the CORNUCOPIA

including AGFD abstracts for the
244th American Chemical Society National Meeting
August 19 - 23, 2012

in PHILADELPHIA

LAUREN JACKSON, Program Chair

AGFD oral sessions take place at the Loews Philadelphia Hotel - 1200 Market Street
AGFD poster sessions take place at the Philadelphia Convention Center (Tuesday afternoon)

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visit our website: http://agfd.sites.acs.org - for a pdf of the Cornucopia and much more
deadline for submission of content for next Cornucopia: January 15
MESSAGE FROM THE CHAIR

As ever I am amazed at how far and wide our organizers and presenters come from. It is true testament to how great an event the ACS National Meetings are; to attract many of the world’s best and aspiring scientists respectively to participate. It is something that every undergraduate and graduate should try to participate in to complete their studies and as ever an excellent opportunity to network. The art of presenting scientific research is an essential skill for all involved, and even more impressive if English is not your first language. The Agricultural and Food Chemistry Division continues to lead the way in attracting new scientists to a chemistry subject that we can all identify with. After all isn’t everyone a minor expert in what they are eating? Certainly food programs on television are abundant and appealing as our knowledge and palates become more sophisticated. There is usually something for everyone with each AGFD symposium slate.

The 2012 San Diego ACS Spring meeting was a great success in a lovely city, with a large program of 273 abstracts over 33 sessions and 12 symposia. I would like to thank the Symposium organizers and all the presenters for their contributions and commitment to our division. Highlights included the Graduate and Undergraduate awards symposia, the Cocoa symposium with plenty of free chocolate, Hispanic foods and Carotenoid cleavage products.

Moving on to the “City of Brotherly Love” and the 244th ACS National Meeting here in Philadelphia. A grand venue for the national meeting. We have another big program of 25 sessions, 12 symposia and 228 abstracts. Amongst the symposia are several multi session topics: Discovering Bioactive Compounds (4 sessions), Neuroactive Compounds from Natural Products (2 sessions), Essential Oils: Natural Materials for Flavor, Fragrance and Bioactives (2 Sessions), Food Safety: New Technologies for the Protection of the Food Supply (3 sessions), Fruit and Vegetable Aroma Precursors (2 sessions), Physical Methods in Food Analysis (2 sessions), General papers (5 sessions) plus General posters and Sci-mix. In addition the Young Scientist Award Symposium, Division Award Symposium, Sterling Hendricks Memorial Lectureship and the Kenneth A. Spencer Award Symposium.

Putting together the symposia for a National meeting is a team effort and in-coming program chair, Lauren Jackson has done an excellent job of assembling a wonderful program of symposia and speakers. She will do a fine job as Division Chair in 2013. In addition I would like to acknowledge the dedicated help of all the symposium organizers, chair-elect Michael Qian, and the ACS’s Robin Green. Each programming chair also depends upon the executive committee and several highly organized and reliable AGFD regulars, namely Secretary Mike Tunick, new Treasurer Steve Toth, councilors Mike Morello, John Finley, Charles Brine, Cornucopia editor Carl Frey and past chair Mike Appell. They have been there to help when needed and we are truly grateful to them all.

Finally a big thank you and farewell to past Treasurer Cynthia Mussinan. She has devotedly served the division over the last 40 years and was the one who encouraged me to apply for the position of Division Chair. She will be greatly missed and we wish her well with her future endeavors. Again enjoy the program and venue.

Neil C. Da Costa
2012 AGFD Chair
neil.dacosta@iff.com
FUTURE PROGRAMS

NEW ORLEANS - April 7 - 11, 2013

Advances in the Generation and Integration of Food Sensation and Cognition - Brian Guthrie, Cargill, brian_guthrie@cargill.com Andrea Buettner, Friedrich Alexander University, Erlangen, Germany Andrea.buettner@lmchemie.uni-erlangern.de

Applied Nanotechnology for Food and Agriculture - Michael Appell; USDA-ARS-NCAUR, Michael.Appell@ars.usda.gov Bossoon Park, USDA-ARS-RRC Bossoon.Park@ars.usda.gov

Arsenic and Heavy Metal Contamination of Food - Lauren Jackson, FDA Summit-Argo, Illinois, Lauren.Jackson@fda.hhs.gov

Chemistry of Cajun Cuisine - Keith Cadwallader, University of Illinois at Urbana-Champaign, cadwlldr@illinois.edu

Chemistry of the Bar - Alyson Mitchell, University of California, Davis aemitchell@ucdavis.edu Stephen Toth, International Flavors & Fragrances, Union Beach, NJ, Stephen.toth@iff.com

Chemistry of the Gulf: What have we Learned? TBD

Emerging Techniques for Food Validation and Verification - Alyson Mitchell, University of California, Davis aemitchell@ucdavis.edu

Energy and Food and Water - John Finley, Louisiana State University Ag Center, JFinley@agcenter.lsu.edu

Food Additives - Vanee Komolprasert, FDA, Riverdale, MD vanee.komolprasert@fda.hhs.gov

General Papers and General Posters - Lauren Jackson, FDA Summit-Argo, Illinois Lauren.Jackson@fda.hhs.gov

Graduate Student Symposium - Charles Brine, CJ Brine and Associates, brinec11@verizon.net

Natural Products for Health and Pharmaceuticals and Biotech - John Finley, Louisiana State University Ag Center, JFinley@agcenter.lsu.edu Navindra Seeram, University of Rhode Island, Kingston, RI nseeram@mail.url.edu

Olfaction - George Preti, Monell, Philadelphia preti@monell.org

Recent Advances in Analytical Methods to Ensure Food Safety - Susan Genualdi, FDA, College Park, MD Susan.Genualdi@fda.hhs.gov Romina Shah, FDA, College Park, MD Romina.Shah@fda.hhs.gov

Synthesis of Natural Products: New Reagents and Reactions - Atanu Biswas, USDA-ARS atanu.biswas@ars.usda.gov Michael Appell; USDA-ARS-NCAUR michael.appell@ars.usda.gov

Undergraduate Symposium - Charles Brine, CJ Brine and Associates brinec11@verizon.net

Confirmed Theme: Chemistry of Energy and Food

INDIANAPOLIS - September 8 - 12, 2013

Advances in Taste Research for Sodium Reduction - Jane Leland, Kraft Foods, Glenview, IL JLeland@Kraft.com Louise Slade, Food Polymer Science Consultancy sladel@optonline.net

Advances in the Understanding of Dairy/Cheese Flavors and Related Analytical Techniques - Sanjay Gummalla, Givaudan sanjay.gummalla@givaudan.com

AGFD Division Award Symposium - Lauren Jackson, FDA Summit-Argo, Illinois, Lauren.Jackson@fda.hhs.gov

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Applications and Advances in Centrifugal Partition Chromatography in Natural Products - John Manthey, USDA, john.manthey@ARS.USDA.gov

Chemistry of Taste Modulation in Beverages - Mathias Sucan, mksucan@aol.com Keith Cadwallader, University of Illinois at Urbana-Champaign, cadwlldr@illinois.edu

Chemistry of Tea - Kevin Goodner, Sensus klg@sensusflavors.com Youngmok Kim, Sensus ymk@sensusflavors.com

Flavanoids in Food Science: Sensory and Biofunctional Properties - Coralia Osorio Roa, Universidad Nacional de Colombia, Colombia cosorior@unal.edu.co

General Papers and General Posters - Michael Qian, Oregon State Univ., Michael.qian@oregonstate.edu

High Performance Foods TBD

Instrumental Methods for the Analysis of Bioactive Molecules - G. K. Jayaprakasha, Texas A&M University gjayaprakasha@ag.tamu.edu Bhimu Patil, Texas A&M University b-patil@tamu.edu; Federica Pellati, Department of Pharmaceutical Sciences, University of Modena and Reggio Emilia, Italy federica.pellati@unimore.it

Kenneth A. Spencer Award Symposium (co-sponsored by AGRO) - Eckhard Hellmuth, UMKC, Kansas city, MO hellmuthe@umkc.edu

Lipid Oxidation - Karen Schaich Rutgers University, NJ schaich@rutgers.edu

Young Scientist Award Symposium - Charles Brine, CJ Brine and Associates brinec11@verizon.net

Confirmed Theme: Chemistry in Motion

DALLAS - March 16 - 20, 2014

Applied Food Chemometrics, Sensometrics, Qualimetrics Workshop - Brian Guthrie, Cargill, brian_guthrie@cargill.com

Computational Methods in Agricultural & Food Chemistry TBD

General Papers and General Posters - Michael Qian, Oregon State Univ., Michael.qian@oregonstate.edu

Graduate Student Symposium - Charles Brine, CJ Brine and Associates, brinec11@verizon.net

Sensor Applications in Food and Agriculture: Identity, Quality and Safety - Brian Guthrie, Cargill, brian_guthrie@cargill.com

Undergraduate Symposium - Charles Brine, CJ Brine and Associates brinec11@verizon.net

SAN FRANCISCO - August 10 - 14, 2014

AGFD Division Award Symposium - Michael Qian, Oregon State Univ. Michael.qian@oregonstate.edu

ACS Flavor Workshop - Terry Acree, Cornell University. Ithaca, NY tea2@cornell.edu

Antioxidants - Artemio Tulio, FDA Summit-Argo, Illinois Artemio.tulio@fda.hhs.gov

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**Authentication and Adulteration of Food** - Fereidoon Shahidi, Memorial University of Newfoundland, Department of Biochemistry  fshahidi@mun.ca  Lauren Jackson, FDA Summit-Argo, Illinois  Lauren.Jackson@fda.hhs.gov

**Biotransformation of Aroma Compounds** - Alyson Mitchell, Univ. of California, Davis  aemitchell@ucdavis.edu

**Flavonoid Nutrition and Interactions** - Fereidoon Shahidi, Memorial University of Newfoundland, Department of Biochemistry,  fshahidi@mun.ca

**General Papers and General Posters**

**Importance of Chirality to Flavor Compounds** - Karl-Heinz Engel, Technical University of Munich, Germany  k.h.engel@wzw.tum.de

**Recent Advances in Assembly and Applications of Food Colloids & Biopolymers** - Ron Qingrong Huang, Dept of Food Science, Rutgers University, New Brunswick, NJ  qhuang@aesop.rutgers.edu

**Young Scientist Award Symposium** - Charles Brine, CJ Brine and Associates  brinec11@verizon.net

**Other PROGRAMS and SYMPOSIA** - unscheduled or beyond 2014

**Art and Science of Flavor Creation** - Neil C. Da Costa, International Flavor & Fragrances, Union Beach, NJ  neil.dacosta@iff.com

**Biotransformation in the Body** - Alyson Mitchell, University of California, Davis, aemitchell@ucdavis.edu

**Chemistry of Phenolics from Fruits and Vegetables** - G. K. Jayaprakasha; Texas A&M University  gjayaprakasha@ag.tamu.edu  Bhimu Patil; Texas A&M University  b-patil@tamu.edu

**Colorants and Pigments** - Fereidoon Shahidi, Memorial University of Newfoundland, Department of Biochemistry  fshahidi@mun.ca  Kazuo Miyashita  Hokkaido University  kmiya@fish.hokudai.ac.jp

**Emerging Trends in Nano-bioactives for the Prevention of Chronic Diseases** - Bhimu Patil; Texas A&M University  b-patil@tamu.edu  G. K. Jayaprakasha; Texas A&M University  gjayaprakasha@ag.tamu.edu

**Flavor Stability: Chemical Changes in Flavor Molecules, Flavor-Food Matrix Interactions, Flavor Encapsulation** - TBD

**Nano-Biotechnology in Foods and Nutraceuticals** - Fereidoon Shahidi  Memorial University of Newfoundland, Department of Biochemistry  fshahidi@mun.ca

**Omega 3 oils** - Fereidoon Shahidi, Memorial University of Newfoundland, Dept of Biochemistry  fshahidi@mun.ca

**Sample Preparation for Neutraceutical & Functional Food Analysis (Plus Workshop)** - Dave L. Luthria USDA, Beltsville MD  D.Luthria@ars.usda.gov

**Snack Foods** - Fereidoon Shahidi, Memorial University of Newfoundland, Department of Biochemistry  fshahidi@mun.ca

**Future Meetings:**
- **Spring 2015** Denver, CO
- **Fall 2015** Boston, MA
- **Spring 2016** San Diego, CA
- **Fall 2016** Philadelphia, PA
AWARD NEWS

Liangli (Lucy) Yu nominated as an IFT Fellow

Congratulations to Liangli (Lucy) Yu on her nomination as an IFT Fellow. Professor Yu, of the University of Maryland, College Park, was honored for her knowledge and expertise in factors affecting the quality, safety, and health properties of nutraceuticals and functional foods. She has received 12 major research and instruction awards, including the Fellow Award from the American Chemical Society Agricultural and Food Chemistry Division. Yu has been a member of IFT since 1996. The IFT Fellow is a unique professional distinction conferred on individuals with outstanding and extraordinary qualifications and experience for their contributions to the food science and technology field. We are fortunate to have Lucy on the AGFD Leadership Committee. The official award ceremony was held during the annual IFT meeting in Las Vegas.

2012 Student Research Awards

As established by AGFD, the 2012 Graduate Student Research Award and the 2012 Undergraduate Student Research Award were determined by competitions which culminated in Symposia at the San Diego National ACS Meeting in August. The 2012 Graduate Student Research Award winners are: Weiping Tang, Rutgers University, first place and Johannes Polster, Technical University of Munich, second place. The 2012 Undergraduate Student Research Award winners are: Jennifer Koch, Miami University (Ohio), first place and Lennie Cheung, University of British Columbia, second place. See photos on page 7. The awardees received cash awards, commemorative plaques and travel expense reimbursements. The AGFD Student Symposia is intended to give national recognition to the excellent research carried out by Agricultural and Food Science graduate and undergraduate students. AGFD applauds the high quality of the research presented and trusts these awards will inspire continued research excellence and promising careers in the field.

2012 AGFD Fellow Awards

At the National ACS Meeting in San Diego AGFD announced the selection of Drs. Michael Tunick, USDA/ARS – EERC, Youling Xiong, the associate editor for JFS and Zhen-Yu Chen, the associate editor for JAFC as 2012 AGFD Fellows. AGFD congratulates these awardees and is proud to highlight their excellent research and trusts they will continue their fine contributions to AGFD in the future.

2012 ACS Fellow Awards

Dr. Charles J. Brine, Charles J. Brine & Assoc., LLC, Mr. Michael Morello, PepsiCo., and Dr. Sara Risch, Science by Design, have been named ACS Fellow Awardees for 2012. The awards will be given in conjunction with the National ACS Meeting in Philadelphia in August.

This ACS Award, initiated in 2010, is a prestigious honor as ultimately it will be limited to 1% of ACS Membership at any one time. To date, slightly over 500 Members have been so honored.

AGFD congratulates these awardees and is proud to highlight their excellent research and service to the Society. We trust they will continue their fine performances and contributions to ACS & AGFD in the future.
Scenes from San Diego

2012 Graduate Symposium
participants - left to right - Zhuohong Xie, Barbara Kerkaert, Charlie Brine (symposium organizer), Wenping Tang (1st place award), Johannes Polster (2nd place award)

2012 Undergraduate Symposium
participants - left to right - Michael Coco, Camille Bertolo, Charlie Brine (symposium organizer) and Lennie Cheung (2nd place award). Not pictured - Jennifer C. Koch (1st place award)

A critical mass of AGFD leadership - left to right - Agnes Rimando, Mike Appell, Alyson Mitchell, Neil C. DaCosta, Lauren Jackson, Mike Tunick
A prize to the first to fax a correct solution to:
Carl Frey at 914-742-4679

Congratulations to the winner of the coveted Spring 2012 prize -
Mark Ross of FDA/CFSAN

ACROSS
1  pretends
5  gab
9  unwelcome lab partner
13 magnetic stirrers go-with
14 moving option
15 type of suction
16 Philly vibe
19 Whitney that made a gin
20 one battery size
21 sugary suffix
22 M. Curie discovery
24 Philly greeting
25 clever with words
27 highway entry
31 happy faces
33 it’s common to iron and calcium
34 -- dine or -- dine
35 Franken or Gore
36 a mail tray label
37 low budget prefix
39 grind
41 Gator ---

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11 Tosca or Tommy
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18 Juan Ponce De ----
23 many a nitrogen compound
25 Philly founder (w/73 across)
26 -- Eliot
28 family name at birth
29 see 30 down
30 Almanack writer (w/29 down)
32 shopper destination
33 How many lonely guys does it take to screw in a lightbulb?
35 Franken or Gore
36 altar statement
38 seep
39 floor cleaners
40 hip bone
41 multiple choice
44 pasture female
49 eerie Nevadan zone: ---- 51
50 electronic calculator maker
51 cheer for
52 raise
53 last song on 1 DOWN
55 Bogie flick: The Treasure of the Sierra ----- 17
9  --- mo
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49 eerie Nevadan zone: ---- 51
50 electronic calculator maker
51 cheer for
52 raise
53 last song on 1 DOWN
55 Bogie flick: The Treasure of the Sierra -----
AGFD DIVISION MEMBERSHIP APPLICATION

The Agricultural and Food Chemistry Division of the American Chemical Society is a non-profit organization dedicated to the technical advancement of all aspects of agricultural and food chemistry. The Division encourages AGFD technical advancement by:
- organizing AGFD symposia at ACS National Meetings and other venues
- providing workshops in AGFD topics
- publishing proceedings of AGFD symposia
- providing cash awards to leading grad students, post docs, and established AGFD scientists
- publishing the Cornucopia newsletter
- hosting social gatherings at national meetings

Join the over 3100 members of the AGFD division. At ACS National Meetings you can meet and discuss division activities at the AGFD hospitality table located near the AGFD technical session rooms. Use the membership application form (below) or join on-line at www.acs.org (click on Technical Divisions and then select Join a Division).

