Science and technology developments to achieve global food security. **E. Lopez Lara**, G.P. Foy, K.E. Peterman, P.S. Weiss
8:30 . Withdrawn
8:55 . Bio-inspired proline sensors for diagnosis and surveillance of plant stress. C.L. Martin, J.R. Cicero, L.L. Springer, D.A. Geroulakos, A.C. Moos, **D.J. Wilson**
9:20 Intermission.
9:30 . Chemical indicator for climate-resilient sugar crops. **S.M. Uchimiya**
9:55 . Metabolomic insights of rhizosphere PFAS uptake, transportation, and bioaccumulation in mung bean sprouts. **A. Dhakal**, S. Mahdi, X. Ma, D. KC, R. Mu, Q. Yang
10:20 . Fate of antibiotic compounds in nutrient recovery systems. N. Bolujoko, **K. Mangalgiri**
10:45 Intermission.
10:55 . Withdrawn
11:20 . Withdrawn
11:45 Closing Remarks.

Marriott Marquis San Diego: Salon B
James Seiber Memorial Symposium
Hosted by AGFD, AGRO
K. L. Armbrust, M. Hengel, A. E. Mitchell, M. D. Pazcarpio-Obeso, *Organizers* J. Finley, J. M. Van Emon, S. S. Walse, *Organizers, Presiding*
8:00 Introductory Remarks.
8:05 . There and back again: Tales from a dishwasher. **M. Hengel**
8:55 . Establishment of ion-spectrum library with high-resolution mass spectrometry (HRMS) for residual pesticide analysis. **J. Moon**, H. Jo, J. Sun
9:20 . Production of fertilizer byproducts from a lithium clay mine. **G.C. Miller**, D. Stem, C. Barile, S.M. Dunham-Cheatham
9:45 Intermission.
10:10 . Veterinary pharmaceutical research applications of residue analysis in complex matrices. **T.A. Wehner**
10:35 . Differences in trifluoroacetic acid concentrations in various consumer foods. **T.M. Cahill**, A. Hawley, M. Winne
11:00 . Air, water, fog and frogs – exploring the environment with James Seiber. **L.L. McConnell**
11:25 . Working the interface of science and regulatory policy. **K.L. Armbrust**, D. Seth-Carley, L.L. McConnell

Chemistry of Sustainable Production in the Grape and Wine Industry
Spons. PRES, Cospons. AGFD

MONDAY AFTERNOON March 24
Marriott Marquis Grand Ballroom: Section 1
Breeding for Flavor Sensory Quality and Sustainability of Fresh and Fresh-Cut Fruits and Vegetables
X. Du, G. Nui, X. Sun, Y. Weng, *Organizers, Presiding*
2:00 Introductory Remarks.
2:05 . Cucumber sensory properties and the variance in flavor molecules (aroma and taste) in a GWAS panel. C.N. Duan, N. Latorre, T. Pham, T. Nguyen, J. Tan, Y. Weng, **X. Du**
2:35 . Key role of texture in fresh-cut vegetables and characterization of texture-related parameters in cucumber. **C.N. Duan**, T. Nguyen, J. Tan, Y. Weng, X. Du
3:05 . Quantitative trait loci mapping of fruit firmness in cucumber. **Y. Weng**, J. Tan, T. Nguyen, C.N. Duan, **U. An**, X. Du
3:35 Break.
4:00 . Aroma composition of blackberries: Implications for flavor enhancement. **R. Sen**, K. Sheehan-Lust, S. Lafontaine, M. Leigh Worthington
4:30 . Effects of rootstocks on the flavor quality of huanglongbing-affected sweet orange juices. **Y. Wang**, X. Liu, F. Gmitter, J. Grosser
5:00 . Development of active packaging for postharvest preservation of fruit. **X. Sun**, C. Shu, Z. Yusufali

Marriott Marquis San Diego: Salon B
Withycombe-Charalambous Graduate Student Symposium
E. Kreger, C. Osorio Roa, *Organizers* K. Deibler, *Organizer, Presiding*
2:00 Introduction.
2:10 . Encapsulation of Phytochemicals through polymer-catechin particles self-assembled via tea-steeping. **S. Chang**, J. Pereira, A. Nordin, S. Santra
2:40 . Understanding how beverage components interact with aluminum beverage cans. **A. Montgomery**, R. Allison, M.J. Sheehan, J.M. Goddard, G.L. Sacks
3:10 . Baked-though butter flavor: Flavor dynamics of lactones during baking in a “shortbread” cookie model system. **H. Chai**, K.R. Cadwallader
3:40 Intermission.
4:05 . Combined cross-linked enzyme aggregates of β-galactosidase and glucose isomerase stabilized by trehalose nanostructure excipients. **J.G. Scott**, J.M. Goddard
4:35 . Engineering novel nucleic acid biosensors for the rapid on-site detection of foodborne pathogens using nanomaterials. **T. Kasputis**, J. Chen
5:05 . Simultaneous dual-gene detection of *Escherichia coli* O157:H7 based on CRISPR/Cas13-Mediated biosensor. **Y. He**, X. Zhang, J. Chen

Marriott Marquis Grand Ballroom: Section 6
Food Security: Tackling World Hunger CCC - Highlighting Chemistry from Multiple Divisions: Nanomaterials for Food Security
Hosted by AGFD, AGRO, ANYL
C. L. Haynes, H. B. Irrig, M. J. Morello, *Organizers* S. M. Lomnicki, Z. Xie, *Organizers, Presiding*
2:00 Introductory Remarks.
2:05 . Agricultural nanoparticle’s impacts on soil enzymatic activity. **D. KC**, N. Tu, A. Dhakal, Y. Barazandegan, W. Doggett, L. Xu, T. Wuliji, J. Yang, Q. Yang

2:30 . Nanocarrier mediated delivery of insecticides into tarsi enhances stink bug mortality. **S. Sharma**, T. Perring, S. Jeon, H. Huang, W. Xu, E. Islamovic, B. Sharma, Y. Giraldo, J. Giraldo
2:55 . Withdrawn
3:20 Intermission.
3:30 . Application of nano-selenium and nano-boron as seed primers to enhance the germination and growth yield of maize and tomato. **P. Cervantes**
3:55 . Withdrawn
4:20 Intermission.
4:55 . Proximate, micronutrients and sensory properties of instant breakfast flakes from OFSP-cocoyam composite flour sweetened with date palms. **E.N. Odoh**
5:15 . Anthelmintic effects of phytochemicals from herbal plants for gastrointestinal nematode control in small ruminants. **C. Ke**, S. Mahdi, R. Mu, D. K.C, T. Wuliji, Q. Yang
5:35 . Bio-based approach for sustainable control of root-knot nematodes. **R. Rai**, A. Hodson, C. Simmons, N. Nitin
5:55 Closing Remarks.

TUESDAY MORNING March 25
Marriott Marquis San Diego: Salon A
Applying Mass Spectrometry and NMR Techniques in the Study of Plant and Food Metabolomics
T. D. Stark, *Organizer, Presiding*
8:00 Introduction.
8:05 . Integrated approach combining mass spectrometry, NMR, and chemometrics for quality and authenticity assessment of essential oils. **M. Wang**, J. Zhao, I.A. Khan
8:25 . Metabolic alterations of root exudates in *Lotus japonicus* caused by *Acidovorax* strains and arbuscular mycorrhiza. **F. Seufert**, Y. Si, J. Krumbach, T.D. Stark, C. Gutjahr, C. Dawid
8:45 . Characterizing bourbon whiskey via the mass spectrometry - based molecular fingerprinting. **C. Zhu**
9:05 . Integration of sensory and multi-omics approaches to understand flavor pathways in mango. **Y. Wang**, X. Liu, J. Crane, X. Wu
9:25 . Nontargeted LC/MS chemical profiling of chili pepper pungency. **J. Borcherding**, E. Tello, D.G. Peterson
9:45 Intermission.
10:15 . Harnessing food volatilomics for sample categorization and sensory prediction. **J. Beauchamp**, L. Friedrich, A.T. Grasskamp, H. Haug, M. Izaber, T. Sauerwald, S. Singh, G. Zeh
10:35 . Targeted metabolomic approach to identify phenolic compounds in *Psidium friedrichsthalianum* fruit. T. Cuadrado-Silva, M. Pozo Bayon, **C. Osorio Roa**
10:55 . Mozambioside degradation products activate bitter taste receptors TAS2R43 and TAS2R46. **C. Czech**, A. Di Pizio, M. Behrens, R. Lang
11:15 . *In vitro* bioassay-guided isolation and identification of bioactive compounds by LC-MS *Parkia timoriana* (DC.) Merr. - a lesser-known edible medicinal plant species, from Manipur, Northeastern India. **S. Sureshkumar Singh**, K. Kennedy Singh, C. Lal Sharma
11:35 . Tracing the transfer of dietary chemosensates and their metabolites from the maternal diet into human milk and urine by means of a curry spice intervention study. **M. Gigl**, K. N`Diaye, M. Debong, R. Lang, A. Buettner, T. Hofmann, H.M. Loos, C. Dawid
11:55 Conclusions.

DIGITAL SESSION
AGFD General Papers - Agricultural and Food Chemistry Flash Talks
E. Kreger, C. Osorio Roa, *Organizers, Presiding*
10:00 . Evolution of metabolomics in the agricultural and food sciences. **A. Buko**
10:15 . Epitopes of Scy p 1 were identified through the bionics digestive system combined multi-omics. M. Liu, Y. Li, F. Huan, Y. Gu, Z. Sun, H. Liu, G. Chen, **G. Liu**
10:30 . Analysis of structure-allergenicity relationship by site-mutation in disulfide bond site from Cra a 4. **S. Gao**, F. Huan, M. Wu, L. Ni, Y. Gu, Y. Liu, M. Liu, G. Liu
10:45 . Designing a hypoallergenic derivative of Cra a 1 with the potential for tolerance induction. **F. Huan**, S. Gao, L. Ni, M. Wu, Y. Gu, M. Liu, G. Liu
11:00 Intermission.
11:10 . Substances of health concern: Label accuracy of cannabidiol and tetrahydrocannabinol in commercial tinctures from the United States. **Z. Sullivan**, C. Lapierre, L. Weiser Erlandson, L. Pham
11:25 . Characterization of odorants in thermally treated lobster mushrooms. **T. Nguyen**, E. Darby, J.P. Munafo
11:40 . Engineering climate-resilient crops using a nano-enabled strategy. **S. Chen**
11:55 . Characterization of the taste profile of Chardonnay marc fractions prepared through taste-guided fractionation. **N. Nguyen**, J.P. Munafo
12:10 Intermission.
12:20 . Will mixing different flavors and/or styles of waterpipe tobaccos before use increase consumer satisfaction and/or regulatory concerns?. **J.H. Lauterbach**
12:35 . Utilization of button mushroom stem waste in seafood analogs. **E. Darby**, T. Nguyen, J.P. Munafo
12:50 . Effects of media pH on lipid yield in microalgae *Pseudochloris wilhelmii* for biodiesel production. **E. Clayton**, E. Clement, S. Fedele, C. Tobin, B.C. Eigenbrodt
1:05 . Withdrawn
1:20 Intermission.
1:30 . Electrocatalytic activity of CeO2 modified carbon electrodes for rapid H2O2 detection. **N. Gunasekaran**, H. Muraleedharan Jalajamony, R. Adu, R. Fernandez, R. Govindarajan T
1:45 . GC-MS analysis, antimicrobial potential, haematological and some pharmacological properties of *Terminalia avicennoides* Stem extracts. **O.O. Onawumi**, **A. Sodamade**, **D.L. Abiona**, **O.A. Adewusi**, B.A. Adewole

DIGITAL SESSION
Food Security: Tackling World Hunger CCC - Highlighting Chemistry from Multiple Divisions
Hosted by AGFD, AGRO, ANYL
C. L. Haynes, H. B. Irrig, M. J. Morello, *Organizers* S. M. Lomnicki, Z. Xie, *Organizers, Presiding*
10:00 Introductory Remarks.
10:05 . Intelligent packaging for real-time meat freshness monitoring: Integrating an ionic liquid-modified anthocyanin nanosensor array with deep learning. **Z. Yu**, M. Lin
10:25 . Supervised multivariate curve resolution-alternative regression for the rapid detection and quantification of adulterated coconut oil by palm oil using Raman spectroscopic data. **V. B. Moneravilla**, D. Rodrigo, G. Dharmarathne, N. Abeyasinghe, H. Jayaweera, S. Gunewardene
10:45 . Reciprocal effect on lateral diffusion of receptor for advanced glycation endproducts and toll-like receptor 4 in the HEK293 cell membrane. **M. Walid**
11:05 . Assessment of the nutritional composition of a dough meal from Acha (*digitaria exilis)* flour fortified with soybean concentrate and UN-dehulled breadfruit flour. **O.C. Ogbuele**

11:25 . Polymer facilitated detection of toxic metal ions in water. **J. Hu**, M. Bogar
11:45 . Synthesis and characterization of nanocrystalline Samarium substituted Nickel Ferrites by Co-precipitation technique. **S.S. Modhave**

TUESDAY AFTERNOON
Marriott Marquis San Diego: Salon A
Chemistry of Alcoholic Beverages
N. O. Flynn, *Organizer, Presiding*
2:00 . Introduction: Chemistry of alcoholic beverages. **N.O. Flynn**
2:10 . Chemistry of beer styles. **N.O. Flynn**
2:40 . Quantifying the terroir of beer using HS-GCMS, HR LCMS, and GC-O. **R.A. Quinlan**, P. Pond, D. Mitchell, D.V. Liskin, A. Higgs, A. Brehm, K. Kingsbury
3:05 . Development and metabolomic assessment of low-cost bench-top malting protocol for laboratory-scale malt quality evaluation. **H. Rani**, J.G. Walling, S.J. Whitcomb
3:30 Intermission.
3:50 . Non-invasive optical sensors for authenticating Pisco spirits. **Y. Wu**, L. Rodriguez-Saona
4:15 . Evaluating commercially available yeast strains for their application and flavor profiles in non-alcoholic beer. A. Maust, R. Sen, **S. Lafontaine**
4:40 . Next chapter of reengineering non-alcoholic beer: Unmalted rice and *Saccharomycodes ludwigii* in production. **C. Schubert**, S. Lafontaine
5:05 . Volatile aromatic compounds in *Canarium schweinfurthii* Engl blanched fruits, thermally pasteurized must and wine. **O. Francis**, J.L. Okullo, S. Natukunda, R. Komakech, J. Agea

Marriott Marquis San Diego: Salon B
Extraction, Recombinant Production, and Function of Proteins of Food Safety and Food Manufacturing Importance
Y. Zhang, *Organizer, Presiding*
2:00 . Novel green carbon dots: Free-radical scavenging and anti-inflammation. **W. Jun**, B. Sun, W. Fang
2:25 . Modulating molecular interactions in extruded pea protein isolate. **B. Hasan**, J. Ubbink
2:50 . Protein language model-based prediction of potential allergens in *Chlorella vulgaris*. **C. Liu**, Z. Du, Y. Li, J.J. Love, H. Altammami, S. Daley, S. Teran, C. Zuniga, J. Zhao
3:15 . Withdrawn
3:40 . Utilizing the AI protein design tool AlphaFold to enhance precision bacterial fermentation of bovine αs1-casein. **J.J. Love**, S. Murrell, C. Liu, J. Zhao
4:05 intermission break.
4:20 . Withdrawn
4:45 . Different isoforms of the 11S seed storage protein of hazelnut form hetero hexamers. **Y. Zhang**, F. Guo, A.J. Howard, Y. Xu
5:10 . Immunodetection of an egg yolk allergen: Chicken serum albumin (Gal d 5). **Q. Rao**, Y. Zhao, X. Jiang
5:35 . Withdrawn

WEDNESDAY MORNING March 26
Marriott Marquis San Diego: Salon B
AGFD General Papers - Food Safety and Agriculture
E. Kreger, C. Osorio Roa, *Organizers, Presiding*
8:00 Opening Remarks.
8:05 . GelMA-chitosan hydrogels as soil conditioners in agriculture. **B. Calbas**, F. Albreiki, Z. Carey, T. Wright
8:25 . Interpreting residues of glyphosate in food and dietary exposure. **L. Riter**, J. Vicini
8:45 . Withdrawn
9:05 . Examination and determination of acrylamide and synergistic components in small animal feed. **S. McComis**, **T. Tatum**, K. Allen, A. Czernik, G. Venson
9:25 Break.
9:55 . Acrylamide-calcium chloride-activated carbon composites generates atmospheric water for agricultural uses. **N. Hamidi**
10:15 . Growth and yield assessment of Tomato under elevated particulate matter concentration. **S. Pannu**, V. Singh, M. Kumar, U. Mina, P. Jain
10:35 . 3D-printed nanoparticle-based slow-releasing micronutrient fertilizers improves growth and productivity of wheat plants. **R. Rai**, P. Dhar

Marriott Marquis San Diego: Salon A
Microbial Food Safety - Emerging Technologies for Detection, Intervention, and Antimicrobial Packaging of Foodborne Pathogens
Y. Liu, *Organizer* X. Fan, T. Jin, *Organizers, Presiding*
8:00 Opening Remarks.
8:05 . Withdrawn
8:25 . Investigating xenobiotic interactions with the gut microbiota: an *in vitro* approach. **L. Liu**, J. Firrman, K. Mahalak, J. Lemons, A. Narrowe
8:45 . Impact of environmental heterogeneity on the competitive growth of antibiotic-resistant bacteria in food systems. **C. Zheng**, Y. Xing, Y. Men
9:05 . Washing and coating apple fruit with bio-based phenolic fatty acids reduce *Listeria innocua* populations. **X. Fan**, V. Ryu, H. Ngo, T. Jin
9:25 . How the FDA regulates food packaging and substances that come into contact with food. **E. Furukawa**
9:45 Coffee Break.
10:00 . Combination of antimicrobial treatments and packaging technology to enhance food safety and extend shelf life of root vegetables. **T. Jin**, X. Fan
10:20 . Enhancing chitosan-Zein films with *bergenia Ciliat*A extracts: A comprehensive study on UV-protection, antioxidant, and antimicrobial properties. **A.B. Chand**
10:40 . Cellulose nanocrystals derived from maple leaves with partially retained lignin for Pickering emulsion stabilization and food preservation. **C. Ji**, Y. Wang
11:00 . Engineered micro/nanofibers/particles for food packaging applications. **D.K. Arserim Ucar**
11:20 . Characterization of antibiotic resistant *salmonella* recovered from organic and non-organic whole broiler carcasses using whole genome sequencing. **S. Parveen**, A. Punchihewage Don, Z. Chen, J. Meng

WEDNESDAY AFTERNOON
Marriott Marquis San Diego: Salon B
AGFD General Papers - Nutrition Topics
E. Kreger, C. Osorio Roa, *Organizers, Presiding*
2:00 . Identifying possible misleading labels on weight loss teas. R. Quinones, **H. Knott**, **K. King**
2:20 . Withdrawn
2:40 . Anti-Inflammatory and antioxidant effects of oleuropein in human skin cells: molecular mechanisms and potential cosmeceutical applications. **C. Liu**, H. Li, N. Deng, H. Ma, N.P. Seeram
3:00 . Cottonseed-derived ethanol extracts and gossypol on regulate glucose transport gene expression in mouse macrophages. **H. Cao**, K. Sethumadhavan
3:20 . Withdrawn
3:40 Break.

4:10 . Withdrawn
4:30 . Withdrawn
4:50 . Curcumin-metformin conjugate: Extremely facile microwave-induced organic synthesis and characterization via ESI-MS/MS. A potentially important target molecule for antiviral effect on SARS-CoV 2 viral load. **B. Dayal**, G. Dayal
5:10 . Deciphering the antioxidant capacity of common vitamins against specific reactive oxygen species by nuclear magnetic resonance. **J. Park**, H. Tang, P. Zhang
5:30 . Macromolecular antioxidants. **C.Y. Lee**

Marriott Marquis Pacific Ballroom: Section 26
Flavor Preferences of Cats and Dogs
J. Beauchamp, S. McGrane, *Organizers, Presiding*
2:00 Introductory remarks.
2:05 . Flavor perception and health: A two-way street. **N. Rawson**
2:25 . Sweet, umami, and kokumi taste perception of the domestic cat, an obligate carnivore. **S. McGrane**
2:45 . Role of organoleptic variety in food intake of domestic cats. A. Goyon, **M. Trehiou**
3:05 . Genomic approach to investigate key feline taste receptors. **D. Roberts**, S. Michlig Gonzalez, A. Zollinger, S. Damak, G. Woodward
3:25 . Chemical pest defense by the characteristic response to silver vine and catnip plants in the domestic cat. **M. Miyazaki**
3:45 Intermission.
4:00 . Flavor enhancement strategies across life stages for cats and dogs. R. Schave, S. Anderson, D. Simmons, A. Monforte, **S. Martins**
4:20 . Analysis of polymorphisms in canine chemosensory receptor genes. **Y. Niimura**
4:40 . Impact of smell on dog's food choice. C. Petel, **E. Mehinagic**
5:00 . Resolution revolution: High-resolution mass spectrometry and pet food. **J.W. Marshall**, D. Hemmler, C. Roullier-Gall, L. Jones, S. Nadine, M. Rychlik, P. Schmitt-Kopplin, A.J. Taylor
5:20 . Characterizing the dynamics of aroma release from wet cat food for different formulations and feeding protocols. **J. Beauchamp**, N. Cleve, S. Nadine, C. Beckmann

Marriott Marquis San Diego: Salon A
Microbial Food Safety - Emerging Technologies for Detection, Intervention, and Antimicrobial Packaging of Foodborne Pathogens
X. Fan, T. Jin, *Organizers* Y. Liu, *Organizer, Presiding*
2:00 Opening Remarks.
2:05 . Withdrawn
2:25 . Propidium monoazide is unreliable for quantitative live-dead molecular assays. **S. Kaur**, L. Bran, G. Rudakov, M.S. Verma
2:45 . Application of an engineered anti-biofilm enzyme (ABE) to detect and remove *Listeria Monocytogenes*. **B. Berger**, S. Felton, K. Lynn, J. Lee, Y. He, A. Oest, A. Miller, C. Chen, C. Armstrong, J. Renye, J. Capobianco
3:05 . Nanopore-based sequencing and quantification. **A. Gehring**, **S. Harper**, K. Counihan, S. Tilman, S. Kanrar, G. Paoli
3:25 . Genetic engineering of a *Salmonella* phage to develop a rapid biosensor for host separation, concentration, and detection. **R.K. Anderson**, S.R. Nugen
3:45 Coffee Break.
4:00 . Withdrawn
4:20 . Withdrawn
4:40 . Development and application of aptamer-based biosensors for the rapid and sensitive detection of *yersinia enterocolitica* across different growth stages. **M. Shoaib**, W. Zhouping
5:00 . Helicase mediated isothermal amplification based on CRISPR/Cas12a for detection of monkeypox virus. **H. Wang**, Z. Chen, I. Yu
5:20 . Withdrawn
5:40 . Photoactivated CRISPR/Cas12a-HDA one-pot nucleic acid detection technology. **H. Liao**

THURSDAY MORNING March 27
Marriott Marquis San Diego: Salon B
AGFD General Papers - Protein Topics & Quality/Processing/Sustainability
E. Kreger, C. Osorio Roa, *Organizers, Presiding*
8:00 . Withdrawn
8:20 . Layer-by-layer chitosan coating of yeast protein isolate-stabilized emulsions: Effects on colloidal stability and curcumin bioaccessibility. **S. Lee**, M. Jo, Y. Choi
8:40 . Withdrawn
9:00 . Simulating oxidative pathways in linoleic acid: a molecular dynamics approach to safeguard food quality and extend shelf life. **A.S. Vaishya**, L. Hwang, L. Hong, J. Zhao, C. Liu
9:20 . Use of microwave-assisted processes for agro-based materials. **H. Cheng**, A. Biswas, M. Appell, H. Cao, Z. He, K. Klasson
9:40 Break.
10:10 . Biodegradable, water-stable, and reusable drinking straws from papaya agricultural wastes. **R. Rai**, P. Dhar
10:30 . Release dynamics of bioactives (anthraquinones) encapsulated in casein micelles during in vitro digestion. **U. Sadiq**
10:50 . Investigating the migration of volatiles from food packaging into rolled oats. **M. Edwards**, K. Murtada, J. Ogden, M. Gaida, L. McGregor
11:10 . Impact of UV-A dehydration on food product quality and structure. **S. Karami**, L.J. Bastarrachea
11:30 . Techno-economic perspective of chickpea hulls-derived dietary fiber affected by extraction methods. **Y. Li**, K. Sivakumar, S. Hong, Z. Xu, B. Rajpurohit, H. Wang, Y. Li, H. Huang, Y. Xu
11:50 . Exploring the versatility of oleogels in food systems: Structural, functional, and sensory attributes. **R. Silva**

Check out the Awards Application Form section after the Abstracts

ABSTRACTS
for the 2025 Spring
AGFD Technical Program

SUNDAY MORNING March 23
James Seiber Memorial Symposium
No abstracts available

SUNDAY AFTERNOON
James Seiber Memorial Symposium
No abstracts available

SUNDAY EVENING 7PM
AGFD General Posters & Undergraduate Poster Competition & Graduate Student Competition

684. Development of benchtop NMR techniques for kombucha analysis Abbie G. Morgan[1], abbiemorgan48@gmail.com, Jaden L. Perrin[1], Luis Melara[2], John N. Richardson[1], Jeb Kegerreis[1]. (1) Dept. of Chemistry, Shippensburg Univ. of Pennsylvania(2) Dept. of Mathematics, Shippensburg Univ. of Pennsylvania With the rapid growth of the kombucha market over the past two decades, verified techniques for its chemical analysis have become increasingly more important to quantify concentrations of its main components such as acid, sugar, and alcohol. This research project expands upon recent advances utilizing benchtop NMR to confirm acetic acid, sucrose, glucose, fructose, and ethanol amounts in kombucha by developing an optimal analytical methodology to accurately analyze kombucha using this instrument. A novel test system consisting of two brews utilizing pure glucose and pure fructose was prepared, one in a standard glass vessel and one in an air-permeable bag. Not only do the results further support previous work suggesting that an air permeable bag is a much more efficient brewing vessel than a traditional glass jar for home brewers, but the results demonstrate that a benchtop NMR yields comparable analytical results vs. traditional techniques of analysis for determining acid, sugar, and alcohol by volume (ABV) concentrations such as HPLC and GC-FID. These time-consuming and expensive methods can therefore be replaced or supplemented using a benchtop NMR spectrometer, which becomes a one-stop-shop for kombucha brewers to quickly and accurately measure the main components of kombucha.

685. Comparison of lignan content and antioxidant activity in five perilla varieties cultivated in Korea Yoonjeong Kim[1] ang1569@naver.com, Min Young Kim[2], Jung In Kim[2], Younghwa Kim[1]. (1) BB21plus Project Team, Dept. of Food Science and Biotechnology, Kyungsung Univ., Busan, Korea (the Republic of)(2) Dept. of Southern Area Crop Science, National Institute of Crop Science Miryang, Gyeongsangnam, Korea (the Republic of) Lignans, a class of polyphenols found in many plant-based foods, demonstrate various biological activities. This study investigated the lignan content and antioxidant activity of five perilla varieties grown in Korea. Six lignan compounds including secoisolariciresinol (Seco), matairesinol (Mat), syringaresinol (Syr), lariciresinol (Lar), medioresinol (Med), and pinoresinol were analyzed using high-performance liquid chromatography (HPLC)-mass spectrometry. Additionally, sesamol (Ses), sesamin (Sem), and sesamolin (Sel) were quantified using HPLC. Total lignan content was highest in *Anyu* (88.639 μg/100 g), followed by *Namcheon* (59.655 μg/100 g) and *Neulbora* (47.041 μg/100 g). Notably, *Anyu* contained 44.809 μg/100 g of Syr, which was 2-5 times higher than in other varieties. However, Seco, Mat, Med, Ses, Sem, and Sel were not detected in any varieties. The total polyphenol content (TPC) was highest in *Dayu* (8.702 mg catechin equivalent (CE)/g) and *Gayeon* (8.209 mg CE/g), and total flavonoid content (TFC) was most abundant in *Gayeon* (7.447 mg CE/g). However, the lowest values were observed in *Neulbora*, with 2.765 mg CE/g for TPC and 2.230 mg CE/g for TFC, respectively. The *Gayeon* had the highest ABTS radical scavenging activity of the five perilla varieties at 3.686 mg CE/g. The DPPH radical scavenging activity was highest in *Dayu* (4.601 mg CE/g) and *Gayeon* (4.339 mg CE/g). Pearson correlation revealed strong relationships between TPC, TFC, and radical scavenging activities in the perilla seeds. Specifically, the highest positive correlation between TPC and ABTS (r=0.994, p<0.01) was observed, followed by TPC and DPPH (r=0.991, p<0.01). In contrast, the total lignan content negatively correlated with TPC, TFC, ABTS, and DPPH assays (r=−0.374 to−0.208). These findings provide insights into the functional properties of perilla varieties and suggest potential applications in food and health industries based on their lignan content and antioxidant activities.

686. Strawberry shield: Unveiling the antimicrobial paper defenses Camille Pruitt[2], c.pruitt2731@student.tsu.edu, Eva Almenar[1], Purva Khule[1]. (1) School of Packaging, Michigan State Univ., East Lansing(2) Chemistry, Texas Southern Univ., Houston Strawberries are highly perishable with a short shelf life due to their high moisture content and susceptibility to mold and bacterial contamination. This helps reduce spoilage and extends the shelf life of strawberries. The paper can help regulate moisture levels around the strawberries, preventing them from becoming too dry or too moist. Overall, anti- microbial paper serves as a packaging innovation that helps maintain the quality and extend the shelf life of strawberries. Anti-microbial paper is important when handling strawberries because it enhances preservation, reduces spoilage, and promotes food safety. This research's main objective is to evaluate whether microbial paper can effectively reduce anti-microbial growth on strawberries, thereby preserving their quality and extending their shelf life. Anti-microbial paper use can have a significant environmental benefit because the paper is biodegradable, economically efficient, and supports sustainable and healthier food systems.

687. Molecular dynamics simulations of *Trans* fatty acid formation in various oils during high-temperature frying Chih-Ling Lee[1], clee4893@sdsu.edu, Leo Hong[2], Lexi Hwang[3], Changqi Liu[1], Jing Zhao[1]. (1) School of Exercise and Nutritional Sciences, San Diego State Univ. College of Health and Human Services, California(2) Dept. of Mechanical Engineering, Loyola Marymount Univ., Los Angeles, California(3) College of Education, California State, Los Angeles *Trans* fatty acids (TFAs) are known to be a significant risk factor for cardiovascular disease due to their ability to induce an inflammatory response in cell membranes more effectively than *cis* fatty acids. To provide insights into selecting oils that minimize TFA intake from fried foods, this study investigated TFA formation in four frying oils - sunflower, palm, canola, and flaxseed - under high-temperature conditions. Using molecular dynamics (MD) simulations, we examined TFA formation in oils with different ratios of oleic acid, linoleic acid and alpha-linolenic acid. The MD simulations revealed that when heated at 900K, flaxseed oil (60% alpha-linolenic acids, 20% linoleic acids, and 20% oleic acids) generated the highest level of TFAs compared to other oils, with

31.25% of double bonds converting to the *trans* configuration. Canola oil, composed of 14% alpha-linolenic acids, 16% linoleic acids, and 65% oleic acids, showed the second highest TFA formation, generating 18.75% *trans* double bonds after heating. Sunflower oil (60% linoleic acids, 30% alpha-linolenic acids) exhibited remarkable resistance to high temperatures, with only 6.67% *trans* bond formation. Palm oil (46% palmitic acids, 9.1% linoleic acids, and 36% oleic acids) did not generate any *trans* fatty acids but exhibited a breakdown of two unsaturated fatty acid molecules. In summary, the stability of these oils under high temperature conditions varies significantly, with flaxseed oil being the most prone to TFA formation, followed by canola oil, sunflower oil, and palm oil.

688. DNA delivery by virus-like nanocarriers in plant cells
Marina Youngblood[1], myoun098@ucr.edu, Hye-In Kim[1], Juan Pablo Giraldo[1], Nicole Steinmetz[2], Greg Lowry[3], Adam Caparco[2]. (1) Univ. of California Riverside(2) Univ. of California San Diego, La Jolla(3) Carnegie Mellon Univ., Pittsburgh, Pennsylvania Tobacco mild green mosaic virus (TMGMV)-like nanocarriers were designed for gene delivery to plant cells. High aspect ratio TMGMVs were coated with a polycationic biopolymer, poly(allylamine) hydrochloride (PAH), to generate highly charged nanomaterials (TMGMV-PAH; 56.20 ± 4.7 mV) that efficiently load (1:6 TMGMV:DNA mass ratio) and deliver single-stranded and plasmid DNA to plant cells. The TMGMV-PAH were taken up through energy-independent mechanisms in *Arabidopsis* protoplasts. TMGMV-PAH delivered a plasmid DNA encoding a green fluorescent protein (GFP) to the protoplast nucleus (70% viability), as evidenced by GFP expression using confocal microscopy and Western blot analysis. TMGMV-PAH were inactivated (iTMGMV-PAH) using UV cross-linking to prevent systemic infection in intact plants. Inactivated iTMGMV-PAH-mediated pDNA delivery and gene expression of GFP *in vivo* was determined using confocal microscopy and RT-qPCR. Virus-like nanocarrier-mediated gene delivery can act as a facile and biocompatible tool for advancing genetic engineering in plants.

689. Xanthan gum- based edible coatings enriched with grape stalk extract for prolonging the shelf life of white grapes *(Thompson seedless)* Vikrant Bodana[2], b.vikrant@iitg.ac.in, Vimal Katiyar[1]. (1) Chemical Engineering, Indian Institute of Technology Guwahati, Guwahati, Assam, India(2) Centre for Sustainable Polymers, Indian Institute of Technology Guwahati, Guwahati, Assam Grapes are one of the most consumed fruits worldwide due to its excellent sensory characteristics and spectrum of health benefits. However, due to their highly perishable nature, its post-harvest losses are among the highest in the world. The grape stalks, which is one the winery byproducts could be utilized for the development of active edible coating materials. This research aimed to develop xanthan gum based edible coating (0.5%) incorporated with grape stalk extract (GSE) with varying concentration (5- 25%) and evaluating its potential to increase the shelf life of white grapes. The developed edible coating formulation exhibited excellent antioxidant and phenolic activity showing higher viscosity at lower shear rates. The Herschel-Bulkely model demonstrated the best fit (R^2= 0.99) for all coating solutions indicating pseudoplastic behavior. The coating formulation was able to retain the physiochemical attributes of grapes (weight loss, puncture strength, titratable acidity, total soluble solids and color attributes) for 16 days at 25 ± 2 ^oC (RH= 75 ± 5 %). Further, the coating formulation incorporated with higher concentration of GSE was able to retain the phenols, flavonoids and antioxidant activity of grapes as compared to the uncoated grapes throughout the storage period.

690. Development of a kinetic model for the dynamics of kombucha fermentation Jaden L. Perrin[1], jp5394@ship.edu, Abbie G. Morgan[1], Luis Melara[2], John N. Richardson[1], Jeb Kegerreis[1]. (1) Chemistry, Shippensburg Univ. of Pennsylvania (2) Mathematics, Shippensburg Univ. of Pennsylvania Kombucha is a beverage made by fermenting a sweet tea with a symbiotic culture of yeast and bacteria (SCOBY). The growing popularity for the drink has subsequently increased the demand for studies that seek to optimize the fermentation dynamics of this complex system. In our research, a comparison of the fermentation process under different environments was performed by brewing kombucha in a traditional glass jar and comparing it to a kombucha brewed in an air permeable silicone bag. Two separate studies were performed to enact this comparison: one with glucose as a food source, and one with fructose as a food source for the SCOBY. For each study, a bag and a jar contained an equivalent initial kombucha, and the concentrations of ethanol, acetic acid, gluconic acid, and sugars were quantified over a 30-day brew cycle. A kinetic model based upon the law of mass action for the aforementioned metabolites was developed and applied, which allowed for the quantification of differences in fermentation dynamics observed throughout the brewing process for the different vessels. While it was initially expected that the increased oxygen levels provided by the silicon bag would only enhance the rate of the metabolic processes for the bacteria within the SCOBY, the dynamics of the metabolic processes for both the bacteria and yeast were enhanced relative to the dynamics observed within the jar. However, the bacterial activity was amplified to a greater extent, and thus the air permeable bag should be viewed as an advantageous brewing vessel for kombucha as lower alcohol by volume coupled with higher acid concentrations were observed, no matter the food source. The utility of the mathematical model utilized in this study was demonstrated, and this work thus provides a foundation for future development of a more sophisticated model for the fermentation dynamics of kombucha. Our model has the potential to become an invaluable predictive tool to kombucha brewers and could possibly be expanded to other fermentation processes within the field of food chemistry as well.

691. Hydrophobic plant protein-polysaccharide blend facilitates low-temperature production of sustainable meat alternatives
Bhanu Devnani, Nicholle Kirsten Tan, nikki08404@gmail.com, Lutz Grossmann. Univ. of Massachusetts Amherst High-moisture extrusion (HME) is widely used in producing plant-based meat alternatives (PBMAs) due to its ability to mimic the fibrous structures of conventional meats. However, the high operating temperatures typically required in HME can negatively impact the functional properties of the products and raise environmental concerns over significant energy consumption. A promising solution is to leverage the low plasticization temperature of zein, a prolamin protein capable of forming viscoelastic structures at temperatures below 100 °C. While zein's low nutritional value (PDCAAS of 0.47) limits its application, potato protein with a higher nutritional value (PDCAAS of 0.93) and hydrophilic properties is selected to form a suitable protein matrix with zein in HME. This study explores the role of high-acyl gellan gum (HAGG) and pea starch in enhancing the texture of zein-potato protein extrudates, focusing on how varying HAGG concentrations affects the fibrousness and textural attributes. The pea starch concentration remained constant at 2% with HAGG concentrations varying from 1%, 3%, and 5%. HAGG promotes fiber formation, with increased stiffness, specific mechanical energy, and homogenization pressure as concentration rises. Shear force tests indicated that samples exhibited greater tenderness when heated to 60 °C compared to tests conducted at 25 °C. Color analysis showed no significant differences in the redness and yellowness across different HAGG concentrations, though lightness decreased as HAGG concentrations increased. The stiffness of the samples, as measured by the Young's modulus, was used to calculate the anisotropy index with the 3% HAGG concentration showing the highest degree of

fibrous difference. These findings suggest that achieving anisotropic characteristics in extruded high-moisture meat alternatives using prolamin proteins is feasible at temperatures below 100 °C, offering a viable method to reduce energy consumption during production. Furthermore, this approach offers flexibility in protein formulation, enabling the inclusion of other proteins to enhance both textural properties and nutritional value in the final product.

732. Comparison of phenolic composition, flavonoid content, and antioxidant properties among cacao nibs sourced from different origins Samantha J. Hazen, hazens@southwestern.edu, Holly P. Lawson, Emily D. Niemeyer. Chemistry and Biochemistry, Southwestern Univ. Brown College of Arts and Sciences, Georgetown, Texas Cacao nibs, which are produced from beans harvested from the *Theobroma cacao* tree, have numerous nutritional benefits that make them attractive to health-conscious consumers. Cacao nibs are high in protein and other nutrients and like all chocolate products, they contain phenolic compounds and flavonoids, which are substances with known antioxidant properties. Despite the increasing availability and popularity of cacao nibs, few studies have examined how the region where the nibs are grown can affect their phenolic composition, flavonoid levels, and antioxidant capacities. Therefore in the current study, nib samples were obtained from 10 different countries, processed, and their phenolic compounds were extracted. The total phenolic contents (TPC) of the nib extracts were measured using the Folin-Ciocalteu method and the total flavonoid concentrations were determined using a microplate-based colorimetric assay. Additionally, antioxidant properties were analyzed using the cupric-ion reducing antioxidant capacity (CUPRAC) method, and individual cacao bioactive compounds such as methylxanthines and catechins were quantified by high-performance liquid chromatography (HPLC). Initial results show significant differences in both TPC and total flavonoid levels between nibs originating from different countries. For example, nibs produced from cacao grown in Thailand and Peru generally had higher concentrations of phenolic compounds and flavonoids compared to nibs from other geographical regions. Overall, this study shows that cacao nibs are a good source of phenolic antioxidants, regardless of where they are cultivated. This presentation will provide an overview of how the phenolic content, flavonoid levels, and concentration of bioactive compounds affect the antioxidant properties within a variety of cacao nibs, providing important information to understand the potential health benefits of nibs sourced from different origins.

733. Protecting crop health: Machine learning for weed detection with hyperspectral imaging Supreet Gandhok, supreetgand05@gmail.com, Trevor Pollock, tpollock@csumb.edu, Eduardo Lopez, Arunkumar K. Sharma, Arun Jani. Biology & Chemistry, California State Univ. Monterey Bay, Seaside *Impatiens Necrotic Spot Virus* (INSV) has caused over $100 million in economic losses for growers in Monterey County, CA, over the last several years, necessitating improved weed management and disease control. In the Central Coast region, several weed species are carriers of INSV, the most important of which include annual sowthistle (*Sonchus oleraceus*), common purslane (*Malva parviflora*), and little mallow (*Portulaca oleracea*). Interactions between these weed species and crops can significantly reduce crop yields. By analyzing patterns in collected field data, machine learning models can improve detection and management by accurately identifying INSV carriers, supporting more effective disease control and weed management strategies. Prior efforts to apply machine learning for plant identification have relied heavily on plant morphology. While this approach is useful, it does have limitations, primarily in identifying partially obscured weeds or those growing in dense populations where structural features are less distinct. These limitations can be addressed by incorporating hyperspectral imaging (HSI), which analyzes spectral data from individual pixels in an image. Hyperspectral imaging examines a wide range of wavelengths. It gathers detailed information across numerous color bands, enabling more accurate analysis of features and detection of changes, improving the ability to identify weeds, even when they are partially concealed or densely clustered. A preliminary model was trained on hyperspectral and conventional images of annual sowthistle, little mallow, and lettuce. Images of weeds and crops were taken in various life stages and health and environmental conditions. The model successfully distinguished between images of weeds and lettuce with standard and hyperspectral imaging. These findings highlight the model's potential to extend weed identification to include common purslane. Further research will focus on detecting INSV-infected plants using HSI analysis, leveraging the physiological pigmentation changes observed in affected plants.

734. Almond shells: An innovative solution for phenolics in winery wastewater Poll Zhang[1], pollzhang68@gmail.com, Elyse Doria[1], Larry A. Lerno[2], Alyson E. Mitchell[1]. (1) Food Science and Technology, Univ. of California Davis(2) Viticulture & Enology, Univ. of California Davis California is the main producer of almonds and wine in the U.S., generating significant waste, primarily almond shells (ASP) and winery wastewater (WWW). WWW, which is acidic and rich in dissolved sugars and phenolic compounds, requires costly and energy-intensive treatments before environmental disposal. The high concentrations of phenolics in WWW are biodegraded slowly and hazardous to microorganisms. However, treatment of WWW by ASP has been shown to bind up to 64% of phenolics due to its porosity and composition of lignin, cellulose, and hemicellulose. This study focuses on optimizing the recovery of phenolic compounds from winery wastewater-enriched almond shells for sustainable applications. To determine optimal recovery of phenolics, ethanol:water ratios (v/v) (20:80, 50:50, 70:30) and ASP:ethanol ratios (m/v) (1:2, 1:5, 1:7) were evaluated. On a shaker, 2-4mm ASP was mixed with model WWW containing four phenolic compounds (rutin, gallic acid, caffeic acid, and (+)-catechin) and DI water. After 20 minutes of mixing, the ASP (i.e., phenolic-enriched ASP) was drained, and phenolics were recovered using ethanol on SPE Vacuum Manifold. The ethanol-phenolics mixture was analyzed via reverse-phase High-Performance Liquid Chromatography coupled with a diode array detector (HPLC-DAD). Percent recovery of phenolics was ranged from 55% to 71%. The optimized condition, using 50:50 (v/v) ethanol:water with 1:7 (m/v) ASP:ethanol ratio, yielded the maximum recovery (i.e, 71% total phenolics). These results highlight that phenolic compounds can be effectively recovered from phenolic-enriched ASP exposed to WWW. Recovered phenolics could provide a more accessible and diverse stream of phenolics for future uses.

735. Nitrite content in cured meats commercialized in Costa Rica: A comparative study from 2022 to 2024 Joel Ramírez Alfaro, Karina Hernandez Ugalde, Michel Porras Fonseca, michelleporras377@gmail.com, Jose A. Rodriguez Corrales. Laboratorio de Análisis y Servicios Químicos, Univ. Nacional, Costa Rica, Heredia Nitrites and nitrates are commonly used in the meat industry as preservatives, antimicrobial agents, and color fixatives. However, the excessive consumption of these compounds has been associated with various health concerns, such as the formation of nitrosamines, which are carcinogenic compounds. Tolerance levels of nitrites in cured meats are established by RTCA 67.04.54:18, Central American Technical Regulation for additives in processed foods and beverages, and Codex Stan 192-1995, Codex General Standard for Food Additives. The maximum concentration of total nitrites (NO_2^-) depends on product type and category, as defined by the type of cut, treatment, and curing of the meat product. The Laboratory of

Chemical Analysis and Services (LASEQ), from Univ. Nacional, is the only officialized laboratory by the National Service of Animal Health (SENASA) to perform official nitrite determination in meat products for regulatory purposes in Costa Rica. Herein, we report the nitrite content and regulatory compliance in cured meat commercialized in Costa Rica over a 2-year period (i.e., August 2022 to August 2024). Since SENASA requires routine analysis of all meat products produced in the country, this study provides an extensive representation of nitrite dosage. The majority of the 858 analyzed samples belong to categories with a limit of 80 mg/kg of nitrite ion (approx. 120 mg/kg equivalent $NaNO_2$), whereas the mean concentration is 50.58 mg/kg NO_2^- (75.85 mg/kg equivalent $NaNO_2$). Furthermore, a small percentage of the samples do not comply with local regulations, thus prompting retesting and follow-up. The distribution of concentrations and compliance among product types and classifications will be discussed. Our results emphasize LASEQ's and SENASA's efforts to enforce existing regulations, improving quality control practices, raising consumer awareness, and ensuring the safety of cured meats in Costa Rica.

736. *Annona muricata* leaves and stem as an antibacterial agent against Gram-positive and Gram-negative bacteria Javier E. Santiago-Martell, javier.santiago33@upr.edu. Natural Sciences, Univ. de Puerto Rico Aguadilla The increasing prevalence of bacterial antibiotic resistance poses a critical challenge, resulting in heightened interest in the identification of natural alternatives for the management of bacterial infections. Research work from Nigeria and Brazil has shown that *Annona muricata* (soursop) leaves and stems possess antibacterial properties against Gram-positive and Gram-negative bacteria due to the presence of flavonoids and other polyphenols. This study aims to evaluate the antimicrobial effects of soursop extracts from Puerto Rico. We employed the disc-diffusion test with aqueous extract of soursop leaves and stem to evaluate its effectiveness against nine Gram-positive and nine Gram-negative bacteria. Our data demonstrated that extracts from soursop leaves and stems exhibit inhibitory effects against certain Gram-negative bacteria, such as *Citrobacter freundii* and *Aeromonas hydrophila*, respectively. Nevertheless, both extracts had inhibitory effects against *Bacillus cereus*, Gram-positive bacteria. In addition, a qualitative test confirmed the presence of flavonoids in both extracts. Our study emphasizes the potential for discovering other natural extracts or compounds that could fill the gaps in conventional medicine. By incorporating an analysis using different concentrations of the extract and determining the minimum inhibitory concentrations, we will be able to assess the complete inhibitory capabilities of soursop. This will provide valuable information about its effectiveness against various bacterial strains.

737. Optimized fermentation conditions of whole pulses using *Lactobacillus plantarum* and its effect on scavenging capacity and markers of type 2 diabetes Andrea Jimena Valdes Alvarado, Andreav@illinois.edu, Damian Castaneda Reyes, E G. Demejia. Food Science and Human Nutrition, Univ. of Illinois Urbana-Champaign Fermented pulses have shown beneficial effects on human health, particularly their antidiabetic and antioxidant properties. The objective was to optimize lactic acid fermentation using *Lactobacillus plantarum* 299v and five whole pulses: red lentils (RL), pinto beans (PB), green split peas (GSP), black eye peas (BEP), and black beans (BB) based on 2,2-diphenyl-1-picrylhydrazylradical (DPPH) and dipeptidyl peptidase (DPPIV) as marker of type-2 diabetes. A Box-Behnken surface response methodology was utilized with three input variables: fermentation time, bacteria colony-forming units (CFU), and pulse concentration (g/100 mL). The DPPH inhibition was set as the output variable. The range of optimized conditions were 8 – 9 h, 0.76 - 3.5 x 10^9 CFU, and 5.5 – 15 g. The optimized conditions for all the pulses had a non-significant lack of fit ($p > 0.05$), and the model system was $p<0.01$, suggesting a good fit for the model. The antioxidant capacity for fermented RL, PB, BEP, BB, and GSP was 57%, 72%, 68%, 80%, and 83%, respectively; while the predicted antioxidant capacity was 60.44 ± 2.43%, 79.62 ± 1.90%, 69.73 ± 4.01%, 68.60 ± 3.01%, and 73.12 ± 4.45%, respectively. Optimized fermented products showed DPPIV inhibition between 32 and 51%. Soluble protein concentrations after fermentation ranged between 3 and 10 mg/mL. SDS-PAGE electrophoresis showed a change in protein profile between 50 – 100 kDa before fermentation due to the action of commercial α-amylase. Peptides were sequenced after fermentation indicating the presence of small new peptides. Correlation analysis showed a significant ($p<0.05$) relationship between DPPH and protein ($r = 0.92$, $p<0.05$) for some pulses, suggesting that higher DPPH correlates with higher protein concentration. The fermentation of pulses enhanced their scavenging capacity and produced DPPIV inhibition, which can potentially reduce oxidative stress and lower the risk of T2D.

738. Almond shells as a natural biosorbent for the removal of phenolics in winery wastewater Elyse Doria[1], eldoria@ucdavis.edu, Larry A. Lerno[2], Alyson E. Mitchell[1]. (1) Food Science and Technology, Univ. of California Davis(2) Viticulture and Enology, Univ. of California Davis California produces a large amount of the US wine and world's almond supply, which results in large quantities of by-products, mainly almond shells and winery wastewater. Winery wastewater (WW) primarily comprises dissolved sugars, acids, and high concentrations of phenolics, which requires costly and often ineffective wastewater management. An alternative wastewater treatment using almond shells (ASP) has recently shown it can effectively bind 64% of phenolics in a model system. This study focuses on further characterizing the phenolic binding properties of the ASP, evaluating the phenolic capacity, binding kinetics, and reusability of the almond shell material using reverse-phase High-Performance Liquid Chromatography coupled with a Diode Array Detector (HPLC-DAD). The binding capacity of ASP 2-4 mm and 6-9 mm were evaluated by exposing consecutive treatments of model wastewater until binding remained consistent, resulting in 2.7 mg g^{-1} and 1.9 mg g^{-1} of total phenolics bound to 2-4 mm and 6-9 mm, respectively. The 2-4 mm was subsequently used to test binding rates over time and the recovery and reusability of ASP due to its higher binding capacity. Binding rapidly occurred within the first 20 minutes of exposure, resulting in 41% binding, after which rates decreased, resulting in only 64% binding at 240 minutes. Binding kinetics followed a pseudo second-order kinetics (R^2 of 0.997), indicating chemisorption is the rate-limiting binding step (i.e., available ASP binding sites). The recovery and reusability of the ASP were also evaluated by extracting phenolic-enriched-ASP with 50:50 (v/v) ethanol:water three consecutive times. Of the 0.75 mg bound, 0.24 mg, 0.11 mg, and 0.04 mg were recovered during the first, second, and third consecutive recoveries, resulting in a total of 0.39 mg (53%). The same ASP was then re-saturated with phenolics, and phenolics were extracted for two more treatments. Recoveries decreased across each treatment, resulting in 0.29 mg (36%) and 0.26 mg (27%) recovered for the second and third treatments.

739. Distinctive sterol profiles in two species of morel mushrooms: *Morchella tomentosa* and *Morchella americana* Thomas W. Nalli, tnalli@winona.edu, Alix Overgard, Sumar Quint, Natalie Y. Walker, Chun Wa Chu. Chemistry, Winona State Univ., Winona, Minnesota In this paper we report that two commonly consumed species of morel mushrooms have distinctive sterol profiles that could affect their relative nutritional benefits and serve to identify them. Commercially sourced (Idaho Wildcraft), dehydrated *Morchella tomentosa* and *Morchella americana* specimens were extracted (petroleum ether), the extracts saponified, and the sterols derivatized as TMS ethers prior to GC-MS analysis.

The respective relative concentrations of the well-known morel sterols, ergosterol **1** (27.5% vs 18.8%), brassicasterol **2** (46.5% vs 59.5%), campesterol **3** (4.4 vs 7.7%), and dihydroergosterol **4** (6.6% vs 0.9%) all showed statistically significant ($p < 0.05$) differences. More strikingly, the two species contain widely disparate proportions of the rarer sterols, 24-methylenecholesterol **5** (2.7% vs 10.0%, $p = 0.029$) and ergosta-5,22,24(28)-trienol **6** (9.2% vs 0.3%, $p = 0.00011$). Sterol **6** is an extremely rare compound that has only been reported in mushrooms (truffles) once in the previous literature and might be useful as a phenotypic marker for *M. tomentosa*.

740. Training a machine learning algorithm to estimate plant biomass from single agricultural images Tommie A. Cristales, D. Richard Rakijian, Marco M. Allard, mallard@lasierra.edu. Chemistry and Biochemistry, La Sierra Univ., Riverside, California Optimizing agricultural yields with respect to energy, nutrient and water consumption is necessary to ensure sustainable agricultural practices in urban vertical farming environments. Optimizing farm yields through automation is critical in order to reduce the carbon footprint, minimize cost, and encourage sustainable local food production. In Southern California the weather can vary widely, and heavy energy use for climate control of hydroponic systems can be unsustainable, and cost prohibitive for certain crops. Achieving plan maturity faster can also ensure the profitability and the long-term viability of vertical farms, that require heavy upfront costs. This work is primarily focused on accurately predicting yields (in terms of mass) from simple photo analysis. To achieve this we will use Machine Learning Algorithms, that we will train with our own dataset. Our data production and collection has been ongoing and includes: time stamped photos, accurate weight of whole plant mass. The algorithm will be trained on this data through various deep learning protocols in order to obtain a plant yield directly from live digital cameras. Our ultimate goal is to automate and optimize growth conditions while using simple, single, digital images. This work is focused on fast-growing plants (various Lettuce) grown hydroponically, indoors, in controlled conditions. We have collected and analyzed data through more traditional methods (RGB picture analysis for plant areas, and mass as a function of time). We used traditional statistical methods to compare to ML results, on both 2D objects (single Arugula leaves) and whole 3D plants (buttercrunch lettuce plants).

741. Evaluating concentrations of five PFAS in agricultural soils of Puerto Rico Jeremy Torres Ruiz[1], jeremy.torres2@upr.edu, Inna E. Popova[2], Daniel Bair[1]. (1) Dept. of Agroenvironmental Sciences, Recinto Univ. de Mayaguez Univ. de Puerto Rico(2) Dept. of Soil and Environmental Sciences, Univ. of Wisconsin-Madison Due to anthropogenic activities, PFAS have become commonplace in our environment. These compounds are slow to degrade and accumulate in the soil, in groundwater and other bodies of water, in the air, and even in humans and wildlife. They cause detrimental health effects in humans and other organisms. Once present in soil, PFAS can be uptaken by certain crops as well as leach into groundwater and surface waters. There can also be a risk of exposure for humans with direct contact to the soil. Five PFAS (PFOA, PFOS, PFHxS, PFBA, and PFBS) were analyzed in soil samples from fourteen agricultural sites in Puerto Rico. Samples were collected in triplicate following a systematic random sampling scheme. Sample areas ranged from 120 to 400 m^2. PFAS were extracted and analyzed by LC-MS following EPA Method 1633. PFAS concentrations in agricultural samples were compared to samples from urban sites, illegal landfill sites, and sites with low human activity in Puerto Rico. Additionally, PFAS sorption was studied in two agricultural soils with different mineralogy types: smectitic and ferruginous. Batch experiments were conducted where the five PFAS were spiked into aliquots of each soil type and the leachates were analyzed by LC-MS following the same parameters established in Method 1633. To date there has been limited research on the levels of PFAS in the soils of Puerto Rico. For these reasons, the identification and quantification of PFAS in soils is critical.

742. Effects of parental nutrition on offspring development of Alzheimer's Disease Nick Boehly, nickboehly1@gmail.com, Bridey Brown, Matt Hale. Biology, Texas Christian Univ. College of Science & Engineering, Fort Worth Previous studies have shown that nutrition plays a key role in influencing epigenetic markers. Additionally, changes in gene expression have been linked to the development of Alzheimer's disease (AD). However, it is unclear how, and to what effect, nutrition influences changes in the epigenome. To that end, we divided mice into groups and exposed them to two different diets 1) a typical American diet (TAD) and 2) a Mediterranean diet (MD). Although it is known that diet can induce epigenetic modification, it is unknown if these changes are heritable. There has been little research that has focused on the offspring of the mice fed with these diets. Therefore, this experiment will focus on how the diets of parental mice affects their offspring's methylation patterns of previously identified candidate genes linked to the development of AD. Prefrontal cortex samples from F1 mice, whose parents were exposed to MD or TAD, were removed, and the RNA was extracted and reverse transcribed into cDNA. This cDNA will display levels of expression by 10 distinct genes that have been linked to AD in previous studies. Our goal is to identify correlations between nutrition and the development of AD through modifications of gene expression. Moreover, this data will help illustrate how inheritance of epigenetic modifications can influence gene expression in subsequent generations.

743. Quantification of steroid hormones in grocery store meat samples via LC-MS/MS Colby C. Huffman, william.huffman@my.maryvillecollege.edu, Sophie E. Jaynes, Nathan Duncan, Drew Crain. Natural Science, Maryville College, Tennessee The use of anabolic steroid hormones without prescription is illegal in humans, but the cattle industry has been using them for decades to accelerate muscle production. Over time, the public has become more aware of these practices, raising questions regarding the ethics of their use, impact on cattle, and health effects after human consumption of meat treated with such hormones. In response, the beef industry has utilized new products that are not hormone-based but have anabolic effects; such implants and anabolic steroids and are referred to collectively as anabolic agents. European countries have banned most anabolic agents, which are still widely used in the US. Apart from ethical issues, the question remains whether it is safe for the public to consume anabolic-enhanced meat products. This study extracted and analyzed beef samples (85% lean meat - 15% fat hamburger and ribeye steaks) purchased from (1) the largest retail grocer in the US, (2) a local farmer using no enhancements, and (3) a local farmer using enhancements. Steroid hormones and anabolic agents were extracted from the meat via liquid-liquid extraction, followed by solid-phase extraction. Our study uses liquid chromatography-tandem mass spectrometry to quantify and report the presence of anabolic agents in meats from the three sources.

744. Evaluation of chemical attributes and volatile markers of extra-virgin avocado oils extracted from different California varieties Fareeya Kulapichitr[1], fareeyak@ucr.edu, Donpon Wannasin[2], David Obenland[3], Selina Wang[2], Mary Lu Arpaia[1]. (1) Botany and Plant Sciences, Univ. of California Riverside(2) Dept. of Food Science and Technology, Univ. of California Davis(3) USDA-ARS San Joaquin Valley Agricultural Sciences Center, Parlier, California Production of extra-virgin avocado oil is a small part of the California avocado industry which is dominated by fresh fruit sales. Due to the predominance of the variety 'Hass' most of the oil

produced in California and worldwide is from this variety. Demand for avocado oil is increasing worldwide and the opportunity exists to develop a specialty oil market from California produced fruit since the state grows several varieties. Information on the characteristics of extra-virgin oil from other varieties would be of great benefit to enhance the range of properties in the oil that is produced and in the development of international standards for avocado oil. In this research extra-virgin avocado oil was extracted from 10 avocado varieties harvested from January 2024 to August 2024. Both oil quality parameters and aroma-active compounds were evaluated in a preliminary evaluation of this oil. Free fatty acids were within the range of 0.18-0.33% and peroxide values were 1.6-3.1 meq O2/kg, and chlorophyll ranging from 61.98 - 85.03 mg/kg oil in the varieties examined to date. Screening of aroma-active compounds by the Headspace-SPME-GC-MS-O method indicated that many volatile markers, such as propanal, 2/3-methylbutanal, hexanal, (*E*)-2-hexenal, (*Z*)-3-hexenol, guaiacol and eugenol, differ in presence among oil samples. Overall chemical determinations and flavor analyses reveal potential differences among the varieties tested.

745. Investigating the impact of lactic acid bacteria fermentation on the physicochemical properties of plant based protein Tahmina Parveen, Danhui Wang, dwang4@twu.edu. Texas Woman's Univ., Denton Global demand for plant-based proteins has increased in recent years, driven by rising consumer awareness of the health benefits and environmental sustainability of plant based proteins. However, the utilization of plant based protein in the food industry is still limited by the non-optimal texture. A potential approach for texture modification is to apply fermentation technology. The aim of this study is to investigate the impact of the fermentation by lactic acid bacteria (LAB) on the physicochemical properties of plant based protein. Two LAB strains were tested on four types of plant based protein, respectively. Samples were analyzed for pH, titratable acidity, water holding capacity, and viscosity. Results showed that the fermentation with LAB induces the modification of physicochemical properties more significantly on soybean protein and fava bean protein compared with the other two types of protein tested in this study. Fermentation with LAB is a potential technology to obtain tailored physicochemical properties of plant based protein and improve their functionality in food industry. It can also further enhance the usability of plant based protein as ingredients for innovative foods.

746. Antioxidant dendrons Skylar Medes, medes1sa@cmich.edu, Ashlyn Lapratt, Choon Y. Lee. Chemistry, Central Michigan Univ., Mount Pleasant Antioxidants play a key role in reducing the amount of oxidative damage to cellular materials, which is caused by reactive, radical species. Shielding cells and tissues from radical damage is key to reducing oxidative stress and inflammation in the body. Our research focuses on making antioxidants, carrying multiple phenolic antioxidant units, which can take on multiple different reactive radical species. In this presentation, we will present two antioxidant dendrons with various solubilities—gallic aldehyde-based and methyl gallate-based—that are highly suitable for clinical applications. We will showcase syntheses of the dendrons as well as our findings on their antioxidant activities.

747. Comparative metabolomics and neuroprotective potential of pomegranate cultivars Yu Wang[1], yu.wang@ufl.edu, Hana Lee[1], John Chater[2]. (1) Food Science and Human Nutrition, Univ. of Florida, Lake Alfred(2) Citrus Research and Education Center, Univ. of Florida, Lake Alfred In this study, we employed a non-targeted metabolomics approach to evaluate and compare the neuroprotective effects of four pomegranate cultivars, focusing on their bioactive components and activities. The 'Wonderful' cultivar, commonly used in the U.S. beverage industry, was included alongside lesser-known varieties to provide a comprehensive metabolic profile. By analyzing the cultivars' metabolic pathways and correlating their metabolites with neuroprotective properties, we identified potential bioactive compounds that may contribute to Alzheimer's disease (AD) prevention. Our findings reveal differences in bioactive compound accumulation, particularly within the phenylpropanoid pathway, across the cultivars. The 'Wonderful' cultivar exhibited the highest antioxidant activity. However, other cultivars demonstrated unique metabolite profiles and significant antioxidant potential, highlighting the diversity of functional properties within pomegranate varieties. This research not only enhances our understanding of the health benefits of different pomegranate cultivars but also provides insights for breeders aiming to select varieties with superior neuroprotective properties.

788. Low-pressure air plasma seed surface modification to expedite seed germination Paola Aguilera, paola1577@mail.fresnostate.edu, Morgan J. Hawker. Chemistry and Biochemistry, California State Univ. Fresno As climate conditions continuously shift, plant species are at risk of transitioning to extended periods of dormancy as a way to adapt to unfavorable environments and extreme climates, ultimately impacting seed germination. Seed coats are conceivably the most important feature of a plant seed as they serve as a protective barrier. This outer layer is vital to ensuring proper maintenance of the seed embryo through adequate absorption of water and sufficient gas exchange. Both the chemical composition and porosity of the seed coat impact seed dormancy. Presumably, physical modifications of the seed coat surface could mitigate unfavorable dormancy. Recent studies demonstrate the use of cold plasma (a partially ionized gas) as a method to enhance germination rate and strengthen seed viability. Cold plasma is characterized as a low-temperature, non-equilibrium plasma. As an alternative for chemical fertilizers and chemical coatings, plasma can modify the surface of the seed coat while still maintaining seed integrity. The impact of plasma modification on seed germination has been investigated, though results are conflicting. Vague correlations between surface alterations and seed development are formulated with inconsistent variation of plasma treatment parameters, including power, pressure, time, plasma reactor geometry and processing gas. A methodical plasma parameter investigation is needed to elucidate the mechanism of how each plasma parameter impacts seed germination. The purpose of this study was to determine the optimal low-pressure air plasma parameters to efficiently enhance seed germination of chickpeas (as a model seed). Parameters included applied power, precursor pressure, and exposure time. The impact of these parameters on seed coat hydrophilicity and imbibition were investigated. Wettability of the seed was determined by the water contact angle measured by a goniometer and morphological changes were analyzed through scanning electron microscopy. Additionally, x-ray photoelectron spectroscopy was used to analyze the chemical composition of the seeds before and after plasma modification. Onset of germination was established by the first visible appearance of seed coat rupture, and development of roots and shoots was monitored over time. Obtaining an optimal set of parameters provides insight into how to most effectively employ plasma treatments to maximize seed germination.

789. Effects of Papaya ringspot virus on organic molecules in squash leaves Gregory Palomar[2], gmanpalomar@icloud.com, Paige Taylor[2], Robert Sheaff[2], Akhtar Ali[1]. (1) Biological Science, Univ. of Tulsa, Oklahoma(2) Chemistry and Biochemistry, Univ. of Tulsa, Oklahoma Previous experimentation proved the theory that viral infection can change the organic molecule composition in crops. To further this data and create more reliable chemical libraries, a wider study must be performed to better catalog the specific molecules found in virally infected crops. This study focuses on summer squash

plants. Six healthy squash plants had their leaves extracted for their small organic molecules. Each leaf sample set was kept separate to compile and compare results between different squash plants. These extracted samples were analyzed by gas chromatography-mass spectrometry. The same experimentation was performed on six more squash plants, but this set was infected by mechanical inoculation of papaya ringspot virus (PRSV). Having compiled separate data charts on the resulting organic molecules to each plant, theories can be made on what protein expression and protein pathways PRSV is affecting, and a better understanding of PRSV can be developed from a chemical perspective. Other possibilities exist like identifying an RNA segment in the PRSV genome that gives rise to specific molecules being changed or created in squash leaves. With this knowledge genetic engineering could be performed to make plants more viable for differing purposes like optimization for processing into biofuels or improving plant survivability under harsh conditions.

790. Analysis of lead and cadmium in dark chocolate bars and cocoa powders Victoria Pipinich, Raymond C. Dudek, rdudek@wittenberg.edu. Chemistry, Wittenberg Univ., Springfield, Ohio Previous research performed by Consumer Reports has found certain dark chocolate bars and cocoa powders contain high amounts of lead and cadmium. To test these results, dark chocolate bars and cocoa powders were digested and tested using atomic absorption spectroscopy. Each sample of chocolate was analyzed for lead and cadmium and compared to the California maximum allowable dosage level (MADL) of lead/cadmium consumption per day. The MADL levels for lead and cadmium are 0.018 and 0.145 ppm/g of a serving size of chocolate product per day respectively. In addition, calcium in chocolate products was also analyzed and compared to the calcium value listed on a chocolate product's nutritional facts label to determine the digestion efficiency. Two chocolate bars exceeded the MADL levels for both lead and cadmium while the rest of the chocolate bars fall within the limit of allowable lead and cadmium to digest per day.

791. Investigation on separation and analysis of streoisomeric flavonolignans from milk thistle using chiral HPLC columns Dongyup Hahn, dohahn@knu.ac.kr, Seunguk Yu, Thao Quyen Cao, Seong Do Lee. Kyungpook National Univ., Daegu, Daegu, Korea (the Republic of) Milk thistle (*Silybum marianum*) is well-known for its active components, flavonolignans, particularly silymarin, which exhibit significant antioxidant and hepatoprotective effects. These bioactive compounds exist as stereoisomers, which can vary in their pharmacological activity. However, the separation and analysis of stereoisomeric flavonolignans pose a significant challenge due to their structural similarity. In this study, we investigate the use of chiral high-performance liquid chromatography (HPLC) columns to achieve efficient separation and analysis of flavonolignan stereoisomers from milk thistle extracts. Various chiral stationary phases (CSPs) were screened to optimize separation conditions. The mobile phase composition, flow rate, and temperature were systematically varied to achieve optimal resolution of stereoisomers. The separated compounds were further analyzed using mass spectrometry (MS) to confirm their structures. This method provides a reliable approach for the stereochemical characterization of flavonolignans and could be applied to enhance the understanding of their distinct biological activities. The developed protocol holds promise for improving the quality control of milk thistle products and advancing research on stereospecific pharmacological effects.

792. Tissue distribution and metabolism of polymethoxyflavones from orange peel Yu Wang, yu.wang@ufl.edu. Food Science and Human Nutrition, Univ. of Florida, Lake Alfred While oranges are widely used across the food and beverage industries, their peels hold additional health benefits due to bioactive compounds such as polymethoxyflavones (PMFs). PMFs are notable for their greater stability and bioavailability compared to other flavonoids. These attributes make PMFs a promising resource for nutraceutical and therapeutic applications. In this study, we administered orange peel extracts to mice and performed tissue analysis using mass spectrometry. Relevant tissues, including plasma, urine, feces, liver, kidney, brain, testes, small intestine, and colon, were examined. From our previous research, we had identified and isolated 11 PMFs from orange peel. This allowed us to quantify the presence of these compounds in various tissues and map their metabolic transformations, including the formation of glucuronide, sulfate, and demethylated metabolites. These results provide critical insights into the tissue-specific distribution and metabolism of PMFs, highlighting which chemical structures contribute to targeted tissue absorption. Furthermore, understanding the metabolic pathways and bioavailability of these compounds is essential for developing effective nutraceuticals derived from orange peel, offering sustainable solutions for improving health while reducing environmental waste.

793. Analysis of lignan content and volatile compounds in the Korean wild chive (*Allium monanthum*) Yoonjeong Kim [1], ang1569@naver.com, Jihyeon Yu[1], Jina Lee[1], Keono Kim[2], Jeehye Sung[2], Younghwa Kim[1]. (1) BB21plus Project Team, Dept. of Food Science and Biotechnology, Kyungsung Univ., Busan, Korea (the Republic of)(2) Dept. of Food Science and Biotechnology, Andong National Univ., Gyeongsangbuk-do, Korea (the Republic of) The Korean wild chive, *Allium monanthum*, is a spring vegetable with minuscule bulbous roots that have a mild onion flavor and found in the woodlands in Korea. In this study, the lignan content and volatile compounds of the wild chive were investigated. Samples were harvested from three different regions (A, B, and C) and categorized into four parts (root, bulb, leaf, and whole plant). The total lignan content in the wild chive ranged from 160.032 to 3261.797 μg/100 g, and the bulbs from the region C showed the highest lignan content. In contrast, the lignan content in samples from the region A was the lowest, varying from 160.032 to 527.203 μg/100 g, with the leaf part showing a particularly low value. In addition, volatile compounds of the wild chive were evaluated using gas chromatography-mass spectrometry. A total of 418 volatile compounds were identified, which include 6 alcohols, 22 aldehydes, 3 alkenes and amines, 9 carboxylic acids, 3 esters, 2 halogenated compounds, 9 heterocyclic compounds, 4 hydrocarbons, 5 siloxanes, 20 sulfur compounds, and 10 miscellaneous in the wild chive. The wild chive mainly contained aldehydes, sulfur compounds, and heterocyclic compounds such as (E)-1-(prop-1-en-1-yl)-2-propyldisulfane, (E)-1-methyl-3-(prop-1-en-1-yl)trisulfane, 2,4-dimethylthiophene, 2-ethyl-trans-2-butenal, dimethyl trisulfide, and methyl propyl trisulfide. These results provide the basic information regarding the properties and applications of Korean wild chive.

794. Blooming solutions: Transforming eutrophic algal blooms into biofertilizers Ainsley Moore[1], ainsleymoore1156@gmail.com, Thea DeBellis[1], Rachel Brague[1], Natascha K. Knowlton[1,2]. (1) Rowland Hall, Salt Lake City, Utah(2) The Univ. of Utah, Salt Lake City Synthetic fertilizers and pesticides can cause public health issues, environmental harm, and further runoff into nearby water bodies. The contaminated water can result in the growth of harmful algal blooms (HABs), which lead to detrimental consequences on aquatic life within an ecosystem. Creating a sustainable and effective biofertilizer from HABs can both mitigate the negative impacts of HABs and reduce harmful impacts of synthetic fertilizer runoff. To address these environmental problems, this study will harvest HABs from Utah Lake, which has a long history with HABs, and convert the microalgae into biofertilizer in the form of pellets, powder, and suspension. Each form of biofertilizer will be tested on mini peppers,

cilantro, and grass seedlings, and compared to both unfertilized plants and those fertilized with a commercially available synthetic option. Plant height, color, and width will be measured weekly, as well as the number of leaves per plant for the cilantro and mini pepper. It is predicted that all forms of the biofertilizer will increase plant growth, while the powder biofertilizer will have the best results compared to the algae pellets or liquid due to increased surface area and therefore better access to and absorption of nutrients by the plant roots. Furthermore, mini pepper plants are anticipated to respond most positively to the biofertilizer due to their extensive root systems. Future research entails combining growth-promoting plant hormones, such as gibberellins, with the HABs to create a more effective biofertilizer.

795. Analysis of biotin content in commonly consumed foods in Korea Jihyeon Yu[1], yjh10126@naver.com, Jina Lee[1], Yoonjeong Kim[1], Eunji Park[2], Youngmin Choi[2], Younghwa Kim[1]. (1) BB21plus Project Team, Dept. of Food Science and Biotechnology, Kyungsung Univ., Busan, Busan, Korea (the Republic of)(2) Food and Nutrition Division, National Institute of Agricultural Sciences, Wanju-gun, Jeollabuk-do, Korea (the Republic of) This study investigated the biotin contents of commonly consumed agricultural products in Korea, including cereal grains, vegetables, fruits, and seeds. The linearity of the biotin standard was R^2=0.9999, showing excellent linearity. The limits of detection and quantification of biotin were determined to be 0.009 μg/mL and 0.024 μg/mL, respectively. Among all the samples, dried celtuce (11.459 μg/100 g) contained the highest content of biotin. In vegetables, the biotin content generally tended to decrease when boiled or blanched. The biotin content in raw *chwi-chung* cucumber was 0.381 μg/100 g, however, the steamed and the boiled showed decreased biotin levels to 0.264 μg/100 g, and 0.271 μg/100 g, respectively. In addition, biotin content of blanched butterbur was decreased to approximately 32% compared to the raw. In fruits category, dried *Schisandra chinensis* fruit showed the highest biotin content at 3.738 μg/100 g, whereas raw apricot had the lowest at 0.208 μg/100 g. The biotin content of cereal grains ranged from 0.074 μg/100 g to 8.002 μg/100 g, especially pronounced in rice bran, where it was the highest at 8.002 μg/100 g. The present study provides reliable analytical biotin values that can be used for the development of a Korean food composition database.

796. Lignan contents of frequently consumed agro-foods in Korea Jina Lee[1], bbc5528@naver.com, Yoonjeong Kim[1], Jihyeon Yu[1], Heon-Woong Kim[2], Younghwa Kim[1]. (1) BB21plus Project Team, Dept. of Food Science and Biotechnology, Kyungsung Univ., Busan, Korea (the Republic of)(2) Food and Nutrition Division, National Institute of Agricultural Sciences, Wanju-gun, Jeollabuk-do, Korea (the Republic of) Lignans are derived from the shikimic acid biosynthetic pathway in plants and are known as phytoestrogens due to their steroid-like chemical structures. In this study, the contents of six lignans (secoisolariciresinol, lariciresinol, matairesinol, pinoresinol, syringaresinol, and medioresinol) were determined in frequently consumed agro-foods (vegetables, pulses, starchy roots and starch products, fruits, nuts and seeds) in Korea using liquid chromatography-tandem mass spectrometry. In the results, roasted white sesame showed the highest lignan contents (4673.859 μg/100 g) while leaf of *Aster scaber* showed the lowest lignan contents (0.342 μg/100 g) among the analyzed all samples. Steamed and roasted sweet potatoes contained lignan levels that were 74.99% and 38.44% higher, respectively, than those of the raw sweet potatoes. The total lignan contents of fruits ranged from 0.749 to 815.342 μg/100 g, with the highest contents in raw Korean raspberry *(Rubus crataegifolius*) (815.342 μg/100 g). Medioresinol was not detected in any of the analyzed samples. The results of this study provide reliable data on the lignan contents in frequently consumed agro-foods in Korea.

797. Measurement of urinary magnesium in domestic swine by conductometric titration Linda D. Schultz[1], schultz@tarleton.edu, Rajani Srinivasan[1], Levi Jackson[1], Michele McAfee[2]. (1) Chemistry, Geosciences, and Physics, Tarleton State Univ. College of Science and Mathematics, Stephenville, Texas (2) Laboratories, Medical City North Hills, North Richland Hills, Texas Magnesium is the fourth most abundant cation in the human body and second most important intracellular cation. It plays a major role in many enzymatic reactions and neuromuscular processes and fulfills similar functions in domestic livestock and household pets. Since the kidney plays an important role in regulating Mg balance, there is growing interest in the study of magnesium levels in urine. Classic techniques for determination of urinary magnesium using colorimetric methods have limitations and have been largely replaced by instrumental methods such as atomic absorption. In our lab, we have studied conductometric titrations to determine the amount of urinary sulfate present in pigs and found the technique to be relatively rapid, inexpensive, and able to produce results as accurate as classic techniques. Based upon these results, an investigation of conductometric titration as a viable alternative method to measure urinary magnesium was initiated. Results are compared to those obtained by ion chromatography.

798. Enhancing nutritional science with molecular dynamics: A focus on the Maillard reaction Wyatt Mathers[1], wyattmathers@gmail.com, Lexi Hwang[4], Jing Zhao[2], Changqi Liu[2], Chih-Ling Lee[2], Leo Hong[3]. (1) San Diego State Univ. College of Sciences, California(2) School of Exercise and Nutritional Sciences, San Diego State Univ. College of Health and Human Services, California(3) Loyola Marymount Univ. Frank R Seaver College of Science and Engineering, Los Angeles, California(4) California State Univ. Los Angeles Charter College of Education, Los Angeles Molecular dynamics (MD) has become a key tool for uncovering the mechanistic steps of reactions that are not yet fully understood. By designing and running MD simulations of known reactions and comparing them to experimental results, we can explore unknown reactions and achieve desirable outcomes. In this work, we focused on simulating the Maillard reaction, a well-studied reaction with numerous possible positive results to benchmark our progress. The Maillard reaction involves a series of non-enzymatic reactions in foods rich in proteins and carbohydrates, especially reducing sugars. It is crucial in developing brown color and flavors during cooking methods such as baking and grilling. We used the ReaxFF force field method in conjunction with the AMSjobs chemical modeling software to prepare and simulate reactions between amino acids (lysine, arginine, and proline) and sugar molecules (glucose, fructose) . Experimental settings were adjusted to determine the effects of temperature, input molecules, density, and molecule count on the reaction outcomes. The resulting data was then analyzed for molecules resembling Maillard reaction products or precursors, of which we identified multiple furan and pyrrole substituents. Given the complexity of MD simulation design, it is essential to control and test each variable to understand its impact on simulation results. By optimizing the Maillard reaction we demonstrated the potential of using MD simulations to further the study of nutritional and food sciences.