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<th>APPLICATION FOR AGFD DIVISION MEMBERSHIP (7623P)</th>
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<td>[ ] I am an ACS member and wish to join AGFD ($10.00)</td>
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Be cool JOIN AGFD

Return application, with payment, to AGFD Membership Chair:
Dr. Lucy Yu
University of Maryland
Department of Nutrition & Food Science,
3303 Marie Mount Hall
College Park MD 20742
AGFD OFFICERS & COMMITTEE MEMBERS

Chair - Serves 1 year. Presides over Division meetings, & appoints committees
Neil Da Costa
International Flavors and Fragrances R&D
1515 Hwy. 36
Union Beach, NJ 07735
732-335-2110 neil.dacosta@iff.com

Chair-Elect - Serves 1 year. Substitutes for the chair as needed
Lauren S. Jackson
USFDA, National Center for Food Safety & Technology
6502 S. Archer Rd.
Summit-Argo, IL 60501
708-728-4162 Lauren.Jackson@fda.hhs.gov

Vice Chair - Serves 1 year. Assists Chair-elect in developing future technical programs.
Michael Qian, Oregon State Univ.
Dept. of Food Science and Technology
Corvallis, OR 97330
541-737-9114 Michael.qian@oregonstate.edu

Secretary - Responsible for Division correspondence and meeting minutes.
Michael Tunick
USDA-ARS
Eastern Regional Research Center
600 E. Mermaid La.
Wyndmoor, PA 19038
215-233-6454 michael.tunick@ars.usda.gov

Treasurer - Responsible for Division finances.
Stephen Toth
International Flavors & Fragrances R&D
1515 Hwy. 36
Union Beach, NJ 07735
732-335-2772 stephen.thoth@iff.com

Cornucopia Editor - Edits Division newsletter.
Carl Frey
Pepsi-Cola R&D
100 E. Stevens Avenue
Valhalla, NY 10595
914-742-4832 carl.frey@pepsico.com

Councilors - Represent Division for 3 years on ACS council.
John Finley (thru ‘14), jfinley@agecenter.lsu.edu
Michael Morello (thru ‘14), mike_morello@pepsico.com
Agnes Rimando (thru ‘12), agnes.rimando@ars.usda.gov
Sara Risch (thru ‘13), sjrisc@sbglobal.net

Alternate Councilors - Substitute for Councilors that can not attend Council meetings. Serves 3 years.
Charles Brine (thru ‘12), brinec11@verizon.net
Keith Cadwallader (thru ‘14), cadwlldr@uiuc.edu
Russ Rouseff (thru ‘13), rhr@crec.ifas.ufl.edu
Fereidoon Shahidi (thru ‘13) fshahidi@mun.ca

At-Large Executive Committee Members - Assist in management of Division. Serves 3 years.
Terry Acree (thru ‘13), tea2@cornell.edu
Jane Leland (thru ‘14), jleland@kraft.com
Robert McGorrin (thru ‘14), robert.mcgorrin@oregonstate.edu
Mathias Sucan (thru ‘13) mksucan@aol.com

Awards Committee - Solicits nominations and oversees awards process.
Chair - Steve Nagy agscience@aol.com
Student Awards - Chi-Tang Ho ho@aesop.rutgers.edu
Fellow Awards - Fereidoon Shahidi fshahidi@mun.ca
Canvassing - Stephen Toth, stephen.thoth@iff.com; Artemio Tulio, Jr. artemio.tulio@fda.hhs.gov

Finance - Monitors the Division’s finances for 1 year. Filled by Immediate Past Chair
Alyson Mitchell aemitchell@ucdavis.edu

Hospitality - Organizes receptions and banquets.
Charles Brine - brinec11@verizon.net

Membership - Responsible for recruitment and retention of Division members.
Lucy Yu - lyu5@umd.edu

Nominations - Develops slate of officers. Served by Immediate Past Chair.
Alyson Mitchell aemitchell@ucdavis.edu

Public Relations - Publicizes Division.
Charles Brine - brinec11@verizon.net

Web Master - Maintains web site.
Michael Appel michael.appell@ars.usda.gov

Flavor subdivision - Develops symposia.
Chair - Kevin Goodner, klg@sensusflavors.com
Chair-Elect - Gavin Sacks, gls9@cornell.edu
Vice-Chair - Sanjay Gummalla, sanjay_gummalla@givaudan.com
Secretary - Valeria Acquarone, valeria.acquarone@pepsico.com

Functional Foods & Natural Products subdivision - Develops symposia.
Chair - Navindra Seeram, nseram@mail.uri.edu
Chair-Elect - Gene Lester, gene.lester@ars.usda.gov
Vice-Chair - Luke Howard, lukeh@uark.edu
Secretary - Youngmok Kim, ymk@sensusflavors.com

This space reserved for your name.

Stop by the AGFD hospitality table and find out how you can get involved.
AGFD Executive Committee MEETING MINUTES

Sunday, March 25, 2012  Embassy Suites Hotel, San Diego, CA

Takes place at each ACS National Meeting

Attendees: Michael Appell, Charles Brine, Neil Da Costa, John Finley, Chi-Tang Ho, Lauren Jackson, Guddaram Jayaprakasha, Elizabeth Jeffery, Alyson Mitchell, Michael Morello, Cynthia Mussinan, Agnes Rimando, Sara Risch, James Seiber, Fereidoon Shahidi, Stephen Toth, Michael Tunick

AGFD Chair Neil da Costa called the meeting to order at 5:17 p.m.

Agnes Rimando, who is an associate member in the International Activities Committee, introduced three guests who attended for a few minutes. Nadia Harb spoke about the program, which allowed people to learn inner workings of a scientific society. Salma Al-Jabban and Hutbama Hasan from Iraq introduced themselves and described their affiliations.

The minutes of the previous meeting were approved with no changes.

Stephen Toth gave the Treasurer’s Report. The investments have gained $37,800 so far this year. The treasury has $493,370. Industry donated $6000 for Sue Ebeler’s symposium. Since the Cornucopias were not mailed this time, their cost was only $880. There was a discussion about funding the student award symposia. AGFD partially supports the awards symposia with funds from the membership dues, which were increased slightly for 2013. Charles Brine pointed out the difficulties in getting industry support for any symposium that is not focused on a particular topic. The increased income from investments will also cover some of the cost.

In the Program Report, Neil Da Costa noted that there were 12 symposia, 33 sessions, four rooms, and 272 abstracts. Lauren Jackson, the incoming Program Chair, said that the Philadelphia meeting is on track for 12-13 symposia, with 160 abstracts submitted so far. New Orleans appears to have 11 symposia, and Indianapolis is also full. John Finley pointed out that the New Orleans theme is Energy and Food, and James Seiber has taken the lead. John is trying to pull together a food-related event to be held off-site, such as in a restaurant. A budget of $22,500 for Philadelphia was approved. Jim Seiber won the Kenneth Spencer Award for 2012, and the Kansas City Section will have a symposium for that in October. AGRO will also have a Spencer Award symposium at the Philadelphia meeting. John reported that the Biotechnology Secretariat will end on December 31, 2012, and that it should become a subdivision of AGFD. Michael Morello said that a slate of four officers for that subdivision should be assembled and that they should plan to have a symposium a year, and possibly a short course.

The Councilor’s Report was given by John Finley, Mike Morello, Agnes Rimando, and Sara Risch. Sara said that the ACS President has assembled a blue ribbon panel for providing a toolbox of information about climate change. Agnes described the international GREET (Global Research Experiences, Exchanges and Training) program of the Office of International Affairs. Mike reported that the Division of Colloid and Surface Chemistry want to change its name to Colloid, Surface Chemistry, and Nanomaterials. The Councilors wants to talk to students and get them to join AGFD, and an Innovative Program Grant proposal may be written to get the message out to our members emphasizing our benefits to them. John suggested that eventually a real-time webcast of a symposium should be attempted. Neil Da Costa requested that AGFD programming be at the Convention Center at this meeting, but we were isolated at this hotel instead. Mike said that we should be located next to MEDI, and will try to make that happen in Philadelphia.

Neil Da Costa reported for Steve Nagy that Eric Decker has won the Award for the Advancement of Application of Agricultural and Food Chemistry, which was approved by the Executive Committee. The Executive Committee passed a motion setting the deadline for nominations for this award to be moved to January 31 so that a symposium could be arranged at the Fall Meeting. The determination of the Fellow Awards is in progress. Chi-Tang Ho reported that the Roy Teranishi Graduate Fellowship in Food Chemistry has been won by Rashin Sedighi, North Carolina A&T University. Michael Tunick announced that the Sterling Hendricks Award has been won by Eric Block, and AGFD will run the award symposium at the Fall Meeting. Charles Brine ran the Withycombe-Charalambous Graduate Student continue on the next page
Award Symposium (first place: Wenping Tang, Rutgers University) and the Undergraduate Student Award symposium (first place: Jennifer C. Koch, Miami University of Ohio, second place: Lennie Y.K. Cheung, University of Maryland). The winners were to be announced at the Chair’s Reception. The Undergraduate Award had 23 applicants, the most ever. Nominations for the Young Scientist Award are being received. Neil said that AGFD was nominated for a ChemLuminary Award.

Neil da Costa reported for Cornucopia editor Carl Frey and said that the newsletter was posted to the website six weeks earlier than usual, with a cost savings of $7000 per issue, since it was not mailed. An email with a link should be sent to AGFD members when the next issue appears. Alyson Mitchell of the Communications Committee is trying to limit emails to one per quarter.

Hospitality/Public Relations Chair Charlie Brine arranged for the reception for this meeting. Mike Tunick is working on a venue for the Fall Banquet.

Neil da Costa reported for Membership Chair Lucy Yu and said that AGFD had 3140 members as of Jan. 1, including 19 who are celebrating 25 years with the Division. Sara Risch is one and received her pin at the meeting.

Alyson Mitchell, the Chair of the Nominating Committee, reported that the slate of offices will include Lauren Jackson for Chair, Michael Qian for Chair-Elect, Mike Tunick for Secretary, and Steve Toth for Treasurer. She needs a suitable person from industry to run for Chair-Elect. The Councilor term of Agnes Rimando and the Alternate Councilor term of Charles Brine expire at the end of the year. All have been contacted by Alyson and have agreed to serve again. The slate will be voted upon at the Business Meeting in the fall, with the Councilor and Alternate Councilor being decided by mail ballot.

John Finley and Jim Seiber reported that the Journal has a rejection rate of 65%, with an increase in quality. The Journal is now weekly and some of the names of the subject categories have changed. The Journal is celebrating its 60th anniversary. They like to have review articles, and request that a prospectus for such an article be sent first.

Michael Appell reported that he is working with Victoria Finkenstadt on the Web Site.

In New Business, Mike Appell reported that the submission process for ACS Fellows is now online. The Division can nominate up to eight members. Neil Da Costa said that he processed 70 one-day registrations for this meeting, which is far too many. Chemists should not receive the one-day waiver intended for non-chemists. ACS members should pay their registration and then get reimbursed.

The meeting adjourned at 7:13 p.m. Submitted by Michael Tunick, AGFD Secretary

In Memorium - Dr. Shuryo Nakai

On January 24, 2012, the world lost a pioneer in food science, Dr. Shuryo Nakai, who passed away in Vancouver at the age of 85. Dr. Nakai received a BSc in Agricultural Chemistry from the University of Tokyo in 1950, and a Ph. D. in Dairy Chemistry in 1962. After heading research at Meiji Milk Products, he joined the Food Science Department at the University of Illinois, and then went on to the University of British Columbia (UBC) where he became a full Professor in 1975. His research on protein chemistry made him one of the most cited scientists in the area of food science and yielded him numerous awards and recognitions - the UBC Killam Research Prize, Fellow of the Canadian Institute of Food Science and Technology, American Egg Board Research Award, American Oil Chemists Society Award and the AGFD Award for the Advancement of Agricultural and Food Chemistry. A scholarship at UBC now bears his name. His friends at AGFD will miss him and extend condolences to his family.
ELECTION OF DIVISION COUNCILORS

If you are a full member of AGFD, please vote by marking the ballot below, **signing in the space provided**, and printing your name legibly beneath the signature. Fold the page on the dotted lines so that the ballot is on the inside and the mailing address on the outside. Tape or a staple the open edges, affix postage and mail. Ballots must be received by November 1, 2012. After your membership is verified, the portion of the form with your signature and name will be removed prior to opening and counting the ballots. Thank you for exercising your democratic franchise.

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**Vote for 1 Councilor** for the 2013 - 2015 term (or write in your own candidate)

[  ] Agnes Rimando
Agnes Rimando is a Councilor whose term expires in 2012.

or write in [  ] __________________________

and

**Vote for 1 Alternate Councilor** for the 2013 - 2015 term (or write in your own candidate)

[  ] Charles Brine
Charles Brine is an Alternate Councilor whose term expires in 2012.

or write in [  ] __________________________

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To Michael H. Tunick
USDA-ERRC
600 E. Mermaid Lane
Wyndmoor PA 19038
First things first - here’s a photo of the Principeza at her 5th grade awards assembly. That brush she’s brandishing is actually an award presented to the most artistic student in the 5th grade. Clearly she does not get that from me!! It’s also worthy of note that she is now eleven years old and is over five feet tall.

For all of you fans of Mussinan’s Memoirs, this is the final edition. After 44 years at IFF and AGFD, I am retiring at the end of June. In fact, I’m already retired as you read this! I have enjoyed every minute I’ve spent with the Division. If you don’t believe me, go back to my earliest writings -- similar in timing to the Dead Sea Scrolls.

So, right now I want to tell you about my last AGFD hurrah – the International Flavor Conference XIII, held May 28 – June 1 in Porto Heli, Greece. In fact, I’m writing these memoirs from Porto Heli. These meetings are truly one of AGFD’s gems. As usual, I handled the financial piece, registrations, etc., which can be a little tricky since many of the attendees have the same name, and the rest have more syllables than Mussinan!

To get here, we took the plane to the bus to the boat to the car. Typical of Greece, all scheduled departures are subject to change at any moment. Still, we got here, and this is, indeed, a beautiful place. The first night we left the door open, but there were a few mosquitoes. I got up in the middle of the night to shut the door and put on the AC.

I had to turn on the light and put on my glasses to see how it worked. When it didn’t really get any cooler, I figured it was just like other Greek AC that I’ve encountered where the temperature is lowered from 85 to about 80. As it was only about 75 to begin with, I just let it go. The next day we tried it again. There was an on/off button, a button to control the fan speed, a dial for the temperature, and an indicator with a snowman at the top and a beach umbrella at the bottom. As we wanted it cooler, I set this on the snowman -- wrong!! The AC worked just fine when set on the beach umbrella! Go figure!

The next morning, they delivered the mo-ped that we rented. As on Skiathos, we rented a 50cc model for my friend Maggie and I to ride together. The guy showed us how to work the thing - sort of, i.e. he spoke in Greek, we answered in English, and then everyone nodded although no one understood. He watched me ride around once. Then he pointed at one of the hand brakes, shook his head, and motioned like going over the handle bars. My interpretation was that this was the brake for the front wheel and to try not to use it. As it turned out, neither brake did much of anything, both tires were bald, and nothing electrical worked – like the starter, the lights or the horn, so, OK, we’re good to go!

continues on the next page
The two men left and I tried about 20 times to kick start it. I said to Maggie – “now we know why it was so cheap” (17 Euros per day). It’s because it can’t be started. We laughed, tried a few more times, and finally it started. So, off we went! See below!

This one is a little more powerful than the last one we rented on Skiathos. At that time Maggie had to get off every time we went up a hill. Everything was fine until I tried to turn around in a church yard. We stopped and just kind of fell over. It was sorta like that bike on Laugh-In if anyone remembers that old TV show. Anyway we didn’t get hurt, so we just kept going.

Another thing - I always thought mo-peds were good on gas, but we used ¾ of a tank in only 30km. I'm not sure we had real gas in it. Maybe it was olive oil.

We filled up the tank (with real gas) and in the perhaps 100km more that we rode it, the gas gauge never moved (maybe it broke!) So we tooléd around for three days, got chased by dogs and almost ran over a snake, but in the end, we were able to return it with the mo-ped, Maggie and I in one piece.

The Taverna night was super, Greek night was great, and the farewell banquet was better yet. Oh, did I mention that the presentations and poster session went well too? Many thanks to the ACS for awarding us an IPG grant to enable more than twenty students to participate. Will there be another conference?? I don’t know - maybe!

I bid farewell and Godspeed to all of my friends at ACS. Of course, there could possibly be a cameo appearance in Philadelphia. Rumor has it that Gail Tunick will be there with tickets for Dave and Buster’s. You’ll just have to wait and see. I might also mention that I’ve often thought I could write these memoirs without going to the meeting at all. Perhaps I’ll put that to the test!