799. Chemical inhibition of enzymatic browning during mealworm (*Tenebrio molitor*) protein extraction Kenneth Tran[3], John J. Love[4,2,3], Jing Zhao[1,2], Changqi Liu[1,2], changqi.liu@sdsu.edu. (1) School of Exercise and Nutritional Sciences, San Diego State Univ., California(2) Center for Better Food Futures, San Diego State Univ., California(3) Dept. of Earth & Environmental Sciences, San Diego State Univ., California(4) Dept. of Chemistry and Biochemistry, San Diego State Univ., California Mealworms are a

sustainable source of protein. However, enzyme-catalyzed melanization during mealworm protein extraction can adversely affect the appearance, functionality, digestibility, and flavor of the proteins. The objective of this study was to identify effective inhibitors of enzymatic browning during mealworm protein extraction. Mealworm larvae were homogenized in ten volumes of water or various inhibitor solutions at 30,000 rpm until fully mixed (~30 seconds). The inhibitors tested included ascorbic acid, butylated hydroxyanisole (BHA), citric acid, ethylenediaminetetraacetic acid (EDTA), phenylthiourea (PTU), sodium bisulfite, sodium chloride, sodium metabisulfite, and sodium sulfite at different concentrations. The homogenate was filtered through cheesecloth and kept at 20°C for 30 minutes, with color measurements taken every five minutes using a Konica Minolta spectrophotometer. Results showed that PTU and all sulfite salts at 1 mM completely inhibited browning for 30 minutes. EDTA and ascorbic acid (1 mM) extended the lag time of the reaction from 5 minutes to 10 and 15 minutes, respectively, but their inhibitory effect diminished by 30 minutes. Citric acid exhibited a slower inhibition onset, but mealworm extracts in 1 mM citric acid had significantly higher ($P \leq 0.05$) L* values at 30 minutes compared to those in water, 1 mM ascorbic acid, BHA, EDTA, and sodium chloride solutions. Higher concentrations of ascorbic acid significantly improved browning inhibition ($P \leq 0.05$), with complete inhibition observed at concentrations of 5 mM and above for 30 minutes. The half maximal inhibitory concentration (IC50) of ascorbic acid was determined to be 1.82 mM. In summary, ascorbic acid (5 mM) and sulfite salts (1 mM) effectively inhibit enzymatic browning during mealworm protein extraction, enhancing the quality of mealworm proteins and supporting their utilization as a valuable food ingredient.

800. Applying FT-ICR MS with formula assignment algorithm on the Chinese Medicine Characterization Kenneth Y. Chow[2,1], Chowkenneth@g.ucla.edu, Xiaohan Mo[1], Lin Zhang[1], Christy Y. Lau[1], Dominic T. Chan[3], Pang Chui Shaw[4], Alex T. Chow[1]. (1) Dept of Earth and Environmental Sciences, The Chinese Univ. of Hong Kong Faculty of Science(2) Univ. of California Los Angeles(3) Dept. of Chemistry, The Chinese Univ. of Hong Kong Faculty of Science(4) School of Life Sciences, The Chinese Univ. of Hong Kong Faculty of Science Traditional Chinese medicine (TCM) herbal formulas are composed of not less than two herbs with decoction over a period of time. Water extract of each herb consists of thousands of chemical constituents. Simmering the herbs mixtures could alter the original chemical constituents and create chemical compositions that are different from the individual herbs. To evaluate the composition changes due to the synergistic effect and time of simmering during decoction, we applied Fourier transform ion cyclotron resonance mass spectrometry (FT-ICR MS) coupling with a formula assignment algorithm to evaluate the chemical composition of TCM. Li-Zhong-Tang (LZT), which is known for its therapeutic effects on gastrointestinal disorders, was selected for the first test because of its relatively simple receipt. Four herbs with same dried mass, including rhizome of *Zingiber officinale Rosc.* (known as Gan-Jiang), rhizome of *Atractylodes macrocephala Koidz.* (known as Bai-Zhu), root of *Codonopsis pilosula (Franch.) Nannf.* root (known as Dang-Shen), and rhizome of *Glycyrrhiza uralensis Fisch. ex DC.* (known as Gan-Cao) were simmered with water individually and together for 30 and 90 minutes. Residuals were then filtered and freeze-dried, and then redissolved in water: methanol (1:1) for negative electrospray ionization in a 9.4T FT-ICR MS. Preliminary results demonstrated that a total of 4493 molecular formulae was identified in all the samples, with 50% were CHON compounds (i.e., nitrogen-containing compounds) and 42% were CHO compounds. Herbs from 90-minute simmering had 14–47% higher number of molecular formulae than those from 30-minute simmering. For 30-minute simmering, we identified 1624 molecular formulas that were exclusively present in the combined mixture, not in any of the individual components (69.4% increased). For 90-minute simmering, this number of unique molecular formulae in the mixture increased to 2493 (73.6% increased). Overall, only identified 14 molecular formulae that were shared by four individual components and LZT in both 30- and 90-minute simmering, indicating a great diversity of chemical composition in TCM decoction. Future chemical and data analyses will include compound class assignments and comparability with different FT-ICR-MS instruments and formula assignment algorithms.

801. Characterization of organic acids in fruited sour beers Neil Tiwari, tiwarin4@vcu.edu, Maxwell Holle. Chemistry, Virginia Commonwealth Univ., Richmond In recent years, the production of sour beers has increased due to a rise in popularity and consumer demand. As a result, local craft breweries are creating more flavor variations to appeal to consumers. Sour beers require the addition of a lactic acid bacterium (LAB) which is added to ferment the sugars in the mash. This fermentation creates lactic acid from the glucose as well as a small amount of ethanol, which subsequently gets fermented into acetic acid. This creates a “blank” sour base that can then be flavored with a fruit mash to introduce other organic acids. Two of the organic acids of interest, lactic acid and acetic acid, are produced by LABs and can also be introduced to the samples via the fruit mashes. The use of the sour beer base helps determine the influence of the addition of the fruit mash to the total organic acid flavor profile. This research characterizes the relation of these organic acids (lactic, acetic, malic, citric, etc.) in various sour beers from the same local craft brewery. Reverse Phase-High Pressure Liquid Chromatography with a photodiode array detector was utilized for the characterization of the organic acids in the samples. The complete results of the characterization of organic acids in all samples of beer tested will be presented.

802. Reaction of ergothioneine with redox active dyes: Implications for the redox potential and detection of ergothioneine Chaz T. Cao[2], chaz.cao@uvm.edu, Dagny Keltner[1], William E. Geiger[2], Robert Hondal[1,2]. (1) Biochemistry, Univ. of Vermont The Robert Larner MD College of Medicine, Burlington(2) Chemistry, Univ. of Vermont College of Arts and Sciences, Burlington Ergothioneine (EGT) is the betaine of 2-thiohistidine, and is a putative antioxidant compound produced by some fungi and bacteria. While EGT has been studied for more than 100 years, some of its redox properties are poorly understood and methods to detect its presence in a food extract are complex and laborious. The redox potential of EGT was reported to be -0.06 V in 1944, but this value has been questioned recently. To verify this value, EGT was reacted with various redox active dyes including DTNB, methylene blue (MB), and 2,6-dichloroindophenol (DCIP) and these reactions were compared to ascorbate (Asc), a similar antioxidant. The reaction of Asc and EGT with DTNB resulted in Asc reaching a deeper endpoint, indicating a more negative potential for Asc in comparison to EGT. The reaction of EGT and Asc with MB at pH 0 showed that the reduction was 5-fold faster with Asc. Both compounds reduce MB by the same mechanism, demonstrating again that Asc has a more negative potential. The redox potentials of Asc and EGT were then measured by cyclic voltammetry using a Ag/AgCl electrode at pH 7 with $Ru(NH_3)_6^{+3}$ as a reference standard. The determined redox potentials at pH 7 versus the standard hydrogen electrode are: -0.21 V, +0.43 V, and +0.62 V for $Ru(NH_3)_6^{+3}$, Asc, and EGT respectively. The measured values for the standard and Asc match literature measurements closely, but the value determined for EGT is much different than previously reported. However, the electrochemical value reported here for EGT is in agreement with the experiments with the redox active dyes that we used, which enhances our confidence of the measurements. The reaction of EGT with DCIP did

not result in a reduction of the dye as has been previously reported, but did result in a nucleophilic aromatic substitution reaction in which both chlorine atoms of the dye are substituted with EGT, which could be detected by UV-vis spectroscopy and resulted in a unique spectroscopic signature that allows for the detection of EGT in samples. Mass spectral analysis showed that disubstituted and trisubstituted adducts resulted from the reaction. Other sulfur-containing compounds like glutathione and β-mercaptoethanol, which rapidly reduced DCIP, did not form adducts via nucleophilic aromatic substitution. DCIP has long been used to detect Asc in samples for the food industry. Current efforts are focused on developing a method to detect the presence and quantity of EGT in food extracts using DCIP.

803. Creepy carrots: A biocatalyst for reduction reactions Paige A. Horsley, phorsley@butler.edu, Anne M. Wilson. Chemistry and Biochemistry, Butler Univ. College of Liberal Arts and Sciences, Indianapolis, Indiana Studies have shown that carrots act as a biocatalyst for reduction of ketones. Because of the carrots ability to perform these reduction reactions, it is hypothesized that this will be a greener and more environmentally friendly way to teach the use of TLC, GC-MS, and melting point in undergraduate organic chemistry laboratories. To determine this, fresh carrots were harvested from the Butler Univ. Campus Farm. Carrots were then washed, chopped, added to a container containing water, substrate, and chopped carrots and allowed to react overnight. The resulting products were isolated and analyzed. The tested substrates had an observed conversion rate of 80% or higher.

850. Use of various energy molecular orbitals in the AI design of new herbicides Micah Shaver, mlshaver@ualr.edu, Jerome A. Darsey. Chemistry, Univ. of Arkansas at Little Rock Herbicides are chemical compounds used to control weeds and/or their spores. An herbicide works primarily by interfering with one of the biological functions of the weed. Weeds cause serious damage in agriculture, resulting in critical losses of yield, quality, and profit. Most herbicides can be bought in either the liquid or solid form. An important active ingredient in most herbicides is sulfur. Herbicides, by their nature, are usually very toxic. Examples of herbicides are propazine, paraquat, atrazine, propanil, simazine, and many more. The discovery of molecules that prevents weeds from growth is something that greatly impacts food sustainability and supply. The modeling of molecules that can be used as effective herbicides must also be environmentally safe. This study will model molecules used to inhibit weed growth on foods and at the same time are safer for the environment and humans. The manner in which we carry out this study is to first do quantum mechanical calculations in which we calculate the lowest unoccupied molecular orbitals and highest occupied molecular orbitals. We then use parameters from these calculations as input into our artificial intelligence (AI) software. The main goal of this study is to determine which set of parameters from our MO calculations will produce the best results. Our first study used the first 20 occupied molecular orbitals (highest energy) and the lowest 20 unoccupied molecular orbitals (lowest energy). The current study used the last 20 occupied molecular orbitals (lowest energy) and the same number of lowest unoccupied molecular orbitals (lowest energy). We have plans in the future to further study whether the position of the molecular orbitals used in our AI software influences the design of new herbicides.

851. Antidiabetic activity screening of Costa Rican plant extracts: Inhibition of advanced glycation-end products Maria B. Gomez[1,2], maria.gomez.bogantes@est.una.ac.cr, Dessire Arrieta[1,2], Paula Chivi Ramirez[1,2], Esteban Gamboa[1,2], Carlos M. Martinez Mora[3,2], Ana F. Carballo-Arce[3,2], Jose A. Rodriguez Corrales[1,2]. (1) LIDETEQ, Univ. Nacional de Costa Rica, Heredia(2) Escuela de Química, Univ. Nacional de Costa Rica, Heredia(3) LIB, Univ. Nacional de Costa Rica, Heredia, Heredia, Costa Rica Diabetes is a chronic disease that affects more than 38 million people in the US alone. It is characterized for elevated levels of glucose in the blood (i.e., hyperglycemia), which leads to several physiological effects, including the formation of advanced glycation end products (AGEs). These compounds arise from non-enzymatic reactions involving reducing sugars, proteins, and lipids. AGEs accumulation in organs and tissues is associated with complications, such as kidney failure and cardiovascular diseases; therefore, compounds that inhibit their formation may function as potential drugs or dietary supplements for diabetic patients. Glycation of proteins and lipids results in fluorescent products that can be detected in miniaturized assays using microtiter plates. In turn, metabolites with antidiabetic activity that inhibit the formation of AGEs decrease the relative fluorescence. In this study, we report the screening of the antidiabetic activity in five Costa Rican plant extracts. Different levels of inhibition were observed among the five extracts, two of which showed activity comparable to a known AGEs inhibitor. The half-maximal inhibitory concentration (IC50) obtained for the know inhibitor and for each extract will be presented and future research avenues will be discussed.

852. Shellac-based microgels for enhanced probiotic delivery Kriza Faye Calumba, kcalumba@vols.utk.edu, Qixin Zhong. Dept. of Food Science, The Univ. of Tennessee Knoxville Shellac is an enteric material with the potential to deliver probiotics to the colon. This study explores shellac-based microgels for encapsulating *Lactobacillus bulgaricus* ATCC 11842, a probiotic strain that is used in the food industry but becomes undetectable at simulated intestinal conditions. Dispersions with one, two, or all of shellac (5% w/v), zein (2% w/v), and sodium alginate (1% w/v) were prepared at pH 7.7 and were mixed with the probiotic cells (8 log CFU/mL), followed by spraying to 2.5% $CaCl_2$ gelling solution at pH 3.0, 4.5, or 6.0 to form microgels. Wet microcapsules were collected by centrifugation. Cell viability was determined during simulated digestion and storage. The FT-IR spectra were obtained from the lyophilized microgels. Wet microcapsules produced at different pH had similar populations of viable cells. Cells in shellac-zein, shellac-zein-alginate, and shellac-alginate microcapsules fabricated only at pH 4.5 had at least 5 log CFU/g viable cells after sequential *in vitro* gastric and intestinal digestion, with the shellac-zein microcapsules showing the least reduction in probiotic viability. Both encapsulated and free cells had at least 6 log CFU/g viable cells during 21 days of storage at 4 °C and pH 4.5. The FT-IR spectra suggest that hydrogen bonding and electrostatic interactions are crucial for microcapsule formation. This work can be useful for developing shellac-based encapsulation technologies to deliver probiotics in functional foods and beverages for gut health.

853. Effects of L*antana camara* L. leaves extracts and essential oils in the production and protection of tomato (*Solanum lycopersicum* L.) Roma VF Ayopo A. Sotade, drayopo@yahoo.com. Chemistry, Univ. of Ibadan Faculty of Science, Ibadan, Oyo, Nigeria Synthetic pesticides are commonly used in the protection of tomatoes (the most consumed vegetable fruit in Nigeria) against pests and diseases. However, the continued use of synthetic pesticides has negative impacts on human health and the environment. Commonly known weeds, such as *Lantana camara* L. are used as organic pesticides and could be a viable alternative to synthetic pesticides. The use of extracts and essential oils (EO) of *L. camara* as organic pesticides has not been adequately documented. Therefore, the potential of *L. camara* extracts and EOs on the production and protection of tomatoes under field conditions (*Solanum lycopersicum* L.) Roma VF was investigated in Ibadan, Nigeria. Fresh *L. camara* L. leaves were collected from the campus

of the Univ. of Ibadan, Oyo State and authenticated at the Herbarium unit, Dept. of Botany, Univ. of Ibadan (UIH 23103). The leaves were air-dried, pulverized and subjected to hydrodistillation for EO extraction. The leaves were further macerated with methanol and water to obtain the crude extracts. I*n vivo* pesticidal bioassay was done to determine the biocidal potential of *L. camara* leaves using aqueous extract, methanolic extract, EO and water (as control) via two modes of application (spraying and drenching). Data were analysed using ANOVA. The EO treatment gave better control of the pests compared to the control, resulting in a significantly higher fruit yield (1821 g/plant) than all the other extracts and the control (512.5 g/plant) in the 2022 growing seasons. Thus, the EO of the leaves of *Lantana camara* L. showed promising biocidal potential, which can be used to protect tomatoes against pests for increased fruit yield.

854. Production, physicochemical and sensory quality of bottled and sterilized tigernut milk: Exploring the future of plant-based beverage from an underutilized crop Chinasa Okorie-Humphrey, okorie.chinasa@mouau.edu.ng. Food Chemistry and Biotechology, Michael Okpara Univ. of Agriculture, Aba, Abia, Nigeria The upsurge in urbanization has increased the demands of consumers for new products, In today's world, beverages are no longer considered as thirst quenchers; consumers look for specific functionality, which forms their lifestyle. The prevalence of veganism, awareness of animal welfare, the idea of lower environmental impact and improved health has created an opportunity for plant-based beverages to thrive. Given the global interest in food security, it is important to explore the nutritional and economic potentials of some underutilized crops. Tigernut milk is one of the appreciated plant-based beverages, and a healthy source of nutrients with no allergy-causing components, yet they are highly underutilized. This study investigated the physicochemical properties and sensory quality of bottled and sterilized tigernut milk produced from two varieties of tigernut tuber (yellow and brown) using three processing methods (boiling, soaking, and malting). The tigernut milk beverages were bottled and sterilized. The pH values obtained indicates that tigernut milk is a low-acid food which is a factor during bottling and sterilization. There was a decrease in the total solid and titratable acids. The moisture content varied throughout the storage period. Boiled yellow sample had the lowest pH value (4.10) while soaked brown sample had the highest pH (6.45). As storage period progressed, the pH of the samples decreased and their TTA increased. The sensory attributes were within the acceptable range for plant-based beverages. There was no significant ($P>0.05$) differences in colour between the samples at the first four months of storage. However, the soaked malted samples varied ($P< 0.05$) from other samples at months five and six. Malted samples received a lower score among all samples but maintained a high acceptability score for texture. The study elucidated the effect of processing and sterilization on the physicochemical and sensory properties of tigernut milk. The decreased pH could be as a result of the accumulation of organic acids in the tigernut milk. Sterilization did not have a pronounced effect on the sensory quality; the malted samples recorded low sensory scores during storage. The study highlighted the possibility of processing tigernut milk that can be stored for an extended period.

855. Physicochemical characterisation and investigation of antioxidant properties of Southwest Missouri floral honey and honey related product Propolis using FRAP, GC/MS, GPC, XRF and DSC Lillabeth Milam[1], lillabeth.whitlow@student.cottey.edu, Ganga Fernando[2]. (1) Cottey College, Nevada, Missouri(2) Chemistry, Cottey College, Nevada, Missouri This study presents a comprehensive evaluation of the physico-chemical properties of local floral honey and honey product Propolis using Gas Chromatography Mass Spectrometry (GC/MS), Ferric Reducing Array (FRAP) assay, UV-Vis spectroscopy, Gel Permeation Chromatography (GPC), Differential Scanning Calorimetry (DSC), water content (Karl Fischer) and X-ray Fluorescence (XRF). Honey samples collected from local southwest Missouri honey producers were studied alongside honey from diverse geographical regions and floral sources. This investigation also identifies Propolis, a sticky, resin like substance collected usually as a byproduct of the honey harvesting process. Initial FRAP assay of Propolis showed a relatively high antioxidant capacity compared to any other honey varieties studied here. Hence, a comprehensive characterisation of Propolis was carried out. Microscopic views of Propolis were collected using a high resolution microscope, molecular weight distribution using GPC, elemental composition using XRF, volatile organic chemical composition using GC/MS and antioxidant capacity using FRAP are presented here. For the FRAP assay, Trolox equivalents were prepared as standards, and the antioxidant capacity of honey was quantified using the FRAP reagent, with a 20 mM $FeCl_3$ solution and 0.3 M acetate buffer (pH 3.6). UV-Vis spectroscopy data is used to compare the antioxidant capacity of different types of honey samples including honey harvested from the same farm in different seasons. Additional experiments investigated the influence of floral source variation, storage conditions at high and low temperatures, exposure to direct sunlight vs, stored in a cool storage space and the effect of long term storage on antioxidant activity. This study provides valuable insights into the local honey compared to well characterized honey varieties such as Manuka honey from Australia and other commercially available honey samples from east and west coasts of The US. Investigations have been extended to study the potential of honey and propolis as natural antioxidants and antimicrobial agents to combat oxidative stress and promote health.

856. Avocado oil based oleogels: a comparative analysis of the physical characteristics of various structuring agents Christopher Carter, deskofchristopher@gmail.com, Roberta Silva. Family and Consumer Sciences, North Carolina Agricultural and Technical State Univ., Greensboro Oleogels are a novel semi-solid lipid alternative system that has gained attention in the food and beverage industry for their ability to replicate some of the functionalities of traditional fats while enhancing products' nutritional profiles. This research compares the physical characteristics of oleogel systems using individual oleogelators—carnauba wax (CW), rice bran wax (RBW), and ethylcellulose (EC)—against combinations of these agents (EC + CW and EC + RBW). All systems were prepared using avocado oil as the dispersed phase structured with 5% and 10% of oleogelator(s). Physical properties were evaluated using polarized light microscopy (PLM) and rheology. The PLM images revealed that CW systems formed well-defined crystals at 20-60°C for 5% and 10%, respectively, while RBW systems exhibited smaller and compact crystalline networks under similar thermic conditions as the CW systems, at 5% and 10%, respectively. 5% EC oleogels displayed a micelle crystalline structure with no aggregation, whereas the 10% EC systems showed denser crystalline packing under the previously mentioned thermic conditions. Oleogels structured with a combination of EC + CW displayed a micelle structure within their compact crystalline networks, between 20-80°C at 5% and 10%, respectively. EC + RBW oleogels displayed a scattered crystalline network at 5% and 10%, respectively. In comparing individual oleogelators with wax-EC systems, CW and RBW at 5% and 10%, respectively, displayed the most promise due to their defined, aggregated, and pronounced crystalline networks. Rheological analysis indicated that the type of oleogelator significantly influenced the system's viscoelastic properties, with higher concentrations resulting in increased viscoelasticity across all individual oleogelators. The combined oleogelators (EC + CW and EC + RBW) exhibited longer crossing points in storage and loss moduli at both concentrations, suggesting superior elastic characteristics across varying conditions compared to singular agents. When comparing

individual systems against those that see a combination of structuring agents, EC + CW and EC + RBW oleogelators can withstand a longer application of stress in comparison to individual oleogelators. These findings contribute to the characterization of individual and combined oleogelators for future applications in the food and beverage industry.

857. Comparing the flavour profiles of gin using high-capacity sorptive extraction and GC×GC–TOF MS Laura McGregor[1], Khaled Murtada[2], Meriem Gaida[1], Matthew Edwards[2], medwards@sepsolve.com, Bob Green[1]. (1) SepSolve Analytical Ltd, Peterborough, United Kingdom(2) SepSolve Analytical, Waterloo, Ontario, Canada Gin is a distilled alcoholic beverage with a complex flavour profile, primarily derived from juniper berries and an array of botanicals such as citrus peels, angelica seeds and various spices. The blend of these botanicals creates a multifaceted flavour profile. Unfortunately, traditional analytical techniques often fall short in capturing the full spectrum of volatile and semi-volatile compounds present. In this study, high-capacity sorptive extraction probes, offering a larger volume of stationary phase (65 µL) compared to traditional solid-phase microextraction (SPME) (~0.5 µL), were utilized to enhance sample loadings. Combined with trap-based focusing, this approach provides improved sensitivity and enhanced chromatographic performance. However, improved extraction capability often results in more complex chromatograms. Here, comprehensive two-dimensional gas chromatography coupled with time-of-flight mass spectrometry (GC×GC–TOF MS) was used for enhanced separation, allowing confident identification of compounds that would co-elute in conventional 1D GC. This approach enabled the detection of over 250 distinct peaks in dry gin and up to 400 in flavoured gins. Tile-based chemometrics was then employed to automatically identify unique chemical markers for the different gins, including those from the same brand and those with similar flavour descriptions. Here, we show how sorptive extraction and GC×GC–TOF MS can be leveraged for the comparison of gin flavour profiles to help innovate, refine, and tailor products to meet consumer demands.

858. Physicochemical properties, quality, and characteristics of traditional Bulgarian artisanal cheese from raw sheep's milk during ripening Hafize Fidan[1], h_fidan@uft-plovdiv.bg, Salam Ibrahim[3], Stanko Stankov[1], Tatyana Balabanova[2]. (1) Tourism and Culinary Management, Univ. po hranitelni tehnologii, Plovdiv, Bulgaria(2) Univ. po hranitelni tehnologii, Plovdiv, Bulgaria(3) North Carolina Agricultural and Technical State Univ., Greensboro Artisanal cheese is highly valued in the culinary heritage of Bulgaria for its traditional production methods and unique taste. However, this type of cheese relies on raw milk, so a careful examination of quality attributes and food safety factors during the ripening process becomes paramount. Cheese ripening is the process by which product the flavor, texture, and aroma develop. At present, there is limited information related to the ripening of this type of traditional Bulgarian cheese. The objective of the present study was thus to investigate the physicochemical properties, quality and characteristics of Bulgarian artisanal cheese from raw sheep’s milk during the ripening process. Product composition and quality parameters throughout the ripening period (1-60 days) were also examined. Results showed that the analyzed raw sheep’s milk consisted of 20.75% dry matter, 8.17% fat, 6.55% protein, and 4.94% carbohydrates. The total bacterial count was 6.20 Log CFU/ml. Saturated fatty acids at 74.73% were- three times higher than unsaturated fatty acids (24.66%). Additionally, 31 volatile components were identified on the 40th and 60th days of ripening and categorized as follows: organic acids (7), aldehydes (1), ketones (7), alcohols (14), and hydrocarbons (2). Our findings could thus contribute to the recovery of Bulgarian artisanal cheese productiontraditions with minimal food safety risk.

859. Designing research diets using USDA food composition tables and ICP-OES Christina N. Vialva, cvialva@sandiegoacs.org, Sisi Cao, Connie Weaver. Exercise and Nutritional Sciences, San Diego State Univ., California In designing diet interventions for nutritional health research, ensuring accurate nutrient content of the diet is important. A researcher can design a diet based on the analysis of various foods using Nutrition Facts sections on food package labels, USDA food composition databases, or direct measurement of nutrient composition, i.e. Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) for minerals. The purpose of this research was to compare nutritional content using food package labels, the USDA food database, and direct measurement, from a representative Western Diet from our research study. We tested the hypothesis that the Nutrition Facts information from food package labels overestimates actual, measured nutrient content. We employed quality control practices, including analyzing samples in triplicate and validating our methods with a certified National Institute of Standards and Technology wheat flour (reference number 1567b) sample. Reported calcium and sodium values for the total days diet summed from individual foods using food composition databases were consistently lower than measured values by ICP-OES. Discrepancies were as great as 1.5 fold, contrasting with our hypothesis that the food package label overestimated nutritional content. We identified specific foods that contributed to the overall discrepancy. This work illustrates that package labels should be referenced as estimates rather than accurate values for nutrient content of foods and diets.

860. Quantitative analysis and thermal stability of cannabinoids in commercial hemp products using Q-ToF LC-MS/MS Ashraf Duzan[1,2], asduzan@aggies.ncat.edu, Salam Ibrahim[1], mufeed Basti[1]. (1) Applied Science and Technology, North Carolina Agricultural and Technical State Univ., Greensboro, North Carolina(2) Pharmaceutical Science, Nova Southeastern Univ., Fort Lauderdale, Florida Hemp and marijuana are often confused as distinct species, but the main difference lies in their THC content. Hemp is defined by the FDA as cannabis with THC levels of 0.3% or less. Due to increasing consumer confusion and the rise of hemp-based products, this study evaluated cannabinoid content in commercial products and assessed label accuracy. Using a validated LC-MS/MS method, we quantified cannabinoids in 17 samples, and tested thermal stability, finding degradation of cannabinoids at elevated temperatures. The LC-MS/MS method demonstrated high sensitivity and precision, with an accuracy range of 98.2% to 102.6% and precision between 0.52% and 8.18%. Calibration curves exhibited excellent linearity (R2 > 0.99), with limits of detection (LOD) ranging from 5 to 25 ng/mL and limits of quantification (LOQ) between 10 and 50 ng/mL. Only 30% of the commercial hemp products tested were within the acceptable accuracy range of ±10% relative to the labeled cannabinoid content. The thermal stability test revealed an average cannabinoid degradation of up to 15% after one week at 37°C. However, we saw no changes under the 4°C storage temperature conditions. This study highlights significant discrepancies between labeled and actual cannabinoid concentrations in commercial hemp products. The validated LC-MS/MS method proved accurate, precise, and suitable for routine cannabinoid analysis. Moreover, thermal stability testing indicated that elevated temperatures could degrade cannabinoids, underscoring the need for strict quality control measures. Additional research is warranted to explore the impact of other environmental factors such as humidity, light exposure, and packaging on cannabinoid stability.

861. Nutrient composition and functional properties of microalgae as food ingredients Corissa Williams[1], cwilliams8568@sdsu.edu, Joanna Rockwell[1], Liana Feng[1], Changqi

Liu[1,2], Cristal Zuniga[3], Jing Zhao[1,2]. (1) School of Exercise and Nutritional Sciences, San Diego State Univ., California(2) Center for Better Food Futures, San Diego State Univ., California(3) Dept. of Biology, San Diego State Univ., California Microalgae are an eco-friendly protein source gaining popularity and making their way into diverse food applications. This study aimed to analyze the nutrient composition and physicochemical properties of different microalgae species and assess their incorporation into food products. Commercial microalgae species, *Arthrospira platensis*, *Chlorella vulgaris*, *Dunaliella salina*, *Haematococcus pluvialis*, and *Nannochloropsis salina*, were analyzed for nutrient composition, water activity, and color. Select microalgae species are incorporated into a freeze-dried guacamole mix to enhance its nutritional value. *A. platensis*, *C. vulgaris*, and *N. salina* had high protein contents ranging from 48.5% to 56.1%, while *H. pluvialis* and *D. salina* had lower protein levels at 16.2% and 0.9%, respectively. The essential amino acid index of the microalgae species ranged from 83.6% to 90.5%, using whole egg protein as the reference. All microalgae powders exhibited low water activity (0.12-0.40), indicating good shelf stability. Color varied considerably among the species. *A. platensis*, *C. vulgaris*, and *N. salina* appeared green with negative a* values, whereas *D. salina* and *H. pluvialis*, exhibited orange and red colors, respectively, with positive a* values. Incorporating 5% *A. platensis* into the guacamole mix resulted in a darker color, more than doubled protein content, a thicker and stickier consistency, and a decreased overall liking score from 7.18 to 5.64 on a 9-point hedonic scale ($P < 0.05$). It also increased the pH of the rehydrated guacamole from 4.87 to 5.22, leading to a perceivable reduction in sourness. Replacing 1% of the *A. platensis* with *D. salina* produced similar color, protein content, and pH, but resulted in a texture and liking score (6.55, $P > 0.05$) comparable to the control guacamole. These findings demonstrated the potential of microalgae as functional food ingredients, though careful evaluation is needed when incorporating them into different food products.

863. Antioxidant activities of limu extracts in a beverage system
Brett West, Brett.West@partner.co. Research and Development, Partner.co, American Fork, Utah Limu is the common Polynesian name for many seaweed species. Extracts from some limu sources contain fucoidan, a sulfated polysaccharide, and are used as functional ingredients in beverages due to their health-promoting properties. To examine the antioxidant potential of a combination of aqueous extracts from *Fucus vesiculosus* and *Undaria pinnatifida*, as well as that of a commercial beverage product containing this combination, the 2,2-diphenylpicrylhydrazyl (DPPH) radical scavenging assay and the ferric reducing power assay were performed under various conditions. Across a range of concentrations, samples of the extract combination were dissolved in water (neutral pH at room temperature) and in acidified water (pH 3) followed by heating to 85 °C. The commercial product (LIMU Original®) served as an authentic reference, having undergone commercial blending, pasteurization, bottling and so forth. The limu extract combination scavenged up to 75% of free radicals (DPPH). The beverage system and pasteurization conditions (i.e. low pH and heating) did not significantly alter radical scavenging activity nor ferric reducing power. The commercial product (LIMU Original®) scavenged up to 5.75 times more free radicals, and had 3.25 times more ferric reducing power, than a commercial apple cider vinegar reference sample. These results indicate that these limu extracts may provide antioxidant benefits even when used in low pH pasteurized beverages. Further, the ferric reducing power may also explain several of the perceived health benefits of limu extracts since reduction of Fe^{3+} to Fe^{2+} is necessary for the proper functioning of hemoglobin, the subsequent generation of ATP (involving the electron transport chain), and is a cofactor of several enzymes.

864. Production of Maillard reaction intermediates during mashing and boiling of a single malt, single hop (SMaSH) beer
Angelina Lo Presti, lopresax@dukes.jmu.edu, Chrisi A. Hughey. Dept. of Chemistry and Biochemistry, James Madison Univ. College of Science and Mathematics, Harrisonburg, Virginia The Maillard reaction is a non-enzymatic reaction that occurs between reducing sugars and amino acids in the presence of heat and produces a variety of compounds that impact the color and flavor of beer. This reaction has predominantly been studied in the kilning of malt. Here we investigate the Maillard reaction during the mashing and boiling of a single malt, single hop (SMaSH) beer and in laboratory-scale brewing experiments. Samples collected throughout mashing and boiling of the SMaSH beer revealed the presence of Amadori rearrangement products (ARPs) and Strecker aldehydes–both important intermediates in the Maillard reaction. The rapid increase of 3-methylbutanal at the end of boiling suggested that these reaction intermediates were produced during mashing, not just extracted from the malt. To test this hypothesis, laboratory-scale brewing experiments were conducted with a 2:1 ratio of maltose to amino acid (either leucine, Leu, or phenylalanine, Phe). The solution was heated for 60 minutes at 90°C followed by 60 minutes at 105°C while a constant volume was maintained. Amino acids and ARPs were quantified using HILIC positive-ion LC-QqQ-MS. MS/MS experiments were performed on ARPs using q-TOF MS, and fragmentation patterns of ARPs were confirmed by matching to the literature. Maltose was also quantified using a HILIC method in negative ion QqQ-MS while volatile flavor compounds were quantified with headspace solid phase microextraction (HS-SPME) GC/MS. ARPs increased significantly after 60 minutes of heating in both Leu and Phe systems. Flavor compounds also increased. The Phe system saw an increase in phenylacetaldehyde while the Leu system saw an increase in 3-methylbutanal. Accordingly, amino acid and sugar concentrations decreased. Thus, laboratory experiments confirm that ARPs and their respective flavor compounds are produced during brewing and likely contribute to the color and flavor of the final beer.

865. Importance of water-induced molecular organization in petfood aromatic and the selection done by pets Melanie Trehiou,. melanie.trehiou@royalcanin.com. R&D, Royal Canin, Aimargues, Occitanie, France The water content in food and petfood plays a role in the aroma release into the surrounding gas space. The state of water, whether bound or free, modulates this release. The change in volatile distribution links to the water content directly and affects the volatile composition available for olfactory detection. Given the critical role of olfaction in food selection by pets, it is important to understand what these molecular changes are and how they affect animals' perception and subsequent feeding. In this study, using Mass Spectrometry techniques, in parallel to feeding trials, we monitored the dynamics of the different chemical classes of volatile molecules and the link with the dog preferences. Our results indicate that the redistribution of volatiles is done in a way which is perceived either positively or negatively by the pets, depending on the configuration, highlighting the importance of water-induced molecular organization in petfood perception and selection.

925. Effect of soy-based textured vegetable protein and textured pea protein mixtures on the physicochemical properties of hybrid beef burger patties Sage McBride, sage.mcbride562@topper.wku.edu, Hanna(John) Khouryieh, Luiz Pereira Silva. Western Kentucky Univ., Bowling Green The growing trend toward health-conscious diets continues to encourage a decreased intake of red meats. This has led to increased interest in hybrid meats and plant-based diets to address health concerns related to red meat consumption. The objective of this study was to investigate the effects of soy-based textured vegetable protein (TVP)

and textured pea protein (TPP) mixtures on the quality characteristics of hybrid beef patties. Six treatments of patties were formed and tested: a beef control (100% beef), a soy-based TVP hybrid (100% TVP), a TPP hybrid (100% TPP), and three additional hybrid patties with various combinations (75% TVP-25% TPP, 50% TVP-50% TPP, 25% TVP-75% TPP). Chemical analysis of the patties found that the addition of TVP/TPP mixtures resulted in significantly ($p < 0.05$) lower fat content, while there were no significant differences ($p > 0.05$) in moisture content, protein content, water activity, or pH. The incorporation of TVP/TPP mixtures into the patties increased moisture retention and reduced cooking loss. Texture profile analysis revealed that hardness, cohesiveness, springiness, gumminess, and chewiness were significantly reduced ($p < 0.05$) with the substitution of TVP/TPP mixtures compared to the control. Over a six-day period, color results indicated that raw patties generally became lighter over time, but no significant differences ($p > 0.05$) were found with the substitution of TVP/TPP mixtures compared to the control. The results indicated that hybrid beef patties exhibited good quality characteristics with a 30% substitution of TVP/TPP.

926. Esculetin inhibited fat accumulation in *Caenorhabditis elegans* through insulin/insulin-like growth factor and AMP-activated protein kinase pathways Aaron T. Kim, aaronkim@umass.edu, Yeonhwa Park. Food Science, Univ. of Massachusetts Amherst Esculetin, a plant-derived 6,7-dihydroxy coumarin derivative, has been linked to lipid metabolism and accumulation. In this study, we investigated the effects of esculetin on lipid accumulation using *Caenorhabditis elegans*, a microscopic soil nematode widely used as an in vivo model organism. Treatment with esculetin (100 and 200 μM) resulted in a significant reduction in fat accumulation and nematode body size compared to the control. Importantly, esculetin did not significantly affect pharyngeal pumping rate, body bending, or locomotive activity (average moving speed), indicating that food intake and energy expenditure behaviors were not altered. The reduction in fat accumulation was mediated by the regulation of lipogenesis-related genes *daf-16* (encodes forkhead box transcription factors class 0), *daf-2* (encodes insulin-like growth factor 1 receptor), and *aak-2* (encodes the catalytic-α subunit of AMP-activated protein kinase), suggesting that esculetin functions by modulating the insulin/insulin-like growth factor and AMP-activated protein kinase pathways in *C. elegans*.

927. Sommelier training of an artificial nose Larissa Negom, larissanegom@yahoo.com, Lauren Crumb, lrcrumb1@gmail.com, Emily A. Jarvis. Loyola Marymount Univ. Frank R Seaver College of Science and Engineering, Los Angeles, California Rapid and accurate detection and identification of gaseous compounds holds practical applications ranging from Homeland Security to medical diagnoses and quality control. Such ability is also valuable within the food and beverage industry for analyzing complex solutions and focusing on only the most notable features. In particular, wine is a notoriously complex solution but is graded by sommeliers to highlight key prominent notes in aroma and flavor. Wine aromas typically are organized into four major families: fruity, floral, oak, and vegetal. We train an electronic nose (Cyranose 320) to serve as an instrumental sommelier for identification of aromas in wine samples. This is accomplished through a combination of instrumentation hardware and software. Exposing the array of sensors in the electronic nose to a volatile aroma induces an electronic response to this compound. Repeated exposure to the same aroma results in similar electronic responses of the sensors to create a characteristic response for a given aroma. Using machine learning algorithms, these characteristic responses for a set of aromas can then create a training set for each of the aroma families. The "trained" nose is then employed to identify aromas in increasingly challenging samples. We discuss our protocol for creating training sets with Principal Component Analysis (PCA) plots that avoid overlap of distinct aromas within the aroma family set. These training sets are then used to identify unknown samples of individual aromas similar to the samples used for creating the training set. More challengingly, we test our trained nose on more complex samples comprised of combined aromas, aromas in model wine solutions, and actual wine samples. Our trained nose shows promise in identification of key components in complex sample media while certain combinations present an ongoing challenge.

929. Evaluation of antioxidant activity in Costa Rican plants using the oxygen radical absorbance capacity (ORAC) method Esteban Gamboa[1], esgam29@gmail.com, Maria B. Gomez[1], Monserrat Avalos[1], Sarah Ruiz Mena[1], Victor Álvarez Valverde[3], Ana F. Carballo-Arce[2], Jose A. Rodriguez Corrales[1]. (1) LIDETEQ, Escuela de Quimica, Univ. Nacional, Heredia, Costa Rica(2) LIB, Escuela de Quimica, Univ. Nacional, Heredia, Costa Rica(3) LAFIT, Escuela de Quimica, Univ. Nacional, Heredia, Costa Rica Antioxidants, molecules that inhibit free radical reactions, play a crucial role in preventing diseases associated to natural oxidative stress in the human, such as cardiovascular and neurodegenerative diseases and certain types of cancer. Daily consumption of antioxidants has probed to decrease the impact of long-term oxidative processes. Costa Rica hosts approximately 5% of the world's biodiversity, while its native or endemic plants could possess undiscovered and potent antioxidant metabolites. Antioxidant activity can be screened using the Oxygen Radical Absorbance Capacity (ORAC) assay, which measures the rate of oxidation of a fluorescent molecule and the protecting effect of potential antioxidants. Thus, activity is quantified by comparison with a standard curve of Trolox, a reference antioxidant. In this study, miniaturized assays in microtiter plates were used due to their versatility and low reagent requirements. The assays were used to evaluate antioxidant activity in several Costa Rican plant extracts, finding high antioxidant capacity at low extract concentrations, which suggests their potential use in health and wellness products and supports further investigation of these and other plants.