Cornucopia thanks Cynthia for brightening each issue with a slice of Mussinan life.
We wish her many more adventures worthy of a Memoirs installment.
Schedule of AGFD Business, Social and Technical Activities

<table>
<thead>
<tr>
<th>Event</th>
<th>Time</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive Committee Mtg</td>
<td>5:00 - 8:00 pm</td>
<td>Sunday</td>
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<tr>
<td>Flavor Subdivision Mtg</td>
<td>12:15 - 1:15 pm</td>
<td>August 19</td>
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<tr>
<td>Future Programs Mtg</td>
<td>12:15 - 1:15 pm</td>
<td>August 19</td>
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<tr>
<td>Functional Foods &amp; Natural Products Subdivision Mtg</td>
<td>12:30 - 1:15 pm</td>
<td>August 20</td>
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<tr>
<td>Business Mtg</td>
<td>12:45 - 1:30 pm</td>
<td>August 20</td>
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<tr>
<td>AGFD Award Banquet</td>
<td>6:00 - 8:00 pm</td>
<td>Tuesday</td>
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AGFD oral sessions take place at the Loews Philadelphia Hotel - 1200 Market Street
AGFD poster sessions take place at the Philadelphia Convention Center (Tues afternoon)

SUNDAY Morning   August 19   Section A   Loews Philadelphia Hotel   Commonwealth Hall A1/A2
Young Scientist Award Symposium
C. Brine, Organizer, Presiding
8:00 Introductory Remarks.
8:05 1. Low cost, portable lab-on-a-chip device for detection of food adulterants. F. He, S. Jin, S. R. Nugen
8:35 2. Factors affecting the generation and fate of hydrogen peroxide in complex foods. L. Zhou, R. Elias
9:35 Intermission.
10:50 6. Activation of neuronal housekeeping (autophagy) by polyphenol-rich berries and walnuts. S. M. Poulose
11:20 Concluding Remarks.

Section B   Loews Hotel Philadelphia   Commonwealth B
Neuroactive Compounds from Natural Products   Cosponsored by AGRO and ENVR
A. M. Rimando, B. Shukitt-Hale, Organizers, Presiding
8:30 Introductory Remarks.
9:05 8. Systemic and neuronal cross-talk: Effects of nature's products. B. Burton-Freeman, B. Shukitt-Hale
10:05 Intermission.
10:20 10. Use of cannabinoid receptors in the identification of biologically active secondary metabolites as immunestimulants from foods. S. J. Cutler
11:00 11. Exploring nature against depression, anxiety, and opioid withdrawal. A. T. El-Alfy
12:00 Concluding Remarks.

Section C   Loews Hotel Philadelphia   Commonwealth C
Food Safety: New Technologies for the Protection of the Food Supply   Cosponsored by ENVR
K. Morehouse, C. Sommers, Organizers, Presiding
8:30 Introductory Remarks.
9:25 15. Using nanotechnology to make foods safer: Nanoparticles as sensors for small molecules, protein toxins, and foodborne pathogens. T. V. Duncan
9:45 16. Sticky DNA: The use of DNA aptamers for the rapid and robust detection of pathogens, proteins, and small
molecules in food. J. DeGrasse
10:05 Intermission.
10:25 17. DNA-based species identification in support of food safety at the FDA. S. M. Handy, J. Deeds
11:05 19. LC-MS detection of process-induced contaminants in edible oils. S. MacMahon, T. H. Begley, G. W. Diachenko
11:25 Concluding Remarks.

other symposia of interest -
- Addressing Complex Sites: Chemistry, Toxicology, Fate of Mixed Pollutants Across Environmental Media
  Sponsored by ENVR, Cosponsored by AGFD and AGRO
- Interactions of Nanomaterials with Emerging Environmental Contaminants
  Sponsored by ENVR, Cosponsored by AGFD and AGRO
- Materials for Water Sustainability - Sensors and Adsorbents
  Sponsored by ENVR, Cosponsored by AGFD and AGRO
- Natural Products for Pest Management - Natural Products: Dedication to Horace Cutler
  Sponsored by AGRO, Cosponsored by AGFD and ENVR
  Sponsored by CINF, Cosponsored by AGFD, ANYL, CHAL, ENVR, MEDI, PROF, and TOXI

SUNDAY Afternoon August 19 Section A Loews Philadelphia Hotel Commonwealth Hall A1/A2

General Papers
L. Jackson, Organizer  M. Qian, Organizer, Presiding
1:30 Introductory Remarks.
1:35 20. pH studies of grape anthocyanins using resonance Raman spectroscopy. A. Burns, J. Mazauric, V. Cheynier
2:15 22. Epigallocatechin gallate interactions with serum albumin. M. Li, A. E. Hagerman
2:55 Intermission.
3:10 24. Distributions of sulfhydryl groups and disulfides in different molecular weight peptides hydrolyzed from soy glycmin by Alcalase. X. Ding, Y. Hua, X. Kong
3:30 25. Influence of bioenergy crops production management on soil quality. Y. Xiong
4:10 27. Multivariate analysis and health risk assessment of heavy metals in wild leafy vegetables. A. M. Abbasi
4:50 Concluding Remarks.

Section B Loews Hotel Philadelphia Commonwealth B

Neuroactive Compounds from Natural Products Cosponsored by AGRO and ENVR
A. M. Rimando, B. Shukitt-Hale, Organizers, Presiding
1:30 Introductory Remarks.
3:15 Intermission.
4:00 33. Neuroactive natural products from mollusks and their associated bacteria. Z. Lin, G. P. Concepcion, M. G. Haygood, A. R. Light, R. Teichert, B. Olivera, E. W. Schmidt
4:30 34. Potential agents to enhance the expression of neurotrophins in the brain. N. S. Murthy
5:00 Concluding Remarks.

Section C  Loews Hotel Philadelphia  Commonwealth C
Food Safety: New Technologies for the Protection of the Food Supply  Cosponsored by ENVR
K. Morehouse, C. Sommers, Organizers, Presiding
1:30 Introductory Remarks.
1:35 35. In-package inactivation of Listeria innocua, Salmonella Typhimurium, and Escherichia coli O157:H7 on cherry tomatoes with gaseous ozone. X. Fan, K. Sokorai, J. Engemann, J. Gurtler, Y. Liu
1:55 36. Cellular damage of Escherichia coli O157:H7 and Salmonella spp. in apple juice treated with high hydrostatic pressure and thermal death time disks. D. Ukuku, K. Yamamoto, S. Kawamoto
2:55 Intermission.
3:35 40. Rapid pesticide screening from fruit surfaces and direct quantitation of Carbendazim and other pesticides in fruit juices by Direct Analysis in Real Time (DART) mass spectrometry. E. A. Crawford, B D. Musselman
4:15 Concluding Remarks.

other symposia of interest -
- 2012 Kenneth A. Spencer Award: Symposium in Honor of James N. Seiber
  Chemical Transport, Fate, and Sustainability
    Sponsored by AGRO, Cosponsored by AGFD
- Addressing Complex Sites: Chemistry, Toxicology, Fate of Mixed Pollutants Across Environmental Media
  Sponsored by ENVR, Cosponsored by AGFD and AGRO
- Interactions of Nanomaterials with Emerging Environmental Contaminants
  Sponsored by ENVR, Cosponsored by AGFD and AGRO
- Materials for Water Sustainability - Sensors and Adsorbents
  Sponsored by ENVR, Cosponsored by AGFD and AGRO

MONDAY Morning  August 20   Section A  Loews Philadelphia Hotel  Commonwealth Hall A1/A2
Discovering Bioactive Compounds  Cosponsored by AGRO and ENVR
N. P. Seeram, J. Finley, Organizers, Presiding
8:30 Introductory Remarks.
8:35 42. Bioactive potential of resveratrol oligomers of the Carex genus. G. E. Henry
9:05 43. Anthocyanin content and percent polymeric color of commercial berry products. L. R. Howard, R. L. Prior, R. Liyanage, J. O. Lay
9:35 44. Whey protein hydrolysates inhibits hydrogen peroxide induced oxidative stress. M. Jin, Y. Lin, J. Li, R. Lu
10:05 45. Curcumin inhibits metastasis of thyroid cancer cells. C. Zhang, L. Zhang, H. Yu, C. Tan, R. Lu
10:35 Intermission.
10:50 46. Cytotoxic polymeric proanthocyanidins from Pourouma cecropiifolia fruit. C. Osorio, J. Barrios, C. Cordero, S. Morantes, F. Aristizabal, A. Morales
11:50 48. Anthocyanins as xenobiotic medicines. P. E. Milbury
12:20 Concluding Remarks.

Section B  Loews Hotel Philadelphia  Commonwealth B
Fruit and Vegetable Aroma Precursors
G. Sacks, Organizer  G. Sacks, Presiding
8:30 Introductory Remarks.
9:00 50. Evolution of oak lactone from glycoconjugate precursors during maturation of wine. K. Wilkinson, A. Prida, Y. Hayasaka
9:50 52. Glycoconjugates of volatile phenols: Their contribution to smoke off-flavours in wines and interaction with human saliva. C. Mayr, M. Parker, P. Osidacz, M. Herderich, L. Francis
10:15 Intermission.
10:30 53. Changes in tomato aroma compounds by thermal processing and the impact of S-methylmethionine a precursor of dimethyl sulfide. J. K. Kreissl, P. Schieberle
10:55 54. Bitter tasting and kokumi enhancing molecules generated upon thermal processing of avocado (Persea Americana MILL.). T. Hofmann, A. Degenhardt
11:20 55. Characterization of key aroma compounds in raw and cooked asparagus by the sensomics approach: Insights into aroma formation during processing. P. Schieberle, J. Scherb-Forster
11:45 Concluding Remarks.

Section C  Loews Hotel Philadelphia  Commonwealth C
Food Safety: New Technologies for the Protection of the Food Supply  Cosponsored by ENVR
K. Morehouse, C. Sommers, Organizers, Presiding
8:30 Introductory Remarks.
8:35 56. Polydiacetylene sensors for food safety applications. S. C. Hill, Y. Htet, M. McSwain, E. Ritchie, W. T. Pennington
8:55 57. Influence of time, temperature, and pH on efficiency ozonated water treatment to inactivate Salmonella enterica Typhimurium on green onion, grape tomato, and green leaf lettuce. W. Xu, C. Wu
9:55 Intermission.
10:30 61. Rapid detection of Listeria monocytogenes in milk using a novel piezoelectric cantilever (PEMC) sensor. H. Sharma, R. Mutharasanan
11:10 63. Fluorescent lateral flow assays for food safety. Y. Wang, C. Koo, S. R. Nugen
11:30 Concluding Remarks.

other symposia of interest -
  Sponsored by ENVR, Cosponsored by AGFD and AGRO
- Innovative Materials and Technologies for Detection and Inactivation of Environmental Pathogens
  Sponsored by ENVR, Cosponsored by AGFD
- Interactions of Nanomaterials with Emerging Environmental Contaminants Novel Materials
  Sponsored by ENVR, Cosponsored by AGFD and AGRO
- International Sustainable Development: Institutional Frameworks
  Sponsored by IAC, Cosponsored by AGFD and BMGT
- Materials for Water Sustainability - Oxidative and Reductive Treatment Technologies
  Sponsored by ENVR, Cosponsored by AGFD and AGRO
- MRLs and Ag Chemicals - Maximum Residue Levels of Agricultural Chemicals on Food
  Sponsored by AGRO, Cosponsored by AGFD and ENVR

MONDAY Afternoon   Section A  Loews Philadelphia Hotel  Commonwealth Hall A1/A2
Discovering Bioactive Compounds  Cosponsored by AGRO and ENVR
N. P. Seeram, J. Finley, Organizers, Presiding
1:30 Introductory Remarks.
1:35 64. Comparison of antithrombotic activity and protective activities on alcohol gastric ulcer and immune system of different Fucoaid from Laminaria japonica. X. Zhao, B. Li, A. Chen, S. Dong, F. Li, J. Wang, S. Yuan
2:05 65. Effect of blueberry anthocyanidin extract on plasma cholesterol in hamsters fed a high cholesterol diet. Z. Chen, Y. Liang
2:35 66. Dietary flavonoids: Red-ox ingredients or just simple "travellers" of plant foods? M. Serafini
3:05 67. Plum fruit polyphenols differentially inhibit inflammation, and fat accumulation in cell models (adipocytes, macrophages, and HUVEC) associated to metabolic syndrome. P. Castillo, F. Ibanez, C. Cao, P. Simons, L. Cisneros-Zevallos
3:35 Intermission.
3:50 68. Effects of raspberry supplementation on measures of motor and cognitive function in aged rats. R. L. Galli, B. Shukitt-Hale, D. Bielinski

4:20 69. Colonic fermentation of dietary fibers is altered by background diet. J. W. Finley, M. Janes, M. Goita

4:50 70. Stone fruit extracts revert insulin resistance and glucose insensitivity in cell models (muscle, hepatic, and pancreatic β cells) associated to type 2 diabetes. F. Ibanez, P. Castillo, C. Cao, P. Simons, L. Cisneros-Zevallos

5:20 Concluding Remarks.

Section B  Loews Hotel Philadelphia  Commonwealth B

Fruit and Vegetable Aroma Precursors

G. Sacks, Organizer  G. Sacks, Presiding

1:30 Introductory Remarks.

1:35 71. Varietal thiols precursors in grape: New insights on their structure and evolution during the prefermentative operations of winemaking. A. Roland, F. Cavelier, A. Razungles, R. Schneider

2:00 72. Behavior of a putative 3-isobutyl-2-methoxypyrazine (IBMP) precursor during grape maturation and ripening. S. A. Harris, I. Ryona, G. L. Sacks

2:25 73. 3-Alkyl-2-methoxypyrazines as key aroma compounds in highbush blueberry fruits. Y. Zhang, H. Feng, M. C. Qian

2:50 Intermission.

3:05 74. Harvest, storage, and processing effects on 3-mercaptohexan-1-ol precursor concentrations in Sauvignon Blanc grape juice. D. L. Capone, C. A. Black, D. W. Jeffery

3:30 75. Molecular insights into a unique fruit flavor: Durian (Durio zibethinus). M. Steinhaus, J. Li, P. Schieberle

3:55 76. Reactivity between 1-hydroxyethyl radicals and aroma active components in wine. G. Y. Kreitman, R. J. Elias

4:20 Concluding Remarks.

Section C  Loews Hotel Philadelphia  Commonwealth C

General Papers

M. Qian, L. Jackson, Organizers  N. Da Costa, Presiding

1:30 Introductory Remarks.


1:55 78. Arsenic in juice – are the results reliable? W. R. Mindak

2:15 79. Development of a LC-UV-MS method for the determination of ginsenosides in a standard reference material. C. M. White, K. W. Phinney

2:35 80. Enrichment of antioxidant activity of sweet potato by electric treatment. K. Hironaka, M. Omoto

2:55 Intermission.

3:10 81. Effects of red wine, white wine, and wine constituents on gastric acid secretion in healthy subjects and in parietal cells in culture. K. I. Liszt, R. Eder, M. Marek, J. Walker, V. Somoza

3:30 82. Separation and antioxidation properties of proanthocyanidins in hops. Y. Li, C. Liu

3:50 83. Fast Blue BB microassay method for determination of total phenolics in beverages and fruits. M. B. Medina, Q. Li


4:30 Concluding Remarks.

other symposia of interest -

- Green Chemistry and the Environment Benign By Design: Greener Catalytic Protocols
  Sponsored by ENVR, Cosponsored by AGFD and AGRO

- Materials for Water Sustainability - Membranes
  Sponsored by ENVR, Cosponsored by AGFD and AGRO

- MRLs and Ag Chemicals - Global Challenges and Efforts in MRL Issues
  Sponsored by AGRO, Cosponsored by AGFD and ENVR

- Undergraduate Research Posters - Agricultural and Food Chemistry
  Sponsored by CHED, Cosponsored by AGFD and SOCED

MONDAY Evening  8:00 - 10:00  Pennsylvania Convention  Center Hall D

SCI-MIX

L. Jackson, M. Qian, Organizers

121, 126, 129, 134, 135, 136, 147, 149, 161, 165, 166, 172, 173, 177, 179, 180, 183. See subsequent listings.
TUESDAY Morning August 21 Section A Loews Philadelphia Hotel Commonwealth Hall A1/A2
Discovering Bioactive Compounds Cosponsored by AGRO and ENVR
N. P. Seeram, J. Finley, Organizers, Presiding
8:30 Introductory Remarks.
8:35 85. Mechanism of inhibition of advanced glycation end products by bioactive compounds present in okra seed extracts: A comparison with the well known inhibitor aminoguanidine. B. Dayal, R. George, M. Lea
9:05 86. Portable nanoparticle-based sensor for the discovery of food antioxidants. E. M. Sharpe, S. Andreescu
9:35 87. Alkylresorcinol as the major active components in wheat bran for colon cancer prevention. Y. Zhu, D. Soroka, S. Sang
10:35 Intermission.
12:20 Concluding Remarks.

Section B Loews Hotel Philadelphia Commonwealth B
AGFD Division Award Symposium
N. Da Costa, Organizer, Presiding
8:30 Introductory Remarks.
8:35 92. Lipid oxidation and its effects on postmortem appearance. C. Faustman
9:05 93. Design of edible nanoemulsion-based delivery systems for lipophilic food components. D. J. McClements
9:35 94. Flavor-based approach to address obesity. S. Subramanian
10:05 Intermission.
10:20 95. Oxidative stability of lipid dispersions in the presence of bioactive polyphenols: Elucidation of pro-oxidant mechanisms. R. Elias
10:50 96. Role of water-lipid interfaces in the oxidation of lipids. E. A. Decker
11:20 Concluding Remarks.