931. Acute toxicity of chemical compounds on the biocontrol agent Cryptolaemus montrouzieri in citrus orchards Ariela Kaspi-Kaneti[1], ariela.w.kaspi@gmail.com, Shashwat Singh[2], Alex Protasov[2], Gal Yaacobi[2], Roy Kaspi[2]. (1) Chemistry, Univ. of La Verne College of Arts and Sciences, La Verne, California(2) Entomology, Agricultural Research Organization, Rishon LeZion, Israel This study evaluates the acute toxicity of 22 chemical compounds commonly used in citrus orchards on *Cryptolaemus montrouzieri*, a key predator of citrus pests such as mealybugs. The chemicals tested include acaricides, mineral oils, insecticides, plant hormones, and combinations with fertilizers, with formulations applied through direct spray, residual contact, and contaminated food bioassays. The study emphasizes the role of chemical structure and mode of action in determining the selectivity and safety of these compounds, which range from nerve-targeting insecticides like Tau-Fluvalinate to more selective agents like Spinetoram. These findings underscore the importance of selecting chemicals that balance pest control efficacy with the preservation of beneficial species in integrated pest management (IPM) programs.

933. Improving acidic stability of casein via glycation with hydroxypropyl methylcellulose Bryan A. Castellanos, bcastel2@vols.utk.edu, Qixin Zhong. Food Science, The Univ. of Tennessee Knoxville Tickle College of Engineering Casein aggregates and precipitates at pH 3.0-5.5, particularly near its isoelectric point of 4.6, limiting its food and non-food applications. The objective of this study was to investigate the potential of hydroxypropyl methylcellulose (HPMC) to enhance the acid stability

of casein through glycation at alkaline conditions. The reaction was conducted at room temperature (22 °C), pH 11.0, and casein:HPMC mass ratios of 1:1, 1:2, and 1:3 for 2 h, followed by adjusting pH to 4.5. The casein-HPMC mixtures were characterized using nuclear magnetic resonance – heteronuclear single-quantum correlation, sodium dodecyl sulfate-polyacrylamide gel electrophoresis, free amino group content, and size exclusion chromatography HPLC. The results confirmed the covalent bond formation at all casein: HPMC mass ratios, with the degree of glycation following the mass ratio of 1:1 < 1:3 < 1:2 . Morphological analysis via atomic force microscopy revealed the reduced aggregation and increased compactness of the mixtures after the reaction. There were no Maillard reaction byproducts. The degree of glycation was correlated to visual appearance of pH 4.5 dispersions that remained visually stable after 2-week storage at room temperature and showed the increasing clarity following the mass ratio of 1:1, 1:3, and 1.2. These findings demonstrate the effectiveness of HPMC glycating caseins and subsequently stabilizing casein dispersions at acidic conditions.

934. Zein nano-carriers for the delivery of genetic materials to plants Preeti Maiti[1,2], pr877400@ucf.edu, Swadeshmukul Santra[1,2], Jorge Pereira[2], Edwin A. Davidson[1,2]. (1) Chemistry, Univ. of Central Florida, Orlando(2) Nanoscience Technology Center, Univ. of Central Florida, Orlando Considering the estimated global population surpassing 10 billion by 2050, shortage of food for feeding the future generation is inevitable. At the current food production rate, 943 million people are going to face food insecurities by 2025. This demands for improving crop protection and overall yield. New advances in nucleic acid therapies for gene and transient protein expression have significant potential for improving plant health and enhancing yield sustainably. This strategy however poses a big challenge due to its low penetrating ability into the plant cell. This challenge could be addressed using nanoparticle carriers (nanocarriers). In this research, zein protein nanoparticles (ZNP) are synthesized for delivering nucleic acid cargos to plant tissue. Zein is plant derived protein which has the ability to form colloidal solution. The average particle size was 173 nm as estimated by the Dynamic Light Scattering technique. Zeta potential measurements confirmed ZNP surface charge of +60.7mV. The binding of negatively charged dsDNA to ZNP was confirmed by reduction in surface charge of ZNP from +60.7 mV to +46 mV. A blue shift in UV-VIS spectrum suggests the binding of dsDNA to ZNP. Optical density (OD) change measured at 260 nm also suggests ZNP-DNA binding. ZNP improved dsDNA stability as monitored by the OD measurements. Confocal microscopy studies showed successful leaf penetration of the DNA loaded ZNP. The above results suggest that the ZNP nanocarriers could successfully deliver nucleic acid cargoes to plant cells.

935. Synthesis and evaluation of d-mannitol-based antioxidant dendrimers Blessed Agbemade, agbem1b@cmich.edu, Choon Y. Lee. Chemistry and Biochemistry, Central Michigan Univ. College of Science and Engineering, Mount Pleasant Free radicals start the chain reactions. If not neutralized, they can damage cellular materials and cause oxidative stress in the human body, which can ultimately contribute to the pathogenesis of numerous diseases. Antioxidants are known for their ability to protect cells against oxidative stress by scavenging free radicals. The solubility of antioxidants in aqueous media is vital for their bioavailability and functionality. In this presentation, we will report biocompatible antioxidant dendrimers, synthesized using D-mannitol as the scaffold, which was attached to various antioxidant building blocks (4-hydroxybenzaldehyde, syringaldehyde, pyridoxal, and/or pyridoxal-5-phosphate) via copper-catalyzed azide-alkyne cycloaddition click chemistry reactions. Additionally, we will present their DPPH radical scavenging activities, DNA protective effects against free radicals, and pro-oxidant potentials.

936. Structure of anthocyanin complex with flavonoids and metals to form blue coloration under acidic conditions Xinyue Fan, fan.1079@buckeyemail.osu.edu, Monica Giusti. Food Science and Technology, The Ohio State Univ., Columbus Food industries are looking for a natural colorant that could provide blue color to foods in acidic environment as alternative to the use of synthetic colorant. This has proven challenging. Our previous research showed that a mixture containing delphinidin-3-rutinoside (Dp3rut), neochlorogenic acid and $Al_2(SO_4)_3$, expressed blue color in acidic pH ranging from pH 3 to 5. However, the incidence of Dp3rut in edible food materials is limited. Therefore, we explored the ability of other anthocyanins to form the blue complex. Chinese round eggplant and black Goji were used as sources of delphinidin-3-rutinoside-5-glucoside (saponified) and petunidin-3-(p-coumaroylrutinoside)-5-glucoside, respectively, and were compared to Dp3rut. UV-Vis spectrophotometer, circular dichroism (CD), Raman spectrometer and high resolution mass spectrometry were used to identify the complex color and structure changes in different pH. Both anthocyanin types were able to form the blue complex, and the different acylation and glycosylation patterns did not interfere. All complexes showed positive cotton effect in pH 4 in CD, indicating an asymmetric compound, and a coordination bond formed. The blue hue did not change significantly from pH 3 to 5. At pH lower than 3, the color became purplish blue and there was no positive cotton effect in CD. At pH around 5, the blue color was lighter and there was a negative cotton effect. Raman result showed the Al-O bond at pH 3 & 5, indicating that the geometry of this complex might change with pH. At pH 6 to 7, the color turned green with little cotton effect in CD. The peak of Al-O bond found in Raman suggested that the interaction of anthocyanins and metal remained , but the structure of the complex likely changed in this pH. Our results demonstrated the formation of a metal complex between anthocyanins (delphinidin or petunidin derivatives), aluminum and neochlorogenic acid, capable of expressing blue color in pH 3-5, providing fundamental understanding of its behavior and structure. Our results will help food industries develop a natural blue color for application in acid foods.

937. Predicting protein gelation properties through modeling using published literature results Jing Zhao[1], jzhao2@sdsu.edu, David Hecht[2,3], Rabiul Roni[4], Mozhgan Esmaeelian[5], Ali Raza[1], Dominik Grabinski[6]. (1) School of Exercise and Nutritional Sciences, San Diego State Univ., California(2) Dept. of Chemistry, Southwestern College, Chula Vista, California(3) Dept. of Chemistry and Biochemistry, San Diego State Univ., California(4) Faculty of Engineering Sciences, German Univ. Bangladesh, Gazipur(5) Dept. of Food Chemistry, Research Institute of Food Science and Technology (RIFST), Mashhad, Iran (the Islamic Republic of)(6) AI Bobby, Paris, France Protein functionalities are crucial for the applications of proteins in foods. Understanding the effects of various extraction and processing conditions on protein gelation properties could help ingredient manufacturers and food companies optimize their products in a faster and more economical way. Considering the development of artificial intelligence technologies and their potential applications in protein development, this study aims to take a first step in this direction through the construction of predictive machine learning (ML) models of gel hardness and water holding capacity (WHC) using published literature results to provide a proof of concept for large data analysis. Protein gel hardness and WHC tested under over 1000 conditions were extracted from published research articles. The treatment variables included protein type, protein concentration, pre-treatments of proteins, pH, salt type, ionic strength, and heating conditions. These features were imported into the Molegro Data Modeller (MDM) software where they were normalized and used to generate predictive models using a variety of ML algorithm that include: Multiple Linear Regression (MLR);

Partial Least Square regression (PLSR); Support Vector Machines (SVM); Neural Networks (NN), and K-nearest neighbors (KNN) algorithm. Cross-validation and leave-one-out analyses were performed to test the robustness of the models. Finally, the sensitivity and specificity of each of the models were evaluated and compared, to evaluate their relative efficacy. In this study, we present predictive ML models of protein gelation properties. Future studies will be conducted on expanded datasets to better predict various protein functionalities using artificial intelligence (AI) and ML based tools.

938. Sensory similarity and consumer preferences of plant-based seafood analogues James Wadman[1], jwadman7311@sdsu.edu, Liana Feng[1], Stacey Lehrer[1], Ali Raza[1], Changqi Liu[1,2], Jing Zhao[1,2]. (1) School of Exercise and Nutritional Sciences, San Diego State Univ., California, US(2) Center for Better Food Futures, San Diego State Univ., California As the demand for plant-based seafood analogues grows, understanding consumer preferences and sensory properties of these products becomes increasingly important. This study aimed to evaluate the sensory attributes and overall liking of seafood analogues among participants with varied dietary preferences. A total of 47 participants (76% omnivores) who had previously eaten shrimp evaluated four shrimp imitation products, while another 47 participants (73% omnivores) with prior experience eating cod evaluated four cod imitation products. Participants rated the overall liking of the seafood analogue products and their similarity to real seafood in terms of appearance, smell, taste, and texture. Those on restricted diets rated the appearance of imitation shrimp products higher than omnivores ($P = 0.017$). The Beleaf Plant-Based Shrimp received the highest scores for overall liking (6.09±2.05), appearance (7.13±1.64), taste (5.69±2.19), and texture (6.07±2.06). Verisoya Imitation Shrimp had a significantly higher smell score (6.72±2.09) than all other samples ($P \leq 0.016$). For cod imitation products, participants on restricted diets rated overall liking higher than omnivores ($P = 0.002$) and showed a trend of giving higher scores for smell ($P = 0.057$) and taste ($P = 0.062$). Gardein F'sh Filets received the highest ratings for overall liking (7.09±1.02), appearance (6.92±1.46), smell (5.81±2.08), taste (7.17±1.39), and texture (6.38±1.86). Across both categories of seafood analogues, there were significant positive correlations between overall liking, appearance, smell, taste, and texture ($P < 0.001$). Taste had the strongest correlations with overall liking for both shrimp imitation products ($\rho = 0.75$) and cod imitation products ($\rho = 0.56$). This study highlights the positive correlations between sensory attribute similarity and overall liking of seafood analogue products, with preference differences between omnivores and those on restricted diets, and sets the stage for further analysis of key flavor compounds in seafood analogues using gas chromatography-mass spectrometry-olfactometry.

997. Using the AI program AlphaFold to engineer transient tertiary structure (TTS) tags to enhance αS1-casein solubility Sierra Murrell[1], smurrell3782@sdsu.edu, John J. Love[1], Mia Bartolovich[1], Changqi Liu[2], Jing Zhao[2]. (1) Dept. of Chemistry and Biochemistry, San Diego State Univ., California(2) School of Exercise and Nutritional Sciences, San Diego State Univ., California The primary aim of this research is to produce the nutritious proteins found in milk (αS1-casein) using precision bacterial fermentation. This approach aims to reduce the carbon footprint associated with fossil fuel-based mechanical processes inherent to modern farming methods. In addition to greenhouse gas emission, the production of feedstock agricultural products (e.g., soy, corn, and grains) for milk production also requires significant amounts of water. For example, approximately 120 gallons of water is required to produce just four ounces of cheese using traditional methods that rely on milk produced by dairy cows. We believe that the production of the αS1-casein milk protein via bacterial fermentation is potentially more sustainable and results in a significantly lower carbon footprint and reduced water requirement. When casein proteins are expressed in E. coli, they tend to aggregate into 'inclusion bodies' due to the lack of structure and high expression rates driven by strong transcriptional promoters. A negative aspect of this is exemplified by the irreversible aggregation of egg white proteins in boiled eggs. If the aggregation of an expressed protein is not extensive, then it is possible to re-solubilize the proteins from looser aggregates. There is a spectrum of inclusion body properties that range from completely insoluble aggregates to loosely packed gels that are straightforward to re-solubilize and purify. The more folded an expressed protein is, the less prone it is to form insoluble inclusion bodies. This is precisely why we are using the AI program, AlphaFold, to design transient tertiary structure (TTS) tags that are expressed as fusions to the N- and C- termini of αS1-casein. The function of the TTS tags is to impart transient structure on αS1-casein, enabling a looser protein association within inclusion bodies, which will greatly enhance our ability to quickly isolate and purify nutritious milk proteins. Purified αS1-casein will be tested for structural and functional properties and its potential use in cheeses and other food products. Once the process is developed and optimized for cost-effective αS1-casein production, we will apply the same methods for large-scale production of the other caseins: αS2-casein, β-casein, and κ-casein.

998. Antioxidant activities of different microalgae species Krisztina Kemenes[1], kkemenes1457@sdsu.edu, Daniel Norena-Caro[3], Changqi Liu[1,2], Cristal Zuniga[3], Jing Zhao[1,2]. (1) School of Exercise and Nutritional Sciences, San Diego State Univ., California(2) Center for Better Food Futures, San Diego State Univ., California(3) Dept. of Biology, San Diego State Univ., California The demand for antioxidants in the food and supplement industries has increased significantly over the past decade, with microalgae emerging as a promising natural source. This study evaluated the antioxidant activities of five species of commercial microalgae. Antioxidants were extracted from *Arthrospira platensis*, *Chlorella vulgaris*, *Dunaliella salina*, *Haematococcus pluvialis*, and *Nannochloropsis salina* by lysing the cells with a sonicator and using acetone, ethanol, methanol, and hexane as solvents. Antioxidant activity was assessed using ferric reducing power, ferrous chelating activity, and ABTS radical scavenging activity assays. Methanol appeared to be the most effective solvent for extracting antioxidants from microalgae. *N. salina* exhibited the highest ferric reducing power (190.8 µmol ascorbic acid equivalent/g), followed by *A. platensis* (182.8 µmol ascorbic acid equivalent/g), *C. vulgaris* (154.9 µmol ascorbic acid equivalent/g), *H. pluvialis* (138.0 µmol ascorbic acid equivalent/g), and *D. salina* (119.9 µmol ascorbic acid equivalent/g). *A. platensis* demonstrated the highest ferrous chelating activity (171.0 µmol EDTA equivalent/g), followed by *C. vulgaris* (135.4 µmol EDTA equivalent/g), *N. salina* (95.6 µmol EDTA equivalent/g), *D. salina* (36.9 µmol EDTA equivalent/g), and *H. pluvialis* (6.6 µmol EDTA equivalent/g). In ABTS radical scavenging activity, *A. platensis* showed the highest activity (56.8 µmol Trolox equivalent/g), followed by *H. pluvialis* (23.4 µmol Trolox equivalent/g) and *C. vulgaris* (21.9 µmol Trolox equivalent/g), while *D. salina* and *N. salina* showed no ABTS radical scavenging activity. Interestingly, *D. salina* displayed the lowest antioxidant activities among all tested species, despite being known as the riches natural source of β-carotene. The low antioxidant activity of *D. salina* could be attributed to the oxidation of β-carotene during storage, as indicated by the visible fading of its orange color. This study highlights the considerable variability in antioxidant activities among different microalgae species and emphasizes the importance of selecting appropriate extraction methods.

MONDAY MORNING March 24

Food Security: Tackling World Hunger CCC - Highlighting Chemistry from Multiple Divisions: Advancement in Crop Protection and Nutrient Analysis
No abstracts available

James Seiber Memorial Symposium
No abstracts available

MONDAY AFTERNOON
Breeding for Flavor Sensory Quality and Sustainability of Fresh and Fresh-Cut Fruits and Vegetables

Cucumber sensory properties and the variance in flavor molecules (aroma and taste) in a GWAS panel Cassidy N. Duan[1], Nicole Latorre[1], Thi Pham[1], Thi Nguyen[2], Junyi Tan[2], Yiqun Weng[2,3], Xiaofen Du[1], xdu@twu.edu. (1) Nutrition and Food Sciences, Texas Woman's Univ., Denton(2) Plant and Agroecosystem Sciences, Univ. of Wisconsin System, Madison(3) Vegetable Crops Research Unit, USDA ARS, Madison, Wisconsin Cucumber (*Cucumis sativus*) is a popular fruit vegetable for fresh consumption which is appreciated particularly for its unique flavor and texture. Cucumber is a key ingredient in salads, pickles, and beverages, offering a mild, refreshing flavor that enhances the variety of dishes. Cucumber sensory quality is a combination of smell (aroma), taste, and texture; however, our knowledge on the scope of variation of these attributes in cucumber is limited. The current study had two primary objectives: 1) to conduct a consumer survey to understand cucumber consumption motivation, preferred nutritional and sensory qualities, and perceived market gaps; and 2) to investigate the variance in flavor molecules (aroma and taste) across 220 cucumber lines. From survey among 1028 participants, we found that texture (crispy and juicy), taste (sweet), and aroma (fresh, green, melon-like) are the most important sensory attributes. Taste-relevant soluble sugars (fructose, glucose, and sucrose) were quantified using a high-performance liquid chromatograph coupled with an ultraviolet detector (HPLC-UV), which revealed fructose as the dominant sugar, with glucose being a closely second. The concentration of these sugars showed 10-20 times variation across this cucumber collection. Taste-relevant organic acids (malic, citric, fumaric, and oxalic acids) were quantified using HPLC-UV. The results showed malic acid was the most prevalent, followed by citric, fumaric, and oxalic acids, and the concentration of these acids varied up to 10 times in the GWAS panel. Volatile organic compounds (VOCs) were analyzed using solid-phase microextraction with gas chromatograph-mass spectrometry (SPME-GC-MS). Among ~150 VOCs identified, C6 and C9 aldehydes and alcohols were the most dominant. Around 20 volatiles were key to recreating cucumber-like aroma which were verified by a sensory study. These findings elucidate consumer expectation on cucumber flavor and how flavor varies across different varieties.

Key role of texture in fresh-cut vegetables and characterization of texture-related parameters in cucumber Cassidy N. Duan[1], cduan@twu.edu, Thi Nguyen[2], Junyi Tan[2], Yiqun Weng[2,3], Xiaofen Du[1]. (1) Nutrition and Food Science, Texas Woman's Univ., Denton(2) Plant and Agroecosystem Sciences, Univ. of Wisconsin System, Madison(3) USDA-ARS Vegetable Crops Research Unit, Madison, Wisconsin Texture is a key quality parameter for fresh-cut fruits and vegetables, which can influence consumer preference for freshness and crisp texture. Texture can be measured using both instrumental analysis and sensory evaluation. However, there is a notable gap in the current literature regarding an in-depth understanding of texture-related parameters in fresh-cut vegetables, including cucumber. This study aims to review fresh-cut salad vegetable texture and its characterization, as well as define and characterize vital texture parameters related to fresh-cut cucumber. For texture measurement, a Texture Analyzer equipped with a specific software was used to assess the overall hardness (N, cut through the whole slide of cucumber) and essential parameters such as hardness (N), brittleness (N), cohesiveness, gumminess, springness, and chewiness for individual slices of cucumber fruit. Twenty randomly selected cucumbers were sliced into 10 equal slices and trimmed to 10 mm using a kitchen-grade mandolin. Each slice was tested for overall hardness (N) using a knife blade and tested for individual parameters on three different tissues of the cucumber using a Magness-Taylor Texture Probe for mesocarp and endocarp, and a Voldokecivh Bite Jaw probe for the exocarp. Results showed that overall hardness is lowest at the blossom end (~12.614 N) and highest at the stem end (~19.042 N), with significant differences between the two regions. Furthermore, the endocarp tissues of the cucumber exhibit the lowest values of hardness, brittleness, gumminess, and chewiness (~3.140 N, 3.315 N, 0.375, and 0.242 respectively), while the exocarp exhibits the highest values (~12.724 N, 13.160 N, 1.266, and 0.768 respectively). No significant difference was observed in cohesiveness and springiness. This study identifies key texture-related parameters that define fresh cucumber texture, improving our understanding of its role in fresh-cut fruits and vegetables. The findings could inform future sensory evaluations on consumer acceptance of cucumber texture.

Quantitative trait loci mapping of fruit firmness in cucumber Yiqun Weng[1,2], yiqun.weng@usda.gov, Junyi Tan[2], Thi Nguyen[2], Cassidy N. Duan[3], Uijeong An[3], uan@twu.edu, Xiaofen Du[3]. (1) Vegetable Crops Research Unit, USDA ARS, Madison, Wisconsin(2) Dept. of Plant and Agroecosystem Sciences, Univ. of Wisconsin, Madison(3) Dept. of Nutrition and Food Sciences, Texas Woman's Univ., Denton Cucumber (*Cucumis sativus* L.) is appreciated by consumers for its unique flavor and texture. Fruit (skin and flesh) firmness is a key attribute of texture, which is closely associated with consumer acceptance for fresh consumption, processing quality (e.g., pickling), and post-harvest storage or shelf life. There is a wide variation in fruit texture across cucumber varieties due to long-term breeding and selection for adapting to different environments, production systems, market demands, and postharvest use. The physiological and genetic mechanisms underlying fruit firmness seem complex, which is known to be under the control of quantitative trait loci (QTL). A QTL mapping study was conduct aiming to identify genes/QTL associated with fruit firmness in cucumber. Two segregation populations were developed from crosses among three cucumber lines with contrast fruit firmness profiles. A GWAS (genome-wide association study) panel consisting of 220 accessions from diverse phylogenetic groups, geographic origins, or market classes were also created. Skin toughness and flesh firmness were phenotyped in replicated trials across multiple environments for these populations. QTL analysis in the biparental populations and association analysis in the GWAS panel suggested that fruit firmness in cucumber is controlled few (three to five) QTL with major or moderate effects. A major-effect fruit firmness QTL *ffm1.2* was subjected to fine genetic mapping with near isogenic line (NIL)-derived segregating populations, which allowed to delimit the QTL into a region less than 100 kb. Based on multiple lines of evidence, a candidate gene for *ffm1.2* was identified, which seems to have a novel function in regulating fruit firmness. This study provides novel insights into the genetic and molecular control of cucumber fruit firmness which may contribute to the manipulation of this important trait through biotechnological approaches in the future.

Aroma composition of blackberries: Implications for flavor enhancement Rahul Sen[2], rsen@uark.edu, Katelyn Sheehan-Lust[1], Scott Lafontaine[2], Margaret Leigh Worthington[1]. (1) Horticulture, Univ. of Arkansas, Fayetteville(2) Food Science, Univ. of Arkansas, Fayetteville Deciphering the details of blackberry flavor is essential for aligning consumer tastes and maintaining a competitive edge in the market. Aroma plays a crucial role in shaping the flavor profile of

blackberries. Current study was conducted on 96 blackberry (*Rubus* subgenus *Rubus*) cultivars grown in Arkansas with the aim of identifying and quantifying key volatile compounds using Gas Chromatography-Mass Spectrometry (GC-MS/MS) to providing valuable chemical insights for future breeding targets. A total of 184 volatile compounds from nine chemical classes were identified and semi-quantified using a deuterated internal standard in full scan mode. A significant variation was observed among the cultivars in terms of their aroma profiles. The same samples were evaluated by consumers through sensory analysis under the Univ. of Arkansas Fruit Breeding Program, for aroma and taste attributes such as overall liking, aroma, flavor, sweetness, and sourness across 24 panels. Pearson correlation analysis revealed a significant positive correlation between overall liking, overall flavor, aroma, and sweetness, as well as specific aroma and taste attributes such as apple, banana, candy, grape, and peach. In contrast, attributes such as citrus, grassy, earthy, musty, pine, and chemical-like flavors showed significant negative correlations with overall liking. A total of 118 compounds were found to show strong either positive or negative correlations with consumer preferences. Efforts are now being made to quantify these compounds using the targeted GC-MS/MS analysis to confirm their presence and understand their influence on the fruit's sensory properties to identify a suitable breeding target for improved and consistent flavor profiles

Effects of rootstocks on the flavor quality of huanglongbing-affected sweet orange juices Yu Wang, yu.wang@ufl.edu, Xin Liu, Fred Gmitter, Jude Grosser. Citrus Research and Education Center, Univ. of Florida, Lake Alfred Citrus greening disease, also known as Huanglongbing (HLB), is one of the most destructive diseases impacting citrus production worldwide. To optimize scion/rootstock combinations and improve the flavor quality of HLB-affected orange juice, an integration of the sensory study and chemical profiling approach was employed to study the effects of different rootstocks on the flavor quality (CH, Blue, 1804, FG, SW, and Volk). A sensory panel evaluated the flavor attributes of the orange juices, revealing that juice from rootstock CH had the best overall quality, characterized by high sweetness, and low sourness and bitterness. In contrast, rootstocks Volk and FG produced juices with the poorest flavor quality. Chemical profiling using ultra-high-performance liquid chromatography–mass spectrometry (UHPLC-MS) and gas chromatography–mass spectrometry (GC-MS) resulted in the semi-quantification of 89 metabolites, including nonvolatile and volatile compounds. Canonical correlation analysis highlighted that specific sugars and sugar alcohols contributed significantly to the sweetness of the juice. Additionally, amino acids were linked to positive flavor quality. In contrast, limonin were identified as contributors to increased bitterness. KEGG pathway enrichment analysis further indicated that different rootstocks influenced key metabolic pathways, such as ABC transporters, and monoterpenoid biosynthesis. These findings demonstrate how specific rootstocks can alter metabolite profiles, thus affecting the overall flavor quality of orange juice.

Development of active packaging for postharvest preservation of fruit Xiuxiu Sun, xiuxiu.sun@usda.gov, Chang Shu, Zahra Yusufali. USDA Agricultural Research Service, Hilo, Hawaii A major concern of the food processing industry is foodborne illness. Every year, about one in six Americans is affected by foodborne illness. Foodborne illness causes 3000 deaths and over 15 billion dollars in medical expenses annually. Another major concern is food spoilage. One third of all food is wasted globally, which is over a billion tons. Annually, spoilage results in over 250 billion dollars in wasted food. Therefore, the development of food packaging and processing methods that extend shelf-life and reduce foodborne illness and food spoilage is critical for the food industry. Edible and sustainable packaging, including coatings, films, and capsules extended the shelf-life and improved food safety of tropical and subtropical fruit without negatively impacting their quality.

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Encapsulation of Phytochemicals through polymer-catechin particles self-assembled via tea-steeping Sawyer Chang[1], sawyerchang@rocketmail.com, Jorge Pereira[1], Ander Nordin[2], Swadeshmukul Santra[1,3,4]. (1) NanoScience Technology Center, Univ. of Central Florida, Orlando (2) Dept. of Materials Science and Engineering, Univ. of Central Florida, Orlando (3) Dept. of Chemistry, Univ. of Central Florida, Orlando (4) Burnett School of Biomedical Sciences, Univ. of Central Florida, Orlando The brewing of teas has been an integral pillar of human culture for millennia. These beverages have always aimed to extract the phytochemicals within berries, leaves, and many other food products. Leaves from *Camellia sinensis* are used to prepare green, black, white, oolong, and pu'er teas that are highly regarded for their organoleptic properties. Moreover, many of the widely regarded health benefits are ascribed to the high polyphenolic content within the teas. It has been established that polyphenols can interact with hydrophilic polymers, through hydrogen bonding, to form stable small particle suspensions. In this work, polymer-catechin particles were synthesized *in situ* to load and deliver active ingredients without requiring any behavioral change by the end user. The particle's size and surface charge properties were assessed via dynamic light scattering and zeta potential. Furthermore, the chemical composition of the particle was studied with Fourier-transform infrared spectroscopy, UV-Vis, and fluorescence spectroscopy. The loading of the phytochemicals was confirmed through liquid chromatography-mass spectrometry. A 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay was utilized to assess radical scavenging activity and a minimum inhibitory concentration (MIC) assay was employed to assess the impact of the particle on model gut microbes. The co-loading of hibiscus and turmeric exemplifies the system's ability to load a wide range of compounds and food products for the selection of desired particle characteristics. These findings demonstrate the potential to create a simple and economical alternative to nutraceutical delivery simply by the brewing of tea.

Understanding how beverage components interact with aluminum beverage cans Austin Montgomery, am3253@cornell.edu, Rachel Allison, Matthew J. Sheehan, Julie M. Goddard, Gavin L. Sacks. Food Science, Cornell Univ., Ithaca, New York, US The diversity of beverages packaged in an aluminum can has drastically increased over the past decade. The way beverage components interact with aluminum cans (and the <10-micron polymer liner that separates beverage and metal) has not been well documented in peer reviewed literature. The term "corrosion" is generally used to describe the following three phenomena in canned beverages: 1. Off-aroma formation (SO_2 containing beverages produce H_2S), 2. Pinhole corrosion (high electrolyte beverages eat through can bodies), and 3. Increased aluminum dissolution/visible damage (high organic acid/ethanol beverages degrade the liner). Each problem is measured using a different analysis technique, as well. Dissolved aluminum measurements are generally the gold standard metric for long term studies. Electrochemical impedance spectroscopy (EIS) can give information about the state of the polymer liner before visual methods can detect corrosion. H_2S can be measured directly via colorimetric gas detection tube. Through these techniques, we have developed passive and active solutions following long-term storage, and accelerated, short-term tests. Passive solutions have identified the maximum concentration of corrosive components before problems arise so that producers can adjust formations accordingly. Active solutions involve beverage can treatments that inhibit corrosion and extend the shelf life without compromising beverage formulation. This talk will discuss generally how beverage

components interact with aluminum cans and provide an overview of the active and passive solutions developed to increase the quality and shelf life of beverages in aluminum cans.

Baked-though butter flavor: Flavor dynamics of lactones during baking in a "shortbread" cookie model system Hui-Erh Chai, hechai2@illinois.edu, Keith R. Cadwallader. Food Science and Human Nutrition, Univ. of Illinois Urbana-Champaign Flavor generation, retention and depletion during baking, especially at high temperatures, is of great concern for the bakery industry. Understanding how flavor compounds behave under thermal dynamics is crucial for minimizing flavor loss during baking while enhancing the sensory experience during consumption. An important requirement for predicting flavor dynamics in baked products is the development of an appropriate formulation and process that produces a representative product while allowing for precise control over critical process parameters. Classic shortbread cookie, with its simple, well-defined composition—sugar, butter, and flour in a 1:2:3 w/w ratio—and the availability of commercial benchmark products, serves as an ideal matrix for studying flavor behaviors during thermal processing. From a flavor analysis perspective, stable isotope dilution analysis (SIDA) combined with gas chromatography-mass spectrometry (GC-MS) represents the best practice, as the quantitation method self-corrects for matrix variations, ensuring accurate measurement of key odorants despite the dynamic changes in the matrix during baking. Among the 107 odorants identified in both commercial and self-prepared shortbread cookies using solvent-assisted flavor evaporation (SAFE) combined with gas chromatography-olfactometry (GC-O), aroma extract dilution analysis (AEDA), and GC-MS, δ-decalactone, *(Z)*-6-dodeceno-γ-lactone, δ-dodecalactone, and butanoic acid showed the highest flavor dilution factors. These findings align with published literature, which emphasizes that γ- and δ-lactones, derived from butter triglycerides, are key odorants contributing to the unique flavor of shortbread cookies. Quantitation of 61 selected odorants using SIDA, along with odor activity values (OAVs), revealed the significance of δ-dodecalactone (OAV > 100) plus 16 additional odorants showing OAVs above 1. By substituting butter with palm oil, water, and a slight amount of salt, and chemically reconstructing shortbread flavor from its components, this research successfully developed a "shortbread" matrix cookie (model system) nearly indistinguishable from traditional shortbread. This presentation will discuss the development and application of this model system for studying dynamic flavor changes in shortbread cookies during baking, thus offering valuable insights into the complex relationship between baking parameters and flavor development or loss in this product.

Combined cross-linked enzyme aggregates of β-galactosidase and glucose isomerase stabilized by trehalose nanostructure excipients Joshua G. Scott, jgs297@cornell.edu, Julie M. Goddard. Food Science, Cornell Univ., Ithaca, New York Immobilization of enzymes into solid nanobiocatalysts allows scientists and engineers to mediate a wide range of food waste transformations. However, enzyme stability is a challenge when using immobilized enzymes under extreme conditions (e.g., high temperature, low pH values) typical to food waste and byproduct streams. Nanomaterials enhance enzyme activity retention in immobilized enzyme systems by reducing denaturing enzyme-carrier interactions and improve enzyme stability in environmental extremes. Hierarchical biocatalytic nanocomplexes provide nanoscale environments for activity retention while containing microscale character to allow facile recovery. To create hierarchical biocatalytic nanocomplexes which enable cascade biocatalytic reactions and stabilization against extreme conditions, multiple enzymes may be co-immobilized by precipitation and cross-linking into combined cross-linked enzyme aggregates (combi-CLEAs) containing nanostructure excipients having the enzyme stabilizing disaccharide, trehalose. Herein, we report the preparation and assessment of combi-CLEAs of β-galactosidase (β-Gal) and glucose isomerase (GI) containing trehalose-decorated poly(amidoamine) nanostructures for the conversion of lactose into lactose-fructose syrup. Combi-CLEAs of β-Gal and GI were prepared by precipitation of 100 mg/mL β-Gal and GI mixtures with 70% *t*-Butanol, followed by crosslinking with 100 mM glutaraldehyde. The effect of varying β-Gal and GI concentrations in combi-CLEAs preparation on combi-CLEAs conversion of lactose to fructose was evaluated, showing a maximum β-Gal and GI activity when preparing combi-CLEAs with 100 mg/mL enzyme solutions with a β-Gal to GI activity ratio of 100 $U_{\beta\text{-Gal}}/U_{GI}$. Trehalose nanostructures, prepared by carbodiimide coupling of succinylated trehalose to poly(amidoamine) and characterized by Fourier-transform infrared spectroscopy and nuclear magnetic resonance, was added to the combi-CLEA preparation, and the resulting combi-CLEAs exhibited 51% higher β-Gal activity and enhanced thermal stability while maintaining GI activity. Combi-CLEAs with trehalose decorated nanostructures were able to be recycled five times while maintaining 40% and 7% β-Gal and GI activity, respectively. This work has shown potential to perform cascade biocatalytic reactions to valorize D-lactose and improve enzyme performance in environmental extremes through use of multi-enzyme biocatalytic nanomaterials containing trehalose nanostructures.

Engineering novel nucleic acid biosensors for the rapid on-site detection of foodborne pathogens using nanomaterials Tom Kasputis[1], tomk21@vt.edu, Juhong Chen[2,1]. (1) Biological Systems Engineering, Virginia Polytechnic Institute and State Univ., Blacksburg(2) Bioengineering, Univ. of California Riverside Ensuring food safety through rapid detection of contamination is critical for protecting public health and reducing economic losses. Foodborne pathogens cause significant morbidity and mortality, costing the U.S. economy over $100 billion annually. The current standard for detecting foodborne pathogens is PCR, which requires specialized equipment and trained personnel, limiting its use in field settings. On-site biosensing is essential to improve foodborne pathogen surveillance, yet many existing biosensors lack the necessary sensitivity or timeliness to properly address foodborne contamination. To overcome this challenge, I have developed several nucleic acid biosensors for the rapid and sensitive detection of foodborne pathogens. By leveraging CRISPR systems combined with several innovative nanomaterials such as gold nanoparticles (AuNPs), graphene oxide (GO), and G-quadruplexes (G4s), I have demonstrated efficient on-site detection of antimicrobial resistance in food processing facilities, *Salmonella* in milk, and norovirus in leafy greens. These CRISPR-based biosensors offer high sensitivity and simplicity owing to their unique *trans*-cleavage mechanism, allowing untrained personnel to perform tests in non-laboratory environments. Complementing this approach, microfluidics offers another power tool for on-site pathogen detection by manipulating fluids at the nanoscale for precise analysis within portable devices. This is highlighted by the self-powered digital microfluidic chip (Sp-dChip), developed using loop-mediated isothermal amplification (LAMP) to provide quantitative and sensitive viral detection. Together, these innovations advance the field of food safety by offering effective and implementable solutions for on-site biosensing, enhancing the detection of foodborne pathogens, and contributing to safer food systems

Simultaneous dual-gene detection of *Escherichia coli* O157:H7 based on CRISPR/Cas13-Mediated biosensor Yawen He[1], yawenhe@vt.edu, Xuemei Zhang[2], Juhong Chen[3]. (1) Virginia Polytechnic Institute and State Univ., Blacksburg(3) Univ. of California Riverside Shiga toxin-producing *Escherichia coli* O157:H7 (*E. coli* O157:H7) causes a large number of foodborne outbreaks worldwide each year. Due to the high genomic similarity of different E. coli serotypes, it is difficult to distinguish *E. coli*

O157:H7 from other *E. coli*. To address this issue, we used bioinformatic method to locate specific genes encoding *E. coli* O antigen and H antigen, then developed a CRISPR/Cas13-mediated biosensor for simultaneous dual-gene detection of *E. coli* O157:H7. Two Cas13 nucleases (LwaCas13a, PsmCas13b) were utilized to target the $rfbE_{O157}$ and $fliC_{H7}$ genes in *E. coli*, respectively. In the presence of *E. coli* O157:H7, Cas13 nucleases can recognize $rfbE_{O157}$ and $fliC_{H7}$ gene simultaneously, triggering unique dinucleotide preferences for two fluorescent probes by *trans*-cleavage, which in turn generates a dual-channel fluorescent signal. Integrated with recombinase polymerase amplification (RPA), the proposed CRISPR/Cas13-mediated biosensor successfully distinguished *E. coli* O157:H7 from other *E. coli* serotypes. Impressively, this biosensor has a detection limit as low as 43 CFU/mL for *E. coli* O157:H7, and 100% accuracy in milk samples. This biosensor provides a more accurate and convenient pathway to identify *E. coli* O157:H7 in the food supply chain.

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TUESDAY MORNING March 25
Applying Mass Spectrometry and NMR Techniques in the Study of Plant and Food Metabolomics

An Integrated Approach Combining Mass Spectrometry, NMR, and Chemometrics for Quality and Authenticity Assessment of Essential Oils Mei Wang[1], meiwang@olemiss.edu, Jianping Zhao[2], Ikhlas A. Khan[2]. (1) USDA-ARS Natural Products Utilization Research Unit, Univ., Mississippi(2) National Center for Natural Products Research, Univ., Mississippi Current standards and methods for assessing essential oil (EO) quality, as established by regulatory authorities, often inadequate due to the inherent complexity of EOs and the increasing prevalence of adulteration in the expanding market. This study introduces a comprehensive analytical framework that integrates mass spectrometry (MS), nuclear magnetic resonance (NMR) spectroscopy, and chemometrics to evaluate the quality and authenticity of EOs. MS provides detailed chemical profiles and quantitative data on volatile compounds present in EOs, while NMR offers comprehensive, unbiased detection, and spectral fingerprinting for identifying EOs. Chemometric techniques are employed to analyze complex datasets, enhancing the interpretation of MS and NMR results. This integrated approach enables precise identification and quantification of key constituents, detection of adulteration, and verification of the oil's origin. By combining the strengths of each analytical method and applying them synergistically through chemometric analysis, this framework significantly improves the reliability and accuracy of essential oil assessments. The findings highlight the effectiveness of this multi-faceted approach in ensuring the authenticity and quality of essential oils, offering a promising tool for quality control in the EO industry.

Metabolic alterations of root exudates in *Lotus japonicus* caused by *Acidovorax* strains and arbuscular mycorrhiza Franziska Seufert[1], franziska.seufert@tum.de, Yang Si[3], Jenna Krumbach[3], Timo D. Stark[1], Caroline Gutjahr[3], Corinna Dawid[1,2]. (1) Chair of Food Chemistry and Molecular Sensory Science, Technische Univ. Munchen, Bayern, Germany(2) Professorship of Functional Phytometabolomics, Technische Univ. Munchen, Bayern, Germany(3) Max-Planck-Institut fur Molekulare Pflanzenphysiologie, Potsdam, Brandenburg, Germany Considering the increasing world population, it is becoming more important to enhance the yield of crucial food crops such as legumes (Fabaceae). They are the second most important plant family due to their high content of protein, minerals, and micronutrients. Preserving or increasing their crop yield can be achieved through chemical additives, which harm the environment, and also through interaction of microorganisms. Plant roots are inhabited by a diverse range of bacteria, which significantly alter the plant metabolome. This is the case for various *Acidovorax* bacterial strains that were previously found on the roots of *Lotus japonicus* wild-type. While previous research has delved into the symbiotic relationship between *L. japonicus* and arbuscular mycorrhiza fungi (AMF), the effect of *Acidovorax* on the metabolome is still unknown. We investigated the changes in the metabolome of *L. japonicus* root exudate induced by AMF and *Acidovorax* bacteria using untargeted metabolomics with UPLC-ESI-ToF-MS in positive and negative ionization mode. The secondary plant metabolites showing the most significant changes were determined by using MS and comparing the results with authentic reference standards. Commercially not available components were isolated using HPLC, and their structures were determined by means of MS and nuclear magnetic resonance (NMR) spectroscopy. Through different comparisons of the varying biological treatments, we discovered that different substance classes, including polyphenols, saponins, hydroxy fatty acids, coumarin derivates, and pterocarpans were significantly altered in the root exudate. Importantly, the bioactivity of these compounds on root-associated microorganisms is currently under investigation, with potential implications for increasing plant yields.

Characterizing bourbon whiskey via the mass spectrometry - based molecular fingerprinting Chris Zhu, zhu.2484@osu.edu. The Ohio State Univ., Columbus Whiskeys are popular alcoholic beverages made from grains by fermentation, distillation, and aging processes. Among all the whiskeys, bourbon is an American whiskey made from at least 51% corn and various percentages of wheat, barley, and rye. As a result, American whiskey is an essential contributor to the local economies, and it was found that over 4 billion U.S. dollars in revenue have been generated by bourbon & Tennessee whiskeys in 2019. Because of the high economic value of whiskey, sensitive, robust, and reliable measures of product quality evaluations are frequently sought but often with disappointing outcomes. Meanwhile, metabolomics and foodomics can shed light on the molecular processes within living organisms and the complex food composition by leveraging sophisticated analytical techniques to systematically analyze the vast array of molecular features. Therefore, in this study, 121 commercial bourbon samples were analyzed using both gas chromatography and liquid chromatography combined with mass spectrometry. Both targeted and untargeted foodomics revealed distinctive molecular fingerprints that vary by bourbon's age, color and sweetness. Overall, we demonstrated that mass spectrometry-based analytical techniques in combination with bioinformatics tools can provide a powerful strategy for the confident identification of high-quality products and robust evaluation of their commercial values.

Integration of sensory and multi-omics approaches to understand flavor pathways in mango Yu Wang[1], yu.wang@ufl.edu, Xin Liu[1], Jonathan Crane[2], Xingbo Wu[2]. (1) Food Science and Human Nutrition, Univ. of Florida, Lake Alfred(2) Tropical Research and Education Center, Univ. of Florida, Homestead In this study, we combined consumer sensory evaluations with multi-omics (metabolomics and proteomics) to investigate the formation pathways of key flavor compounds in three mango cultivars. A consumer panel were conducted to asses sensory qualities such as overall liking, flavor intensity, sweetness, and firmness etc. Results indicated that flavor intensity and overall flavor liking played a critical role in consumer preference. To further explore the flavor differences, we conducted GC-MS analysis of aroma compounds, which revealed distinct profiles across cultivars. Terpenoids were the most abundant compounds, followed by aldehydes, esters, and alcohols, helping explain the higher consumer liking. By integrating metabolomics and

proteomics data, we identified key metabolic pathways—such as those involving linoleic and linolenic acids, amino acids, and fatty acid oxidation—contributing to the formation of specific flavor compounds in each cultivar. Variations in these pathways were linked to distinct flavor profiles, such as the grassy notes as well as the fruity notes. In conclusion, this study highlights how combining sensory analysis with multi-omics can uncover the biochemical pathways underlying consumer-preferred flavors in mangoes.

Nontargeted LC/MS chemical profiling of chili pepper pungency Joel Borcherding, borcherding.13@buckeyemail.osu.edu, Edisson Tello, Devin G. Peterson. The Ohio State Univ., Columbus Pungency, commonly referred to as spiciness, describes the sharp, burning sensation often experienced when consuming chili peppers (Capsicum spp.). This sensation, classified as a chemesthetic perception, arises when chemical irritants stimulate nociceptive neurons, leading to feelings of pain or pungency. This flavor perception is broadly contained within the somatosensory system, wherein receptors (TRPV1) may be activated by thermal, mechanical, and chemical stimuli. Historically, the pungency of chili peppers has been linked to two primary capsaicinoids: capsaicin and dihydrocapsaicin. In this study, a nontargeted Liquid Chromatography/Mass Spectrometry (LC/MS) flavoromics approach was utilized to identify compounds influencing the perception of pungency in chili peppers. Chemical profiles from 10 different chili pepper cultivars were analyzed using orthogonal partial least squares regression, comparing them to sensory descriptive time-intensity data (maximum intensity). The model showed strong fit and predictive ability ($R^2Y = 0.992$, $Q^2 = 0.827$). Highly predictive features (Pcorr > -0.7, VIPpred > 2.0) were selected for further investigation. The predictive compounds were isolated from chili peppers using multi-dimensional off-line preparative LC/MS fractionation and structurally characterized through high-resolution MS and mono- and bi-dimensional nuclear magnetic resonance. Two capsicosides, two terpene glycosides, and one glycolipid were identified and quantified. Sensory recombination analysis using a half-tongue two-alternative forced-choice discrimination test confirmed that three compounds significantly suppressed the perception of pungency. An improved understanding of the complex chemical stimuli contributing to pungency perception provides a basis for flavor optimization.

Harnessing food volatilomics for sample categorization and sensory prediction Jonathan Beauchamp[1], jonathan.beauchamp@ivv.fraunhofer.de, Lea Friedrich[1,2], Andreas T. Grasskamp[1], Helen Haug[1,2], Maria Izaber[1,2], Tilman Sauerwald[1,3], Satnam Singh[1], Gina Zeh[1]. (1) Sensory Analytics and Technologies, Fraunhofer-Institut fur Verfahrenstechnik und Verpackung IVV, Freising, Bayern, Germany(2) Chair of Smell and Aroma Research, Friedrich-Alexander-Univ. Erlangen-Nurnberg, Bayern, Germany(3) Dept. of System Engineering, Univ. des Saarlandes, Saarbrucken, Germany Unraveling the complex aroma profiles of foods is usually undertaken by combining sensory evaluations with instrumental analyses. This approach offers a comprehensive and detailed characterization of a product on a molecular basis, yet it is time-consuming and can be a hindrance in certain endeavors, such as in product development where it can hamper progress. Consequently, if large quantities of samples require analysis, such thorough methods become unviable and more sophisticated and cost-effective procedures are required. Often, similar samples – from raw materials to novel formulations – contain common constituents that are responsible for the overall aroma profile, albeit in different proportions. In such cases, an unequivocal identification of the individual compounds is not always strictly necessary, especially during the early stages of food product development or quality control for which a rapid screening would suffice. Analyzing the volatile profiles of products via mass spectrometry or related techniques represents an ideal approach to characterize and categorize samples. The Smart Odor Assessment (SOdA) method represents one such approach that exploits the volatilomics data acquired by gas chromatography-mass spectrometry (GC-MS) analyses of samples by using machine learning algorithms for a predictive classification of their sensory profiles. Specifically, the linear retention indices and mass spectral data from GC-MS analyses are compared with an in-house database of aroma compounds and their sensory properties, which are combined with data derived from sensory evaluations of the samples to afford an automated sample classification. This technique has been previously demonstrated to successfully differentiate samples in various food systems, from pea protein isolates to whiskies, and can prospectively allow the influence or impact of specific food ingredients on the ensuing product to be predicted. In a related approach, volatilomics and sensory datasets can be combined with additional parameters of a product, such as its textural properties or hedonic liking to provide a prediction of consumer acceptance. This has been demonstrated on fruit gum candies using volatilomics data from GC ion mobility spectrometry (GC-IMS) analyses. This presentation will showcase current endeavors, through the use of machine learning, to harness volatilomics datasets for categorizing products or predicting their sensory properties and/or consumer acceptance.

Targeted metabolomic approach to identify phenolic compounds in *Psidium friedrichsthalianum* fruit Tatiana Cuadrado-Silva[1], Maria Pozo Bayon[2], Coralia Osorio Roa[1], cosorior@unal.edu.co. (1) Dept. de Química, Univ. Nacional de Colombia, Bogota(2) Instituto de Investigación en Ciencias de la Alimentación (CIAL), Madrid, Spain The Myrtaceae family is well known for its high content of bioactive compounds, being relevant phenolic compounds. The metanolic extract of *Psidium friedrichsthalianum* Nied., was partitioned with solvents of increasing polarity: ethyl ether, ethyl acetate, and n-butanol. The antioxidant activity was measured by Folin-Ciocalteu and ABST assays. The ethyl acetate fraction showed the highest phenolic content; thus, an analytical method for the comprehensive profiling of phenolic compounds was used by UPLC-ESI/QqQ/MS/MS in MRM mode. From this analysis, 22 phenolic compounds were identified, among which several hydroxybenzoic, phenylacetic, and hydroxycinnamic acid derivatives were found. Some of them, (+)-catechin, procyanidin B1, procyanidin B2, and (-)-epicatechin, were reported as constituents of *Psidium friedrichsthalianum* fruit. Bioguided fractionation by exclusion size, C_{18} column chromatography, and preparative RRLC (rapid resolution liquid chromatography) allow purifying of the 3,3',4-tri-O-methylellagic acid-4'-O-*β*-D-glucopyranoside. The presence of ellagic acid and isomeric procyanidin B shows the potential of this fruit for the development of functional foods.

Mozambioside degradation products activate bitter taste receptors TAS2R43 and TAS2R46 Coline Czech[1,2], c.bichlmaier.leibniz-lsb@tum.de, Antonella Di Pizio[2,3], Maik Behrens[2], Roman Lang[2]. (1) TUM School of Life Sciences, Freising, Bayern, Germany(2) Leibniz-Institut fur Lebensmittel-Systembiologie an der Technischen Univ. Munchen, Freising, Bayern, Germany(3) Chemoinformatics and Protein Modelling, School of Life Science, Technical Univ. of Munich, Freising, Bayern, Germany As a globally traded commodity with significant economic and social influence, coffee stands out due to its unique flavor profile, marked by roasted aromas and bitter taste. At temperatures above 220 °C, green coffee beans are roasted to the final product of roasted coffee beans. However, during the roasting process, new compound classes form from naturally abundant precursors in green coffee beans, potentially contributing to coffee's bitter taste. The bitter-tasting diterpene glycoside mozambioside is an Arabica-specific compound that degrades partly during roasting into new products. The newly formed roasting products were previously unknown, and their potential to contribute to coffees bitter taste was studied.

Structural investigations were conducted to predict bioactivity of similar analytes from this compound class. Mozambioside (**1**) was isolated from green Arabica coffee beans by methanolic extraction and preparative liquid chromatography. The pure isolated **1** was roasted without any matrix to generate roasting products, leaving only about 20% of the original mozambioside. By semi-preparative LC, five new degradation products were isolated in pure form and structurally elucidated using NMR spectroscopy, MS, UHPLC-PDA, and –ELSD detection: 17-*O*-*β*-D-glucosyl-11-hydroxycafestol-2-on (**2**), 11-*O*-*β*-D-glucosyl-16-desoxycafestol-2-on (**3**), 11-*O*-*β*-D-glucosyl-(*S*)-16-desoxy-17-oxocafestol-2-on (**4**), 11-*O*-*β*-D-glucosyl-15,16-dehydrocafestol-2-on (**5**), and 11-*O*-*β*-D-glucosyl-(*R*)-16-desoxy-17-oxocafestol-2-on (**6**). In an in vitro bitter taste receptor activation experiment roasting products **4**, **5**, and **6** revealed the most potent activation for TAS2R43 and -R46, showing even greater potency compared to the educt mozambioside. In silico molecular modeling explained how the small changes in the molecules and its functional groups greatly impact the interaction between analytes and the binding sites of bitter taste receptors. Using a 3-AFC experiment, a human panel of 10 participants studied the in vivo bitter threshold of potent activators **1**, **4**, **5**, **6**, and their aglycone 11-hydroxy-cafestol-2-on (**8**). Quantitative analysis was conducted using a UHPLC-QTrap-MS/MS device to detect the content of the target compounds in commercial coffee grounds, coffee brews, and coffee roasting series.

***In vitro* bioassay-guided isolation and identification of bioactive compounds by LC-MS *Parkia timoriana* (DC.) Merr. -a lesser-known edible medicinal plant species, from Manipur, Northeastern India** Sorokhiabam Sureshkumar Singh[2,1], suresh@manipuruniv.ac.in, Khaidem Kennedy Singh[2,3], Chaman Lal Sharma[2]. (1) Botany, Manipur Univ., Imphal, Manipur, India(2) Forestry, North Eastern Regional Institute of Science and Technology, Nirjuli, Arunachal Pradesh, India(3) Natural Product Chemistry, Institute of Bioresources and Sustainable Development, Imphal, Manipur, India The pods and inflorescence of a lesser-known edible medicinal plant species, *Parkia timoriana* (PT) is used as a rare and costly seasonal food as well as for the treatment and management of diabetes by different ethnic communities in Manipur, Northeastern India. The present study aimed to identify the antidiabetic and antioxidant properties of the petroleum ether (PTPE), ethyl acetate (PTEE), methanol (PTME) and water extracts (PTWE) of the inflorescence tissues using *in vitro* α-glucosidase and α-amylase assays. The PTME and PTME inflorescence extracts showing significant (>50%) antidiabetic and antioxidant activities of as compared to standard reference drug acarbose and gallic acids were separated through column chromatography, and assayed for both biological activities. The column fractions with significant antidiabetic and antioxidant activities were analyzed to identify the presence of bioactive compounds by LC-MS. The IC_{50} values of the two PTME column fractions (F2 and F5) and one column fraction of PTWE (F10) revealed highly significant α-glucosidase inhibitory activities (13.1, 14.8 and 13.8 µg/ml) as compared to acarbose as the standard reference drug (15.8 µg/ml). Similarly, for antioxidant activity, a PTME column fraction (F5) and two column fractions of PTWE (F9 and F10) have shown IC_{50} values of 0.75, 17.5 and 15.4 µg/ml as compared to 16.5 µg/ml for gallic acid as standard antioxidant. A total of 19 major phytochemicals were identified from the five column fractions. Six of the compounds with positive ESI $[M+H]^+$ mass (m/z), 1,2-Benzenedicaroxylic acid, decyl octyl ester (419.02), Beta-sitosterol (415.14), Epigallocatechin gallate (459.24), Hyperin (465.16), Stigmasterol (413.27) and Ursolic acid (457.27) were found to show antidiabetic and antioxidant properties. The present study validates the scientific reasons behind traditional medicinal systems of using of *Parkia timoriana* as an antidiabetic remedy.

Tracing the transfer of dietary chemosensates and their metabolites from the maternal diet into human milk and urine by means of a curry spice intervention study Michael Gigl[1], michael.gigl@tum.de, Katharina N`Diaye[2], Marcel Debong[3], Roman Lang[4], Andrea Buettner[3,5], Thomas Hofmann[2], Helene M. Loos[3,5], Corinna Dawid[1,2]. (1) TUM School of Life Sciences, Professorship for Functional Phytometabolomics, Technische Univ. Munchen, Freising, Germany(2) TUM School of Life Sciences, Chair of Food Chemistry and Molecular Sensory Science, Technische Univ. Munchen, Freising, Germany(3) Dept. of Chemistry and Pharmacy, Chair of Aroma- and Smell Research, Friedrich-Alexander-Univ. Erlangen-Nurnberg, Erlangen, Germany(4) Leibniz-Institut fur Lebensmittel-Systembiologie an der Technischen Univ. Munchen, Freising, Germany(5) Fraunhofer-Institut fur Verfahrenstechnik und Verpackung IVV, Freising, Germany Early sensory experiences play a pivotal role in shaping an infant's sensory preferences and food acceptance later in life. This study investigated the transmission of flavor-active compounds from a customary curry dish consumed by breastfeeding mothers to their milk and, subsequently, their potential perception by nursing infants. Additionally, the transformation reactions of flavor actives and their renal excretion in human metabolism were studied by analyzing the participating mothers' urine at distinct time points by means of untargeted and targeted metabolomics approaches. Breastfeeding mothers joined an intervention trial where they consumed the curry dish, and milk and urine samples were collected for flavor compound analysis. The dominant taste impression of the curry dish was identified as pungent, attributed to ingredients such as chili, pepper, and ginger, suggesting the presence of flavor compounds like capsaicin, piperine, and gingerols. Using targeted and untargeted mass spectrometry, piperine was identified as the intervention-derived compound present in human milk. Notably, piperine from pepper-containing foods is rapidly transferred to the mother's milk within an hour and subsequently delivered to the nursling. Although piperine concentrations in milk (50-200 nM) are lower than the human taste threshold, frequent exposure to sub-threshold concentrations may contribute to an increased tolerance via TRPV1 desensitization. Untargeted metabolomics analysis of urine samples from the intervention group revealed twelve metabolites, including (R/S)-linalool-β-glucuronide, eugenol-β-glucuronide, eugenol sulfate, 6-gingerol-4‘-O-β-glucuronide, and 6-gingerdiol-4‘-O-β-glucuronide upregulated after curry consumption. A liver homogenate bioassay introduced a novel approach for synthesizing reference standards of flavor-derived metabolites generated through phase I and II biotransformation reactions, enabling their accurate quantification using UHPLC-MS/MS. This investigation sheds light on the competitive biotransformation of sensory and physiologically active compounds from the curry dish within the human body. The study also helps to understand the observed metabolites' renal excretion process. Further research is necessary to explore the sensory impact of these metabolized flavor compounds and their potential influence on neonatal sensory programming.

DIGITAL SESSION
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Evolution of metabolomics in the argicultural and food sciences Alexander Buko, alex.buko@humanmetabolome.com. Human Metabolome Technologies Kabushiki Kaisha, Tsuruoka, Yamagata, Japan Over the past 20 years the field and technologies of metabolomics have grown significantly and expanded from biology to agriculture to food sciences, even into space. Moving into cellular biology with future foods, compositional and taste analysis of natural plant and fungi extracts and cell engineering have helped to expand metabolomics. Let’s take a look on how this field has grown, the new technologies and recent applications.

Epitopes of Scy p 1 were identified through the bionics digestive system combined multi-omics Meng Liu[1], Ying Li[1], Fei Huan[2], Yi Gu[2], Zhaomin Sun[1], Hong Liu[2], Guixia Chen[3], Guangming Liu[1], 200561000029@jmu.edu.cn. (1) Xiamen Ocean Vocational College, Xiamen, Fujian, China(2) Jimei Univ., Xiamen, Fujian, China(3) Women and Children's Hospital Affiliated to Xiamen Univ., Fujian, China Scy p 1 (tropomyosin) is one of the main allergens in *Scylla paramamosain*, while Scy p 1 is commonly ingested as food matrix contents after thermal processing. Processing and food matrix can potentially influence allergen allergenicity. It is necessary to identify the epitopes of Scy p 1 in thermally processed crab. The crab matrix was processed by the high temperature-pressure. Then the bionic digestive system was constructed based on the *in vitro* continuous simulated gastrointestinal tract digestion and the absorption of human intestinal Caco-2 cells. Bioinformatics, mass spectrometry technologies, and serological experiments were used to identify the epitopes. There were 13 epitope peptides predicted by bioinformatics technology, and 11 epitope peptides were detected by mass spectrometry after processing and bionic digestion. Nine candidate epitope peptides of Scy p 1 were identified. Five peptides (M_{19}-N_{29}, L_{99}-A_{109}, F_{153}-Y_{162}, A_{170}-S_{188}, E_{211}-Y_{221}) retained IgE-binding activity and were identified as the epitopes. IgE-binding activity of seven mutants (R21A, E103A, E104A, E115A, A116G, E122A, and E156A) was significantly reduced, which means are the critical amino acids of identified epitopes for Scy p 1. The study provides insight into understanding allergen epitopes and helps to eliminate crab allergenicity during thermal processing.

Analysis of structure-allergenicity relationship by site-mutation in disulfide bond site from Cra a 4 Shuai Gao, 2240770793@qq.com, Fei Huan, Ming-Xuan Wu, Ling-Na Ni, Yi Gu, Ya-xin Liu, Meng Liu, Guang-Ming Liu. Jimei Univ., Xiamen, Fujian, China Sarcoplasmic calcium binding protein (Cra a 4) from *Crassostrea angulata* was registered in the WHO/IUIS allergen database in our previous research. It had been reported that the spatial structure of allergen was crucial for maintaining the IgG-/IgE-binding activity, but the structure-allergenicity relationship of Cra a 4 has not been reported. In this study, the structure of Cra a 4 was destroyed by chemical denaturant treatment, showing that disruption of the structure reduced its IgG-/IgE-binding activity. Subsequently, site-directed mutation was used to mutate critical amino acids of the disulfide bond site (C_{97}), conformational epitopes (I_{105}, D_{114}), or Ca^{2+}-binding region (D_{106}, D_{110}) into alanine. The immunoreactivity of mutants (C_{97}A, I_{105}A, D_{114}A) by critical amino acid mutations in disulfide-bonding site or conformational epitopes significantly were reduced, and C_{97}A had the lowest immunoreactivity. Moreover, secondary structure, surface hydrophobicity, and surface electrostatic potential were analyzed, and the increase of the α-helical content, surface hydrophobicity, and hydrogen bonding forces of C_{97}A affected its allergenicity. Finally, the allergenicity of C_{97}A was further evaluated in the murine model of food allergy. Compared with Cra a 4, C_{97}A-immunized mice have weaker allergic symptoms, and the level of IgE in sera was significantly reduced, indicating C_{97}A has the hypoallergenic characteristic *in vivo*. Overall, these findings suggest that the disulfide bond site is the key amino acid to maintain the structure and allergenicity of Cra a 4, understanding the structure-allergenicity relationship will facilitate the development of prevention and treatment strategy for the oyster allergy.

Designing a hypoallergenic derivative of Cra a 1 with the potential for tolerance induction Fei Huan, 1225252857@qq.com, Shuai Gao, Ling-Na Ni, Ming-Xuan Wu, Yi Gu, Meng Liu, Guang-Ming Liu. Jimei Univ., Xiamen, Fujian, China Tropomyosin was reported as an important allergen in *Crassostrea angulata* and designated Cra a 1. The B-cell epitopes have been identified in Cra a 1 in our previous research, while the localization of the T-cell epitopes is still lacking. It is of great significance to design a hypoallergenic derivative based on the identified epitopes for the treatment of oyster allergy. In the present study, four T cell epitopes (T1-Cra a $1_{(2\sim18)}$, T2-Cra a $1_{(82\sim104)}$, T3-Cra a $1_{(110\sim124)}$, T4-Cra a $1_{(251\sim265)}$) were identified by using the wild-type Cra a 1 (wtCra a 1)-immunized mouse splenocyte cultured with synthetic peptides. Further, the hypoallergenic derivative (mCra a 1) was developed by deleting linear B-cell epitopes and retaining T-cell epitopes. mCra a 1 could stimulate $CD4^+$T cell proliferation and upregulate interleukin (IL)-10 secretion. Moreover, the allergenicity of mCra a 1 with wtCra a 1 was compared in a murine model of food allergy, finding that the allergic symptoms score, serum sIgE level, and the proportion of IL-4^+CD4^+ cells in mesenteric lymph nodes in mCra a 1 sensitized-mouse were significantly lower than those in wtCra a 1-sensitized group. At the same time, mCra a 1 group was associated with an increase in $Foxp3^+$Treg in mesenteric lymph nodes. Overall, mCra a 1 has reduced allergenicity and can induce upregulation of $Foxp3^+$Treg, suggesting that mCra a 1 may serve as a safe and viable candidate for inducing tolerance of oyster-sensitive individuals.

Substances of health concern: Label accuracy of cannabidiol and tetrahydrocannabinol in commercial tinctures from the US Zander Sullivan, zsul3428@gmail.com, Coady Lapierre, Laura Weiser Erlandson, Linh Pham. Texas AM Univ. - Central Texas, Killeen, Texas In recent years, the production and consumption of cannabinoids have increased significantly. Researchers are particularly interested in cannabidiol (CBD), Δ^8-tetrahydrocannabinol (Δ^8-THC), and Δ^9-tetrahydrocannabinol (Δ^9-THC). Despite the growing prevalence of these molecules in everyday life, research indicates that cannabinoid products are often mislabeled. In this study, we quantified and compared the label accuracy of CBD in full- and broad-spectrum tinctures and evaluate whether there is a public health concern related to CBD, Δ^8-THC, and Δ^9-THC. A total of 18 samples from different brands sold online in the US were collected for this study. Reverse-phase high performance liquid chromatography with an ultraviolet/visible light detector (HPLC-UV) was employed to detect and quantify the concentrations of CBD and THC isomers within the samples. Labels were considered inaccurate if the actual concentration of CBD deviated by more than 10% from the labeled amount. Our findings showed that 12 out of 18 samples had inaccurately labeled CBD concentrations. Notably, a significant difference in CBD label accuracy was observed between broad- and full-spectrum tinctures ($p = 0.0282$). No significant correlation was found between the cost of the tinctures and the label accuracy for CBD ($p = 0.2117$). While none of the broad-spectrum tinctures contained Δ^8-THC, two contained Δ^9-THC. All full-spectrum tinctures contained both Δ^8-THC and Δ^9-THC at levels below the federal limit of 0.3 w/w%. Accurate labeling of CBD and THC in tincture products is a public health concern across the US. There is a need for the U.S. Food and Drug Administration to promulgate regulations for labeling products that contain CBD and THC.

Anti-Inflammatory and antioxidant effects of oleuropein in human skin cells: molecular mechanisms

Characterization of odorants in thermally treated lobster mushrooms Thien Nguyen, tnguy103@vols.utk.edu, Ethan Darby, John P. Munafo. Food Science, The Univ. of Tennessee Knoxville Institute of Agriculture Edible mushrooms have garnered increasing popularity owing to the growing demand for healthy, nutritious, and tasty foods. Among them, lobster mushrooms attract increasing attention in the culinary world given their unique flavor and texture. They are a type of mycorrhizal mushroom with a distinct seafood-like flavor that grows in the temperate forests of North America. Interestingly, they are not a single species of fungus but are formed when the ascomycete fungus *Hypomyces lactifluorum* colonizes some *Russula* or *Lactarius* mushroom hosts. Lobster mushrooms are

harvested in a short period during the warmer months and dried to be sold year-round. The dried mushrooms are rehydrated before being cooked. The seafood-like aroma of lobster mushrooms is enhanced on cooking, suggesting the aroma is improved via thermal treatment. Previous studies from our lab characterized the important odorants in dried and rehydrated lobster mushrooms, providing the first insights into their aroma chemistry leading to their thermally generated seafood flavor. Herein, the odorants in thermally treated lobster mushrooms were isolated using solvent-assisted flavor evaporation and identified using gas chromatography–olfactometry and gas chromatography–mass spectrometry. Flavor dilution (FD) factors were determined using aroma extract dilution analysis. Several odorants were identified, including alcohols, aldehydes, lactones, and organic acids. Their FD factors were determined, providing a relative ranking of each odorant's contribution to the overall seafood aroma. This study provides the foundation for quantitative and sensory studies to determine the key odorants responsible for the prominent seafood-like aroma of thermally treated lobster mushrooms.

Engineering climate-resilient crops using a nano-enabled strategy Si Chen, MG1925005@smail.nju.edu.cn. School of Environment, Nanjing Univ., Jiangsu, China Under a changing climate, cultivating climate-resilient crops will be critical to maintaining food security. Here, we propose the application of reactive oxygen species (ROS)-generating nanoparticles as nanobiostimulants to trigger stress/immune responses and subsequently increase the stress resilience of plants. We use ROS-generating silver nanoparticles (AgNPs) as a nanobiostimulant to "train" (seed priming, foliar spraying) rice. The results show that all "stress training" regimes significantly enhanced the resistance of rice against to blast disease and cold stress. The metabolomics and transcriptomics showed that "stress training" induced considerable metabolic and transcriptional reprogramming in rice leaves. Importantly, results showed that the "stress memory" can be transferred transgenerationally, conferring offspring seeds with improved seed germination and seedling vigor. This may provide an epigenetic breeding strategy to fortify stress resilience of crops. In addition, AgNPs used as seed priming agents to simultaneously enhance the tolerance of maize seeds and seedlings to diverse (drought, cold, salt) and even multiple stresses (drought + cold, drought + salt, cold+ salt). RNA-seq analysis reveals that AgNPs seed priming induced a transcriptomic shift in maize seeds. Plant hormone signal transduction and MAPK signaling pathways were activated upon seed priming. These findings demonstrate that nano-enabled priming strategy can be used to significantly enhance the climate resilience of crops through modulated ROS homeostasis and that this approach could be a powerful nano-enabled tool for addressing worsening food insecurity.

Characterization of the taste profile of Chardonnay marc fractions prepared through taste-guided fractionation Ngan Nguyen, nnguye49@vols.utk.edu, John P. Munafo. Food Science, The Univ. of Tennessee System, Knoxville Chardonnay marc, a waste stream left after juicing grapes for the winemaking process, primarily consists of skins, seeds, and a trace number of stems. Over 500,000 tons of Chardonnay marc are generated each year. However, it is overlooked and often ends up as livestock feed or waste. Recent discoveries have proven that naturally occurring compounds in Chardonnay marc positively affect human health and are potential ingredients for enhancing food flavor. To characterize the taste chemistry of Chardonnay marc, taste-guided fractionation coupling natural product chemistry separations with sensory science was applied. The initial stage of this method involved aqueous extraction followed by solid-phase extraction (SPE) fractionation, yielding six fractions (SPE F1–F6) with the following yields: SPE F1 (20%), SPE F2 (5.68%), SPE F3 (0.84%), SPE F4 (0.52%), SPE F5 (0.06%), and SPE F6 (0.01%). SPE F1 had a sweet and sour taste. SPE F2 through F6 had varying bitterness, umami, and astringency levels. With the goal of focusing on the bitter, umami, and astringent sensory qualities, fractions SPE F2–F6 were pooled and subjected to sequential solvent partitioning fractionation with a series of organic solvents with different polarities, producing four solvent partitioning fractions, F1–F4. The most bitter fraction was F2, while F3 had the most astringency and umami. This study highlights the sensory analysis results of the fractions generated using taste-guided fractionation. Additionally, it lays the groundwork for future studies to fully characterize the tastants responsible for the pleasant taste of Chardonnay marc, an emerging food ingredient.

Will mixing different flavors and/or styles of waterpipe tobaccos before use increase consumer satisfaction and/or regulatory concerns? John H. Lauterbach, john@lauterbachandassociates.net. Chemistry & Toxicology, Lauterbach & Associates, LLC, Deland, Florida Most consumers of tobacco products such as cigarettes, cigars, and moist snuff and snus, use the products as intended by the manufacturers. While users of waterpipe tobaccos (WPT) have always had options to choose a variety of waterpipes (WP) and accessories (e.g., charcoal, bowls, foils) that can alter smoke composition, there has been little emphasis by marketers of WPT to get users to blend different flavors of WPT to get a more pleasing smoke. Now that has changed with specific mixing instructions and flavors of WPT to use on the Internet. Recommended mixing is blending the two or three WPT together, layering them in the bowl, or using virtual sections of the bowl such as one-third of the bowl for each flavor. Such practices may have the users buying two or three packages of product instead of one, so two times or three times the amount of product may be sold. Also, mixing can involve WPT from more than one manufacturer and/or mixing flue-cured (FC) WPT with dark-air-cured (DAC) as some flavors are only available in DAC. To study mixing, we looked at both the emissions and residues (about 70% of WPT remains after use) using liquid chromatography (LC). Using a combination of vanilla FC WPT and a fruit WPT, we evaluated all three mixing procedures. We also evaluated a mixture of a FC fruit WPT with a single-fruit flavored DAC WPT. LC of the emissions as well as the residues (Cogent Bidentate C8 column with Agilent 1100 diode-array detector with acetonitrile/water (75/25) at 0.6 mL/min) showed that the three mixing techniques for FC WPT did not make a significant difference in emissions nor did the mixture of FC and DAC WPT. Moreover, additional chromatography columns were used to resolve overlapping peaks. These additional columns included Cogent Phenyl Hydride and Agilent SB-C3. Based on the mixtures studied, mixing of flavored WPT should not raise regulatory concerns.

Utilization of button mushroom stem waste in seafood analogs Ethan Darby, edarby5@vols.utk.edu, Thien Nguyen, John P. Munafo. Food Science, The Univ. of Tennessee Knoxville Institute of Agriculture The white button mushroom *Agaricus bisporus* is the most consumed mushroom in the US. Owing to packaging constraints and consumer preferences, the production of *A. bisporus* yields large quantities of stem waste. As mushroom stems are sources of protein and other nutrients, they are a target for reclamation. The flavor chemistry of white button mushrooms, including the presence of umami tastants and a chitin polymer–influenced texture, makes them particularly suitable for use in seafood analogs. While meat analogs are growing in popularity, one of the largest challenges in their formulation remains matching the flavor and texture of nonmeat components with that of animal tissue. Many different types of alternative nonmeat protein offerings are commercially available to consumers (i.e., burgers and sausages); however, there are less offerings that are available representing the seafood category. The lobster mushroom, *Hypomyces lactifluorum*, has a prominent seafood-like flavor. Preliminary studies in our lab have shown that when lobster mushrooms are mixed with discarded button mushroom stems and wheat gluten, a crabmeat-like substitute can be prepared.

The seafood analogue had similar shear and compression, toughness, stiffness, hardness, and cohesiveness values to surimi (artificial crab); however, the flavor and texture still required optimization. This investigation aimed to 1) optimize formulations of wheat gluten and mushroom stems to best emulate the texture of crabmeat, and 2) optimize a lobster mushroom-inspired flavor incorporated into the seafood analog matrix. This talk will discuss seafood analogs created using button mushroom stems and explore the challenges when utilizing *A. bisporus* waste streams as a component in seafood analogs.

Effects of media pH on lipid yield in microalgae *Pseudochloris wilhelmii* for biodiesel production Emily Clayton, eclayton@villanova.edu, Emme Clement, Sophia Fedele, Catherine Tobin, Bryan C. Eigenbrodt. Chemistry, Villanova Univ., Pennsylvania Fossil fuels are scarce and sustainable alternative energy sources are in rapidly increasing demand; one contender is biofuels from plant matter. Algal biodiesel is a recent development in this area, produced by converting triacylglycerols from algal intracellular lipid bodies into free fatty acids. Lipid production can be increased by manipulating cultivation conditions to behave as external stressors, in response to which microalgae store energy as energy-dense triacylglycerols. The research presented explores the effects of manipulating pH as an external stressor on biodiesel production in the microalgae *Pseudochloris wilhelmii*, as well as the subsequent multivariate quantitative analysis of four abundant fatty acids. Analytical methods utilized for this study include GC/MS, fluorescence spectroscopy, and confocal fluorescence microscopy. This research aids in the development of a renewable fuel source and demonstrates the adaptability of *P. wilhelmii* as a contender for algal biodiesel production under a wide berth of cultivation conditions.

Electrocatalytic activity of CeO2 modified carbon electrodes for rapid H2O2 detection Nithin Krisshna Gunasekaran[1], n.gunasekaran@spartans.nsu.edu, Harikrishnan Muraleedharan Jalajamony[1], Reven Adu[2], Renny Fernandez[3], Ramesh Govindarajan T[2]. (1) Materials Science and Engineering, Norfolk State Univ., Virginia(2) Biology, Norfolk State Univ., Virginia(3) Engineering, Norfolk State Univ., Virginia The Ce3+ and Ce4+ valence states of cerium oxide, along with oxygen vacancies, make it one of the most important nanoparticles used as a catalyst in the electrochemical industry. Electrochemical sensors based on screen-printed electrodes are widely employed due to their advantages, such as reduced sample volume, simple cleaning processes, and easy connectivity. The screen-printing methodology has been extensively used for the mass production of cost-effective, disposable sensors designed for detecting components like biomolecules, microorganisms, and enzymes across various industries. Hydrogen peroxide (H2O2) detection has important applications in the food processing industry, where monitoring H2O2 levels is crucial for maintaining safety standards. In electrochemistry, H2O2 is associated with the reduction process that correlates with the catalytic and oxidase activity of CeO2-modified screen-printed electrodes. In this research, screen-printed electrodes were modified using cerium oxide nanoparticles synthesized through both chemical and green methods. High-quality printing, along with enhanced and uniform deposition, was achieved using atmospheric plasma, ensuring the cerium oxide nanoparticles adhered firmly to the surface of the screen-printed electrode. The modified electrodes were analyzed using scanning electron microscopy (SEM), Fourier-transform infrared spectroscopy (FTIR), and UV-visible analysis. Cyclic voltammetry was conducted to assess the electrochemical response of cerium oxide nanoparticles. The cathodic current corresponding to varying H2O2 concentrations was detected, and the sensitivity of the electrode toward hydrogen peroxide was determined to evaluate its efficiency as a sensor.

GC-MS analysis, antimicrobial potential, haematological and some pharmacological properties of *Terminalia avicennoides* Stem extracts Oluwayemi O. Onawumi[1], estherdr@rocketmail.com, Abiodun Sodamade[1,2], sodamade1@gmail.com, Dupe L. Abiona[3], modupeoluwa2013@gmail.com, Olubunmi A. Adewusi[4], bunmiadewusi@yahoo.com, Blessing A. Adewole[1]. (1) Chemistry, Ladoke Akintola Univ. of Technology, Ogbomoso, Oyo, Nigeria(2) Dept. of Chemistry, Emmanuel Alayande College of Education, Oyo, Nigeria(3) Dept. of Chemistry, The Polytechnic Ibadan, Oyo, Nigeria(4) Dept. of Chemistry, Lagos State Univ., Ojo, Lagos, Nigeria One of the most common global health issues faced by men and women of reproductive age nowadays is reproductive disorders that could lead to a terminal disease, infertility, high stress, or premature death. Extracts from different parts of plants have been used as alternative means of combating ailments, sickness and diseases as a result of the high cost and some likely adverse effects of some synthetic medicines. *Terminalia avicennoides* is one of the plants that has been considered to combat some pathological conditions. The study therefore aims to determine the bioactive constituents, antimicrobial and some of the haematological and pharmacological properties of *Terminalia avicennoides* The stem of this plant was separated from the whole plant obtained from a wild located in Gbadewole village Iwo, Osun State in Nigeria after the plant was authenticated at the Forestry Research Institute of Nigeria (FRIN) Jericho Ibadan. Distilled water was used to clean the stems, pulverize them and ground them into a fine powder before evaluating their GC-MS profile, phytochemical constituents and antimicrobial potentials. Male and female Wistar rats were also used to evaluate the effects of the extracts on haematological parameters and reproductive indices using the standard method of analysis. The results of the GC-MS analysis showed the presence of some bioactive substances that could be useful in the synthesis of some industrial, pharmaceutical and medicinal products, phytochemical analysis of the plant sample in mg/100g showed the presence of Tannin: 2.41±0.78, total phenol: 1.34±0.46, Phytate, oxalate, Alkaloids, Saponin and Flavonoids in appreciable amount. The extracts from the plant sample at low concentration showed antimicrobial activities against *Staphylococcus aureus, Neisseria gonorrhea, Streptococcus pyogenes, Streptococcus feacalis, Pseudomonas aeruginosa, Klebsiella pneumonia* and *Proteus mirabilis*. The sperm count, sperm morphology, semen quality, haematological parameters as well as reproductive hormones of the male and female Wistar rats used improved after the use of the plant extract. It is evident from the study that the extracts from the stem of the plant sample could serve as a viable means of combating some problems associated with reproductive disorders and on ten selected microorganisms apart from being a reliable source of phytochemical compounds for dietary, medicinal and industrial uses.