Section C Loews Hotel Philadelphia Howe
Sterling Hendricks Memorial Lectureship Cosponsored by AGFD and AGRO
M. H. Tunick, S. Duke, K. Kaplan, Organizers, Presiding
11:30 Award Presentation.
11:40 97. Fifty years of smelling sulfur: From Allium chemistry to olfactory detection of sulfur compounds. E. Block
12:30 Award Reception.

other symposia of interest -
- Environmental Biotechnology and Sustainability: Applications to Drinking Water, Industrial Waste Treatment, and Site Remediation
  Sponsored by ENVR, Cosponsored by AGFD and AGRO
- Green Chemistry and the Environment - Nanomaterials
  Sponsored by ENVR, Cosponsored by AGFD and AGRO
- Is Your Analytical Method Good Enough?
  Sponsored by AGRO, Cosponsored by AGFD and ENVR
- MRLs and Ag Chemicals - Real World Impact of MRLs
  Sponsored by AGRO, Cosponsored by AGFD and ENVR

TUESDAY Afternoon Section A Loews Philadelphia Hotel Commonwealth Hall A1/A2
Discovering Bioactive Compounds Cosponsored by AGRO and ENVR
N. P. Seeram, J. Finley, Organizers, Presiding
1:30 Introductory Remarks.
1:35 98. Where have all the polyphenols gone? J. Vinson, C. A. Peters, Jr., V. Chopra
2:05 99. Health benefits of fruit polyphenols: Clinical evidence of fruit-derived polyphenol action in the postprandial state, and effects on blood pressure. B. Burton-Freeman
2:35 100. Chardonnay grape seed flour reduces plasma lipids and increases expression of hepatic genes for cholesterol and fat synthesis in hamsters fed a high fat diet. R. Lipson, T. Arvik, G. Bartley, H. Kim, W. Yokoyama
3:35 Intermission.
3:50 102. Chardonnay grape seed flour, not red grapes, reduce plasma cholesterol and body weight gain in hamsters on high fat diets. T. Arvik, R. Lipson, G. Bartley, H. Kim, W. Yokoyama
4:50 104. Total Western Diet (TWD) increases azoxymethane induced aberrant crypt foci (ACF) compared to the AIN93G diet. K. J. Hintze, A. D. Benninghoff, R. E. Ward
5:20 Concluding Remarks.

Section B   Loews Hotel Philadelphia   Commonwealth B
2011 Kenneth A. Spencer Award: Symposium in Honor of Michael W. Pariza
Conjugated Linoleic Acid: A Naturally Occurring Anti-obesity Antiinflammatory Fatty Acid Cospon by AGRO
E. Hellmuth, Organizer    M. Cook, Organizer, Presiding    L. Jackson, Presiding
1:30 Introductory Remarks.
1:55 106. CLA and its effect on dairy cow fertility with emphasis on low level inflammatory processes. G. Bertoni, P. Grossi, E. Trevisi
2:15 107. Isomers of conjugated linoleic acid as important nutrients in the dairy cow. K. J. Shingfield
2:35 108. CLA's role in biochemical processes. Y. Park, Y. Park, J. H. Kim, J. Kim, H. Lee
2:55 Panel Discussion.
3:05 Intermission.
3:35 110. CLA in obesity. L. D. Whigham
4:15 112. Perspectives on CLA. M. W. Pariza
4:35 Panel Discussion.

Section C   Loews Hotel Philadelphia   Commonwealth C
General Papers
M. Qian, L. Jackson, Organizers    N. Da Costa, Presiding
1:30 Introductory Remarks.
2:35 Intermission.
2:50 116. Oxidative stability of cashew nut (Anarcadium occidentale) oil. M. C. Azih
3:10 117. Optimization by the uniform design and modified simplex method of the separation of biogenic amines in hop pellets by HPLC. G. Luan, C. Liu, Q. Li
3:50 119. Determination of gibberellic acid in malt and beer. J. Wang, Z. Xu, C Liu, Y. Li, Q. Li
4:10 Concluding Remarks.

Section D   Pennsylvania Convention Center   Hall D
General Posters
L. Jackson, M. Qian, Organizers
2:00 - 4:00
120. Characterization of pectin from Citrus sinensis (sweet orange) juice. A. Galant, W. Widmer, G. Luzio, R. Cameron
121. Formation of micro/nanoparticle via complex coacervation between gelatin and gum arabic. Y. Lv, X. Zhang
122. Cytoprotective effects of hesperetin and hesperidin against amyloid β-induced impairment of glucose transport through down-regulation of neuronal autophagy. S. Huang, S. Tsai, G. Yen
123. Effect of common additives and brewing time on polyphenolic antioxidant capacity of Nilgiri and Tibetan tea. S. Tewani, A. Grewal
125. Structure-activity relationship of aliphatic compounds for nematicidal activity against pine wood nematode (Bursaphelenchus xylophilus). S. Shin, I. Park
126. Determination and confirmation of oxytetracycline, chlortetracycline, and tetracycline in bovine kidney by LC-MS/MS. L. Girard, S. Smith, M. Lopez, P. Kijak, S. Feng
128. Next generation of superfruits: Enhancing anthocyanin rich black raspberries. J. Lee, M. Dossett, C. E. Finn
129. Super gas barrier of all polymer multilayer films. D. Hagen, J. C. Grunlan, Y. Yang
130. Dietary flavonoids induced the activity of P-glycoprotein, an efflux drug transporter. C. Yu, P. Hariharan, S. Tsai, Y. Hou, P. Chao
131. Milk Thistle decreased oral bioavailability of cyclosporine via activation of P-gp. P. Chao, S. Yang, S. Tsai, Y. Hou
132. Effects of green tea ingestion on the changes of immune responses after high-intensity exercise. S. Fang
133. Pharmacokinetics and tissue distribution of resveratrol and emodin in rats after intake of Polygonum cuspidatum. Y. Hou, S. Lin, M. Wu, S. Tsai, P. Chao
135. Photodegradation of the herbicide Imaethapyr on soybean and corn wax. A. M. Nienow, M. Crow, M. C. Johnson
136. Fate of conjugated steroid hormones in concentrated animal feeding operation wastewater. Y. Zou, B. Meschewski, W. Zheng
139. Effect of nitrogen treatment on the antioxidant capacity of Aronia melanocarpa grown in Maryland. B. C. Aroh, B. Volkis, S. Mathew, A. G. Ristvey, V. V. Volkis
141. Assessing the exposure to organotin compounds from food contact applications. K. R. Hatwell, P. N. Turowski, A. B. Bailey
143. Synthesis and biological activity of a tangeretin bioisosteric compound. S. Li, J. Zhang, M. Pan, J. Wang, C. Ho
144. Isolation and biological activity screening of (-)-epicatechin gallate from green tea. S. Li, J. Wang, M. Pan, C. Ho
145. Toxicology evaluation of Meso-Zeaxanthin. S. Li, X. Xu, L. Zhang, B. Shao, X. Sun, S. Ye, L. Yu, M. Jiao, C. Ho
147. Biosensor detection of staphylococcal enterotoxin A and B in cultures after removal of Protein A with immuno-affinity chromatography. M. B. Medina, Q. Li, X. Yao
148. Antimicrobial properties of cumin oil nanoemulsions. L. Guo, S. Xu, Q. Zhang, Q. Huang
153. Anticancer and structure activity related (SAR) studies of maple gallotannins. A. Gonzalez-Sarrias, T. Yuan, N. P. Seeram

155. Inhibitory effects of sumac fruit extracts and pentagalloyl glucose on mushroom tyrosinase enzyme. H. Ma, L. Guo, T. Yuan, M. Edmonds, W. Lu, N. P. Seeram

156. Exposure assessment of 4-methylimidazole (4-MEI) from caramel coloring for the U.S. population. D. L. Doell, D. E. Folmer, H. S. Lee, S. E. Carberry

157. New method of 1-methylcyclopropene storage, handling, and application for fruits and vegetables. Y. Zhang, W. Eli

158. Flavonoids interacting with copper (II) affects α-synuclein aggregation. N. Juliely, S. Hän

159. Impact of bioactive food components on drug metabolizing enzymes in human colon cells. M. M. Erzinger, C. Bovet, K. M. Hecht, S. J. Sturla

160. Maximizing hop flavor profiles through supercritical fluid extraction. R. A. Baskette, K. J. James

161. Determination of phenolic content, free radical scavenging capacities, and identification of phenolic compounds using HPLC-DAD-ESI-MSn of 40 varietal honeys from Florida. S. Marshall, K. Schneider, J. Hayes, L. Gu


164. Physicochemical properties of UHP-assisted cationic starches. Y. Chang, Y. Kim, C. Park, B. Kim, M. Baik

165. Characterization of lactase conjugated to magnetic nanoparticles. J. N. Talbert, J. M. Goddard

166. Potent dendritic antioxidants without pro-oxidant effects. C. Lee, A. Sharma, R. Uzarski, C. Nanah, R. Held, R. Baral, S. Upadhaya

167. Cis-stilbene glycoside and trans-stilbene glycoside from Polygonum multiflorum suppress PEPCK gene expression and gluconeogenesis in HepG2 cell. W. Tang, P. Hsieh, M. Pan, C. Ho

168. Development of a chemical profile produced in the fermentation of gluten-free beverages. D. Budner, D. Ojennus


170. Comparison of anti-inflammatory activities of several novel compounds in a mouse ear edema model. W. Tang, S. Li, Y. Liu, M. Huang

171. Anti-inflammatory activity of Shiitake mushroom-derived β-1,3;1,6-glucan, lentinan, through modulation of TNF receptor 1 (TNFR1) distribution in intestinal epithelial cells. Y. Nishitani, M. Mizuno

172. Investigation on bitter taste-active compounds in Omija (Schisandra chinensis Baillon) tea. M. Kih, Y. Kim


175. Conventional and ultra high pressure (UHP) assisted cationization of dextrin. A. Cho, S. Choi, B. Kim, C. Park, Y. Kim, M. Baik


177. Centrifugal partition chromatography isolation and chemical identification of lipophilic antioxidant constituents from avocado pulp (Persea americana). D. G. Rodríguez-Sanchez, C. I. Silva-Platas, G. J. García-Rivas, C. Hernández-Brenes

178. Decontamination of Salmonella enterica on blueberries by washing with organic acid, ozone, and mild heat. Y. Li, C. Wu, W. Xu, M. Ehrich

179. Induction of apoptosis and inhibition of proliferation on prostate cancer cells by bitter melon extract. C. Jang, C. Wu

180. Antiproliferative and anticytotoxic effects on human prostate cancer cell line and in vitro antioxidant activities of Taxillus nigrans (Hance) Danser, a traditional Chinese medicine. W. Xu, C. Wu

181. Identification of aroma compounds in Chinese rice wine by normal phase liquid chromatography fractionation followed by gas chromatography-olfactometry. S. Chen, M. Qian, Y. Xu

182. Study on continuous biosynthesis of theaflavins by immobilized laccase in a packed bed reactor. H. Jiang, B. Wang, J. Zhang, Y. Huang

183. HPLC-fluorescence studies of the changes in secondary metabolites during progression of Huanglongbing disease in sweet orange leaves. J. A. Manthey, F. M. Hijaz, J. R. Reyes-De-Corcuera, S. Y. Folimonova, C. L. Davis, S. E. Jones

184. Challenges of ionic liquid GC column for beer and wine volatile analysis. Y. L. Qian, M. C. Qian
185. Polyunsaturated fatty acids (PUFAs) production from microalgae cultured in fermentation wastewater. P. Wang, B. Wang
186. Chemical profiles of cumin essential oil with different extraction methods. L. Guo, Q. Zhang, B. A. Bogusz, S. Zou, S. Li, C. Ho, Q. Huang
187. Study of the interactions between limonene and starch from various origins using reversed-flow gas chromatography techniques. J. Kapolos, L. Delporte, A. Koliadima

other symposia of interest -
- Environmental Biotechnology and Sustainability: Applications to Drinking Water, Industrial Waste Treatment, and Site Remediation
  Sponsored by ENVR, Cosponsored by AGFD and AGRO
- Is Your Analytical Method Good Enough?
  Sponsored by AGRO, Cosponsored by AGFD and ENVR

WEDNESDAY Morning  August 22  Section A  Loews Philadelphia Hotel  Commonwealth Hall A1/A2

Essential Oils: Natural Materials for Flavor, Fragrance, and Bioactives
N. Da Costa, X. Fan, Organizers, Presiding
8:30 Introductory Remarks.
8:35 188. Application of allyl isothiocyanate in foods for pathogen control. T. Z. Jin, W. Sang
9:00 189. Peppermint oil nanoemulsion colloidal system assembly for prolonged efficacy against gram-positive bacterial strains. R. Liang, F. Zhong, Q. Huang, C. F. Shoemaker
9:50 Intermission.
10:05 191. Use of gaseous essential oils to control foodborne human pathogenic bacteria on fresh produce. X. Fan, J. Yun, X. Li
10:30 192. Antifungal activity of clove oil extracted by steam distillation, hydrodistillation, and supercritical carbon dioxide. W. Guan, R. Yan
10:55 193. Antifungal activity of cinnamon oil and clove oil in vitro and in vivo fruit tests. X. Li, Y. Xing, Q. Xu, J. Yun
11:20 Concluding Remarks.

Section B  Loews Hotel Philadelphia  Commonwealth B
Physical Methods in Food Analysis  Cosponsored by ENVR
M. H. Tunick, C. Onwulata, Organizers, Presiding
9:00 Introductory Remarks.
9:30 195. Screening of fluoroquinolone residues in caprine milk using a portable time-resolved fluorometer. G. Chen
10:20 Intermission.
10:35 197. Detection of food allergens: Current analytical methods and future needs. L. S. Jackson
11:00 198. Targeted unknown LC(ESI+)/Q/TOFMS approaches for food verification. A. E. Mitchell, J. Lee
11:50 Concluding Remarks.

other symposia of interest -
- Is Your Analytical Method Good Enough?
  Sponsored by AGRO, Cosponsored by AGFD and ENVR
- Nanomaterials in Medicine, Food and the Environment
  Sponsored by ENVR, Cosponsored by AGFD and AGRO

WEDNESDAY Afternoon  Section A  Loews Philadelphia Hotel  Commonwealth Hall A1/A2

Essential Oils: Natural Materials for Flavor, Fragrance, and Bioactives
N. Da Costa, X. Fan, Organizers, Presiding
1:30 Introductory Remarks.
1:35 200. Antioxidant activity of the volatile and non-volatile extracts of sweet fennel seeds (Foeniculum vulgare) grown in Egypt. M. S. Shaheen
2:00 201. Emulsion electrospinning of novel core/shell nanofiber mats for the controlled release of bactericidal cinnamaldehyde. K. A. Rieger, J. D. Schiffman
2:50 Intermission.
3:30 204. Headspace solid-phase microextraction (HS-SPME) gas chromatography-mass spectrometry (GC-MS) analysis of the essential oils from the aerial parts of Artemisia vulgaris L. reveal the possible existence of new chemotypes. J. D. Williams, T. Xie, D. N. Acharya
3:55 205. Light therapy with no external device: A novel approach to skin care. V. Cataldo, V. Gruber, F. Muia
4:20 Concluding Remarks.

Section B  Loews Hotel Philadelphia  Commonwealth B
Physical Methods in Food Analysis  Cosponsored by ENVR
M. H. Tunick, C. Onwulata, Organizers, Presiding
1:30 Introductory Remarks.
1:35 206. Dissolution models for estimating glycemic potential of food materials. C. Onwulata
2:00 207. Exploring reaction kinetics and mechanism between β-lactoglobulin and genipin. P. X. Qi, A. Nunez, E. D. Wickham
2:25 208. Isolation and characterization of natural blue pigments from underexplored sources. A. G. Newsome, R. B. van Breemen
2:50 Intermission.
3:05 209. Simultaneous HPLC analysis of six polymethoxyflavones and six 5-demethylated polymethoxyflavones from citrus peel. S. Li, W. Chuang, T. Yang, T. Huang, C. Ho
3:55 211. LC-MS spectroscopic fingerprinting on analysis of diploid and tetraploid Gynostemma pentaphyllum. H. Shi, Z. Xie, Y. Zhao, P. Chen, L. L. Yu
4:20 Concluding Remarks.

other symposia of interest -
- Nanomaterials in Medicine, Food and the Environment - Life Cycle Considerations
  Sponsored by ENVR, Cosponsored by AGFD and AGRO
- Perfecting Communication of Chemical Risk
  Sponsored by AGRO, Cosponsored by AGFD and ENVR
- Addressing Complex Sites: Chemistry, Toxicology, Fate of Mixed Pollutants Across Environmental Media
  Sponsored by ENVR, Cosponsored by AGFD and AGRO
- Environmental Biotechnology and Sustainability: Applications to Drinking Water, Industrial Waste Treatment, and Site Remediation
  Sponsored by ENVR, Cosponsored by AGFD and AGRO
- Green Chemistry and the Environment
  Sponsored by ENVR, Cosponsored by AGFD and AGRO
- Interactions of Nanomaterials with Emerging Environmental Contaminants
  Sponsored by ENVR, Cosponsored by AGFD and AGRO
- Materials for Water Sustainability
  Sponsored by ENVR, Cosponsored by AGFD and AGRO

WEDNESDAY Evening
- Nanomaterials in Medicine, Food and the Environment
  Sponsored by ENVR, Cosponsored by AGFD and AGRO

THURSDAY Morning  August 23  Section A  Loews Hotel Philadelphia  Washington A
General Papers
L. Jackson, Organizer
M. Qian, Organizer, Presiding
8:30 Introductory Remarks.
8:35 212. Novel catalytic performance of a β-galactosidase with high regioselective glucosidase activity on β-1,2-glucosidic linkage. H. Wan, Y. Xia
8:55 213. Heat-induced protein aggregate correlated with trypsin inhibitor inactivation in soymilk processing. Z. C. Xu
9:15 214. pH, NaCl, biopolymer ratio and concentration effects on the complex coacervate formation from soy protein isolate and gum arabic. D. Dong
9:35 215. Microbiological and near IR studies of leather from hides presoaked in formulations that can remove hardened bovine manure. M. L. Aldema-Ramos
9:55 Intermission.
10:10 216. Polymer-clay nanobrick wall thin films as foil replacement for food packaging. D. Hagen, J. C. Grunlan, M. Priolo
10:50 218. Hydroperoxide lyase immobilized on ceramic hydroxyapatite with better stability than the membrane bound hydroperoxide lyase. Q. Q. Liu, X. Z. Kong, C. M. Zhang, Y. M. Chen, Y. F. Hua
11:10 Concluding Remarks.

Section B  Loews Hotel Philadelphia  Washington B
General Papers
M. Qian, Organizer
L. Jackson, Organizer, Presiding
8:30 Introductory Remarks.
9:15 221. Room-temperature synthesis of ZnO-based nanocomposites for food applications. J. Yang, L. Shi, S. Gunasekaran
9:35 222. Hydroperoxide lyase from Amaranthus tricolor to generate (2E)-hexenal that could be efficiently separated by salt-adding steam distillation. J. Xiong, X. Kong, C. Zhang, Y. Chen, Y. Hua
9:55 Intermission.
10:30 224. Improving physicochemical and biological properties of psyllium through sulfation, hydroxypropylation, and succinylation. Y. Niu, Z. Xie, W. Liu, L. L. Yu
11:10 Concluding Remarks.

other symposia of interest -
- Fate & Exposure of Urban Applied Pesticides in the Context of Human and Ecological Risk Assessments
  Sponsored by AGRO, Cosponsored by AGFD and ENVR
- Human Health and Transgenic Crops
  Sponsored by AGRO, Cosponsored by AGFD
- Nanomaterials in Medicine, Food and the Environment - Toxicity Mechanisms
  Sponsored by ENVR, Cosponsored by AGFD and AGRO

AGFD Abstracts, 244th ACS Nat’l Meeting, Philadelphia

AGFD 1  Low cost, portable lab-on-a-chip device for detection of food adulterants  Fei He, Shengquan Jin, Sam R Nugen, snugen@foodsci.umass.edu. Food Science, Univ. of Massachusetts, Amherst, MA  Lab-on-a-chip devices use microfluidic technology to integrate sample handling and analyte detection in a handheld platform, but their need for costly and bulky peripheral equipment has prohibited their adoption by the food industry. This presentation will describe recent advances in the Nugen laboratory to develop low cost lab-on-a-chip technologies that circumvent the need for peripheral equipment like pumps and valves. On-chip reagent storage using electrospun nanofibers, electrowetting valve actuation, and capillary fluid flow enable a self-contained device capable of the advances of state-of-the-art microfluidics in a format suitable for on-farm and in-plant usage. A case study will be highlighted describing the adaptation of our novel technology to detect the presence of low numbers of E. coli O157:H7 from fluid milk.
AGFD 2  Factors affecting the generation and fate of hydrogen peroxide in complex foods  Lisa Zhou, Ryan Elias, elias@psu.edu. Dept. of Food Science, Pennsylvania State Univ., Univ. Park, PA  Polyphenols are attractive functional food ingredients due to their purported health benefits. However, despite their known antioxidant activity, recent studies in our lab have shown that EGCG oxidation results in the rapid generation of hydrogen peroxide (H2O2), which may account for its pro-oxidant activity in some systems. We examined the factors affecting H2O2 production resulting from (-)-epigallocatechin gallate (EGCG) oxidation in surfactant- and casein-stabilized oil-in-water emulsions. The production of H2O2 in the surfactant-stabilized system was dependent on EGCG concentration, and the addition of iron accelerated H2O2 production. In protein-stabilized systems, H2O2 concentrations were significantly lower across all treatments, which accompanied a concomitant increase in protein oxidation products. Paradoxically, the presence of the protein increased the overall rate of EGCG oxidation. Both proteins showed concentration dependent scavenging of H2O2, with casein displaying significantly higher scavenging activity compared to whey protein, possibility due to greater accessibility of key peroxide scavenging amino acids.

AGFD 3  Chemoinformatics exploration of flavors as mood modulators  Karina Martínez-Mayorga1, kmartinez@tpims.org, Terry L. Peppard2, Fabian H Lopez-Vallejo1, Jose L Medina-Franco1.(1) Dept. of Computational Chemistry, Torrey Pines Inst. for Molecular Studies, Port St. Lucie, FL (2) Robertet Flavors Inc., Piscataway, NJ  The need for a broad spectrum of mood modulators has stimulated research in pharmaceutical and food industries alike, though they are targeted at different levels of severity of mood changes. While antidepressants and mood-lifting agents may have commonalities, they also have differences in mechanisms of action and means of administration. The multiple roles of food and food components in maintaining cognitive health, improving mental alertness, delaying onset of memory loss and mood modulation have been recognized over the years, albeit often anecdotally. More studies are needed to establish the scientific basis of these roles and possible mechanisms of action. In this work, we present the computational characterization of compounds with mood modulation properties using principles of chemoinformatics. Comparison of the physicochemical and structural properties of flavor molecules, approved antidepressants, marketed drugs, and agents with reported antidepressant activity shows how flavors may have the potential to act as mood modulators.

AGFD 4  Mushroom sclerotium: A key to cancer prevention?  Ka Hing Wong, Kahing.Wong@inet.polyu.edu.hk.Dept. of Applied Biology and Chemical Technology, The Hong Kong Polytechnic Univ., Hunghom, Kowloon, Hong Kong  Recently, selenium nanoparticles (SeNPs) have become a new research target, since they were found to possess excellent bioavailability, low toxicity and remarkable anti-cancer activity. Nevertheless, SeNPs aggregate easily and their anti-cancer activity will be significantly reduced, once their nano-size could not be maintained. By using the mushroom polysaccharide-protein complexes (PSPs) isolated from the sclerotia of Pleurotus tuber-regium, highly stable SeNPs were successfully prepared under a simple food-grade redox system. Besides, these novel SeNPs were found to remarkably inhibit the growth of human breast carcinoma MCF-7 cells by apoptosis induction in a dose-dependent manner, but were non-cytotoxic toward the normal cells. Further investigation on its in vitro and in vivo anti-cancer activity at cellular and molecular levels is underway. Findings of this study would not only facilitate the development of mushroom PSPs into new functional food ingredients to stabilize SeNPs, but also provide insights on using these novel SeNPs in cancer chemoprevention.

AGFD 5  Novel action of grape skin/pomace extracts on diabetes by targeting alpha-glucosidases and postprandial hyperglycemia  Kequan (Kevin) Zhou, kzhou@wayne.edu.Nutrition and Food Science, Wayne State Univ., Detroit, MI  Grape skin/pomace extract (GSE) has been commonly used as a nutritional antioxidant supplement. We have recently found that GSE intake exerts a novel inhibitory activity on intestinal alpha-glucosidases, the key enzymes controlling starch digestion and absorption. The inhibitory effect of GSE is in vivo sustainable. The dietary intake of a specific GSE significantly ameliorated postmeal hyperglycemia (by 31%) in diabetic mice. Furthermore, we showed that the GSE supplementation exerts a significant hypoglycemic effect in diet-induced obese mice independent of its effects on food intake, weight gain, or antioxidant activity. More recently, we found that the acute intake of GSE reduced postmeal glycemic response by averaging 44% among 9 human subjects (p<0.01). The consistent results from our animal and human studies suggest that grape skins/pomace contain unique non-antioxidant compounds that could be developed as a novel targeted and cost-effective dietary approach to aid in the prevention and treatment of diabetes.

AGFD 6  Activation of neuronal housekeeping (autophagy) by polyphenol-rich berries and walnuts  Shibu M. Poulose, shibu.poulose@ars.usda.gov.Neurocognition and Aging, USDA-ARS, HNRCa at Tufts Univ., Boston, MA  Dysfunctional neuronal housekeeping (autophagy) in brain causes accumulation of damaged proteins which have been implicated in many age-related diseases. Neuroinflammation (INF) and oxidative stress (OS), which both increase in tandem with age, have been critical factors in the loss of autophagy. We investigated whether supplementing brain cells with extracts from walnuts or berries (blueberries, strawberries and acai) would reduce chemically-induced inflammation and OS, along with activating autophagy. Thus, BV2 microglia and HT22 hippocampal neurons were pre-treated with berry or walnut extracts, then subjected to chemically induced stress. Similarly, rats fed with walnut or berry diets were exposed to radiation, a model for accelerated aging. Neurochemical analysis indicated a significant reduction in OS/INF, measured in terms of TNFa, NFkB, p38-MAPK,
AGFD 7 Reversal of age-related motor deficits following stilbene dietary supplementation  Jane E. Cavanaugh1, cavanaughj@duq.edu, Erika Allen1, Agnes M Rimando2, Cassia S Mizuno2.(1) Dept. of Pharmacology, Duquesne Univ. Graduate School of Pharmaceutical Sciences, Pittsburgh, PA (2) Dept. of Natural Products Utilization Research Unit, USDA, ARS, Univ., MA As the population over 65 increases, the incidence of age-related injuries will rise. Currently, there are few therapeutic regimens for age-related motor deficits. Resveratrol is a phytoalexin that has been shown to improve motor function in aged mice. To examine the effect of resveratrol or resveratrol analogs on motor function in vivo, mice (2, 10 and 22 months) were fed resveratrol or pinostilbene containing diet for 8 weeks. Motor function was examined using a challenge beam test and a cylinder test. To investigate the mechanisms that may underlie a reversal of motor deficits, dopamine (DA) and dopamine metabolite levels were examined in all groups and dopaminergic cells were treated with resveratrol or resveratrol analogs +/- DA. Additionally, dopaminergic cells were analyzed for ERK1/2 and ERK5 activation. Resveratrol and pinostilbene protected dopaminergic cells from DA-induced cell death. This research may lead to novel therapies for age-related motor deficits using natural compounds.

AGFD 8 Systemic and neuronal cross-talk: Effects of nature's products  Britt Burton-Freeman1, bburton@iit.edu, Barbara Shukitt-Hale2.(1) Center for Nutrition Research, Illinois Inst. of Technol /IFSH, Bedford Park, IL (2) Neuroscience Laboratory, USDA/ARS/HNRCA at Tufts Univ., Boston, MA Plant foods, including fruits, vegetables, herbs and spices and certain oils have been consistently identified as key components of dietary patterns that reduce risk for the development of chronic diseases, including atherosclerotic cardiovascular disease, Alzheimer's disease, type II diabetes mellitus and some cancers. Recent epidemiological evidence has identified non-essential compounds, such as (poly)phenols that contribute favorably to the diet-disease relationship, presumably through their ability to modulate processes of oxidative stress/damage and inflammation. Anthocyanins and procyanidins are among those compounds showing systemic biological activity as well as neuronal activity. This presentation will discuss processes underlying disease, such as oxidative stress and inflammation and their relationship to chronic disease development, sources and inducers of oxidative stress and inflammation and impacts on neuronal signaling, and foods/food components and extracts that show biological activity systemically and centrally.

AGFD 9 Diverse cellular mechanisms underlying neuroprotective effects of dietary polyphenols in ischemic injury in vitro  Kiran S Panicker, kiran.panicker@ars.usda.gov.Diet, Genomics, & Immunology Lab, Beltsville Human Nutrition Res. Ctr, USDA, Beltsville, MD Polyphenols, present in fruits and vegetables, possess anti-oxidant, insulin-potentiating, anti-inflammatory, and anti-apoptotic properties. Oxidative stress, inflammation, and apoptosis are key characteristics of cerebral ischemia, caused by an interruption of cerebral blood flow, and polyphenols exert neuroprotective effects in ischemic injury. Brain edema is an important consequence of ischemia and oxidative stress and inflammation are implicated in its pathogenesis. Astrocyte swelling is a major component of cytotoxic brain edema and, along with vasogenic edema, may contribute to increased intracranial pressure, brain herniation, and additional ischemic injuries. We investigated the protective effects of several polyphenols in attenuating cell swelling using C6 glial cultures. Polyphenol extracts from cinnamon, green tea, as well as purified type-A polyphenols from cinnamon, myricetin, and quercetin, attenuated cell swelling following oxygen-glucose deprivation (OGD), an in vitro model of ischemic injury. To study the mechanisms underlying the protective effects of such polyphenols we examined their effects on increased ROS production, nitric oxide (NO), mitochondrial dysfunction, and intracellular calcium [Ca2+], key factors that contribute to cell swelling, and on the reduction in glutamate uptake. All the above-mentioned polyphenols significantly reduced the OGD-induced increase in ROS. However, cinnamon and green tea augmented the OGD-induced increase in NO and concentrations of type-A polyphenols, that did not block ROS, significantly attenuated cell swelling, indicating that polyphenols may have multiple actions in reducing cell swelling. Blockade of the mitochondrial permeability transition (mPT) pore generally blocks cell swelling. OGD-induced dissipation of the inner mitochondrial membrane potential (??m), a component of the mPT, was blocked by these polyphenols, but not by quercetin, even though quercetin blocked swelling. This indicated that the cellular mechanisms by which polyphenols reduce swelling are multi-factorial. OGD-induced [Ca2+]i was significantly attenuated by myricetin, quercetin, and a type-A polyphenol from cinnamon. Further, blockade of [Ca2+]i, using calcium channel blockers (nifedipine, nimodipine, verapamil), BAPTA-AM, a calcium chelator, and dantrolene, an inhibitor of Ca2+-release through RyR, significantly attenuated swelling indicating that one mechanism by which such polyphenols reduce swelling is through regulating [Ca2+]i, or a [Ca2+]i-mediated pathway. The type-A polyphenol component from cinnamon, as well as myricetin, but not quercetin, attenuated the decline in glutamate uptake after OGD, similar to cyclosporin A, a blocker of the mPT. These results indicate that polyphenols regulate [Ca2+]i, to exert their protective effects on cell swelling and some of the protective effects of polyphenols are mediated by mitochondria. In addition, given the differential effects of polyphenols on mitochondria, the neuroprotective effects of polyphenols may involve multiple intracellular signaling pathways that target diverse mechanisms.

AGFD 10 Use of cannabinoid receptors in the identification of biologically active secondary metabolites as immune-stimulants from foods  Stephen J. Cutler, cutler@olemiss.edu.Dept. of Medicinal Chemistry, The Univ. of Mississippi School of Pharmacy, Univ., MS Over the past 10 years, significant progress has been made in the field of the endocannabinoid etc., was accompanied with an activation of autophagy measured through the levels of p62, MAP1B-LC3, beclin1 and mTOR. The study offers a unique perspective on phytochemicals in combating age-associated neurochemical dysfunction.
system and in cannabinoid chemistry. Although much of this focus has been in the discipline of pharmacy, there are potential utilities of this system in the agrochemical and food industry. It is interesting to find there is a certain pleasure that comes from migrating across scientific disciplines. The feeling is much like seeing an old friend for the first time in many years. Perhaps another metaphor exists between pharmacy and agrochemicals with the common strand being chemistry. It is recognized that the receptor subtypes of the endocannabinoid system have broad utility. In particular the Cannabinoid Receptor Subtype 2 (CB2) has been suggested to play a role in influencing the immune system. This paper will describe the bioassay directed isolation and characterization of secondary metabolites from plants and food, which may stimulate the immune system.

AGFD 11  Exploring nature against depression, anxiety, and opioid withdrawal  Abir T El-Alfy, ael-alfy@csu.edu.Dept. of Pharmaceutical Sciences, Chicago State Univ., Chicago, IL  The ever-increasing demand for drugs that treat neurological conditions, coupled to the advancement of new techniques for the isolation and characterization of molecular targets as well as chemical entities, the exploration of natural products for neurological drug development is fast advancing. In collaboration with natural products chemists, research efforts in my laboratory have focused on establishing the potential of a variety of natural products to serve as drug leads for the treatment of various neurological disorders including anxiety, depression, as well as in the relief of opioid withdrawal symptoms. Phytocannabinoids isolated from high potency cannabis as well indole alkaloids isolated from marine sponges were evaluated for antidepressant-like actions in animal models of behavioral despair paradigms. The natural product pterostilbene showed significant anxiolytic activity that seems to correlate with down regulation of hippocampal ERK phosphorylation. Finally the potential for Kratom or mitragynine for pharmacological treatments of opioid withdrawal will be discussed.

AGFD 12  Anthocyanin effects in cognition and dementia: Probable mechanisms and future directions  Paul E Milbury, paul.milbury@tufts.edu.Friedman School of Nutrition Science and Policy, Tufts Univ., Boston, MA  Anthocyanins are potent antioxidant and anti-inflammatory agents. Data suggests they have many biologically diverse roles. Anthocyanins are bioavailable after consumption of berries and reside in brain tissue longer than in plasma. This was unexpected, given normal assumptions of pharmacokinetics. The mechanisms by which anthocyanins contribute to neuroprotection remain poorly understood. As new data regarding their tissue concentrations comes to light, a better understanding is possible regarding the potential mechanism involved in preventing neurodegeneration and enhancing memory and cognition. Presently, limited data supports a causal relationship between the consumption of anthocyanins and behavioral outcomes. Supporting evidence will be presented with future directions proposed. Despite a decade of dramatic increase in understanding of the biology of flavonoids, they remain mistakenly portrayed as simply antioxidants. This is a significant barrier to advancing anthocyanins, and indeed flavonoids in general, to preclinical research.