DIGITAL SESSION
Food Security: Tackling World Hunger CCC - Highlighting Chemistry from Multiple Divisions
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TUESDAY AFTERNOON
Chemistry of Alcoholic Beverages

Introduction: Chemistry of alcoholic beverages Nick O. Flynn, nflynn@wtamu.edu. Chemistry & Physics, West Texas A&M Univ., Canyon, Texas The global alcoholic beverage market share is valued at over 1.5 trillion dollars presenting many opportunities for research and development in the chemical sector. Our symposium will present the latest research on the chemistry of alcoholic beverages. This presentation will serve as an introduction to the Chemistry of Alcoholic Beverages symposium and will primarily focus on the alcoholic beverage types and topics that are being presented.

Chemistry of beer styles Nick O. Flynn, nflynn@wtamu.edu. Chemistry & Physics, West Texas A&M Univ., Canyon, Texas There are well over 100 different styles of beer in existence today. What distinguishes one beer style from another can certainly be attributed to chemical aspects of the beer associated with a given style. The unique Belgian beer flavors, for instance, can be attributed to the esters produced by Belgian yeast while sour beers most often owe their flavor profiles to the presence of one or more acids. Sulfur compounds, including dimethyl sulfide, are partially responsible for the characteristic taste of some lighter colored lagers whereas the Maillard reaction helps to generate malts associated with darker styles of beer including porters and stouts. This presentation will cover these and other examples of how chemistry distinguishes beer styles from one another in various categories including flavor, aroma and appearance.

Quantifying the terroir of beer using HS-GCMS, HR LCMS, and GC-O Ronald A. Quinlan[1], ronald.quinlan@cnu.edu, Phillip Pond[1], David Mitchell[1], Dmitry V. Liskin[1], Andrew Higgs[1], Abigail Brehm[2], Kevin Kingsbury[2]. (1) Molecular Biology and Chemistry, Christopher Newport Univ., Newport News, Virginia(2) Tradition Brewing, Newport News, Virginia As the debate on whether or not terroir exists for beer continues to entertain many enthusiasts, the ultimate goal remains the same – make a great tasting beer. Recent literature findings have highlighted differences in the biochemical profiles of hops and barley as a function of growth region. Many brewers, professional and homebrewer alike, are therefore seeking to harness the potential that these difference offer. Can we substitute a cheaper region for another? Can we brew a beverage with a nuanced flavor profile? Here, we present our findings using headspace gas chromatography mass spectrometry (HS-GC-MS), high resolution liquid chromatography mass spectrometry (HR-LC-MS), and gas chromatography with olfactory detection (GC-O). The analytical data is compared to evaluation by an untrained sensory panel. Additional factors, including setting and order of events will be discussed.

Development and metabolomic assessment of low-cost bench-top malting protocol for laboratory-scale malt quality evaluation Heena Rani, bansalheena10@gmail.com, Jason G. Walling, Sarah J. Whitcomb. USDA-ARS Cereal Crops Research Unit, Madison, Wisconsin Brewing high quality beer requires high quality malt. Malt quality and character are determined by three primary factors: genotype, environment, and malting conditions. In order to evaluate malting barley breeding material and to understand how the changing environment affects malt quality, it is crucial to have laboratory-scale malting methods that produce malt that mimics malt produced by commercial malting operations. Established laboratory-scale malting procedures typically require large quantities of grain as well as specialized and expensive equipment. To address these limitations, we developed a low-cost bench-top malting method using a common laboratory water bath, facilitating precise malting control within a laboratory setting without the need for extensive specialized equipment. We evaluated the efficacy of this method by analyzing the malt produced using this approach. The standard quality tests conducted included measurements of malt extract, diastatic power, alpha-amylase activity, and wort composition (soluble protein, Kolbach index, β-glucan, and free amino nitrogen levels). The results indicate that our bench-top malting method yields quality metrics comparable to those achieved by established small-scale and full-scale malting protocols, except for slightly lower diastatic power, potentially attributable to differences in kilning procedures. Additionally, we are currently employing gas chromatography-mass spectrometry (GC-MS) and liquid chromatography-mass spectrometry (LC-MS) to determine whether the metabolome profile obtained with our low-cost bench-top method emulate those from established laboratory-scale malting procedures and commercial malting processes. We hope to find differences that can help optimize smaller-scale malting procedures to mimic industrial procedures more effectively.

Non-invasive optical sensors for authenticating Pisco spirits Yalan Wu, wu.5671@buckeyemail.osu.edu, Luis Rodriguez-Saona. The Ohio State Univ., Columbus Pisco is a traditional alcoholic beverage from Peru, produced by fermenting young Muscat grapes and then distilling the must. It holds a Protected Denomination of Origin (PDO), meaning only specific grape varieties grown in designated regions of Peru can be used in its production. These grape varieties are classified into two groups: aromatic and non-aromatic, which impact the commercial price. Pisco is susceptible to adulteration and mislabeling, where different grape types may be mixed and falsely presented as a pure variety. A growing concern in Peru are reports that ~32% of all alcoholic beverages are adulterated. The aim of this study was to authenticate Pisco grape varieties using portable spectroscopy units by developing machine learning algorithms. A total of 66 Pisco samples (39 Quebranta, 16 Italia, 11 Albilla) were analyzed. Supervised pattern recognition was used to separate grape types. GC-MS was used to determine the volatile profile of Pisco revealing distinct volatile profiles among the samples. Soft Independent Modeling by Class Analogy (SIMCA) classification algorithm identified linalool as the key compound differentiating Pisco from these three grape varieties. Ethyl esters and butanoic acid were crucial in distinguishing between aromatic grape varieties, while 2-methyl-1-butanol and ethyl octanoate were key in differentiating between aromatic and non-aromatic grapes. Portable UV-VIS spectrometer combined with SIMCA clustered Italia and Quebranta with an interclass distance (ICD) 4.26; Italia and Albilla with ICD 4.92. Discriminating power analysis revealed that the absorption bands at 290 nm, corresponding to non-bonding to pi anti-bonding transitions (such as C=C and C=O groups related to grape aroma), were the most significant in explaining the variance in the model. Portable optical sensors are promising tools for developing a simple method to provide precise chemical information for Pisco authentication. This approach provides distillers and regulators with optimal solutions for quality control, helping to reduce marketing misconduct and ensure customer satisfaction.

Evaluating commercially available yeast strains for their application and flavor profiles in non-alcoholic beer Andrew Maust, Rahul Sen, Scott Lafontaine, scott.r.lafontaine@gmail.com. Food Science, Univ. of Arkansas, Fayetteville The production of non-alcoholic beer (NAB) can be achieved through either physical dealcoholization or biological limitation of ethanol production. The utilization of novel yeast strains other than traditional brewers yeasts is one biological method to limit alcohol formation. These alternate yeasts are often maltose negative, producing limited ethanol while still producing desired volatile compounds such as esters and higher alcohols. This study evaluated the profiles of 11 commercially available alternate yeast strains, including Lallemand's LoNa, Fermentis' LA-01, Christian Hansen/ Novensis' NEER Punch, Omega's OYR-071, OYR-252 and OYR 439, Escarpment's NAY, White Lab's NA All Day and Torulaspora delbrueckii, and 2 GM strains from Berkley Yeast, in order to determine how their volatile profiles differ. Further, fermentation was carried out at a low (4.5P) and high (9P) Plato to determine if nutritional stress had an impact on the formation of secondary metabolites. A host of analytical measurements were made to characterize the NABs made. Density and %abv calculations were assessed on an Anton Paar densitometer and alcolyzer. Non-volatile compounds, sugars and organic acids, were measured by HPLC. Volatile compound analysis was conducted with HS-SPME-GC-MS-MS. These quantitative results were compared with a quantitative descriptive analysis conducted by a trained sensory panel. Overall, it was observed that different yeast strains produced varying levels of alcohol and acids, as well as

assimilated available sugars differently. Further, the 9P treatments generally produced a higher ABV (some low-alcoholic beer) and had a different expression of volatile compounds compared to the 4.5P wort for most of the yeast strains. The results of the volatile and sensory analysis highlight that these different yeast strains could be utilized to make a variety of profiles which is crucial to understand in the design of new NAB products and styles. Generally, these results highlight that yeast choice and mash profile are critical decisions in the design of NAB and can be used to generate a multitude of different profiles.

Next chapter of reengineering non-alcoholic beer: Unmalted rice and *Saccharomycodes ludwigii* in production Christian Schubert[1,2], c.schubert@vlb-berlin.org, Scott Lafontaine[1]. (1) Food Science, Univ. of Arkansas, Fayetteville(2) Research Institute for Raw Materials and Beverage Analysis (FIRGA), Versuchs- und Lehranstalt fur Brauerei in Berlin eV, Germany This study examines the potential of replacing barley malt with unmalted rice in the production of non-alcoholic beer (NAB), a process traditionally reliant on barley. The primary aim was to evaluate wort production and fermentation dynamics when substituting varying proportions of barley malt with rice, from 100% barley to 100% rice, including intermediate ratios of 70% barley–30% rice, 50% barley–50% rice, and 30% barley–70% rice. Rice offers a significant advantage by enabling the production of naturally gluten-free NAB for consumers with celiac disease when used in 100% substitution.
As rice content increased, process adjustments were required, including the addition of rice husks for improved filtration and pre-gelatinization of rice starch, due to the differing gelatinization temperatures of barley (52-66 °C) and rice (67-91 °C). Fermentation with *Saccharomycodes ludwigii* at 16 °C showed that higher rice content resulted in slightly higher ethanol levels and faster fermentation rates until ethanol concentrations stabilized. A systematic physico-chemical analysis was conducted, assessing density, original gravity, apparent and real extract, ethanol concentration, free amino nitrogen, pH, color, and bitterness for both wort and the finished beer. Additionally, a descriptive sensory evaluation was performed to provide an in-depth evaluation of how rice substitution affects NAB quality. Sensory results indicated that increasing rice content modified the beer's flavor profile by reducing the pronounced "worty" character. This change was linked to a decrease in aldehydes, particularly methional, which is a major contributor to worty flavors in fresh NABs produced using special yeasts. By lowering the levels of this compound and the main aldehyde precursor potential, the use of unmalted rice not only reduced undesirable flavors in freshly brewed NAB but could also enhance the product's shelf life by potentially minimizing staling-related aging flavors over time.

Volatile aromatic compounds in *Canarium schweinfurthii* Engl blanched fruits, thermally pasteurized must and wine Omujal Francis[1], fomujal@gmail.com, John Bosco L. Okullo[2], Sheilla Natukunda[3], Richard Komakech[4], Jacob Godfrey Agea[5]. (1) Chemistry, Natural Chemotherapeutics Research Institute, Kampala, Uganda(2) Forestry, Geography and Environmental Sciences, Makerere Univ. College of Agricultural and Environmental Sciences, Kampala, Uganda(3) Food Technology and Nutrition, Makerere Univ. College of Agricultural and Environmental Sciences, Kampala, Uganda(4) Research and Innovation, National Environment Management Authority, Kampala, Uganda(5) Extension & Innovation Studies, School of Agricultural, Makerere Univ. College of Agricultural and Environmental Sciences, Kampala, Uganda *Canarium schweinfurthii* Engl. (Family, Burseraceae) is an indigenous edible fruit in Uganda. Recently we formulated wine from the fruits of *C. schweinfurthii* with a unique taste, aroma and flavour. However, understanding the processing steps that influence aromatic compounds in *C. schweinfurthii* fruit wine is essential. This study evaluated the volatile aromatic compounds in *C. schweinfurthii* blanched fruit pulp (BFP), thermally pasteurized must (TPM) and age fruit wine (AFW). The BFP, TPM and AFW were hydro-distilled and the distillate extracted with n-hexane. Aromatic compounds in the organic layer were analyzed with a GC-MS. The total number of compounds identified in BFP, TPM and AFW were 90, 119 and 49 respectively. The dominant compounds in the BFP were; Terpinen-4-ol (18%), Beta myrcene (11%), D-Limonene (5.88%), 9,12-Octadecadienoic acid, ethyl ester (5.98%), Benzene, 4-ethyl-1,2-dimethyl- (4.35%) and those in TPM were; Bicyclo[3.1.1]hept-3-en-2-one, 4,6,6-trimethyl-, (1S (21.3%), 3-Cyclohexen-1-ol, 4-methyl-1-(1-methylethyl)-, (R)- (7.6%), Geraniol (7.1%), Eucalyptol (7.0%), Isoborneol (5.2%), alpha.-Terpineol (4.7%). However, the dominant compounds in AFW were; Phenylethyl Alcohol (62.1%). Acetic acid, 2-phenylethyl ester (5.49%). Succinic acid, ethyl 3-hexyl ester (5.02%). 9-Octadecenoic acid, methyl ester, (E)- (4.95%). 15 compounds were found similar in BFP, TPM and AFW. Although 14 out 15 compounds showed a decrease from BFP to TPM, nine had an increase from TMP to AFW with Cedrane, 8-propoxy exhibiting highest with 94% followed by dihydroxy-1,1,3,6,9-pentamethy (91%). 20 compounds each, were similar in BFP and FW, and TPM and FW respectively. 42, 69 and 22 compounds in BFP, TPM and AFW were only detected in their samples. In conclusion, thermal pasteurization and fermentation metabolized aromatic compounds in TPM and AFW respectively. Moreover, BFP and TPM introduced some aromatic compounds into the AFW. Therefore, there is need to establish the mechanism by which each aromatic compound is metabolized in *C. schweinfurthii* fruits during blanching, thermal pasteurization of the must and fermentation into wine with a unique taste, aroma and flavour.

Extraction, Recombinant Production, and Function of Proteins of Food Safety and Food Manufacturing Importance

Novel green carbon dots: Free-radical scavenging and anti-inflammation Wang Jun[1], jun_wang@hbut.edu.cn, Bo Sun[1], Wanyi Fang[2]. (1) Hubei Univ. of Technology, Wuhan, Hubei, China(2) Univ. of Alberta, Edmonton, Canada Carbon dots (CDs) derived from natural plants are usually photo-stable, highly biocompatible and cost friendly, therefore trigging interest of applications in the fields of chemical sensing, bio-imaging, and nano-medicine. These biomass CDs are also called green CDs. However, synthesis of biomass CDs with excellent antioxidant and anti-inflammation activities, as well as good biocompatibility, is still challenging. Herein, we propose a hypothesis that green CDs with broccoli (BWE-CDs) or knotweed (KT-CDs) as the original biomass can be developed for antioxidant and anti-inflammation purposes, upon optimization of precursor, extraction solvent and other conditions. The obtained BWE-CDs and KT-CDs exhibited excellent free-radical scavenging activity for DPPH and ABTS. Cytotoxicity and embryotoxicity results indicated that they had lower toxicity and better biocompatibility than that of CDs derived from organic solvents. In addition, BWE-CDs and KT-CDs effectively scavenged reactive oxygen species (ROS) in A549 cells, 293T cells, and zebrafish, as well as eliminating inflammation in LPS-stimulated zebrafish.

Modulating molecular interactions in extruded pea protein isolate *Belal Hasan[1], belalhasan@cpp.edu, Job Ubbink[2]. (1) Nutrition and Food Science, California State Polytechnic Univ. Pomona (2) Nutrition and Food Science, Univ. of Minnesota Twin Cities, Minneapolis* Chemical bonds including disulfides, ionic, and hydrogen play a critical role in the formation of fibrous structure in plant-based meats during high moisture extrusion (HME). Researchers debated on the importance of the bonds, and their results were based on indirect tests such as the post-extrusion solubility test which lacks insights for the critical bonds involved in the

texturization of plant-proteins during extrusion. In this study, interaction-modulating compounds (bond breakers) including phosphate buffer, β-mercaptoethanol, urea, and SDS were added to a pre-hydrated pea protein isolate (PPI). The PPI was extruded using Prism 16 mm twin screw extruder (Thermo Electron Corporation) to determine the impact of molecular interactions on the physicochemical properties of extruded PPI. The β-mercaptoethanol-containing matrix demonstrated the most significant impact on the physical properties including reduced hardness, water holding capacity (WHC), and anisotropic index. Moreover, this matrix had the highest protein leaching at $\lambda = 280$ nm and soluble materials leaching at $\lambda = 600$ nm. The effect of the other agents including phosphate buffer, urea and SDS reduces the hardness of the extruded matrices by about a factor two as compared to the control sample indicating their role in the texturization of plant-proteins during the extrusion process. The finding of this study confirms the importance of disulfide bonds in and the impact of β-mercaptoethanol on the physiochemical properties of texturized PPI. The matrices supplemented by sodium phosphate, urea, and SDS had less impact compared to the control due to limited impact of electrostatic and hydrophobic interactions on the texturization of plant-proteins during extrusion. The proposed approach introduces a novel technique to modulate the physical properties of texturized plant protein matrices. This study introduces for the first-time a novel technique to study the effects of different agents on the texturization degree of plant-based proteins, providing insights in the relation between molecular interactions and matrix properties. Therefore, this study demonstrated on the usefulness of the novel technique to tailor the textural properties of extruded plant-proteins.

Protein language model-based prediction of potential allergens in *Chlorella vulgaris* Changqi Liu[1,2], changqi.liu@sdsu.edu, Zhenjiao Du[3], Yonghui Li[3], John J. Love[4,2], Haya Altammami[1], Shealyn Daley[1], Sofia Teran[1], Cristal Zuniga[5], Jing Zhao[1,2]. (1) School of Exercise and Nutritional Sciences, San Diego State Univ., California(2) Center for Better Food Futures, San Diego State Univ., California(3) Dept. of Grain Science and Industry, Kansas State Univ., Manhattan(4) Dept. of Chemistry and Biochemistry, San Diego State Univ., California(5) Dept. of Biology, San Diego State Univ., California Microalgae are a promising and sustainable nutrient source due to their rapid growth, high biomass yield, excellent nutritional profile, and ability to grow on non-arable land. However, as microalgae gain popularity as a novel food source, the risk of related allergies may increase. This study aims to identify potential allergens in the green microalga *Chlorella vulgaris* using pLM4Alg, a state-of-the-art protein language model-based predictor for allergenic proteins. A total of 11,486 *C. vulgaris* proteins from UniProt were analyzed, with 1,721 and 1,017 proteins identified as putative allergens by the pLM4Alg-1280 and pLM4Alg-2560 models, respectively. Among 90 reviewed proteins, the following were identified as potential allergens by both models: tubulin alpha chain, ribulose bisphosphate carboxylase large chain, and an uncharacterized 28.3 kDa protein. Additionally, nitrate reductase was identified as a potential allergen by the pLM4Alg-2560 model. The predicted allergens had a significantly lower aliphatic index compared to non-allergens ($P = 0.006$). Tubulin alpha chain also showed strong evidence of allergenicity according to AllerCatPro 2.0, displaying high sequence similarity to known environmental allergens such as Per a 17 (93.8% identity), Tyr p 33 (93.8%), Lep d 33 (93.8%), Der p 33 (90.0%), and Der f 33 (87.5%). Immunoreactivity of this potential allergen will be confirmed by expressing it as a recombinant protein and testing it with patient IgE. The sequence GIQPDGQMPSDKTIGGGDDA, located between residues 29 and 48 of the tubulin alpha chain, was predicted by Bepipred Linear Epitope Prediction 2.0 as the most likely B cell epitope. It appears as a flexible loop structure protruding outward. By characterizing the molecular biology of potential allergens in microalgae, we can assess the risk of cross-reactivity and develop detection, diagnostic, and immunotherapy strategies.

Utilizing the AI protein design tool AlphaFold to enhance precision bacterial fermentation of bovine αs1-casein John J. Love[1], jlove@sdsu.edu, Sierra Murrell[1], Changqi Liu[3], Jing Zhao[2]. (1) Chemistry and Biochemistry, San Diego State Univ., California(3) School of Exercise and Nutritional Sciences, San Diego State Univ. College of Health and Human Services, California Climate change and correlated severe weather events highlight the urgent need to reduce fossil fuel use, a major driver of global warming. The primary focus of this research is to develop an effective milk protein (casein) production system through precision bacterial fermentation, which could help reduce the carbon footprint of dairy farming. The highly nutritious casein proteins, produced in mammalian mammary glands, are relatively unstructured and exist as suspended colloids in milk. This biophysical feature presents challenges for bacterial production of casein proteins, yet also opportunities. We are exploiting the relatively insoluble nature of the unphosphorylated milk protein, αs1-casein, to simplify purification. Our strategy combines chemical intuition with molecular visualization and the AI-based program AlphaFold. Our design approach entails fusing small, soluble proteins to the N- and C-termini of αs1-casein, which function as transient tertiary-structure tags (TTS). AlphaFold is being used to design the TTS tags such that they form weak associations with αs1-casein, thus imparting increased structural stability on the entire chimeric protein construct. The TTS tags function to impart transient solubility on the casein proteins, which renders them slightly more soluble, and reduces the complexity of the purification steps needed to produce pure milk protein. Following preliminary purification steps, the semi-soluble fused construct will be tested for native-like phosphorylation using the kinases 20FamC and CK2 (casein kinase 2). These kinases will be produced on the surface of E. coli using a Bacterial Surface Display (BSD) system. Following phosphorylation, the TTS tags will be cleaved from αs1-casein using the site-specific TEV protease. After cleavage, the solubility tags will remain in solution and αs1-casein will be induced to precipitate, mimicking casein curd formation in cheese production. Purified αs1-casein will then be tested for structural, functional, and nutritional properties and for its potential use in cheeses and other food products.

Different isoforms of the 11S seed storage protein of hazelnut form hetero hexamers Yuzhu Zhang[1], yuzhu.zhang@usda.gov, Feng Guo[2], Andrew J. Howard[3], Yixiang Xu[1]. (1) ARS-PWA-WRRC, USDA, Albany, California(2) Biotherapeutics, Exelixis Inc, Alameda, California, US(3) Biology, Illinois Institute of Technology, Chicago Proteins are essential in human nutrition, and plant-based protein products are becoming increasingly popular. The 11S seed storage protein is one of the most abundant proteins in edible seeds of many plants, especially in pulses and tree nuts. Thus, information about the 11S proteins' production, transportation, and accumulation in different parts of the seed and their allergenicity are much needed for research to improve crop quality. However, the 11S storage proteins from many plants are also food allergens. Information about the allergens' physical, chemical, and immunological properties is also needed for research to enhance food quality and safety. This study reports the determination of the crystal structure of Cor a 9, the 11 S storage protein of hazelnut and a food allergen. The structure was refined to 1.92 Å, and the R and R_{free} for the refined structure are 17.6% and 22.2%, respectively. The structure of Cor a 9 showed a hetero hexamer of an 11S seed storage protein for the first time. The hexamer was made of two identical trimers associated back-to-back. The trimer consists of three different isoforms of the 11S protein. More than one isoform of the 11S proteins exists in many species. But it is the first time the 11S protein in any species is shown to be

hetero hexamers. The result may be used to understand the allergenicity of the 11S allergens and help enhance the marketability of tree nuts.

Immunodetection of an egg yolk allergen: Chicken serum albumin (Gal d 5) Qinchun Rao, qrao@fsu.edu, Yaqi Zhao, Xingyi Jiang. Health, Nutrition, and Food Sciences, Florida State Univ., Tallahassee Egg is one of the Big Nine allergenic foods in the US. While current detection methods predominantly focus on egg white allergens (e.g., ovomucoid, ovalbumin, and ovotransferrin), there is limited detection of chicken serum albumin (CSA, Gal d 5), the major allergen present in egg yolk. The overall objective of this study was to develop a method to detect CSA from food products and food-processing surfaces for food allergen risk assessment. Western blot was used to characterize the target analyte and assess the species selectivity of a laboratory-developed anti-CSA monoclonal antibody (mAb). Epitope prediction was conducted using Bepipred and Ellipro models, with validation via SPOT peptide arrays. An indirect competitive enzyme-linked immunosorbent assay (ELISA) was subsequently optimized and validated for (1) quantifying CSA in 11 commercial food products and (2) measuring CSA residues on four types of food-processing surfaces. Antibody characterization demonstrated that the anti-CSA mAb exhibited strong immunoreactivity toward poultry serum albumins, including those from chicken and turkey, with no cross-reactivity observed for mammalian, fish, or shellfish. The ELISA was optimized to utilize 4 ppm of CSA as the coating concentration and 2 ppm of anti-CSA mAb as the primary antibody. The assay demonstrated a broad working range (2-250 ppm), high specificity to poultry serum albumin, and excellent sensitivity with detection limits at the ppm level. The method also showed good reproducibility, with inter- and intra-assay coefficient of variation (CV) values below 20%. This validated ELISA successfully detected CSA in commercial egg yolk-containing products such as ice cream, pudding, buttermilk pie, and Caesar salad dressing, and was effective at quantifying CSA residues on stainless steel and plastic food-processing surfaces, achieving good recovery rates. This immunoassay offers a valuable tool for the risk assessment of egg yolk allergens in food products and provides an effective means of validating the cleanliness of food-processing environments, which holds significant potential to enhance food safety and quality through improved allergen management.

WEDNESDAY MORNING March 26
AGFD General Papers - Food Safety and Agriculture

GelMA-chitosan hydrogels as soil conditioners in agriculture Berke Calbas[1], berkecalbas@ucla.edu, Fahed Albreiki[1], Zel Carey[2], Thaiesha Wright[1]. (1) Chemical and Biomolecular Engineering, Univ. of California Los Angeles(2) Chemistry, St. Lawrence Univ., Canton, New York Soil conditioners, also referred to as soil amendments, help improve soil structure by increasing aeration, water holding capacity, and nutrients. Polyacrylamide, a commonly used synthetic soil conditioner, is a long-chain synthetic polymer that acts as water retention agent as well as a strengthening agent against erosion. However, polyacrylamide does not biodegrade in groundwater and can often be collected in runoff resulting in potential environmental and health concerns. Bio-derived soil conditioners are increasingly valued for enhancing agricultural sustainability and improving crop yield. We have developed Gelatin methacryloyl (GelMA)-chitosan hydrogels as a biodegradable alternative to conventional synthetic soil conditioners, with the dual purpose of improving soil moisture retention as well as pathogen resistance. GelMA is a non-toxic material with functional groups suitable for crosslinking and modification. Incorporating chitosan into GelMA enhances the swelling capacity of the hydrogels while contributing antimicrobial properties and promoting plant growth. Preliminary data indicates that GelMA-chitosan hydrogels exhibit improved swelling ratios compared to polyacrylamide-based gels. Scanning electron microscopy (SEM) indicates that the inclusion of chitosan helps form more uniform pore structure, potentially improving the hydrogel's ability to retain water and nutrients. Rheological studies are conducted to evaluate the stability of the hydrogels under mechanical stress, ensuring durability in field applications as a soil additive. Additionally, we have investigated the effects of varying concentrations of precursors on swelling, water retention, and average pore size of the hydrogel. Ultimately, these findings suggest that GelMA-chitosan hydrogels are promising and environmentally sustainable materials to be used as soil conditioners. We anticipate that these hydrogels will have the potential to improve crop yield while reducing the environmental impact of conventional agricultural practices.

Interpreting residues of glyphosate in food and dietary exposure Leah Riter, leah.riter@bayer.com, John Vicini. Bayer CropScience AG, St. Louis, Missouri Glyphosate (N-(phosphonomethyl)glycine), one of the most widely used herbicide around the world, and its metabolite aminomethylphosphonic acid (AMPA) were not tested typically in multiresidue pesticide monitoring methods due to their polarity and ionic nature creating challenges in residue analytical methodology. The lack of multiresidue methods has led to the development of an array of residue method platforms, most commonly LC-MS/MS and LC-FLD, but in recent years ELISA has also been applied. This presentation will provide an overview of fit-for-purpose and pros and cons of various methods to highlight their effectiveness in addressing the unique analytical challenges of glyphosate. Placing analytical data in perspective is essential for making science-based decisions for either compliance or safety. The use of analytical data in pesticide monitoring data and dietary exposure estimation will be discussed with emphasis on distinction of evaluation of compliance with labeled use patterns versus assessing safety. Though real-world examples, the impact of data misinterpretation or use out of context will be illustrated.

Examination and determination of acrylamide and synergistic components in small animal feed Steven McComis, mccomis.s01@mymail.sxu.edu, Tatiana Tatum, tatum@sxu.edu, Kylie Allen, Anna Czernik, Gabrielle Venson. Natural Sciences, Saint Xavier Univ., Chicago, Illinois Acrylamide is a potent neurotoxicant that disrupts the filament networks surrounding cell nuclei, compromising cellular structure and function. Our study investigated the concentrations of acrylamide in small animal feed, commonly used in commercially available bird foods and organic alfalfa, and its interactions with other feed components, such as antioxidants. In addition to measuring acrylamide, interactions between acrylamide and antioxidants were explored. While antioxidants are added to feed to prevent oxidative damage, their role in mitigating or exacerbating acrylamide toxicity remains unclear. Some antioxidants may reduce oxidative stress induced by acrylamide, while others could potentially interact with it, altering its effects. The impact of acrylamide and antioxidant levels on cell adhesion, an essential process for cell-to-cell communication and tissue formation, was examined. Using cell adhesion assays, we assessed the ability of cells to adhere in the presence of acrylamide and varying antioxidant concentrations. Disruption of adhesion is critical, as it affects cellular interactions and could lead to impaired tissue integrity or cell death.

Acrylamide-calcium chloride-activated carbon composites generates atmospheric water for agricultural uses Nasrollah Hamidi, nhamidi@scsu.edu. South Carolina State Univ., Orangeburg Water scarcity is a pressing challenge, particularly in arid regions; innovative technologies help to supply quality water to sustain agriculture, food and life. In this study, we investigate the potential of acrylamide-based composites, incorporating activated carbon and

calcium chloride, for using force of nature to harvest water, passive atmospheric water generation. We conducted a series of water release and vapor adsorption experiments to evaluate the water release capacity and moisture uptake efficiency of the composites; besides of the analyzes of the thermodynamic parameters to understand the energy efficiency of water capture and release cycles. The composites exhibit high moisture uptake capacities, driven primarily by the hygroscopic properties of $CaCl_2$ and the porous structure of AA gel and activated carbon. The thermally sensitive composite demonstrates rapid vapor desorption, with radiation energy causing a phase transition from a hydrophilic to a hydrophobic state, thereby releasing the absorbed water at temperature ranging 35 to 80 °C with the activation energy close to water vaporization. The vapor uptake properties were examined at room temperature and pressure across various partial pressures of vapor, covering from 7 to 31 kPa. The kinetics of vapor uptake were interpreted through the Langmuir adsorption isotherm, the integral method, and the isoconversional method. The steam absorption followed a first-order mechanism, with heat release values between 263 and 299 kJ/mol, which varied with the extent of vapor uptake by the gel. The kinetics of vapor adsorption reveal a rapid uptake in high-humidity environments, while the thermodynamic analysis confirms that these composites can effectively capture and release water with minimal energy input, making them promising candidates for agricultural applications in water-scarce areas. This study highlights the potential for scalable atmospheric water harvesting systems based on cost-effective, renewable materials. The findings have significant implications for sustainable water management in agriculture, particularly for irrigation in arid and semi-arid regions.

Growth and yield assessment of Tomato under elevated particulate matter concentration Sombir Pannu[1], sombir.pannu@chemical.iitd.ac.in, Vikram Singh[1], Mayank Kumar[2], Usha Mina[3], Piyush Jain[4]. (1) Chemical Engineering, Indian Institute of Technology Delhi(2) Mechanical Engineering, Indian Institute of Technology Delhi(3) School of Environmental Science, Jawaharlal Nehru Univ., New Delhi, India(4) Cornell Univ., Ithaca, New York
The study investigated the impact of elevated aerosol particle concentration on six well-watered Pusa Sadabahar tomato plants, conducted in a controlled environment at IIT Delhi from October 2023 to April 2024. The experiment featured three distinct chambers: reduced aerosol, ambient aerosol, and elevated aerosol, with varying temperature and humidity levels. Key findings revealed that relative water content (RWC) significantly decreased under aerosol stress, indicating higher cell membrane permeability and premature leaf senescence, with a decline of 4.5% by the fruiting stage and 12.31% by harvesting. The pH of the leaves also dropped from 7.07 to 6.86, reflecting increased acidity due to stress exposure.
Ascorbic acid content, vital for plant tolerance to pollutants, decreased by over 15% in the elevated aerosol chamber. Total chlorophyll content was adversely affected, declining from 7.7 mg/g in the reduced chamber to 6.89 mg/g in the elevated chamber, which hindered photosynthesis due to shading from dust particles. The Fv/Fm ratio, indicative of photosynthetic efficiency, was highest in the reduced chamber, suggesting better plant health under lower aerosol concentration.
Interestingly, the ambient concentration chamber yielded the highest fruit production—25% more than the reduced chamber and 33% more than the elevated chamber—indicating that mild stress could enhance plant adaptability while excessive stress was detrimental. CHNS analysis showed higher nitrogen and carbon concentrations in the reduced chamber, signifying improved growth potential. Additionally, increased stomatal density was observed in the elevated aerosol chamber, likely a response to dust blocking stomata, demonstrating an adaptive mechanism to maintain transpiration. Overall, the study underscores the negative effects of air pollutants on tomato plants, impacting their physiological and biochemical processes, growth, and fruit yield, contributing valuable insights into aerosol-vegetation interactions.

3D-printed nanoparticle-based slow-releasing micronutrient fertilizers improves growth and productivity of wheat plants Rohit Rai, ROHITRAI613@gmail.com, Prodyut Dhar. School of Biochemical Engineering, Indian Institute of Technology (BHU) Varanasi, Uttar Pradesh, India The unprecedented use of conventional, commercial fertilizers has degraded soil health, enhanced aquatic pollution, and is inefficient in improving crop yield and productivity, which urgently demands environment-friendly fertilizer solutions for agriculturally significant crops. The current work entails the fabrication of crosslinked 3D-printed nanoparticle (NPs) -based tunable fertilizer systems, targeting various growth stages in wheat plants (*Triticum aestervium*) for improvement of growth parameters, nutritional aspects, and productivity. The 3D-printed micronutrient fertilizers (MnFts) showed swelling of 340%, water retention till 24 hours, and slow, sustained release of Mn, Fe, and Zn NPs for 7 days in aqueous media, and 15 days in soil medium. The 3D-printed MnFts showed enhancement in plant growth features (14.2% shoot length, 40.7% root length, 27.3% chlorophyll content, and 40% root volume increase), grain characteristics (~50% more grains), total proteins (35.5% increase), pigments (32.3% increase), anti-oxidant enzymes (40.2% increase) and NPs content in roots, grain, and shoots. The 3D-printed NPs showed higher productivity compared to non-sustainable, soil damaging and water pollution-causing conventional fertilizers and allow the fabrication of tunable, selective, requirement-based, efficient, and sustainable fertilizing solutions.

Microbial Food Safety - Emerging Technologies for Detection, Intervention, and Antimicrobial Packaging of Foodborne Pathogens

Investigating xenobiotic interactions with the gut microbiota: an *in vitro* approach Linshu Liu, linshu.liu@usda.gov, Jenni Firrman, Karley Mahalak, Johanna Lemons, Adrienne Narrowe. USDA, ARS, Eastern Regional Research Center, Wyndmoor, Pennsylvania Man may be exposed to more than one million xenobiotics in a lifetime, many of which enter the body along with consumed foods. *In vitro* simulators of the human gastrointestinal ecosystem are used to investigate the microbial metabolism of xenobiotics and their impact on community health. These systems offer many advantages over the use of animal models. This presentation describes the application of *in vitro* apparatuses in studying xenobiotic interactions with the gut microbial community.

Impact of environmental heterogeneity on the competitive growth of antibiotic-resistant bacteria in food systems Chujing Zheng[1], czhen043@ucr.edu, Yue Xing[2], Yujie Men[1,2]. (1) Chemical and Environmental Engineering, Univ. of California Riverside(2) Univ. of Illinois Urbana-Champaign Antibiotic-resistant bacteria (ARB) spread in food systems has posed a significant risk towards food safety and public health. However, the fate of ARB when coexisting with susceptible bacteria remains unclear, especially under diverse environmental stressors commonly encountered in food processing and storage. To narrow this knowledge gap, this study investigated the impact of varying food-relevant conditions, such as pH, temperature, salinity, and nutrient availability, on the competitive fitness of antibiotic-resistant *Escherichia coli* mutants. Through competitive co-culturing experiments, we found that in the absence of antibiotics, the wild-type susceptive trains always outcompete resistant strains under most growth conditions investigated, except for iron (Fe) limitations. Fe-limitation conditions could favor the proliferation of resistant strains over the susceptive wild-type. In the presence of antibiotics (sublethal levels), although resistant strains

usually have growth advantages, certain suboptimal environmental conditions could suppress the growth of resistant strains and favor the wild-type growth. For example, at non-optimal pH, e.g., acidic (pH=5 or 6), in the presence of antibiotics, ARB fitness was much lower compared to pH=7. Elevated salinity with >100 mg/L KCl and nutrient-limited environments suppressed ARB growth advantage. The study provides critical insights into how environmental heterogeneity affects the persistence of ARB in food matrices, highlighting the potential of pH regulation, salinity control, temperature management, and nutrient limitation as intervention strategies for the mitigation of antimicrobial resistance risks.

Washing and coating apple fruit with bio-based phenolic fatty acids reduce *Listeria innocua* populations Xuetong Fan, xuetong.fan@usda.gov, Victor Ryu, Helen Ngo, Tony Jin. USDA-ARS Eastern Regional Research Center, Wyndmoor, Pennsylvania Foodborne disease outbreaks and recalls have been linked with fresh apples due to *Listeria monocytogenes* contamination occurring during postharvest handling. Effective, preferably bio-based anti-Listeria antimicrobials are needed to minimize the contamination. Bio-based antimicrobials provide various advantages over traditional food preservatives, such as sustainability, biodegradability, and potentially reduced impact on the environment. In the present studies, we applied our recently patented bio-based antimicrobial compounds (i.e., branch-chained phenolic fatty acids) on apples as sanitizers in wash water and antimicrobial compounds in coating formulation. Results demonstrated that the novel phenolic fatty acids at a concentration of 0.1% reduced populations of *Listeria innocua*, a surrogate *of Listeria monocytogenes,* on apple fruit by up to 99.99% when applied either as a wash or as a coating. The sanitizing or coating treatment did not negatively impact the quality of apples during their 2-week shelf life at ambient temperature. The bio-based antimicrobials provide the fruit industry with a sustainable approach to enhance microbial safety and maintain the quality of fresh apples.

How the FDA regulates food packaging and substances that come into contact with food Elizabeth Furukawa, efurukawaphd@gmail.com. FDA, College Park, Maryland The U.S. FDA regulates substances used in contact with food, including substances that compose food packaging, food containers, food processing equipment, and food preparation surfaces. These substances require premarket authorization. In 1997, the FDA Modernization Act established the legal requirements for the Food Contact Substance Notification Program, which is the dominate mechanism by which FDA authorizes the use of food contact substances in the U.S. The focus of this presentation will be to discuss FDA's regulatory approaches on food contact substances, including available regulatory mechanisms to obtain premarket authorization, and how to determine if these substances have FDA's authorization for their intended use.