AGFD 13  Food safety modernization act: An industry perspective and overview of the law  Shannon Cole, scole@gmaonline.org.Grocery Manufactures Association, Washington, DC  On January 4, 2011, Congress enacted the most sweeping changes to food safety laws in more than 70 years. GMA worked closely with legislators to craft the FDA Food Safety Modernization Act (FSMA) and has continued to work closely with the FDA as it develops more than 50 new rules, regulations and guidance to implement the provisions of this new law. This presentation will provide an overview of FSMA, discuss the implications of the law to the food industry, how companies should start preparing for implementation and the GMA action plan going forward. An outline of the new requirements published in the FDA proposed rules for the food industry as a result of the new food safety law will also be discussed.

AGFD 14  Alternative food safety intervention technologies  Christopher Sommers, christopher.sommers@ars.usda.gov.Food Safety and Intervention Technologies, USDA-ARS-Eastern Regional Research Center, Wyndmoor, PA  Alternative nonthermal and thermal food safety interventions are gaining acceptance by the food processing industry and consumers. These technologies include high pressure processing, ultraviolet and pulsed light, ionizing radiation, pulsed and radiofrequency electric fields, cold atmospheric plasma, GRAS antimicrobials, flash pasteurization, and many others. Many of these technologies have been the focus of research at USDA Eastern Regional Research Center. The results of our research, including applications which have been transferred to the food processing industry, will be discussed.

AGFD 15  Using nanotechnology to make foods safer: Nanoparticles as sensors for small molecules, protein toxins, and foodborne pathogens  Timothy V Duncan, timothy.duncan@fda.hhs.gov.Inst. for Food Safety and Health, US FDA, Bedford Park, IL  The conversation about nanofoods often centers around nanoparticles being added to foods or food packaging materials in order to affect food sensory characteristics, quality attributes, nutrition or safety. However, a wholly separate projected function of nanotechnology in the food sector is the use of nanoscale materials to help food safety specialists quickly and selectively detect chemical and biological analytes that could threaten the food supply. Such sensors, which may be incorporated into packaging materials for real-time, noninvasive monitoring of food conditions or for rapid detection of contaminants or pathogens after a suspected exposure, offer significant advantages over conventional sensing methodologies and could revolutionize the way that industry groups and regulatory agencies ensure that food products are safe for the public to consume. This presentation will provide an overview of current work ongoing in this exciting field, as well as a description of significant challenges that need to be overcome.
AGFD 16  Sticky DNA: The use of DNA aptamers for the rapid and robust detection of pathogens, proteins, and small molecules in food  Jeffrey DeGrasse, Jeffrey.Degrasse@fda.hhs.gov. Division of Analytical Chemistry, US FDA, College Park, MD  Immuno-affinity based assays are widely used to directly detect, identify, and quantify foodborne pathogens and toxins. However, the success of these assays depends upon the availability of a high quality monoclonal antibody, the development of which is non-trivial and costly. In contrast to antibodies, aptamers are short nucleic acids that exhibit high affinity and specificity for their targets without the high-costs and ethical concerns of animal husbandry. This talk will describe a novel aptamer, selected in vitro, with affinity to staphylococcal enterotoxin B (SEB) that may be used in lieu of antibodies in staphylococcal enterotoxin detection assays. The aptamer, APTSEB1, successfully isolates SEB from a complex mixture of closely related staphylococcal enterotoxins with extremely high discrimination. This work sets the foundation for future aptamer and assay development towards the entire family of SEs as well as other molecules of interest to food safety.

AGFD 17  DNA-based species identification in support of food safety at the FDA  Sara M Handy, sara.handy@fda.hhs.gov. Center for Food Safety and Applied Nutrition, US FDA, College Park, MD  Due to the ever-increasing variety of plant and animal species being traded in commerce around the world, proper species identification is proving to be a critical component of the FDA's mission of assuring US consumers that the food they eat is both safe and properly labeled. These data can be combined with additional chemical, or microbiological methods to make a more complete story, or be used directly to help protect consumers. Species identification is particularly challenging in processed food products where traditional diagnostic characters used to identify species visually have been removed. Previous methods for species identification of processed food products used techniques such as isoelectric focusing of proteins or analysis of fatty acids, but advances in DNA sequencing technology have made this once complicated and expensive process more affordable and amenable to standardization and validation and therefore useful in the regulatory arena. We have standardized and validated a DNA based method for fish species identification and have now transitioned this method to nine FDA field laboratories allowing the FDA to combat the growing problem of seafood misbranding. To be presented will be a cross section of the DNA based species identification methods to support FDA regulatory investigations, including seafood safety, illegal importations, and most recently in FDA efforts to determine the cause of taste disturbances associated with the consumption of imported pine nuts.

AGFD 18  Evaluation of low trans fat edible oils by Fourier transform infrared spectroscopy and gas chromatography: A comparison of regulatory methods  Cynthia Tyburczy, cynthia.tyburczy@fda.hhs.gov, Magdi M. Mossoba, Pierluigi Delmonte, Ali Reza Fardin-Kia, Jeanne I. Rader. Center for Food Safety and Applied Nutrition, U.S. FDA, College Park, MD  Current interest by the food processing industry in exploring reformulation options that lower the content of trans fat in edible fats and oils requires methods to accurately measure low levels of trans fat. We evaluated the quantitation of trans fat in 25 fat and oil samples using two current regulatory methods, Fourier transform infrared spectroscopy (FTIR) and gas chromatography (GC). Discrepancies between FTIR and GC quantitations at trans fat levels <2% of total fat could be explained, in part, by the presence of saturated fat and/or trans double bond-containing minor constituents (e.g., beta-carotene, stigmasterol) that showed absorbance bands at or near 966 cm⁻¹, a region of the FTIR spectrum that is uniquely characteristic of isolated trans double bonds. Results indicated that the natural content of such minor constituents could lead to significant overestimations of trans fat when FTIR is used to analyze fats and oils of low trans fat content.

AGFD 19  LC-MS detection of process-induced contaminants in edible oils  Shaun MacMahon, shaun.macmahon@fda.hhs.gov. U.S. FDA, College Park, MD  Fatty acid esters of 3-monochloro-1,2-propanediol (3-MCPD), 2-monochloro-1,3-propanediol (2-MCPD) and glycidol are contaminants formed during the processing of commonly consumed edible oils. Free 3-MCPD, 2-MCPD and glycidol, respectively, are released during digestion in rats through hydrolysis of the ester linkages. Both 3-MCPD and glycidol are known to induce tumors in rodents. The compounds have proven difficult to detect and quantitate; most methodology relies on potentially inaccurate indirect analytical approaches. A quantitative method which detects intact 3-MCPD, 2-MCPD and glycidyl esters is required. The method described herein involves rapid SPE cleanup of solid and liquid oils followed by LC-MS/MS detection using electrospray ionization and quantitation of intact 3-MCPD, 2-MCPD and glycidyl esters at concentrations as low as 100 ppb. This rugged, sensitive and specific method allows for the direct determination of fatty acid esters of 3-MCPD, 2-MCPD and glycidol and is suitable for regulatory analysis.

AGFD 20  pH studies of grape anthocyanins using resonance Raman spectroscopy  Andrew Burns, aburns@kent.edu. Kent State Univ., Stark, North Canton, OH  Anthocyanins are well known to exist with different colors as a function of pH, as they exist in an equilibrium system. In acidic media, anthocyanins are red due to the flavyium cation form of the equilibrium dominating. At neutral or basic pH, the quinoidal base form is prevalent and the color turns blue. When the pH is in between, the carbinol and chalcone pseudobase forms are most important and the color fades or turns clear. The anthocyanin equilibrium with respect to pH has been well studied by UV-Vis and NMR. However, very few studies have used vibrational spectroscopy to investigate the equilibrium of the anthocyanin forms. This work provides a Raman study of grape anthocyanins.
as a function of pH, showing the dominate form of the resonance. MicroRaman spectra were recorded using blue light with wavelength 473nm. This did not eliminate fluorescence but reduced it enough to observe a sufficient Raman signal. Infrared was attempted, but unsuccessful due to absorption of water.

**AGFD 21 Adsorption of soy isoflavones by activated charcoal: Kinetics, thermodynamics, and influence of soy oligosaccharides**  Shi Yun, yunshi09@yahoo.com.cn, Hua Yufei, Kong Xiangzhen, Zhang Caimeng, Chen Yeming. School of Food Science and Technology, Jiangnan Univ., Wuxi, Jiangsu China  Adsorption of isoflavones (daidzin, genistin, 6"-O-malonyldaidzin and 6"-O-malonylgenistin) by activated charcoal (AC) during the purification of soy oligosaccharides from soy molasses was investigated. Kinetic study showed that adsorption equilibrium reached in 4.0 h, and the adsorption obeyed intra-particle diffusion mechanism. Experimental data fitted well to Langmuir isotherm at low temperature, and the maximum adsorption capacity of daidzin, genistin, 6"-O-malonyldaidzin and 6"-O-malonylgenistin was found to be 25.063, 35.714, 20.964 and 57.143 mg g\(^{-1}\) AC at 20 °C, respectively. However, 6"-O-malonyldaidzin and 6"-O-malonylgenistin decomposed in the presence of AC at high temperature. Thermodynamic study showed that the adsorption process was endothermic. Moreover, the presence of oligosaccharides was favorable for the decomposition of 6"-O-malonyldaidzin and 6"-O-malonylgenistin at high temperature.

**AGFD 22 Epigallocatechin gallate interactions with serum albumin**  Min Li, hagermae@muohio.edu, Ann E Hagerman. Dept. of Chemistry & Biochemistry, Miami Univ, Oxford, OH  In this study, we explored the mechanism of bovine serum albumin-mediated (BSA) epigallocatechin gallate (EGCG) stabilization. Intrinsic fluorescence of BSA was used as a probe to detect interaction between EGCg, epigallocatechin, or methyl gallate and BSA. Both lifetime and intensity data showed that the quenching ability of EGCG was pH-sensitive, indicating that the protonation status and redox state of EGCG may be important to the interaction. Moreover, the galloyl moiety of EGCG was responsible for quenching, and had a stronger affinity for Trp 213 in hydrophobic pocket than for Trp 134 on BSA surface. Quenching was enhanced by the epigallocatechin group of EGCG. Competitive binding experiments using HPLC and circular dichroism provided confirmation that amino side chains around Trp 213 in the hydrophobic pocket are critical in BSA-EGCG binding. Our model of EGCG-BSA interactions improves our understanding of the likely physiological fate of this green-tea derived bioactive polyphenol.

**AGFD 23 Quantitative analysis of toxic dicarbonyl compounds formed in edible oils and butter upon heat treatment**  Yaping Jiang, ypjiang@ucdavis.edu, James N. Seiber, Takayuki Shibamoto. Dept. of Environmental Toxicology, Univ. of California, Davis, CA  Toxicity of dicarbonyl compounds, such as glyoxal, methyl glyoxal, and diacetyl, is receiving much attention among both food scientists and consumers. Analysis of these compounds in lipid-rich foods, such as cooking oils, is difficult because they are highly reactive. Moreover, their trace analysis is extremely hard due to their high solubility both in water and organic solvents. In the present study, these dicarbonyl compounds were derivatized with phenylene diamine into corresponding quinoxalines, which are stable and water insoluble, using a newly developed simultaneous purging and solvent extraction apparatus. Subsequently, these three dicarbonyl compounds were analyzed as quinoxalines with a gas chromatograph equipped with a DB-WAX column and a nitrogen-phosphorous detector. When various cooking oils and butter were heated at different temperatures, ppb-ppm levels of these compounds were recovered from the headspace. The results suggest that trace levels of these toxic dicarbonyl compounds are inhaled during cooking that involves lipid-rich foods.

**AGFD 24 Distributions of sulfhydryl groups and disulfides in different molecular weight peptides hydrolyzed from soy glycinin by Alcalase**  Xiuzhen Ding, Yufei Hua, yfhuax@jiangnan.edu.cn, Xiangzhen Kong. Dept. of Food Science and Technology, Jiangnan Univ., Wuxi, Jiangsu Province China  Soy glycinin, the major globulin of soy protein, has over 2 sulfhydryls (–SH) and 18-20 disulfide bonds (S-S) per hexamer. The paper investigated the changes sulfhydryls and disulfide bonds during the hydrolysis process of soy glycinin with Alcalase. –SH and S-S were determined by the Ellman's method and also detected by SEC-HPLC with fluorescent labeling by monobromobimane (mBBr). The results showed that the content of –SH was first increased then gradually decreased during the hydrolysis. –SH and S-S were shown to be concentrated in peptides with low molecular weight (MW). The hydrolysis conditions including temperature and pH had no obvious effects on contents of –SH and S-S, but they could affect their distribution. With the temperature increasing, –SH in MW > 10000 peptides and S-S in MW > 5000 peptides were gradually decreased, while –SH in MW < 5000 and S-S in MW 1000-5000 peptides were gradually increased. Upon pH increasing, SH in MW > 5000 peptides was gradually shifted into smaller-MW fractions. S-S in MW > 1000 peptides was increased and MW < 1000 was gradually decreased. The results here, as a preliminary study to screen –SH and S-S, could serve as a theoretical guide not only to elucidate the molecular changes during soy glycinin hydrolysis but also to enrich bioactive peptides containing cystein from the hydrolysates.

**AGFD 25 Influence of bioenergy crops production management on soil quality**  Yedan Xiong, yedan.xiong@smail.astate.edu. College of Agriculture and Technology, Arkansas State Univ., Jonesboro, AR, US  College of Resources and Environment, South China Agriculture Univ., Guangzhou, Guangdong China  Varieties of management such as fertilizer application, crop chosen, or pesticide and herbicide application, can cause large varieties in soil quality. Testing the Electronic Conductivity, pH and LOI on soil samples helps to access the variability of the soil quality in bioenergy crop fields on the Arkansas State Univ. Farm Complex. The fields are divided into four blocks that have twenty 90'x24' plots in each. The
is a known substrate of P-glycoprotein, and thus therapeutic drug levels in CNS are not likely to be achievable. We show that corresponding to the accessible time window for therapy in clinical stroke. The FDA-approved cardiac glycoside drug digoxin Critically, we could show neuroprotective benefit of cardiac glycosides even when applied many hours after OGD, known signaling pathways in a brain slice model for ischemic stroke, and found that several cardiac glycosides could provide clinical studies have failed to provide effective neuroprotection to injured neurons. Previously, we implemented a screen of much study of the biochemical pathways triggered by ischemic stroke, molecular targets that have been targeted to date in Houston, TX (3) Center for Drug Discovery and Dept. of Neurobiology, Duke Univ. Medical Center, Durham, NC Despite Anderson Cancer Center, Houston, TX (2) Dept. of General Oncology, The Univ. of Texas, M. D. Anderson Cancer Center, Houston, TX (3) Center for Drug Discovery and Dept. of Neurobiology, Duke Univ. Medical Center, Durham, NC Robert A. Newman1, newmanscientificconsulting@gmail.com, Denise E. Dunn3, Dong Ning He3, Mary Johansen1, Peiying Yang2, Donald C. Lo3.(1) Dept. of Experimental Therapeutics, The Univ. of Texas, M. D. Anderson Cancer Center, Houston, TX (2) Dept. of General Oncology, The Univ. of Texas, M. D. Anderson Cancer Center, Houston, TX (3) Center for Drug Discovery and Dept. of Neurobiology, Duke Univ. Medical Center, Durham, NC

AGFD 26 Template-mediated synthesis and biofunctionalization of flexible lignin-based nanotubes and nanowires
Elena Ten1,2, elena.ten@ufl.edu, Amelia Dempere3,4, Hector Caicedo1,2, Wilfred Vermerris1,2,1) Agronomy Dept., University of Florida, Gainesville, FL(2) Genetics Inst., Univ. of Florida, Gainesville, FL (3) Dept. of Materials Science and Engineering, University of Florida, Gainesville, FL (4) Major Analytical Instrumentation Center, University of Florida, Gainesville, FL Large-scale implementation of biofuels is only feasible if biofuels are priced competitively with fossil fuels. In addition to reducing the cost of biofuel production itself, production of high-value co-products can off-set the operating costs of the biorefinery, especially if these co-products are derived from the waste stream. We have developed lignin-based nanotubes synthesized in an alumina membrane template. We covalently linked lignin to the inner walls of activated alumina membranes, then added layers of dehydrogenation polymer onto this base layer via a peroxidase-catalyzed reaction, and dissolved the membrane in dilute acid. By using phenolic monomers displaying different reactivities, we were able to change the thickness of the polymer layer deposited within the pores, resulting in the synthesis of nanotubes with a wall thickness of approximately 15 nm or nanowires with a nominal diameter of 200 nm. In contrast to carbon nanotubes, these novel nanotubes/nanowires are flexible and can be specifically bio-functionalized, as evidenced by in vitro assays with biotin and Concanavalin A. Together with their intrinsic optical properties due to the natural fluorescence of the lignin, which can also be varied as a function of their chemical composition, these lignin-based nanotubes are expected to enable a variety of new applications including delivery systems that can be easily localized and imaged after uptake by living cells. The ongoing study focuses on effects of different biomass species and chemical pretreatments on morphology and properties of the nanotubes.