Combination of antimicrobial treatments and packaging technology to enhance food safety and extend shelf life of root vegetables Tony Jin, tony.jin@ars.usda.gov, Xuetong Fan. ARS-Eastern Regional Research Center, US Dept. of Agriculture, Wyndmoor, Pennsylvania Root vegetables including carrots, ginseng, radish, potato, yam, and horseradish, harvested from soils are vulnerable to microbial contaminants such as foodborne pathogens and spoilage microorganisms, which lead to e health risk concerns and reduced shelf life. Fresh baby carrots, one of the root vegetables, is usually consumed as a component of salad or as "finger food" without heat treatment. Therefore, effective antimicrobial measures and suitable packaging technology from field to table are necessary. In this study, we used baby carrots as a model and conducted a comprehensive study to reduce microbial contaminants by combining antimicrobial treatments which included antimicrobial solution washing, antimicrobial edible coating, antimicrobial gas and their combinations with food packaging, including air, vacuum, skin and MAP packaging in the form of pouch and tray. The efficacy of each treatment or combination was evaluated by assessing the reduction in microbial populations (E. coli, Listeria, Salmonella, total aerobic bacteria [TPC], and yeasts and molds [YMC]). The quality characteristic values (color, texture, weight loss, etc.) were also monitored. Results reveal that both antimicrobial solution washing and antimicrobial gas treatment contributed to the microbial reduction, and their combination with pouch and skin tray packaging showed the most antimicrobial effectiveness and quality maintenance. For examples, the combined treatment reduced the populations of TPC and YMC from 4 log CFU/g to < 1 log CFU/g and E. coli from 7 log CFU/g to < 1 log CFU/g after 3 days and no growth was observed through 11- week storage at 4°C. There were no significant differences in texture and weight loss between the treated and control samples, all samples had approximately 4000 g hardness and 0.6% weight loss by the end of storage. This presentation will share more results, discuss the findings from the study, and propose approaches for future studies.

Enhancing chitosan-Zein films with *bergenia Ciliat*A extracts: A comprehensive study on UV-protection, antioxidant, and antimicrobial properties Ananda B. Chand, ananda@bostoncollege.edu.np. Chemistry, Tribhuvan Univ. Institute of Science and Technology, Kirtipur, Kathmandu, Nepal The aim of this research is to develop chitosan-zein protein films supplemented with *Bergenia ciliata* extract (Bc); a traditionally important medical herb of Himalayan origin. The physical, mechanical, antioxidant, and antimicrobial properties of the film were systematically explored. The opacity of chitosan film increased from 2.42± 0.97 to 10.32 ± 1.44 upon introducing Zein (Z) protein in chitosan (Cs) in a 1:2 ratio (w/w); conferring enhanced UV-blocking attributes. The incorporation Bc extracts in the chitosan-zein film (Cs-Z-Bc) under optimized conditions not only increased the opacity to 16.27 ± 1.03 and improved the tensile strength as well. The α-diphenyl-β-picrylhydrazyl (DPPH) scavenging activity of the Cs-Z-Bc film was found to be 97.07±1.09%, suggesting superior antioxidant properties. Additionally, these optimized films displayed significant antimicrobial efficacy, with zones of inhibition of 11.4 mm measured for gram-positive strains like *C. subtitles* and *S. aureus* and 11.2 mm and 11.1 mm for gram-negative *E. coli* and *K. pneumonia*bacterial strains. The film also showed excellent biodegradable properties. The shelf-life study of Himalayan cheese was significantly increased when wrapped with the film. These findings suggested that *B. ciliata* extract-fortified chitosan-zein films can be an excellent food packaging material.

Cellulose nanocrystals derived from maple leaves with partially retained lignin for Pickering emulsion stabilization and food preservation Chuye Ji, jichuye@qq.com, Yixiang Wang. Food Science and Agricultural Chemistry, McGill Univ., Ste Anne de Bellevue, Quebec, Canada Canada is recognized as the land of maple leaves, yet the utilization of fallen leaves remains underexplored. Cellulose nanocrystals can be obtained from fallen maple leaves, but a chemical modification is required to improve the hydrophobicity for better stabilizing Pickering emulsions, and the yield is relatively low due to the removal of non-cellulose components. In this study, lignin was partially retained during the isolation of cellulose from maple leaves, and the prepared lignin-containing cellulose nanocrystals (LCNCs) were applied as a natural stabilizer of Pickering emulsions. Rod-like LCNCs with tunable lignin contents had improved hydrophobicity (contact angle of 66.0°-84.3°) and high aspect ratios (33 to 46) with average lengths of 409-541 nm, resulting in long-term stability of LCNC-stabilized Pickering emulsions. The obtained emulsions provided good encapsulation and protection of cinnamaldehyde, and the controlled release of cinnamaldehyde promoted sustained antibacterial efficacy against

both Gram-positive and Gram-negative foodborne bacteria. Both direct-contact and non-contact preservation modes were investigated for fresh shrimp preservation, where the headspace release of cinnamaldehyde from emulsions at non-contact mode was more effective in inhibiting foodborne bacterial proliferation during refrigerated storage compared to the direct-contact (spray-coating) mode. This work demonstrates the feasibility of developing value-added LCNCs from fallen maple leaves as sustainable Pickering emulsion stabilizers.

Engineered micro/nanofibers/particles for food packaging applications Dilhun K. Arserim Ucar, kerimanarserim@gmail.com. Nutrition and Dietetics, Bingol Univ., Turkey Encapsulation of bioactive compounds using emerging electrohydrodynamic techniques to produce micro/nanofibers/particles is a promising technology. This approach overcomes the restrictions of conventional methods, including low encapsulation efficiency and sustained release of heat-sensitive bioactive compounds and toxic chemicals. Electrospraying/electrospinning process parameters can control the engineered micro/nanofiber/particle properties, including solution, processing, and environmental parameters. Electrohydrodynamic techniques can be used to encapsulate food bioactive compounds for active, intelligent and smart food packaging applications to prevent deterioration and extend the shelf life of food products. This talk will focus on engineered micro/nanoparticles/fibers via electrohydrodynamic techniques, advances, limitations, and challenges of this technology. Recent advances and critical concepts for bioactive particle/fiber production, characterization, and application of this technology to utilizing innovative antimicrobial food packaging.

Characterization of antibiotic resistant *salmonella* recovered from organic and non-organic whole broiler carcasses using whole genome sequencing Salina Parveen[1], sparveen@umes.edu, Anuradha Punchihewage Don[1], Zhao Chen[2], Jianghong Meng[2]. (1) Agriculture, Food and Resource Sciences, Univ. Maryland Eastern Shore, Princess Anne(2) JIFSAN, Univ. of Maryland, College Park *Salmonella* infection or salmonellosis is a global public health problem and is one of the major causes of bacterial food-borne illnesses in the USA. It has been reported most of the salmonellosis are associated with multidrug resistant *Salmonella*. Food of animal origin, especially poultry and poultry products are one of the major vehicles of salmonellosis. The objective of this study was to characterize antibiotic resistant *Salmonella* recovered from organic (OC) and non-organic (NOC) whole broiler carcasses using Whole Genome Sequencing (WGS). A total of 213 *Salmonella* isolates recovered from OC and NOC on the Eastern Shore of Maryland, USA were tested for antibiotic susceptibility using standard methods. A subset of isolates was subjected to whole genome sequencing using Illumina MiSeq. Isolates were frequently resistant to at least one antibiotic (91.24%) or multidrug resistant (45.54%). All isolates were susceptible to fluoroquinolone, carbapenem, and glycylcycline. All *Salmonella* isolates contained at least one antimicrobial resistance (AMR) gene, with *aac(6)-Iaa* as the most common AMR gene. Most isolates harbored AMR genes for aminoglycosides (*ant(3)-Ia, aac(3)-IV*, *aac(3)-Via*, *aph(3)-Ia*, *aac(3)-IV*, *aph(4)-Ia)*, phenicols (*floR*), sulfonamides (*sul1, sul2*), β-lactamase inhibitors ($bla_{CTX\text{-}M\text{-}65}$) and tetracyclines (*tetA, tetC*), and point mutations in *gyrA(D87Y*) for fluoroquinolone/quinolone resistance regardless of the type of chickens, while *fosA3* and $bla_{MY\text{-}2}$ were only present in NOC. Meanwhile, *aadA1* was detected only in OCs. Fisher's exact test indicated a significantly higher prevalence of AMR genes in *Salmonella* isolated from OCs ($p<0.05$). *Salmonella* isolates contained multiple virulence genes including the genes that stimulate the pathogenicity island 1 (SPI1) encoding (*invA, sipD, prgH*), type three secretion system 1 (TTSS-1) translocated effectors (*sipA, sopB, sopD, sopE2, avrA*), SPI2 encoding, TTSS-2 translocated effectors (*ssaQ, ssaR*), fimbrial adherence determinants (*fimC, fimD, fimF, fimH, fimI, csgA, csgB, csgC*), serum resistance (*rck*), stress adaptation (*sodCI*) and Mg^{2+} uptake (*mgtB, mgtC*) in every serovar regardless of the type of chickens. Phylogenetic analysis confirmed that *Salmonella* isolates were closely related based on the serovars. These results suggest that the *Salmonella* isolates from OC and NOC possessed various AMR and virulence genes and thus have the potential to cause salmonellosis.

WEDNESDAY AFTERNOON
AGFD General Papers - Nutrition Topics

Identifying possible misleading labels on weight loss teas Rosalynn Quinones, Heather Knott, knott6@marshall.edu, Kayley King, king593@marshall.edu. Chemistry, Marshall Univ., Huntington, West Virginia Marketing by influencers, celebrities, and the press has popularized dietary supplements. While the FDA does not have the authority to approve weight loss supplements, marketing misbranded or adulterated products is prohibited. The most common labeling problem in weight loss teas is with caffeine, a stimulant and a psychoactive substance classified as "generally recognized as safe" (GRAS) that can be naturally or synthetically derived. Labeling regulations do not require manufacturers to disclose caffeine from naturally occurring sources nor state the total amount of caffeine in a product. High quantities of caffeine may cause heart palpitations, increased cholesterol levels, and increased blood pressure. More importantly, caffeine can interact with various medications, potentially harming consumers. In this study, twenty weight-loss tea supplements purchased in-store (tri-state area: WV, KY, OH, and Washington D.C.) and online were screened for caffeine. Caffeine was identified with Gas Chromatography-Mass Spectrometry (GC-MS) and quantified with High-Performance Liquid Chromatography (HPLC). The standard addition method accounted for matrix effects during quantification. Three tea bags per tea supplement were analyzed with at least three samples per bag. Caffeine was identified and quantified in six samples, however, only one had caffeine listed on the product label. Two teas were homogeneous while three were heterogeneous, the amount of caffeine varied per bag. Across the different brands analyzed, preliminary results show a caffeine range of 5 to 35 mg/bag. This is below the FDA-recommended daily dosage; however, the values may be higher depending on how long the tea is steeped and how many cups are consumed. In addition, three of the tea samples were heterogeneous with the amount of caffeine varying per bag. This study proves the importance of correct product labeling and marketing practices among dietary supplements and the need for consumer education on natural product contents.

Anti-Inflammatory and antioxidant effects of oleuropein in human skin cells: molecular mechanisms and potential cosmeceutical applications Chang Liu, hichang813@uri.edu, Huifang Li, Ni Deng, Hang Ma, Navindra P. Seeram. Univ. of Rhode Island, Kingston Oleuropein is a phenolic compound commonly found in cosmetic ingredients including olive leaves and jasmine flower with various skin beneficial effects. Herein, we evaluated the anti-inflammatory and antioxidant activities of oleuropein in human keratinocytes. In a cell-based inflammasome activation model with human THP-1 cell induced by Lipopolysaccharide (LPS) and nigericin, Oleuropein (12-200 μM) reduced proinflammatory cytokine interleukin (IL)-6 by 38.8, 39.2, 42.4, and 45.5%, respectively. Oleuropein (50 and 100 μM) also alleviated oxidative stress in keratinocytes (HaCaT cells) by reducing H_2O_2-induced cell death by 6.4% and 9.2%, respectively. Additionally, biological evaluations revealed that oleuropein's antioxidant effects were attributed to its mitigation of reactive oxygen species in HaCaT cells. Furthermore, a Geneplex assay identified that IL-1β and thioredoxin-interacting proteins are potential molecular targets that were involved

in oleuropein's protective effects in HaCaT cells. This was supported by findings from several cellular assays showing that oleuropein reduced the level of IL-1β and inhibited the activity of caspase-1/ IL-1 converting enzyme, as well as ameliorated pyroptosis in HaCaT cells. Furthermore, bottom-up proteomics coupled with bioinformatic analysis revealed potential biomarkers modulated by oleuropein and its influence on cellular processes such as FAT10 signaling pathway, apoptosis, and the non-canonical NF-κB signaling pathway. Taken together, findings from this study expand the understanding of oleuropein's skin protective effects against oxidative and inflammatory stresses, which support that oleuropein is a promising natural cosmeceutical for skincare applications.

Cottonseed-derived ethanol extracts and gossypol on regulate glucose transport gene expression in mouse macrophages
Heping Cao, heping.cao@usda.gov, Kandan Sethumadhavan. Southern Regional Research Center, USDA Agricultural Research Service, New Orleans, Louisiana Cottonseed is a byproduct of cotton fiber industry. Cottonseed contains bioactive compounds such as 3,4-dihydroxybenzoic acid, flavonol glycosides, gallic acid, gossypol, peptides, and quercetin. These bioactive compounds from other plant sources have been used for disease prevention and treatment since ancient history. Therefore, cottonseed value may be increased by providing bioactive compounds for health promotion and disease prevention. The objective of this study was to explore the bioactivity of cottonseed-derived ethanol extracts and gossypol on the regulation of glucose transporter (Glut) gene expression in mouse macrophages. The selection of macrophages and Glut genes for this study was because macrophages are involved in insulin resistance and metabolic diseases and Glut proteins are critically important for host immunity due to facilitating glucose transport across the lipid membrane of the cell. Macrophages were treated with various concentrations of ethanol extracts or gossypol for different time followed by qPCR analysis of mRNA levels. As a first step towards gene expression comparison, we evaluated the relative basal mRNAs levels of Class I facilitative Gluts: Glut1, Glut2, Glut3 and Glut4 in the mouse RAW264.7 macrophages. Relative to Glut1 mRNA level using Rpl32 as the internal reference, Glut3 was more abundant than GLUT1 but GLUT4 was much less and GLUT2 was undetectable in the controlled macrophages treated with 1% DMSO. Cottonseed extracts had modest effects on Glut1 gene expression but gossypol had much stronger stimulation. Similar patterns of Glut3 and Glut4 gene expression were obtained from the cells treated with cottonseed ethanol extracts and gossypol. This study demonstrate that cottonseed ethanol extracts have certain effects but gossypol has stronger effect on stimulating Glut gene expression and suggest that gossypol may have a strong effect on macrophage immunity.

Curcumin-metformin conjugate: Extremely facile microwave-induced organic synthesis and characterization via ESI-MS/MS. A potentially important target molecule for antiviral effect on SARS-CoV 2 viral load
Bishambar Dayal[1], dayalb77@gmail.com, Geeta Dayal[2]. (1) Medicine, Robert Wood Johnson Univ. Hospital, New Brunswick, New Jersey(2) Neuroscience Alum, Massachusetts Institute of Technology, Cambridge A recent paper (Clinical Infectious Diseases 79: 354-363, 2024) highlighted a favorable antiviral load in a randomized placebo controlled clinical trial of Covid-19. The mechanism involved suppression of protein translation mammilian target of rapamycin pathway (mTOR). The viral rebound was less frequent with metformin and was consistent across subgroups. We have recently chemically synthesized the curcumin conjugate of metformin via an extremely facile microwave-induced technology. The conjugate was resolved and analyzed by preparatory thin-layer chromatography, nanodrop spectrophotometry and ESI-MS/MS studies. We believe this potentially target molecule will be beneficial and suitable for carrying out studies to reduce Viral Load in patients suffering from acute Respiratory Syndrome Coronavirus 2 (SARS-Cov-2). Since curcumin is known as anti-inflammatory agent we believe the conjugate with metformin may be beneficial in relieving the symptoms of (SARS-Cov-2).

Deciphering the antioxidant capacity of common vitamins against specific reactive oxygen species by nuclear magnetic resonance
Juhyeon Park, park4jk@mail.uc.edu, Hong Tang, Peng Zhang. Chemistry, Univ. of Cincinnati College of Arts and Sciences, Ohio Antioxidant studies are important for preventing oxidative stress and developing preservative techniques for food and medicine. There has been increasing interest in the study of natural antioxidants, such as vitamins, due to their biocompatibility, relatively low cost, and high antioxidant capacity. Spectroscopic tools, including fluorescence and electron spin resonance (ESR), have been developed to evaluate the antioxidant capacity. However, it is difficult for these methods to measure the antioxidant capacity against specific reactive oxygen species (ROS). Built upon a recently developed ^{19}F NMR method to differentiate and quantify specific ROS, we have deciphered the antioxidant capacity of some common vitamins (provitamin A, vitamin B_2, vitamin C, and vitamin E) against specific ROS ($^1O_2$, H_2O_2, and OH radical). Our experimental data show that the order of the antioxidant capacity against $^1O_2$ is vitamin B_2 > vitamin C ≈ provitamin A > vitamin E. The order of the antioxidant capacity against H_2O_2 is vitamin C > vitamin B_2 ≈ provitamin A, while vitamin E does not show antioxidant activity against H_2O_2 under our experimental conditions. The order of the antioxidant capacity of these vitamins against OH radical is vitamin B_2 > Provitamin A > vitamin C > vitamin E. At low concentrations, vitamin E displays pro-oxidant effect against OH radical under our experimental conditions, which is likely due to the enhanced generation of OH radical by vitamin E in the Fenton reaction. This is the first study to systematically compare the antioxidant capacity of these common vitamins against specific ROS. The results shed light on the intricate antioxidant activities of these vitamins against specific ROS.

Macromolecular antioxidants
Choon Y. Lee, lee1cy@cmich.edu. Chemistry and Biochemistry, Central Michigan Univ. College of Science and Engineering, Mount Pleasant Free radical damage can induce oxidative stress, which can result in many diseases in humans, such as cancer, heart disease, and neurological disorders. Polyphenols are well known for their health-related benefits, including antioxidant activities. Unfortunately, the majority of phenolic antioxidants have a low bioavailability due to their lack of water solubility. Consequently, our research focuses on developing various antioxidants in the form of dendrons or dendrimers that are soluble in water or biocompatible solvents. In this presentation, we will present syntheses of such dendritic antioxidants as well as their antioxidant activities against 2,2-diphenyl-1-picrylhydrazyl (DPPH) radicals and protective effects on biomolecules against 2,2'-Azobis(2-amidinopropane) dihydrochloride (AAPH) radicals.

Flavor Preferences of Cats and Dogs

Flavor perception and health: A two-way street
Nancy Rawson, nrawson@monell.org. Monell Chemical Senses Center, Philadelphia, Pennsylvania While we readily recognize the impact that vision or hearing loss can have on overall health, the senses we use to detect chemicals in our external and internal environments ("chemical senses") are at least as vital to our health and longevity. For our pets, these senses play an even more important role, as their ability to perceive their chemical environments, particularly for volatile chemicals, is considerably more acute and behaviorally significant than ours. Health status can impact sensitivity to these chemicals in a variety of ways- from immediate damage due to injury or infection, to more subtle changes over time that occur with aging, inflammation from chronic disease or exposure to polluted environments. Conversely, chemosensory dysfunction can adversely impact health

through altered eating patterns, difficulty in recognizing familiar foods, environments, or family members (both two-footed and four-footed), and reduced sensitivity to environmental hazards such as smoke or gas. In humans and our pets, these changes can lead to nutritional deficits, stress and cognitive and behavioral changes. Recent research is uncovering the mechanisms behind these effects and identifying potential avenues for therapeutic intervention and compensation. Inflammatory processes and hormonal shifts can directly influence the structure and function of these chemosensory systems, impairing their ability to regenerate and altering sensitivity in unexpectedly specific ways. Understanding these changes and their significance is important to the design of products that will provide enjoyment and support a long and healthy life for our beloved furred companions.

Sweet, umami, and kokumi taste perception of the domestic cat, an obligate carnivore Scott McGrane, scott.mcgrane@effem.com. Waltham Petcare Science Institute, Melton Mowbray, United Kingdom Domestic cats (*Felis catus*) are obligate carnivores, and as such require a meat-based diet. The class C GPCRs includes several important taste receptors, such as sweet (T1R2-T1R3), umami (T1R1-T1R3), and kokumi (CaSR). We have studied these taste receptors *in vitro* to determine their functionality and role in the taste perception of the domestic cat. It is long-established that cats are indifferent to sugars and sweeteners, but it was not until more recently that it was discovered that this was due to their sweet taste receptor gene (Tas1r2) being pseudogenised. It is proposed that cats lost their ability to taste sugar since they do not commonly encounter it in their carnivorous diet. Cats, however, have a strong preference for umami compounds such as nucleotides, amino acids, and their mixtures. Interestingly, the cat umami receptor responds to a range of nucleotides as agonists and several amino acids act as enhancers. These compounds are commonly present in meat and are highly appetitive for cats. Indeed, it has been proposed that umami is the main appetitive taste modality for the domestic cat. Cats also have a functional kokumi receptor, which has a high similarity amongst mammalian species, although there are differences in taste sensitivity. It is suggested that kokumi is an important taste modality for carnivores that also enhances the palatability of meat-derived compounds. Collectively, it appears the sense of taste of cats has evolved to detect compounds present in meat, which is their primary food source. Further details on these findings will be presented.

Role of organoleptic variety in food intake of domestic cats Annabelle Goyon, Melanie Trehiou, melanie.trehiou@royalcanin.com. Mars Petcare, Aimargues, Occitanie, France Studies with different species have shown that repeated exposure to a monotonous diet results in a decline in preference or pleasantness of that diet. In a cattery environment, published studies on cats revealed that their preference for a diet, evaluated with a 2-bowl test, doesn't shift to a less preferred diet despite the extended exposure. However, other studies run in-home with a 1-bowl methodology have shown that repeated feeding of the same product can result in a decline in intake over time. This effect is interpreted as sensory specific satiety and is used as evidence of the need for a variety of flavours and textures in the diet of the cat. In addition, some studies have shown higher mean intakes across several days when cats are fed several different products in sequence compared to when they are fed the same product repeatedly. Even though cats are obligate carnivores and don't need dietary variety to achieve a nutritionally complete diet, as a recently domesticated species, cats need sensory stimulation to excite their natural instincts. Royal Canin has used its feline expertise and latest research on cat food palatability to create an entire range of wet foods to stimulate the senses of cats, including three different products tailored to cat's smell, taste, and mouthfeel, that will offer a sensorially-rich experience.

Genomic approach to investigate key feline taste receptors Deborah Roberts[1], Deborah.roberts@rd.nestle.com, Stephanie Michlig Gonzalez[2], Alix Zollinger[2], Sami Damak[2], Gary Woodward[1]. (1) Purina Animal Nutrition LLC, Saint Louis, Missouri(2) Nestle SA Research and Development Network, Vevey, VD, Switzerland Cat taste perception mechanisms involved in their preference for certain food or nutrients can be studied by different approaches. One such approach is understanding the basic biology at the receptor level and identifying cats' different taste receptors. Gene expression analysis in taste papillae of cats can provide insight into the key proteins involved in the taste transduction mechanism. For example, transcriptome analysis of circumvallate papillae would provide a mapping of genes specifically expressed in taste-sensitive tissue as mechanistic elements for cat preference coding. This study investigated gene expression of eleven samples combining two different animals and samples from circumvallate (CV) taste papillae and gustatory tongue epithelium (non-taste: NT) as control tissue. We identified 9676 differentially expressed genes between CV taste papillate and NT from the annotated cat genome (v9.0). One-hundred and eight (108) over-expressed GPCRs in CV can be considered as potential receptors for transduction mechanisms in taste cells. Of these, some were already known to be involved in taste-transduction: TAS1R3, TAS1R1, PLCB2, GNAT3, TRPM5, GNG13 and TAS2R4, and their identification helps confirm the approach. This finding enables potential identification of taste receptors that can help understand why cats like and dislike certain tastes.

Chemical pest defense by the characteristic response to silver vine and catnip plants in the domestic cat Masao Miyazaki, mmasao@iwate-u.ac.jp. Faculty of Agriculture, Iwate Univ., Morioka, Iwate, Japan Domestic cats exhibit a characteristic response to certain plants, such as catnip (Nepeta cataria) and silver vine (Actinidia polygama), which includes licking and chewing the plants, rubbing their face and head against the plants, and rolling on them. This response is triggered by plant iridoids, specifically, nepetalactone in catnip, and dihydronepetalactone, iridomyrmecin, and their isomers in silver vine. Despite extensive research, the biological significance and underlying mechanisms of this response had largely remained undetermined. In this presentation, I will introduce our studies that uncover the behavioral significance and species-specificity of this response. We identified nepetalactol as a potent bioactive compound from silver vine leaf extract, which had previously been overlooked. Behavioral analyses demonstrate that rubbing and rolling on the leaves transfers nepetalactol onto the feline head and body fur. Nepetalactol, like nepetalactone, is repellent to insects such as mosquitoes, thereby providing protection against bites. Our studies also reveal that cats have evolved a sensitivity to plant-specific iridoid production. The licking and chewing of catnip and silver vine leaves by cats cause leaf damage, which increases the emission of iridoids. In silver vine, such damage enhances the complexity of the iridoid profile. Cats exhibit maximum responsiveness to the iridoid composition and amounts produced by these plants; for catnip, they respond to large quantities of nepetalactone, whereas for silver vine, they respond to much smaller amounts of mixed iridoids. On the other hand, our recent study showed that not all felid species respond to these plants. Additionally, about one-third of domestic cats do not inherently respond, suggesting that the behavioral function of mosquito defense alone is insufficient to explain the species specificity of the response. We are currently working to identify the genes responsible for this response in Felidae species.

Flavor enhancement strategies across life stages for cats and dogs Rachel Schave[2], Sarah Anderson[2], Daniel Simmons[2], Ana Rita Monforte[1], Sara Martins[1], smartins@afbinternational.com. (1) AFB International, Oss, Netherlands(2) AFB International, Saint Charles,

Missouri Flavor preferences in pets differ significantly between species and evolve throughout their life stages. This study explores targeted flavor enhancement strategies for both cats and dogs, addressing the unique palatability needs of each species from puppy and kittenhood through adulthood and into senior years. We investigate the role of taste receptors and sensory perception changes that occur at different ages, assessing how these factors influence food preferences. Our research highlights key factors influencing flavor preference, including texture and aroma, which are particularly important for aging cats with diminished senses. Through controlled feeding trials and preference assessments, we evaluate the effectiveness of various natural and synthetic flavoring agents tailored for each life stage and species. Key findings reveal specific flavor profiles that enhance acceptance among kittens, puppies, adults, and senior pets, emphasizing the importance of developing formulations that cater to their distinct taste sensitivities and nutritional requirements. This research aims to inform the formulation of pet foods that promote optimal consumption and enjoyment across life stages, ultimately supporting the health and well-being of both cats and dogs.

Analysis of polymorphisms in canine chemosensory receptor genes Yoshihito Niimura, yosniimura@gmail.com. Dept. of Veterinary Sciences, Faculty of Agriculture, Univ. of Miyazaki, Japan Dogs were domesticated from grey wolves approximately 15,000 years ago. Through artificial selection in recent centuries, around 400 distinct dog breeds have been developed. In this study, to explore differences in olfaction and taste at the molecular level across various dog breeds, we investigated genetic variation in three families of chemosensory receptor genes: olfactory receptors (ORs), type 1 vomeronasal receptors (V1Rs), which are involved in pheromone detection, and type 2 taste receptors (T2Rs), which are responsible for bitter taste perception. We utilized the Dog Biomedical Variant Database Consortium (DBVDC), which includes data from 640 individuals across 134 dog breeds, as well as eight wolves. Our findings revealed that, among 816 functional OR genes and 276 OR pseudogenes, 159 and 10, respectively, are segregating pseudogenes with a minor allele frequency greater than 1%. The dN/dS ratios for both OR and T2R genes were significantly higher in dogs compared to wolves, suggesting relaxed functional constraints during domestication. We also analyzed gene repertoires across different breeds and found that pugs, which have been reported to have poor olfactory abilities, possess significantly fewer functional OR genes and a higher dN/dS value compared to other breeds. Furthermore, we identified an OR gene that is completely pseudogenized in pugs but remains mostly functional in other breeds. Lastly, we examined 15 genome assemblies from various dog breeds, revealing considerable variation in chemosensory receptor gene repertoires among individuals. This study provides valuable data for understanding the flavor preferences of dogs.

Impact of smell on dog's food choice Cécile Petel, Emira Mehinagic, emira.mehinagic@symrise.com. Symrise Pet Food, Elven, France Even if dogs interact with their world via all of their senses, the sense of smell seems to be one of the most important for dogs, because it provides them with very accurate information about the current status of their environment, playing a key role in maintaining their basic life activities such as finding food, recognizing threats, or finding a reproductive partner. The pet food industry players are more particularly interested in the role of dog's sense of smell as a driver of pet food palatability, defined as the capacity of food or ingredient to stimulate dog's appetite, thus encouraging the pet to eat the food and enjoy satisfaction from the meal. Understanding palatability in dogs remains a challenging area and scientists are constantly improving on the development of new methods that may provide further knowledge of the olfactive drivers of dog's hedonic responses. Our research targets to develop the knowledge on impact of volatile compounds on dog's feeding behaviors with a systemic approach from the bowl to the nose and from the nose to the brain. In this communication, we will show the methods and the results we have achieved when testing dog's capacity to identify, discriminate and like or dislike a food odor.

Resolution revolution: High-resolution mass spectrometry and pet food James W. Marshall[1], james.marshall@effem.com, Daniel Hemmler[2], Chloe Roullier-Gall[2], Lewis Jones[1], Schuetz Nadine[1], Michael Rychlik[2], Philippe Schmitt-Kopplin[3,2], Andrew J. Taylor[1]. (1) Waltham Petcare Science Institute, Melton Mowbray, United Kingdom(2) Chair of Analytical and Food Chemistry, Technische Univ. Munchen, Bayern, Germany(3) Analytical Biogeochemistry, Helmholtz Zentrum Munchen Deutsches Forschungszentrum fur Gesundheit und Umwelt, Neuherberg, Bayern, Germany Pet food is classified as an animal feed and is tightly regulated to ensure it deliverers complete and balanced nutrition, and is safe to eat. Pet food must be appealing to pets for it to deliver the nutrition and any other benefits it contains. Pet food is purchased by human "consumers" on behalf of their pets so the characteristics (especially smell and appearance) of pet food need to appeal to pet owners too. Whether a wet or dry format, pet food raw materials, selected to deliver nutrition and flavour are mixed and typically thermally processed to deliver a product that is safe, shelf stable and appealing. During pet food processing, a great deal of thermal chemistry can occur, determined by a complex set of parameters (recipe, composition of ingredients, processing conditions and length and severity of thermal process), none of the parameters are mutually exclusive (they are interdependent). Flavour and colour are generated through Maillard chemistry, but it is challenging to study the full extent of chemical change due to the complexity of the system chemistry. FT-ICR-MS analysis which has previously been used to study the composition of some foods was used to study the remarkable complexity of chemistry generated in simple amino acid sugar model systems when subjected to a thermal process. Changes in flavour compounds and flavour precursors were chemically evaluated as a function of time during thermal processing. Using a pressurised model system, the sterilisation of wet pet food was also studied over the time course of thermal a thermal process analogous to wet pet food sterilisation using FT-ICR-MS. The presentation will end describing strategies for the interrogation of complex chemical data generated using FT-ICR-MS to study aspects of pet food thermal process chemistry.

Characterizing the dynamics of aroma release from wet cat food for different formulations and feeding protocols Jonathan Beauchamp[1], jonathan.beauchamp@ivv.fraunhofer.de, Nina Cleve[1], Schuetz Nadine[2], Christoph Beckmann[2]. (1) 1Fraunhofer Institute for Process Engineering and Packaging, Freising, Germany(2) Mars Gmbh, Verden, Germany Cats are notoriously particular about their food, which can present a challenge for cat owners the world over. As such, the flavor constituents of petfood formulations are a key component in providing attractivity of the cat food to ensure a suitable nutritional intake by cats. Specifically, besides the auditory cues of pet owners placing petfood in a feeding bowl, the aroma released from wet foods represents a primary sensory stimulus to attract the attention of the cat. Although several flavor constituents of wet cat foods are known, the aroma profiles they elicit above the food during its presentation remain largely uncharacterized, especially in view of their release dynamics from the feed bowl during availability. To address this gap, we performed a series of dynamic headspace analyses in real-time using proton transfer reaction-mass spectrometry (PTR-MS). This method allowed the release of selected aroma compounds to be quantified in a continuous manner for up to 60 min. The objective of these analyses was to explore how certain aroma compounds from different chemical classes are liberated from the food over time. In addition, the effects of regularly stirring the cat

food, as well as serving temperatures, were also explored in terms of their suitability for increasing and/or refreshing the headspace volatiles, to ensure an attractive aroma headspace for cats. This talk will present an overview of the experimental methods and outcomes of the different products and serving protocols.

Microbial Food Safety - Emerging Technologies for Detection, Intervention and Antimicrobial Packaging of Foodborne Pathogens

Propidium monoazide is unreliable for quantitative live-dead molecular assays Simerdeep Kaur[1], kaur149@purdue.edu, Laura Bran[1], Grigorii Rudakov[2], Mohit S. Verma[1,2]. (1) Agricultural and Biological Engineering, Purdue Univ., West Lafayette, Indiana (2) Weldon School of Biomedical Engineering, Purdue Univ., West Lafayette, Indiana Propidium monoazide (PMA) is a dye that distinguishes between live and dead cells in molecular assays like Polymerase Chain Reaction (PCR). It works by cross-linking to the DNA of cells that have compromised membranes or extracellular DNA upon photoactivation, making the DNA inaccessible for amplification. Currently, PMA is used to detect viable pathogens and alleviate systemic bias in the microbiome analysis of samples using 16S rRNA gene sequencing. In these applications, treated samples consist of different amounts of dead bacteria and a range of bacterial strains, variables that can affect the performance of PMA and lead to inconsistent findings across various research studies. To evaluate the effectiveness of PMA, we used a sensitive qPCR assay and post-treatment sample concentration to determine PMA activity accurately under varying sample conditions. We report that PMA is unreliable for viability assays when the concentration and composition of the bacterial mixture are unknown. PMA is only suitable for qualitatively assessing viability in samples containing a known number of dead microbes or extracellular DNA.

Application of an engineered anti-biofilm enzyme (ABE) to detect and remove *Listeria Monocytogenes* Bryan Berger[1,2], bwb2k@virginia.edu, Samantha Felton[2], Kevin Lynn[1], Joseph Lee[8], Yiping He[6], Adam Oest[7], Amanda Miller[5], Chin-Yi Chen[6], Cheryl Armstrong[4], John Renye[5], Joseph Capobianco[3]. (1) Chemical Engineering, Univ. of Virginia, Charlottesville(2) Biomedical Engineering, Univ. of Virginia, Charlottesville(3) Research Engineer, Characterization and Interventions for Foodborne Pathogens, USDA Agricultural Research Service, Wyndmoor, Pennsylvania(4) Research Microbiologist, Characterization and Interventions for Foodborne Pathogens, USDA Agricultural Research Service, Wyndmoor, Pennsylvania(5) Research Microbiologist, Dairy and Functional Foods Research, USDA Agricultural Research Service, Wyndmoor, Pennsylvania(6) Research Molecular Biologist, Characterization and Interventions for Foodborne Pathogens, USDA Agricultural Research Service, Wyndmoor, Pennsylvania(7) Biological Laboratory Technician, Dairy and Functional Foods Research, USDA Agricultural Research Service, Wyndmoor, Pennsylvania(8) Biological Science Lab Technician, Characterization and Interventions for Foodborne Pathogens, USDA Agricultural Research Service, Wyndmoor, Pennsylvania Biofilms that are not remediated during routine cleansing and disinfecting procedures can serve as reservoirs for pathogens, leading to contamination of food, packaging, equipment and processing facilities to cause foodborne illnesses. Applying engineered anti-biofilm enzymes (ABEs) that disrupt biofilms can enhance detection of foodborne pathogens adsorbed on abiotic and biotic surfaces by releasing them from biofilm, providing a more accurate assessment of the level of contamination present as well as removal. In the current study, we applied ABE to improve detection of biofilm-embedded pathogens grown on an inert surface and ready to eat (RTE) foods. First, the minimum inhibitory concentration (MIC) of enzyme against L. monocytogenes was determined to ensure that treatments for detection did not result in cell death, which is necessary for accurate detection. The impact of treatment duration was also assessed quantitatively using microbiological plating, quantitative PCR (qPCR), and crystal violet assays. Following initial measurements using glass surfaces, biofilms were grown on RTE meat products and evaluated using parameters consistent with the Microbiological Laboratory Guidelines (MLG-8). Additionally, we examined combinations of a bacteriocin (thermophilin 110) identified previously as effective against L. monocytogenes with ABE, and assessed removal of biofilm-embedded pathogens on glass and plastic surfaces. The results indicate that the effective concentration of enzyme needed for L. monocytogenes biofilm disruption (0.1 mg/mL) was at least 10-fold lower than the MIC. Crystal violet staining, 6x6 plating enumeration, and qPCR demonstrated that biofilms treated with enzyme for longer than 4 hours resulted in a significant increase ($p<0.05$) in the number of cells released into the media as compared to PBS-treated controls. Moreover, in the absence of microbial enrichment, the pathogens were detectable by qPCR from pathogen-contaminated RTE meat after a 6-hr enzyme treatment while PBS-treated controls remained undetectable. These results are in agreement with measurements obtained via the Loop-Mediated Isothermal Amplification system utilized in the 3M Molecular Detection System as defined in the MLG standard set forth by USDA FSIS. ABE was also effective in removing biofilm on plastic and glass surfaces, and in combination with thermophilin 110, was highly effective in killing L. monocytogenes.

Nanopore-based sequencing and quantification Andrew Gehring, andrew.gehring@ars.usda.gov, sky Harper, sky.harper@usda.gov, Katrina Counihan, Shannon Tilman, Siddhartha Kanrar, George Paoli. USDA-ARS-ERRC, Wyndmoor, Pennsylvania Rapid methods employed for the detection of foodborne pathogens are often used in tandem to screen, quantify, and characterize samples, prolonging real-time comprehensive analysis. Next-generation sequencing (NGS) is a relatively new technology that combines DNA sequencing chemistry and bioinformatics to generate and analyze large amounts of short- or long-read DNA sequences and whole genomes. Evaluation of the quantitative capabilities of the real-time NGS Oxford Nanopore Technologies' MinION sequencer through a shotgun-based sequencing approach was performed. Correlation between known amounts of the analyte (lambda DNA as a pathogenic bacterial surrogate) with data output, in both the presence and absence of a background matrix (*Bos taurus* DNA) was observed. A positive linear correlation was observed between the concentration of analyte and the amount of data produced, number of bases sequenced, and number of reads generated in both the presence and absence of a background matrix. In the presence of *Bos taurus* DNA, the sequenced data was successfully mapped to an NCBI lambda reference genome. Furthermore, the workflow from pre-extracted DNA to target identification took less than 3 hours, demonstrating the potential of long-read sequencing as a rapid method for screening, identification, and quantification in food safety.

Genetic engineering of a *Salmonella* phage to develop a rapid biosensor for host separation, concentration, and detection Ranee K. Anderson, rka33@cornell.edu, Sam R. Nugen. Food Science, Cornell Univ., Ithaca, New York *Salmonella* contamination poses a significant threat to public health, leading to foodborne diseases and significant fatalities worldwide. Current detection methods for *Salmonella* require laboratory settings, are labor-intensive, and often yield inconclusive results. Bacteriophages (phages) can be used as a tool to address these challenges. This study aimed to design a faster and more efficient method to utilize *Salmonella* phages for capturing, separating, concentrating, and detecting their host in water and agricultural systems. The S16 phage was genetically engineered to: 1) synthesize monomeric streptavidin fused to approximately 870 Soc proteins per capsid, and 2)

incorporate a luciferase (NanoLuc) gene to signal successful infection of the bacterial host. Click chemistry was used to bind biotin-PEG4-alkyne and azide magnetic nanoparticles to the modified S16 phages. The magnetized phages were then used to bind and separate *Salmonella* from 10 mL water samples, followed by bioluminescent detection of the expressed NanoLuc. The genetic engineering of the S16 was confirmed through sequencing. The engineered S16 was successfully conjugated to magnetic nanoparticles, facilitating the concentration of *Salmonella* from 10 mL samples. The resulting nanoprobe demonstrated a limit of detection of <10 CFU *Salmonella* in 10 mL of water within 7 hours. Comparatively, the wild-type S16 phages did not yield successful results ($P<0.0001$). This study highlights the potential of phage capsid modification for biosensing at ultralow detection limits, enabling the separation and detection of their host bacteria. The use of S16 reporter phages immobilized on magnetic nanoparticles significantly improves the speed of *Salmonella* detection compared to current standard methods.