AGFD 27 Multivariate analysis and health risk assessment of heavy metals in wild leafy vegetables
Arshad Mehmood Abbasi, arshad799@yahoo.com. Plant Sciences, Quaid-i-Azam Univ., Islamabad, Pakistan Fresh wild leafy vegetables were investigated for selected heavy metal contamination. Sixteen vegetable species were collected and the samples were digested in mineral acids, followed by the quantification of the heavy metals by atomic absorption spectrophotometry. Overall, the highest concentration was noted for Fe, followed by relatively high levels of Zn, Mn, Co and Pb. Among the vegetables, Solanum nigrum exhibited the highest levels of Zn, Cu and Cr, while Stellaria media manifested the maximum concentrations of Fe and Cd. However, the highest contents of Mn, Co and Pb were found in Convolvulus arvensis, Cichorium intybus, and Amaranthus viridis, respectively. Multivariate hierarchical factor analysis and principal component analysis show significant anthropogenic contributions of the Pb, Cr, Co, Cd and Fe in the vegetables. Health risk assessment was evaluated in terms of estimated daily intake, health risk index, target hazard quotient and hazard index, which showed that the intake of Cr, Pb, Cd and Fe was higher than the recommended values, consequently the consumption of vegetables may be associated with non-carcinogenic health risks. Elevated levels of Cr and Pb were also found to be associated with lifetime carcinogenic risk to consumers.

AGFD 28 Effect of pH on the thermal stability of ricin evaluated using differential scanning calorimetry
William H. Tolleson, william.tolleson@fda.hhs.gov, Odbert A. Triplett, Kiet T. Nguyen.Division of Biochemical Toxicology, National Center for Toxicological Research - FDA, Jefferson, AR Ricin prid is a highly toxic plant protein abundant in the wet mash byproduct from commercial extraction of castor oil from the seeds of Ricinus communis. Castor bean pomace is used as a raw material for animal feed and fertilizers following heat treatment to inactivate ricin. Differential scanning calorimetry was used to evaluate the effect of pH on the thermal stability of ricin. Ricin unfolding involves an irreversible step, which complicates analysis. Scan rate analysis identified conditions under which the melting temperature and calorimetric enthalpy remained constant, allowing classical thermodynamic analysis. At pH 4.5 where ricin was most stable, the temperatures of optimal stability were calculated using the Gibbs-Helmholtz equation for the A and B subunits (46 °C and 36 °C, respectively). Considering that ricin is most stable at environmental temperatures, the toxicity of ricin present in raw castor bean mash represents a potential occupational hazard without adequate heat treatment.

AGFD 29 Effectiveness of the botanical drug candidate PBI-05204 derived from Nerium oleander in ex vivo and in vivo models of ischemic stroke
Robert A. Newman1, newmanscientificconsulting@gmail.com, Denise E. Dunn3, Dong Ning He3, Mary Johansen1, Peiying Yang2, Donald C. Lo3.(1) Dept. of Experimental Therapeutics, The Univ. of Texas, M. D. Anderson Cancer Center, Houston, TX (2) Dept. of General Oncology, The Univ. of Texas, M. D. Anderson Cancer Center, Houston, TX (3) Center for Drug Discovery and Dept. of Neurobiology, Duke Univ. Medical Center, Durham, NC Despite much study of the biochemical pathways triggered by ischemic stroke, molecular targets that have been targeted to date in clinical studies have failed to provide effective neuroprotection to injured neurons. Previously, we implemented a screen of known signaling pathways in a brain slice model for ischemic stroke, and found that several cardiac glycosides could provide direct neuroprotection to brain slices following ischemic injury induced by transient oxygen-glucose deprivation (OGD). Critically, we could show neuroprotective benefit of cardiac glycosides even when applied many hours after OGD, corresponding to the accessible time window for therapy in clinical stroke. The FDA-approved cardiac glycoside drug digoxin is a known substrate of P-glycoprotein, and thus therapeutic drug levels in CNS are not likely to be achievable. We show that
the botanical drug candidate PBI-05204 provides dose-dependent neuroprotection in brain slice models of ischemic stroke. In addition we present evidence that such neuroprotection is mediated at least in part through its principal bioactive ingredient, the cardiac glycoside oleandrin. We further show that oleandrin can pass effectively across the blood-brain barrier, and present preliminary data for neuroprotection of CNS tissues in rodent models following systemic administration of PBI-05204. That PBI-05204 has already successfully completed a Phase I clinical trial in an oncology indication further suggests that this botanical drug candidate merits further evaluation for therapeutic use in ischemic stroke and related forms of CNS injury. This work supported in part by Phoenix Biotechnology, Inc.

AGFD 30 Attenuation of stress/age associated toxic protein accrual and tau-hyperphosphorylation in brain by berries and walnuts Shibu M. Poulose1, shibu.poulose@ars.usda.gov, Donna F Bielinski1, Stacey M. Gomes1, Kirsty Carhill-Knoll2, Bernard M. Rabin2, Barbara Shukitt-Hale1. (1) USDA-ARS, HNRCA at Tufts Univ., Boston, MA (2) Dept. of Psychology, Univ. of Maryland Baltimore County, Baltimore, MD Phytochemicals protect the brain against stresses caused by oxidative free radicals and inflammation. The susceptibility of the brain to oxidative stress or inflammation increases with age, leading to degeneration and death of neurons with pathologies of neurodegenerative diseases. We investigated whether feeding young rats blueberry- or strawberry-supplemented diets, followed by irradiation with high energy and charge particles, a model for accelerated aging, would protect brain cells from radiation-induced damage. Irradiation caused substantial hyperphosphorylation of tau proteins, a hallmark of Alzheimer's disease, in striatum and hippocampus, and caused substantial buildup of polyubiquitinated protein aggregates. Supplementing rat diets with blueberries and strawberries for 8 weeks, prior to irradiation, protected the brain against aggregation of PHF-tau proteins and attenuated polyubiquitinated aggregation via altering the levels of mTOR, Beclin1, and P62/SQSTM1. Aged animals fed with walnut-supplemented diets also elicited similar benefits in a normal aging brain, indicating benefits at the molecular level.

AGFD 31 Novel tetrameric galectin from a marine sponge potentiates mammalian glutamate receptor function Takuya Ueda1, Yuka Nakamura1, Pamela J. Focia2, Caleb Smith2, Akira Inoue1, Takao Ojima1, Satoko Matsunaga1,Douglas M. Freymann2, Ryuichi Sakai1, Geoffrey T. Swanson2, gtswanson@northwestern.edu.(1) Faculty of Fisheries Sciences, Hokkaido Univ., Hakodate, Japan(2) Dept. of Molecular Pharmacology and Biological Chemistry, Northwestern Univ., Chicago, IL Marine organisms are a rich source of molecules that alter mammalian neuroactivity. We carried out a bioactivity-guided screening using mouse behavior and highly sensitive in vitro electrophysiological assays. An aqueous extract from a Cinachyrella marine sponge potently modified the functional properties of mammalian ionotropic glutamate receptors. Further isolation, functional characterization, and structural resolution yielded a new tetrameric member of the sponge galactose-binding lectin, or galectin, family. The amino acid sequences of the CchGs confirmed that the proteins were distant orthologues of animal prototype galectins. The crystallographic structure of CchGs at 2.1 Å revealed that the lectin monomers associate non-covalently into a toroid-shaped tetramer that has not been observed in previously resolved galectin structures. Purified CchGs potentiated steady-state currents and slowed desensitization of mammalian glutamate receptors expressed in heterologous cells. This unexpected biological activity suggests that analysis of related mammalian galectin proteins will yield further glycobiological and neurophysiological insights.

AGFD 32 Novel neuroactive compounds from aqueous extract of marine sponges Ryuichi Sakai1, ryu.sakai@fish.hokudai.ac.jp, Satoko Matsunaga1, Mitsuro Jimbo1, Martin B Gill3, L. Leanne Lash-Van Wyhe3, Geoffrey T Swanson3.(1) Faculty of Fisheries Sciences, Hokkaido Univ., Hakodate, Hokkaido Japan (2) School of Fisheries Sciences, Kitasato Univ., Ofunato, Iwate Japan(3) Dept. of Molecular Pharmacology and Biological Chemistry, Northwestern Univ., Feinberg School of Medicine, Chicago, IL Aqueous extracts of marine organisms have provided us with interesting neuroactive molecules. We have reported novel kainate receptor ligands disysherbaines from a Micronesian sponge and new purine derivatives with synaptic modulation activity from Palaun sponge. In the present paper, we outline isolation, structure and biological activity of these compounds. In addition, we present our recent progress in discovery of novel marine neuroactive compounds focusing on a novel peptide toxin Aculains (ACUs) found form Okinawan sponge Axynissa aculeata. ACU A and B are isolated as toxic principals in the aqueous extract of the sponge. Aculains are highly unique 44-amino acid peptide with three disulfide bonds. Amino acid terminals of ACUs were modified by long chain polyamines in an unprecedented manner.

AGFD 33 Neuroactive natural products from mollusks and their associated bacteria Zhenjian Lin1, z.j.lin@utah.edu, Gisela P. Concepcion3, Margo G. Haygood4, Alan R. Light2, Russ Teichert5, Baldomero Olivera5, Eric W. Schmidt1.(1) Medicinal Chemistry, Univ. of Utah, Salt Lake City, UT (2) Dept. of Anesthesiology, Univ. of Utah, Salt Lake City, UT (3) Marine Science Inst., Univ. of Philippines, Quezon City, Philippines(4) Environmental & Biomolecular Systems, Oregon Health & Science Univ., Beaverton, OR (5) Biology, Univ. of Utah, Salt Lake City, UT Cone snails are renowned for biological peptides, but we show that they also contain small molecules that act on neurons. Bacteria were cultivated from cone snails and other gastropods, and their extracts were screened using a phenotypic assay. These extracts yielded a variety of natural products, often exhibiting selective and potent activity against individual human receptors and ion channels. We are examining these compounds for their therapeutic potential. In addition, we show that some of these bacterial molecules contribute to the chemical arsenal of cone snails.
AGFD 34 Potential agents to enhance the expression of neurotrophins in the brain Narasinha S Murthy, murthy@olemiss.edu.Pharmaceutics, Univ. of Mississippi, Univ.,MS Neurotrophins are endogenous peptides responsible for development and repair of neurons in the brain. Depletion of neurotrophins could potentially lead to neurodegenerative disorders. Direct delivery of neurotrophins to the brain is not practical. There is an urgent need to discover safe therapeutic agents that can enhance the expression of neurotrophins in the brain. Carnosic acid has been reported to have the potential to enhance the expression of neurotrophins in the in vitro cell line models. Further, we investigated the brain bioavailability of carnosic acid in the brain by microdialysis sampling, following i.p. and intranasal administration. The levels of Nerve growth factor (NGF) and Brain derived neurotrophic factor (BDNF) was found to be significantly higher in treated rats than in the control rats. Pharmacodynamic investigations were performed in depression induced rat model (BDNF depleted rats).

AGFD 35 In-package inactivation of Listeria innocua, Salmonella Typhimurium, and Escherichia coli O157:H7 on cherry tomatoes with gaseous ozone Xuetong Fan1, xuetong.fan@ars.usda.gov, Kimberly Sokoria1, Jürgen Engemann2, Joshua Gurtler1, Yanhong Liu1 (1) Eastern Regional Research Center, USDA, ARS, Wyndmoor, PA (2) JE PlasmaConsult GmbH, Wuppertal, Germany An in-package ozonation system based on dielectric barrier discharges was evaluated for its effectiveness in inactivating Listeria innocua, attenuated Salmonella Typhimurium, and Escherichia coli O157:H7 on cherry tomatoes. The system produced ~1,000 ppm of ozone inside film bags within 1 min of operation. L. innocua was reduced from 5.7 log CFU/fruit to a non-detectable level when inoculated onto the smooth surface of the fruit and was reduced by 4 log CFU/fruit on the stem scar area of the fruit within 40 seconds of treatment. Regardless of location of the bacteria, E. coli O157:H7 and Salmonella were typically reduced by 2-3 log CFU/fruit after 2-3 min treatment. During 3-week storage at 10°C, the color and texture of fruit treated with the ozonation for 3 min were not significantly impacted. The results indicate that bacteria responded differently to ozone, and the ozonation system may be useful for enhancing microbial safety of tomatoes.

AGFD 36 Cellular damage of Escherichia coli O157:H7 & Salmonella spp. in apple juice treated with high hydrostatic pressure and thermal death time disks Dike Ukuku1, dike.ukuku@ars.usda.gov, Kazutaka Yamamoto2, Shinichi Kawamoto2.(1) FSIT, USDA-ARS, Wyndmoor, PA (2) National Food Research Institute, Tsukuba, Ibaraki Japan Membrane damage and leakage of intracellular UV-materials of Salmonella spp. and Escherichia coli O157:H7 bacteria in apple juice following thermal-death-time (TDT) disk and high hydrostatic pressure (HHP) treatments at 23oC, 45 oC, 50 oC, 55 oC, and 60 oC for 4 min and 350 MPa at 25 oC, 35 oC, and 45 oC for 20 min were investigated. Leakage of intracellular UV-materials and ATP of TDT disk injured cells were lower than the values determined from HHP-treated cells. Recovery of TDT injured cells occurred faster than HHP-treated cells during storage of treated samples at 25°C. The results of this study indicate that HHP treatment of apple juice at 350 MPa (30 oC) for 20 min and TDT disk at 55 and 60°C and immediate storage at 5oC will complete inactivation and recovery of injured bacteria.

AGFD 37 Novel methods for detection of foodborne viruses David H Kingsley2, david.kingsley@ars.usda.gov, Gloria Meade2, Christopher Sommers3.(1) Delaware State Univ., USDA ARS FSIT, Dover, DE (2) Delaware State Univeristiy, USDA ARS FSIT, Dover, DE (3) ERRC, USDA ARS FSIT, Wynmoor, PA Human norovirus strains cannot be propagated in the laboratory and current detection methods are based on RNA detection methods such as RT-PCR. Unfortunately RNA-based methods cannot distinguish infectious virions from damaged virions unless the capsid has been completely destroyed. In order to infect the host cell, a virus must first bind to its receptor. We have exploited this fact to develop a means of separating potentially infectious virus from inactive virus using virus receptor-like glycoproteins attached to magnetic beads. This extraction method when coupled with RT-PCR extraction should reduce the detection of inactive norovirus virions that are not a threat to public health. The utility of this method for testing of shellfish and other foods is being evaluated.

AGFD 38 Bactericidal activities of plant-derived dietary supplements, active constituents, and plant essential oils against foodborne pathogens Escherichia coli, Listeria monocytogenes, Salmonella enterica, and Staphylococcus aureus Mendel Friedman, mendel.friedman@ars.usda.gov, Philip R Henika, Carol E Levin.Produce Safety and Microbiology, Western Regional Research Center, Agricultural Research Service, USDA, Albany, CA We evaluated bactericidal activities of plant-derived health-promoting food powders and pure compounds against Escherichia coli O157:H7, Salmonella enterica, Listeria monocytogenes, and Staphylococcus aureus using quantitative bactericidal activity (BA50: concentration of test substance that results in a 50% decrease in colony-forming-units, CFU). Oregano oil, cinnamaldehyde, 4-hydroxytyrosol, olive pomace, olive powder, and epigallocatechin gallate were active against all four pathogens, suggesting that they behaved as broad-spectrum antibiotics. The following plant extracts and compounds showed exceptionally high activity (low BA50 values shown in parenthesis) against Staphylococcus aureus: epigallocatechin gallate (0.0011%), apple skin extract (0.0025%), olive pomace (0.018%), cinnamaldehyde (0.024%), oregano oil (0.028%), grape seed extract (0.028%), black tea extract (0.052%), Darjeeling tea powder (0.061%), and 4-hydroxytyrosol (0.092%). Listeria was also highly sensitive to apple skin extract (0.013%). The most active substances provide candidates for the evaluation of antimicrobial effectiveness in food. Mechanisms of antimicrobial effects and application to foods will be discussed.
AGFD 39  Biogenic amine sensor arrays to detect bacterial contamination and food freshness  John J. Lavigne, lavigne@sc.edu, Xiaoning Li, Min Cai, Toby L. Nelson, Marc S. Maynor.Dept. of Chemistry and Biochemistry, Univ. of South Carolina, Columbia, SC  We have developed conjugated polymer-metal ensembles and small molecule boronates as elements in multi-component sensor arrays for the identification of biogenic and volatile amines towards the qualitative assessment of food freshness. The assays detect biogenic amine by-products formed when foods have been contaminated with bacteria. These approaches use the full spectral response from an array of sensors to create a fingerprint pattern that is indicative of the analyte or mixture of analytes present. Statistical analysis is used to reduce noise and maximize the assay resolution. These analyses have shown exceptional accuracy, identifying 22 structurally similar biogenic amines with 97% accuracy and 12 volatile amines with >99% accuracy. Progress towards the development of a disposable 'dipstick' to assess the quality of foods based on the naked-eye detection of biogenic amines, formed by either bacterial or thermal spoilage, will also be discussed.

AGFD 40  Rapid pesticide screening from fruit surfaces and direct quantitation of Carbendazim& other pesticides in fruit juices by Direct Analysis in Real Time (DART) mass spectrometry  Elizabeth A Crawford, crawford@ionsense.com, Brian D Musselman.IonSense, Inc., Saugus, MA  Routine pesticide and fungicide use in the US, as well as abroad warrants the need for analytical techniques that can rapidly screen and quantify residues in order to efficiently sample products before reaching the consumer market. The allowable residue levels of pesticides on produce that are processed into juices are governed by the US EPA Code of Federal Regulations that sets tolerance levels based on the commodity. Of particular interest in the US, carbendazim was found in imported orange juice from Brazil, where the use of the fungicide is legal. The US does not permit the use of carbendazim on any citrus fruits and therefore any imported citrus juice is held to the same regulation. Ambient ionization offers the ability to screen produce and juice samples directly in seconds and with automated sample introduction quantitative measurements can be assessed using direct analysis in real time (DART) mass spectrometry.