Development and application of aptamer-based biosensors for the rapid and sensitive detection of *yersinia enterocolitica* across different growth stages Muhammad Shoaib[1,2], shoaib_ju@hotmail.com, Wang Zhouping[1]. (1) Synergetic Innovation Center of Food Safety and Nutrition, Jiangnan Univ., Wuxi, Jiangsu, China(2) School of Food and Biological Engineering, Jiangsu Univ., Zhenjiang, Jiangsu, China *Yersinia enterocolitica* poses a significant public health threat due to its role in causing yersiniosis, a disease characterized by symptoms such as diarrhea, ileitis, and mesenteric lymphadenitis. The pathogen's growth patterns, low sample concentrations, and morphological similarities with other bacteria present considerable challenges for rapid, cost-effective, and accurate detection. Recent advancements in aptamer-based detection systems have proven crucial in developing sensitive, specific, and efficient methods to address these challenges. In this study, we screened highly specific ssDNA aptamers against *Y. enterocolitica* across different growth stages using whole cell-SELEX. Cells from various growth stages were harvested and incubated with an ssDNA library, leading to an enriched pool of specific aptamer candidates. Following ten rounds of SELEX, the enriched pool was sequenced and classified into seven families based on sequence homology and secondary structure similarity. Flow cytometry analysis identified aptamers M1, M5, and M7, with Kd values of 37.93 ± 7.88 nM, 74.96 ± 21.34 nM, and 73.02 ± 18.76 nM, respectively, as having the highest affinity and specificity to the target. These aptamers demonstrated binding across different growth stages of *Y. enterocolitica*, significantly increasing gated fluorescence. This efficient aptamer selection strategy provides a foundation for developing accurate and reliable detection systems. Further, we employed a modified Cell-SELEX technique that incorporated counter-selection against closely related bacterial species and selection within complex food matrices, thereby enhancing the specificity and sensitivity of the aptamers. These aptamers were integrated into biosensor platforms, resulting in highly sensitive detection systems identifying *Y. enterocolitica* at the lowest concentrations within minutes. The biosensors underscore their potential for on-site, real-time pathogen detection in the food industry. Our findings contribute significantly to microbial food safety by offering a robust and practical approach to detecting *Y. enterocolitica*, thus supporting efforts to reduce foodborne illnesses and enhance public health outcomes. Additionally, we explore the potential integration of these aptamer-based biosensors with emerging technologies such as microfluidics and portable detection devices to improve further the speed, sensitivity, and applicability of pathogen detection within the food supply chain.

Helicase mediated isothermal amplification based on CRISPR/Cas12a for detection of monkeypox virus Houqi Wang, 642556696@qq.com, Zhangquan Chen, Luxin Yu. Guangdong Medical Univ., Zhanjiang, Guangdong, China Monkeypox is a zoonotic disease caused by Monkeypoxvirus (MPXV) infection. Monkeypoxvirus is a double-stranded DNA (dsDNA) virus. The experimental diagnosis mainly relies on real-time fluorescent quantitative PCR, but this technology requires a special PCR instrument and is time-consuming. Isothermal amplification technology does not require thermal cycling, and only reacts at a single temperature condition, without special instruments. Helicase-mediated isothermal amplification (HDA) is an isothermal amplification technique that uses Helicase instead of heat to open double strands of DNA, known as simplified PCR, but its detection is susceptible to primer dimers. CRISPR/Cas detection technology is a new molecular diagnostic tool. Based on this detection technology, we established CRISPR/Cas12a-HDA detection technology for monkeypox virus detection.

Photoactivated CRISPR/Cas12a-HDA one-pot nucleic acid detection technology Huimin Liao, 2945710696@qq.com. Guangdong Medical Univ., Zhanjiang, China Helicase-dependent isothermal amplification (HDA) has the advantages of simple system, easy operation, and wide temperature compatibility. But it is easy to produce primer dimers, which affect the judgment of test results and may lead to false-positives. CRISPR/Cas has the characteristics of specificity and high sensitivity, which can make up for the shortcomings of helicase-dependent isothermal amplification. However, helicase-dependent isothermal amplification is operated in the same step as CRISPR/Cas12a detection reaction, and the Cas system will inhibit the destruction of the amplification reaction. In order to solve this problem, this study introduced a photoactivated CRISPR/Cas12a strategy and established a photoactivated CRISPR/Cas12a-HDA one-pot molecular diagnostic method. This method uses complementary hybridization of PC-DNA containing photolytic groups and crRNA to block CRISPR/Cas12a reaction. During the amplification stage, the crRNA cannot recognize and bind to the DNA double strand, and it is temporarily inactivated. When the amplification is over, rapid light activates the cutting function of the CRISPR/Cas12a system. This technology exhibits high sensitivity and specificity in the detection of influenza A virus, and can effectively avoid contamination of amplification products. Compared with traditional methods, the detection efficiency is improved and the operating steps and time are reduced. This technology provides an innovative solution for the field of nucleic acid detection and has a wide range of application potential.

THURSDAY MORNING March 27
AGFD General Papers - Protein Topics & Quality/Processing/Sustainability

Layer-by-layer chitosan coating of yeast protein isolate-stabilized emulsions: Effects on colloidal stability and curcumin bioaccessibility Suyoon Lee, microyoon@snu.ac.kr, Myeongsu Jo, Young Jin Choi. Seoul National Univ., Gwanak-gu, Seoul, Korea (the Republic of) Yeast protein isolates (YPI) are gaining recognition as a sustainable protein source in the food industry due to their high nutritional value and superior emulsifying properties compared to plant-based proteins. However, YPI-stabilized emulsions face significant challenges related to colloidal and storage stability, primarily due to protein aggregation and coagulation near the isoelectric point of YPI. This study investigates the potential of enhancing YPI-stabilized emulsion stability through a layer-by-layer (LbL) chitosan coating, with the objective of improving colloidal stability and promoting curcumin bioaccessibility. YPI (1% w/v) was fully hydrated over 12 hours prior to emulsion preparation. Oil-in-water (O/W) emulsions were formulated by mixing a 10% w/w oil phase with a 90% w/w aqueous phase using a homogenizer (11,000 rpm; 2 min), followed by sonication (450 W; 6 min; 1 s duty cycle). The oil phase comprised 9.95% sunflower oil and 0.05% curcumin

(w/w). Chitosan-coated YPI emulsions were prepared via the LbL technique, utilizing chitosan solutions (0-0.6% w/v, CHS) dissolved in 100 mM acetic acid (pH5). Primary emulsions were dropwised in chitosan solution. The emulsions were assessed colloidal and storage stability through particle size distribution, zeta potential, confocal laser scanning microscopy, and simulated digestion. The YPI-stabilized O/W emulsions with chitosan demonstrated improved electrostatic repulsion and enhanced colloidal stability near the YPI isoelectric point at pH 5. At chitosan concentrations above 0.2%, YPI-stabilized emulsions significantly reduced particle size to under 10 μm, compared to uncoated YPI emulsion (CHS0). During simulated digestion, CHS02 and CHS06 emulsions maintained structural integrity and acted as stable carriers under gastric conditions, while delaying the release and digestion of curcumin until reaching the small intestine. While YPI offers excellent nutritional and emulsifying properties compared to plant-based alternatives, its instability near its isoelectric point limits its applicability in food systems. This study demonstrates that layer-by-layer chitosan coating effectively mitigates this issue, enhancing the stability of YPI-stabilized emulsions in acidic environments and improving their performance as encapsulation systems for bioactive compounds. These findings extend the potential applications of YPI in emulsion-based food products, particularly in the context of sustained delivery systems.

Simulating oxidative pathways in linoleic acid: a molecular dynamics approach to safeguard food quality and extend shelf life Arpit S. Vaishya[1], avaishy@calstatela.edu, Lexi Hwang[2], Leo Hong[3], Jing Zhao[4], Changqi Liu[4]. (1) Computer Science, California State Los Angeles(2) College of Education, California State Los Angeles(3) Mechanical Engineering, Loyola Marymount Univ., Los Angeles, California(4) School of Exercise and Nutritional Sciences, San Diego State Univ., California, US Lipid oxidation is a major cause of quality deterioration in foods, especially those rich in polyunsaturated fatty acids. Antioxidants are widely used in foods to inhibit lipid oxidation, therefore extending product shelf-life. This study presents a quantitative molecular dynamics analysis of linoleic acid oxidation and the effects of antioxidants. Using 20 linoleic acid molecules and 80 oxygen molecules, the simulations of oxidation were performed at 300 K using the CHO.ff force field in a 90 x 90 x 90 Å simulation box. The results revealed that 38% of the linoleic acid molecules formed conjugated dienes, which are early markers of lipid peroxidation. Additionally, 56% of the molecules underwent oxidation to form lipid hydroperoxides, primary products of lipid peroxidation. Further decomposition of hydroperoxides resulted in the formation of secondary products such as aldehydes and ketones, contributing to 42% of the total volatile compounds responsible for off-flavors and rancidity. This degradation process significantly shortens the shelf life of food products, making it a crucial factor for consideration in food preservation. Moreover, the study quantitatively underscores the effectiveness of tocopherols (Vitamin E) in reducing lipid oxidation by as much as 30%, emphasizing their role in maintaining food quality. These findings offer valuable insights into the molecular pathways of lipid oxidation, which are critical for developing advanced preservation techniques and enhancing the stability of essential fatty acids in food products. This research provides a solid foundation for improving food safety, extending shelf life, and optimizing antioxidant use in the food industry, making it a significant contribution to academic and commercial sectors.

Use of microwave-assisted processes for agro-based materials H.N. Cheng[1], hncheng100@gmail.com, Atanu Biswas[2], Michael Appell[2], Heping Cao[1], Zhongqi He[1], K. Thomas Klasson[1]. (1) Southern Regional Research Center, USDA Agricultural Research Service, New Orleans, Louisiana(2) National Center for Agricultural Utilization Research, USDA Agricultural Research Service, Peoria, Illinois Microwave technology offers a rapid, energy-efficient means of heating and can significantly reduce reaction times compared to conventional methods. This is particularly advantageous when working with biomass and agro-based materials, as it enables the efficient breakdown of complex plant structures, facilitating the extraction of valuable compounds such as phenolics, oils, and other bioactive substances. In terms of sustainability, microwaves present a greener alternative, reducing both energy consumption and exposure time to chemical reagents. In the research conducted by the speaker and his collaborators, microwave technology has been instrumental in enhancing the extraction of phytochemicals and nutraceuticals from food substances. For instance, the total phenolic content in edible beans extracted using microwave-assisted water extraction at 100°C was found to be two to three times higher than that obtained through conventional extraction at the same temperature. Microwaves also accelerate chemical reactions, particularly those involving kinetically driven reactions and diffusion-controlled processes. A good example is the microwave-assisted synthesis of carboxymethyl cellulose from alkali cellulose and monochloroacetic acid, where the reaction time was significantly reduced. Another example involves the rapid formation of polyurethane from starch, maltodextrin, and cyclodextrin using microwave technology, allowing for much faster reactions compared to conventional heating. Overall, the ability to quickly modify or extract agro-based materials with microwaves paves the way for innovative processes, supporting the broader movement toward more sustainable and eco-friendly chemical and agricultural practices.

Biodegradable, water-stable, and reusable drinking straws from papaya agricultural wastes Rohit rai, ROHITRAI613@gmail.com, Prodyut Dhar. School of Biochemical Engineering, Indian Institute of Technology (BHU) Varanasi, Uttar Pradesh, India Drinking straws from plastics due to their non-degradability, non-recyclability, and large consumption, are posing a great risk to the environment, human health, marine life, and habitats. Paper straws present poor performance, in terms of wet stability, and mechanical strength, and use harmful adhesives and coatings, which urgently demand sustainable and high-performance alternatives. The current work utilizes leaf stalk waste from papaya agriculture and modifies it via delignification, silanization, and drying for the fabrication of drinking straws. The physiochemical modification through silanization and drying incorporates silane groups on the cellulosic backbone and compresses the microporous structure, improving the performance of the straws made. The modified papaya straws present high-water stability (~8 hours), mechanical strength (3.71 MPa), hydrophobicity (contact angle ~90.2°), solvothermal stability (0-80°C), low leaching (<60 mg/kg), low swelling (3.83 times), reusability and low-fizzing. The silanized papaya straws were also readily biodegradable (~28 days), and generated lower ecological impacts than plastic (45% less GWP) and reusable metal straws (85.5% less GWP). The utilization of waste agricultural biomass from papaya agriculture utilizes the natural hollow architecture of leaf stalks which does not require disintegration and remolded during straw preparation making it a facile, cheap, scalable, environment-friendly, renewable, and sustainable strategy for the preparation of high-performance drinking straws as a substitute to plastic and paper straws.

Release dynamics of bioactives (anthraquinones) encapsulated in casein micelles during in vitro digestion Uzma Sadiq, uzma.sadiq113@gmail.com. BioSciences and Food Technology, RMIT Univ., Melbourne, Victoria, Australia Encapsulating anthraquinones extracted from aloe vera in casein micelles (CMs) can prevent their degradation. This study examined the digestion behavior of spray-dried microcapsules of casein micelles loaded with aloe vera-extracted anthraquinone powder (CMAQP), freeze-dried powder (CMFDP), and whole-leaf aloe vera gel (CMWLAG) obtained through ultrasonication during oral, gastric, and intestinal

digestion. The results showed that CMAQP and CMFDP dissolved slowly and formed large curds during gastric digestion, which enhanced the retention of anthraquinones in the digestive tract. Conversely, the structure of CMWLAG was disrupted, leading to an increased release of anthraquinones during the oral and gastric phases, suggesting a higher presence of surface anthraquinones rather than encapsulation within the CMs. Strong hydrophobic interactions protected the anthraquinones within the core of the CM for CMAQP, delaying their diffusion. During simulated intestinal fluid (SIF) digestion, both CMAQP and CMFDP released substantial amounts of anthraquinones, although CMAQP exhibited a more controlled release of aloin and aloe-emodin over time. The release behavior of anthraquinones from CM microcapsules depended on the type of anthraquinone encapsulated. This study offers insights into the release patterns of bioactive compounds encapsulated in food-grade CMs during in vitro digestion and emphasizes the importance of the form of the bioactive component being encapsulated.

Investigating the migration of volatiles from food packaging into rolled oats Matthew Edwards[2], medwards@sepsolve.com, Khaled Murtada[2], James Ogden[1], Meriem Gaida[1], Laura McGregor[1]. (1) SepSolve Analytical Ltd, Peterborough, United Kingdom(2) SepSolve Analytical, Waterloo, Ontario, Canada Studying the migration of volatiles from food packaging is essential to ensuring the safety, quality, and sensory integrity of food products. Over time, packaging materials can release volatiles that migrate into food, significantly impacting sensory attributes such as taste, aroma, and overall consumer appeal. Understanding the extent and mechanisms of this volatile migration ensures compliance with strict food safety regulations and is important in designing packaging solutions that minimise these effects. The interaction between packaging materials and rolled oats is of particular interest, as oats can absorb volatiles, potentially altering their flavour profiles. However, investigating volatiles in complex food matrices like oats requires advanced analytical techniques, given the low concentrations and chemical diversity of the compounds involved. Traditional methods like SPME–GC–MS often lack the necessary sensitivity and resolution for comprehensive volatile characterisation. In this study, we use headspace sorptive extraction paired with GC×GC–TOF MS, a powerful combination that offers enhanced extraction efficiency and high-resolution separation for confident non-target screening. This approach provides in-depth detail of the volatile profiles in food, enhancing the ability to monitor the potential effects of packaging materials on these profiles. Here, we apply this advanced approach to analyse volatiles from six different brands of packaged oats. Using sophisticated chemometric techniques, we identify key differences between packaging materials, such as cardboard, paper, and plastic, and examine the volatiles emitted from these sources to confirm the suspected migration patterns.

mpact of UV-A dehydration on food product quality and structure Sajad Karami[1], sajad.karami@usu.edu, Luis J. Bastarrachea[1,2]. (1) Dept. of Nutrition, Dietetics and Food Sciences, Utah State Univ. College of Agriculture and Applied Sciences, Logan(2) Dept. of Biological Engineering, Utah State Univ. College of Engineering, Logan Food dehydration has been utilized since ancient times and continues to be an effective preservation method. Various dehydration techniques are available, each with advantages and disadvantages, but many involve exposing raw foods to high heat or high energy input. This study explores an alternative low-energy, non-thermal dehydration method. Specifically, we examine the effects of UV-A light as a novel technique on both plant- and animal-based foods, aiming to better understand how UV-A affects their physicochemical properties. UV-A has a longer wavelength and lower energy than other UV types, allowing deeper penetration into food and aiding in water vaporization. We assessed the impact of UV-A on preserving nutrients like vitamin C, β-carotene, phenolic content, and retinol during the dehydration process. To assess color retention, we also studied the role of polyphenol oxidase, an enzyme responsible for browning. Results indicated that UV-A exposure denatured the enzyme while removing moisture, enabling the UV-A-treated samples to maintain the natural color of fresh fruits. Additionally, we evaluated the antimicrobial effects of UV-A on *L. innocua* and *E. coli* in sweet potatoes, finding that it significantly reduced the microbial load (~3 log reductions), despite being a non-thermal process. When comparing UV-A dehydrated beef jerky to conventionally cooked jerky, the UV-A method demonstrated improved color retention and unique surface chemistry. Overall, UV-A light dehydration produced jerky with comparable physical and antimicrobial qualities to traditional methods, while offering distinct advantages in terms of structure and color. These differences, including a more intact microstructure and lower browning index, may appeal to specific consumer preferences and provide opportunities for product differentiation in the market.

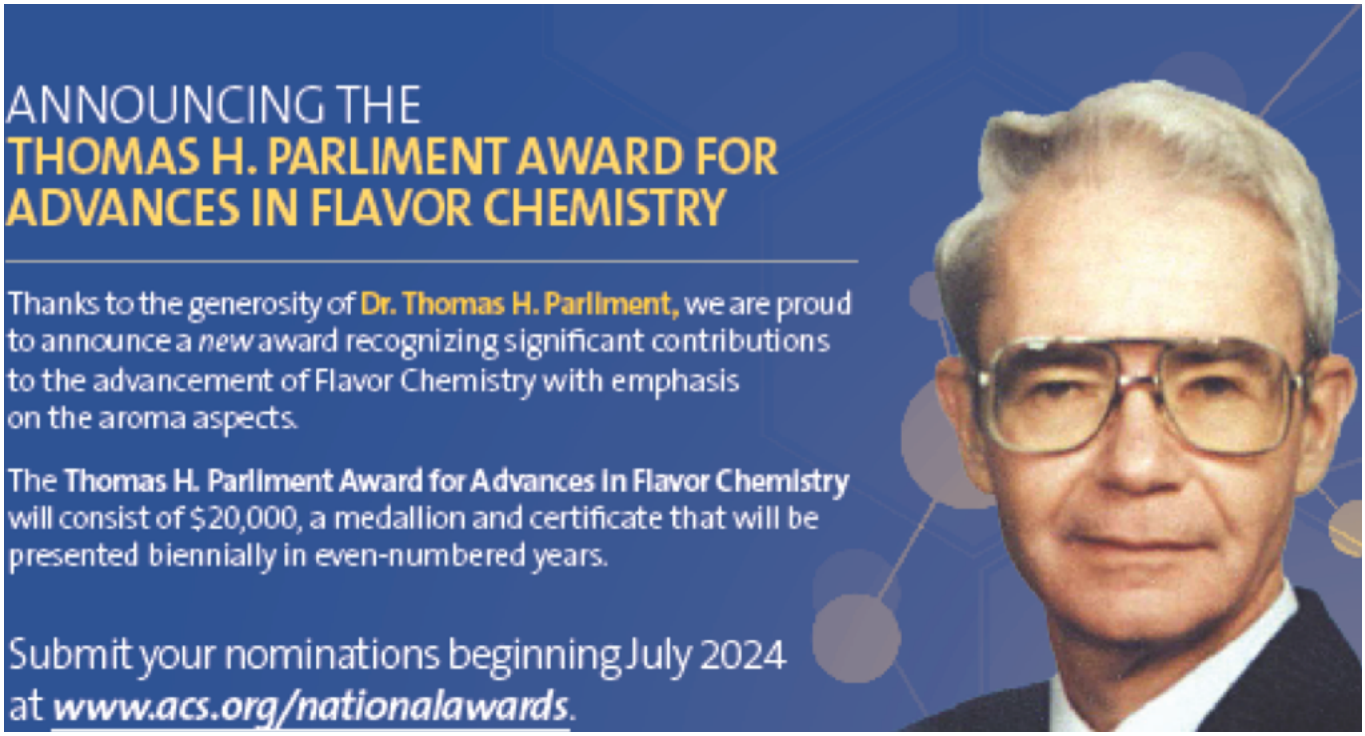
Techno-economic perspective of chickpea hulls-derived dietary fiber affected by extraction methods Yilin Li[1], lyilin@vt.edu, Kavin Sivakumar[2], Shan Hong[3], Zhiyuan Xu[1], Bipin Rajpurohit[3], Hengjian Wang[1], Yonghui Li[3], Haibo Huang[1], Yixiang Xu[2]. (1) Dept. of Food Science and Technology, Virginia Polytechnic Institute and State Univ., Blacksburg(2) Healthy Processed Foods Research, USDA-ARS Western Regional Research Center, Albany, California(3) Dept. of Grain Science and Industry, Kansas State Univ., Manhattan Dietary fiber is a versatile food ingredient that offers many health benefits. Insufficient dietary fiber intake is associated with increasing risks of obesity, heart disease, and cancers. While the health benefits of dietary fiber are well-established and the food industry is actively incorporating it into food products, there are promising opportunities of producing dietary fiber from agricultural byproducts. Chickpea hulls (CPHs), byproducts from chickpea processing, are rich in fiber, making them a potential feedstock for dietary fiber production. This study aims to develop different extraction methods to produce dietary fiber from CPHs and evaluate the economic performance of these methods. Dietary fiber from CPHs were extracted using three methods: 1) alkaline extraction (AT), 2) hydrothermal extraction (HT), and 3) hydrothermal-alkaline extraction (HA). To assess the technical and economic feasibility of extraction methods, we performed a comparative techno-economic analysis using Aspen Plus with three scenarios corresponding to the three extraction methods. The processing plant is assumed to have a process capacity of 5,760 metric tonnes per year. The capital and operating costs, as well as unit fiber product cost, were analyzed for each scenario for determining the most cost-effective process. The dietary fiber extraction yields of AT, HT, and HA were 81.1%, 79.8%, and 66.2%, respectively. The total capital investments were estimated to be 30.8 M USD, 29.5 M USD, and 33.0 M USD for scenarios 1 through 3. The operating costs were 29.3 M USD, 26.5 M USD, and 27.6 M USD, respectively. The optimal process, HT, produced dietary fiber with the lowest unit product cost of 4,594.6 USD per tonne. The cost breakdown analysis showed that the labor cost and raw material cost contributed most to the product cost, accounting for 49% and 32%, respectively. Moreover, sensitivity analyses were performed to determine the key parameters affecting the fiber product cost. In summary, we performed a comparative study that unveils the interrelationship between the extraction processes of dietary fiber and their economic performances, which underpins the dietary fiber production in the food industry. By upgrading low-cost food byproducts to value-added food ingredients, this work enhances the economic feasibility of dietary fiber production, contributing to mitigate dietary fiber deficiencies and supporting the long-term sustainability of the agricultural system.

Exploring the versatility of oleogels in food systems: Structural, functional, and sensory attributes Roberta Silva,

rcsilva@ncat.edu. Family and Consumer Sciences, North Carolina Agricultural and Technical State Univ., Greensboro The growing demand for healthier alternatives in food formulations has driven the exploration of oleogels as replacements for traditional fats. This research presents a comprehensive overview of approaches used by our research group of oleogel systems and their potential applications in the food industry providing reliable and valuable insights. It focuses on the role of various oleogelators in structuring oils, including carnauba wax, rice bran wax, beeswax, ethylcellulose, and others. Oleogels were designed to reduce saturated fats while maintaining desirable textural and sensory attributes, making them suitable for bakery products, meat analogs, and confections. One approach employed by our research group investigated using oleogel-emulsions, examining the stability and textural properties influenced by varying emulsifier concentrations and water content. Results indicated that higher water content increased phase separation, though appropriate emulsifier levels significantly improved stability. Additionally, we explored the application of wax-based oleogels in peanut butter and ice cream formulations, revealing improvements in spreadability and a reduction in oil separation. The partial substitution of traditional fats with oleogels demonstrated potential for maintaining sensory acceptance, with carnauba and rice bran waxes enhancing rheological properties without significant adverse effects on consumer perception. Further studies focused on the oxidative stability of curcumin-loaded oleogels in bakery products. By incorporating curcumin into wax-based oleogels, we found that oleogels delivered bioactive compounds effectively and maintained the desired physicochemical properties, such as solid-like behavior and oxidative stability during storage. Our findings underscore the potential of oleogels to replace conventional fats across various food systems. The versatility of oleogels as fat replacers not only offers a promising pathway toward developing food products with improved nutritional profiles but also inspires innovation in food product development, enhancing consumer acceptance and driving the industry forward.

Mark August 17 - 21, 2025 on your calendar for the 270th ACS National Meeting in Washington D.C.

AWARDS APPLICATION FORMS



This ACS-administered award is granted in even numbered years.

Withycombe–Charalambous Award for Excellence in Graduate Research in Agricultural or Food Chemistry

Purpose:
This competition is designed to showcase the research talents of graduate degree candidates to prospective employers.

Nature:
Symposium held as part of the AGFD program at the spring national meeting. Up to six (6) applicants selected, by a panel of judges, to make oral presentations in the symposium. Applicants selected to participate receive up to $1,000 to off-set travel expenses.

Eligibility:
Participation in the symposium is open to all graduate students who are expected to graduate, during the year of the symposium, from certified universities doing advanced research in the areas of food and agricultural chemistry. Applicants must be a member of AGFD.

Award:
A panel of judges will select first, second, and third place basis research content and presentation. Awardees will receive an engraved plaque and a cash prize of $500, $250, and $100, respectively.

Application deadline:
September 22, 2025

Current information for applications/application instructions:

Email the following to the Award Coordinator: Dr. Kathryn Deibler kdd3@cornell.edu

- Application Form (see below)
- Resume/CV
- Complete undergraduate and graduate transcripts with GPA
- Letters of recommendation from 2 major degree professors (one letter preferably from the graduate advisor)
- Abstract of the proposed presentation
- Submission of the abstract via the ACS MAPS On-line System)

Application to the Division of Agricultural and Food Chemistry
Withycombe-Charalambous Graduate Symposium Competition

Name: _____

College/University: _____

Major(s): _____

Grade Point Average (GPA, provide scale): _____

Address:_____

_____

Phone number: _____

E-mail: _____

ACS Member Number: _____
Are you a member of the Division of Agricultural and Food Chemistry (AGFD)
☐ Yes ☐ No

Research Advisor: _____

Along with this form, please submit the following items:

1. Resume/CV
2. Complete undergraduate and graduate transcripts with GPA
3. Letters of recommendation from 2 professors
4. Abstract of your proposed poster presentation – also submit through ACS MAPS system to the AGFD Withycombe-Charalambous Graduate Competition Symposium

E-mail your completed application to:

Dr. Kathryn Deibler
E-mail: kdd3@cornell.edu

Deadline for applications to be received: September 26, 2025

The Division of Agricultural and Food Chemistry (AGFD)
of the American Chemical Society (ACS)

In conjunction with the 271st ACS National Meeting
March 22 – 26, 2026 in Atlanta, GA

Presents the

UNDERGRADUATE STUDENT POSTER COMPETITION

This research and poster competition is designed by AGFD to showcase the research talents of undergraduate students, provide a professional forum for presentation of their research and promote their continuance of education in food & agricultural chemistry.

Participation in the competition is open to all undergraduate students at all certified universities actively participating in research projects/programs in the areas of food and agricultural chemistry. Applicants must be a member of ACS and AGFD.

Those students chosen to participate as Finalists in the poster symposium will receive coverage of travel expenses up to $1000 to attend and present their research during the AGFD General poster session at the Spring meeting of the ACS. Three Undergraduate Research Award winners will be determined. The winners will receive a cash award of $500, $250, and $100 for first, second and third place, respectively.

Applications are being accepted from qualified undergraduate students. To apply, please submit the following items:

1. Application form
2. Resume / CV
3. Letters of recommendation from one professor
4. Abstract of the proposed poster presentation (<u>also</u> submit abstract to ACS MAPS On-line system to the AGFD General Poster Session)

E-mail Application to:
Dr. Kathryn Deibler
E-mail: kdd3@cornell.edu

Application & Abstract Entry Deadline: September 26, 2025
(Enter your Proposed Abstract to the
AGFD General Poster Session via the ACS MAPS On-line System)

ACS Chemistry for Life®

Application to the Division of Agricultural and Food Chemistry
Undergraduate Student Research Poster Session

Name: _____

College/University: _____

Major(s): _____

Grade Point Average (GPA, provide scale): _____

Address:_____

_____

Phone number: _____

E-mail: _____

ACS Member Number: _____

Research Advisor: _____

Along with this form, please submit the following items:

1. Resume
2. Letters of recommendation from 2 professors (one the advisor)
3. Abstract of your proposed poster presentation – also submit through ACS MAPS system to the AGFD General Poster Session

E-mail your completed application to:

Dr. Kathryn Deibler
E-mail: kdd3@cornell.edu

Deadline for applications to be received: September26, 2025

Young Industrial Scientist Achievement Award

Purpose: Recognize the significant scientific - development contributions of junior industrial scientists to commercial fields of agricultural and food chemistry

Eligibility: Must have <=10 years of industrial service (age <40).

- Must be full member of the division (>= 5 years)
- Must be active in the division, for example: presentations/posters in AGFD technical programs, attendance at AGFD technical programs, service as a symposium organizer, or subdivision officer
- Must have made significant scientific and/ or commercial contributions, including technical publications, patents and patent application fillings, product-ingredient development, analysis methodology

Prize: The awardee(s) will be invited to present their research during a symposium as part of the AGFD program at the fall ACS national meeting.

- The awardee(S) will receive up to $1000 to off-set travel expenses.
- The awardee(s) will be presented an engraved plaque to commemorate this distinguished award.

Application Deadline: February 1

Information for Nominations: A panel of AGFD judges will choose the Young Industrial Scientist based on the nomination package.

- A maximum of two Awardees may be selected in a given year
- Nominations will be valid for two years, as long as nominees maintain their eligibility status.

Self Nomination Package: A self nomination letter

- Two letters of support, one of which must be from an AGFD member
- A one page summary of the research - development significance
- A 150-word abstract of the proposed oral presentation

The candidate's curriculum vitae, including service to AGFD

Roy Teranishi Graduate Fellowship in Food Chemistry

Purpose:
To fund original graduate school research.

Eligibility:
Beginning graduate students. The student must have an outstanding graduate grade point average (GPA) and show promise of an excellent graduate research career.

Prize: A one-time fellowship award of $2500.

Applications due: February 1

AGFD Fellow

Purpose:
To recognize outstanding scientific contributions to the field of agricultural and food chemistry.

Eligibility:
The award recognizes the application of chemistry to improve the supply, safety, and/or quality of food and agricultural products. A significant portion of the research should have been reported in ACS journals and books and/or at Divisional symposia. For industrial chemists, who may be discouraged or prohibited from publishing, qualification criteria might include: patents, product launches, process enhancements, reports & presentations. The nominee must have been a member of ACS and the Division for at least the preceding ten (10) years. Nominations must be made by an AGFD Fellow.

Prize:
The winner receives an engraved plaque at the ACS Fall Meeting.
The nominations are reviewed by a committee consisting of AGFD Fellows.

Deadline:
February 1

Nomination Package:

- Letter of nomination
- 2-4 letters of support form AGFD Fellows
- Brief summary of nominee's research
- Brief curriculum vitae
- Up-to-date publication list highlighting ACS publication record
- There is no nomination form
-

Email nominations to:
Dr. Fereidoon Shahidi
Department of Biochemistry
Memorial University of Newfoundland
45 Arctic Avenue
St. John's, NL, Canada A1C 5S7
fshahidi@gmail.com

Distinguished Service to the Division of Agricultural and Food Chemistry

Purpose:
To recognize substantial and sustained service to the Division.

Eligibility:
The nominee must have served the Division for a minimum of ten years in at least two of the following categories:

- Service as an officer
- Participation as a member of the Executive Committee
- Organization of Divisional symposia

Prize:
The winner receives an engraved plaque at the ACS Fall Meeting.

Deadline:
February 1

Nominations:
Made by email from AGFD executive committee members to awards chair

Selection:
Simple majority vote by the AGFD executive committee.

Journal of Agricultural and Food Chemistry Research Article of the Year Lectureship

sponsored by *JAFC* together with the American Chemical Society (ACS) Divisions of Agricultural and Food Chemistry (AGFD) and Agrochemicals (AGRO)

Nominations are solicited from the JAFC Advisory Board and the awards are selected by the JAFC Editor and Associate Editors.

Lectures are presented as part of the Division's technical program held at the Fall ACS national meeting.

A $1000 USD award is presented in conjunction with the lectureship.

Exemplary Leadership Award

Purpose:
Recognize substantial and extended service to AGFD.

Eligibility:
The nominee should have provided a minimum 25 years of active service to AGFD. Areas of service to be considered are:

- Division Officer
- Subdivision Officer
- Councilor
- Executive Committee Member
- Committee Chair, Councilor
- Symposium Organizer

Prize:
An engraved award presented at the ACS Fall Meeting.

Deadline:
February 1

Nominations:
Made by email from AGFD executive committee members to the award chair

Selection:
Simple majority vote by the AGFD executive committee.

Sterling B. Hendricks Memorial Lectureship Award

Administered by the Agricultural Research Service of the U.S. Department of Agriculture: cosponsored by the Division of Agricultural and Food Chemistry and the Division of Agrochemicals.

Dr. Hendricks contributed to many diverse scientific disciplines, including soil science, mineralogy, agronomy, plant physiology, geology, and chemistry. He is most frequently remembered for discovering phytochrome, the light-activated molecule that regulates many plant processes.
https://www.ars.usda.gov/research/lectures/hendricksp/

Purpose:
To recognize scientists who have made outstanding contributions to the chemical science of agriculture.

Eligibility:
Nominees may be outstanding, senior scientists in industry, universities, or government positions. Current ARS employees are not eligible.

Prize:
The Lecture, on a scientific topic, trend or policy issue of the Lecturer's choice, will be presented at the ACS Fall Meeting. The lectureship is presented at an AGFD symposium in odd-numbered years and in an AGRO symposium in even-numbered years. The award includes an honorarium of $2000, a bronze medallion, and expenses to present the Lecture. All of these costs are borne by ARS, which selects the winner.

Nomination Deadline:
See https://www.ars.usda.gov/research/lectures/2023/sb-hendricks/

HendricksLecture@usda.gov.

- Letter explaining the nominee's contributions to chemistry and to agriculture
- Nominee's current *curriculum vitae*

ACS Fellow

https://www.acs.org/content/acs/en/funding-and-awards/fellows.html

The American Chemical Society (ACS) Fellows Program was created by the ACS Board of Directors in December 2008 to recognize members of ACS for outstanding achievements in and contributions to science, the profession, and the Society.
Divisions can nominate twice their number of councilors

Kenneth A. Spencer Award

Administered by the Kansas City Section of ACS:
cosponsored by the Division of Agricultural and Food Chemistry and the Division of Agrochemicals.

Purpose:
The Kansas City Section continues to present this award to stimulate education, research and industrial developments in science and technology at all levels in the area and to promote chemistry in agricultural and food science nationwide.

Eligibility:
A candidate must be a citizen of the United States and must have done the work for which he or she qualified as a candidate within the United States. The candidate need not be a member of ACS. A candidate's work, whether done in education, industry or research, should have meritoriously contributed to the advancement of agricultural and food chemistry.

Prize:
The Award consists of a medal and an honorarium of $6,000, both of which are presented at a public meeting sponsored by the Kansas City Section. At this meeting the recipient will deliver an address outlining his or her achievements.

Deadline:
See https://acs-kc.com/spencer-application

Nomination information:
https://acs-kc.com/spencer-application

Book Award

Purpose:
To recognize editors who publish under division auspices, and whose books have achieved a high sales volume, which provides a source of royalty income to subsidize costs for future Division Symposia.

Eligibility:
The awardee should be a member of ACS and AGFD. Editors who have published a book under Division auspices and sales of which have achieved sales of 1000 copies or greater are eligible for a Platinum Club Award. Editors whose books equal or exceed 700 copies qualify for the 700 Club Award.

Award:
An inscribed plaque that commemorates the accomplishment, which is presented at the Division awards banquet at the ACS Fall national meeting.

Young Scientist Award

Purpose: To recognize outstanding scientific contributions of scientists early in their careers to the field of agricultural and food chemistry.

Eligibility: Candidates must have earned their last degree within twelve years of October 1 of the year of the presentation. Nominees are required to have been active members of the AGFD for a minimum of three (3) years when submitting their applications

Prize: A panel of AGFD judges will choose the Young Scientist based on the nomination package. The awardee will be invited to present their research during a symposium as part of the AGFD program at the fall ACS meeting. The awardee will receive up to $1000 to off-set travel expenses.
An engraved plaque and a check for $1000 will be presented to the Young Scientist to commemorate this distinguished award.

- **Application Deadline:** February 1
- Nomination letter from a member AGFD
- Two letters of recommendation
- A two-page summary of the research of significance
- A 150-word abstract of the proposed oral presentation
- The candidate's curriculum vitae
- Nominees must be members of AGFD

Advancement of Application of Agricultural and Food Chemistry sponsored by International Flavors and Fragrances, Inc

Purpose:
To recognize and encourage outstanding contributions to pure and/or applied agricultural and food chemistry.

Eligibility:
A nominee must have made: An outstanding application of chemistry and/or chemical technology to the solution of agricultural or food problems of importance to the nourishment and health of mankind, or Outstanding contributions to the advancement of pure and/or applied agricultural and food chemistry. Special consideration shall be given to independence of thought and the originality shown, or to the importance of the work when applied to the public welfare or the needs of humanity. The nominee must be actively engaged in the line of work for which the Award is made.

Prize:
$3000, an engraved plaque, and an allowance to cover the traveling expenses of the awardee to the ACS Fall Meeting at which the Award will be presented.

See application form, below.

AWARD FOR THE ADVANCEMENT OF AGRICULTURAL AND FOOD CHEMISTRY NOMINATION FORM

Send completed form to Award Committee Chairman Michael J. Morello mjmorello226@gmail.com
This form is a guide and should not restrict the scope of the nomination. Provide additional information as needed.

Candidate's name:

Citizenship:

Email address:

Home address:

Business address:

Description of the nature, purpose and results of the candidates' work:

Appraisal/Evaluation: (Provide a detailed evaluation of the candidate's work and its importance to the advancement of agriculture or food chemistry, spotlighting contributions of particular significance to the theory and practice of agricultural and food chemistry. Any important publications cited should reference the co-authors and specify the nominee's contributions.)

Present occupation, describing duties and responsibilities:

Education (degrees and dates):

Professional Career (described thoroughly from present to start):

Memberships in societies, clubs, organizations:

List of previous honors with dates:

List of candidate's patents and publications by title and reference:

Spouse/partner's name (optional):

Names and ages of children (optional):

Major non-professional interests (optional):

I submit that the facts contains in this nomination are accurate to the best of my knowledge:

Submitter's name & title
address
phone
email

AGFD CORNUCOPIA

CORNUCOPIA

Schedule of AGFD Technical, Business and Social Meetings (all Pacific Daylight Time)

Sun. March 23	noon-1:00	Special Topics Meeting	ask at AGFD info table
Mon. March 24	noon-1:00pm	Future Programs	ask at AGFD info table
Mon. March 24	5:00-8:00pm	Executive Committee Meeting	ask at AGFD info table
Tues. March 25	6:00pm-8:30pm	Chair's Reception (see cover)	Joe's Crab Shack