AGFD 41  Determination of volatile organic compounds (VOCs) in food by vacuum distillation sampling and gas chromatography/mass spectrometry  Patricia J. Nyman, patricia.nyman@fda.hhs.gov, Timothy H. Begley.Center for Food Safety and Applied Nutrition, U.S. FDA, College Park, MD  Recent studies related to furan, benzene, and other VOCs in food showed that static headspace and purge and trap methods have limitations when used to determine VOCs, including matrix effects and artifact formation from thermal decomposition. EPA method 8261, a vacuum distillation method, was modified and validated for the determination of furan, chloroform, benzene, trichloroethene, toluene, and styrene in food matrices. The method samples VOCs at room temperature and under high vacuum. Validation studies showed that the limits of quantitation (LOQs) ranged from 0.06 ng/g styrene to 0.29 ng/g chloroform in infant formula and 0.08 ng/g styrene to 0.85 ng/g benzene in canned tuna. Test portions were fortified at 1, 2, and 3 times the LOQs and quantified by using external standards. The method of standard additions was used to evaluate the need to compensate for matrix effects by using matrix matched standards.

AGFD 42  Bioactive potential of resveratrol oligomers of the Carex genus  Geneive E Henry, henry@susqu.edu.Dept. of Chemistry, Susquehanna Univ., Selinsgrove, PA  The Carex genus (family: Cyperaceae), consists of over 2000 species distributed worldwide. Although the genus has been shown to be a rich source of resveratrol based oligomers, the genus has received limited phytochemical attention. We have initiated a study to determine the bioactive potential of the numerous Carex species growing in Pennsylvania, US. Seed and leaf extracts for three Carex species have been shown to have a high content of antioxidant flavonoids. In addition, a resveratrol dimer (pallidol), two resveratrol trimers (trans-miyabenol C and alpha-viniferin), and three resveratrol tetramers (hopeaphenol, kobophenol A and kobophenol B) have been isolated. The compounds were evaluated for cytotoxicity against human colon tumor cell lines, and both alpha-viniferin and hopeaphenol exhibited strong antiproliferative effects against HCT-116 and Caco-2 cells lines, with IC50 values ranging from 2-32 microM. The presence of bioactive flavonoids and anticancer resveratrol oligomers in the Carex genus indicate the potential nutriceutical application of the genus.

AGFD 43  Anthocyanin content and percent polymeric color of commercial berry products  Luke R. Howard1, lukeh@uark.edu, Ronald L. Prior1, Rohana Liyanage2, Jackson O. Lay2.(1) Dept. of Food Science, Univ. of Arkansas, Fayetteville, AR (2) Statewide Mass Spectrometry Center, Univ. of Arkansas, Fayetteville, AR  Anthocyanin losses during storage of processed berries are accompanied by increased percent polymeric color values indicative of the formation of anthocyanin-flavan-3-ol polymers. In this study we evaluated the anthocyanin content and percent polymeric color of 21 commercial samples of various processed berry products. Anthocyanin content ranged from 11.2 mg/kg for strawberry jam to 6071.6 mg/kg for blackberry concentrate, while percent polymeric color values ranged from 13.2% for cranberry concentrate to 37% for blueberry and strawberry juice concentrates. Using MALDI-TOF-MS we detected the presence of anthocyanin-flavan-3-ol polymers in a sample of 100% cranberry juice stored at ambient temperature. A series of masses corresponding to the naked-eye detection of biogenic amines, formed by either bacterial or thermal spoilage, will also be discussed.

AGFD 44  Whey protein hydrolysates inhibits hydrogen peroxide induced oxidative stress  Manman Jin, snowking3412@163.com, Yufang Lin, Jingyan Li, Rongrong Lu.Dept. of Food Science and Technology, Jiangnan Univ.,
Whey protein hydrolysates (WPHs) contain various antioxidant peptides. In order to investigate the mechanism of WPHs' antioxidant activity in protecting against oxidative stress (OS), WPHs was prepared with pepsin and trypsin, PC12 cells model was built to observe the protective effect of WPHs against H2O2-induced changes of cell viability, Total Antioxidant Capacity (T-AOC) and apoptosis. The result indicates that WPHs attenuated cell viability loss by 18.60%, reduced apoptosis by 20%, and recovered T-AOC level. Intracellular ROS accumulation, calcium levels and mitochondrial membrane potential (MMP) were tested by flow cytometry, which indicates that WPHs suppressed the elevation of ROS and calcium, stabilized MMP by 16%. Anti-apoptosis/pro-apoptosis protein Bcl-2/Bax, PARP were investigated by Western blot, which indicates that WPHs could increase expression of Bcl-2 while inhibiting Bax and degradation of PARP. WPHs also block activation of Caspase-3 by 62%. In conclusion, WPHs could significantly protect PC12 cells against H2O2-induced oxidative stress, might be a good antioxidant addition agent.

**AGFD 45** Curcumin inhibits metastasis of thyroid cancer cells

Chi-Yu Zhang1, zcy101951641@hotmail.com, Li Zhang2, Hui-Xin Yu2, Cheng Tan2, Rong-Rong Lu1.(1) Dept. of Food Science and Technology, Jiangnan Univ., Wuxi, Jiangsu China (2) Dept. of Molecular Nuclear Medicine, Jiangsu Inst. of Nuclear Medicine, Wuxi, Jiangsu China

Curcumin is a naturally occurring phenolic compound isolated as a yellow pigment from turmeric. In order to further advance our knowledge of the role curcumin plays in the metastasis of papillary thyroid cancer, we investigated its effect on K1 cell adhesion, spreading, invasion, and migration. In vitro invasion assays was used to assess the changes in invasive behavior. Gelatin zymography and western blot were used to detect Matrix metalloproteinase activation and expression. After treated with different concentrations of curcumin, a series of motility related to metastasis of K1 was repressed in a dose-dependent manner, including adhesion, spread, invasion and migration. Up to now, we have also discovered the activation and expression of MMP-9 were depressed by curcumin. We demonstrate that MMPs are critical effectors of invasion in the papillary thyroid cancer cell line studied. Curcumin may be a effective tumoricidal agents for the treatment of aggressive thyroid carcinomas.

**AGFD 46** Cytotoxic polymeric proanthocyanidins from Pourouma cecropiifolia fruit

Coralia Osorio1, cosorio@unal.edu.co, Juliana Barrios1, Claudia Cordero2, Sandra Johanna Morantes2, Fabio Aristizabal2, Alicia Lucia Morales1.(1) Departamento de Quimica, Universidad Nacional de Colombia, Bogota, DC, Colombia (2) Departamento de Farmacia, Universidad Nacional de Colombia, Bogota, DC, Colombia

The anthocyanin-rich extract (ARE) of the Amazonian fruit Pourouma cecropiifolia showed moderate cytotoxicity toward different human cancer cell lines under MTT assay. Three fractions (F1-F3) were obtained by fractionation of ARE by gel filtration using Sephadex LH-20 and then analyzed by HPLC-PDA and LC-ESI/MSn. F1 was composed of the monomeric anthocyanins delphinidin-3-O-β-glucopyranoside, cyanidin-3-O-β-glucopyranoside, and cyanidin-3-O-(6′′-malonyl)-β-glucopyranoside. F2 contained the isomeric flavonols quercetin-3-O-a-rhamnopyranosyl(1′′-6′)-β-galactopyranosyl and quercetin-3-O-a-rhamnopyranosyl(1′′-6′)-β-glucopyranoside, the structures of which were confirmed by 1H and 13C NMR. F3 contained polymeric pigments, which were analyzed by tandem ESI/MS in an LCMS-IT-TOF equipment. The structures of two proanthocyanidin and two flavanol-anthocyanin condensed pigments were suggested based on their MSn fragmentation patterns. The results of cell viability assays showed that only fraction F3 exhibited a cell growth-inhibitory effect similar to the one found for ARE. F3 significantly reduced the viability of HeP-2 larynx, MKN-45 gastric carcinoma, and MCF-7 breast cancer cells; in contrast, the pure compounds did not show promising citotoxicity toward cancer cells evaluated.

**AGFD 47** Potential of coffee and coffee constituents for promoting body weight-maintenance in healthy subjects

Veronika Somoza, veronika.somoza@univie.ac.at, Annett Riedel.Dpt. of Nutritional and Physiological Chemistry, Univ. of Vienna, Vienna, Austria

Epidemiological studies provide evidence that moderate coffee consumption is associated with a lower incidence of metabolic syndrome. Obesity is one of the major risk factors of metabolic syndrome which is becoming more common due to a rise in obesity rates among adults. Since it is possible to prevent or delay metabolic syndrome by maintaining a healthy body weight, there is growing interest in foods that may help to control energy intake and/or mimic energy expenditure by, e.g., inducing mechanisms of satiety or thermogenesis. Coffee, when consumed in moderate amounts of 3–4 cups per day, has been demonstrated to decrease the daily energy intake and to stimulate mechanisms of satiety in healthy volunteers, and to induce mechanisms of thermogenesis in cells in culture. Current research is focused on the identification of coffee components that act on these mechanisms, such as caffeine and chlorogenic acids.

**AGFD 48** Anthocyanins as xenobiotic medicines

Paul E. Milbury, paul.milbury@tufts.edu.Friedman School of Nutrition Science and Policy, Tufts Univ., Boston, MA

Anthocyanins ward off plants predators and interfere with digestion and absorption of food in mammals, resulting in their classification as anti-nutrients. Yet millennia of evolution provided mammals with benefits. Anthocyanins are interesting among plant compounds as they are found to exert many metabolic effects in mammals. As xenobiotics, mammalian metabolism treats them as such; however, as observed since the time of Hippocrates, foreign chemicals can be potent medicines. Yet polyphenols, including anthocyanins, deliver contradictory research results in prevention of cardiovascular disease, cancer, diabetes and other health conditions. Most studies have been conducted at doses higher than reasonably attainable for most people. More studies in humans and more reliable data on the polyphenol content of foods are needed. Given the evidence we do have, how we do best approach the task of proving a benefit to consuming polyphenols, given funding time scales of modern medical research.
AGFD 49  Aroma precursor profile of California wine grapes  Natalia Loscos, natalia.loscos@ejgallo.com, Hui Hui Chong, Mike Cleary, Nick Dokoozlian.Dept. of Chemistry, E & J Gallo Winery, Modesto, CA  The presence of aroma precursors in grapes has been a well known fact for many years. Glycosidation is the most common way that aromas accumulate in fruit. Glycosides provide a major source of potential aromas that can be released during the winemaking process, thus enhancing the varietal character of the wine. Traditionally, grape quality has been associated with its growing region. However, the use of chemical metrics, such as the measurement of glycosides, could be a more objective measure to assess the potential quality of the grapes. This work presents the distribution of glycosides among grapes coming from different wine regions of California in order to evaluate regional differences. The method used for the analysis is based on the automatic SPE extraction of the precursors, followed by acid hydrolysis, and analysis of the released aromas by SPME-GC/MS. Results show that this measurement can be successfully applied to estimate the aroma potential of grapes.

AGFD 50  Evolution of oak lactone from glycoconjugate precursors during maturation of wine  Kerry Wilkinson1, kerry.wilkinson@adelaide.edu.au, Andrei Prida2, Yoji Hayasaka3.(1) School of Agriculture, Food and Wine, The Univ. of Adelaide, Glen Osmond, South Australia Australia (2) Seguin Moreau, Cognac, France (3) The Australian Wine Research Inst., Glen Osmond, South Australia, Australia  Oak maturation plays an important role in the production of high quality wine, enhancing both physical attributes (color and stability) and sensory properties (aroma, flavor and astringency). Of the 200 oak-derived volatile compounds identified in oak-aged wine and spirits to date, the most important are considered to be the cis- and trans-isomers of oak lactone, which contribute 'woody', 'citrus', 'vanilla' and 'coconut' aromas. Oak lactone is a natural component of oak wood, but also occurs in glycoconjugate precursor forms. This study concerns the role of conjugated derivatives of 3-methyl-4-hydroxyoctanoic acid, i.e. a glucoside, gallate glucoside and rutinoside, as precursors to oak lactone. Maturation trials were conducted to investigate the evolution of oak lactone from glycoconjugate precursors. The glycoconjugate profile of oak powder and model wines were determined by liquid chromatography-tandem mass spectrometry. The effect of toasting on the glycoconjugate content of oak was also investigated.

AGFD 51  Genetic variation in chemosensation: Beyond receptor polymorphism  John E Hayes, jeh40@psu.edu.Dept. of Food Science, The Pennsylvania State Univ., Univ. Park, PA  Chemosensory differences were first attributed to genetics decades ago. After the elucidation of functional variation in TAS2R38 in 2003, additional putatively functional polymorphisms have been proposed (eg, OR7D4, TAS2R16, TAS2R19, TAS1R1/3) by multiple teams, including ours. To date, almost all putatively functional variants occur in transduction pathways. Newer data suggest additional variation arises from modification of stimuli in vivo. The best-known example is copy number variation in the salivary amylase gene AMY1, which differs across cultures that have high and low starch diets, and associates with differences in perceived starch viscosity. Other possible biotransformations include metabolism of non-odor active compounds into odor-active stimuli by mucosal enzymes like the cytochrome P450 system. Because these enzyme systems contain known functional polymorphisms, we propose genetic variation may influence the biotransformation of chemosensory stimuli and thus sensory response. This talk will broadly review current data, and implications for future work will be discussed.

AGFD 52  Glycoconjugates of volatile phenols: Their contribution to smoke off-flavours in wines and interaction with human saliva  Christine Mayr, christine.mayr@awri.com.au, Mango Parker, Patricia Osidacz, Markus Herderich, Leigh Francis.The Australian Wine Research Inst., Adelaide, SA Australia  Glycosidically-bound volatile compounds are abundant in grapes and are important flavour precursors as they can be released during the winemaking process. Research conducted on smoke affected wines, a taint that has caused significant problems to the Australian wine industry in the last years, showed that volatiles from smoke can be converted into glycoconjugates in grapes. Recent work has shown that monosaccharide glycosides of volatile phenols can be hydrolyzed in-mouth. With reconstitution experiments we were able to mimic the smoke taint in red wines via addition of free volatiles (most importantly guaiacol and cresols) in combination with their glycosidically-bound forms. In addition, the potential of monosaccharide and disaccharide glycosides of phenols to contribute directly to the smoke flavour was investigated in vitro and in vivo. Results indicated that enzymes present in human saliva are able to release the volatiles from their glycoconjugates so that they can contribute to aroma.

AGFD 53  Changes in tomato aroma compounds by thermal processing and the impact of S-methylmethionine a precursor of dimethyl sulfide  Johanna Karoline Kreissl, johanna.kreissl@lrz.tum.de, Peter Schieberle.Deutsche Forschungsanstalt fuer Lebensmittelchemie, Freising, Bavaria, Germany  During thermal processing of fresh tomatoes their aroma is completely changed. To get an insight into these changes, the concept of molecular sensory was applied on fresh tomatoes, and the results were compared to those obtained for several samples produced by thermal processing. In agreement with literature data, (Z)-3-hexenal and hexanal had the highest odor activity values in fresh tomatoes, whereas dimethyl sulfide or (E)-beta-damascenone were among the most odor-active compounds in the processed tomato products. Quantitations by stable isotope dilution assays and aroma recombination studies proved the contribution of the aroma compounds identified. Further investigations were focused on S-methylmethionine (SMM), a key precursor of dimethyl sulfide (DMS). For both compounds a stable isotope dilution assay was developed. The methods were applied on different kinds of vegetables as well as on samples from a barley malting process. The results will be discussed with special emphasis on predicting DMS formation.
from the amounts of SMM present. Thus, knowing the concentration of SMM in a certain food it is possible to estimate the amount of DMS formed during processing or storage.

**AGFD 54**  
**Bitter tasting and kokumi enhancing molecules generated upon thermal processing of avocado (Persea americana MILL.)**  
Thomas Hofmann, thomas.hofmann@tum.de, Andreas Degenhardt Technische Univ. Munich, Chair of Food Chemistry and Molecular Sensory Science, Freising, Germany

Sequential application of solvent extraction and RP-HPLC in combination with taste dilution analyses (TDA) and comparative TDA, followed by LC-MS and 1D/2D-NMR experiments led to the discovery of ten C17-C21 oxylipins with 1,2,4-trihydroxy-, 1-acetoxy-2,4-dihydroxy-, and 1-acetoxy-2-hydroxy-4-oxo motif, respectively, besides 1-O-stearoyl glycerol and 1-O-linoleoyl glycerol as bitter tasting compounds in thermally processed avocado (Persea americana MILL.). On the basis of quantitative data, dose-over-threshold (DoT)-factors, and taste re-engineering experiments, these phytochemicals, amongst which 1-acetoxy-2-hydroxy-4-oxo-octadeca-12-ene was found with the highest taste impact, were confirmed to be the key contributors to the bitter off-taste generated from taste-less precursors upon thermal processing of avocado. For the first time, these C17-C21 oxylipins exhibiting a 1-acetoxy-2,4-dihydroxy- and a 1-acetoxy-2-hydroxy-4-oxo motif, respectively, were discovered to induce a mouthfulness (kokumi) enhancing activity in sub-threshold concentrations.

**AGFD 55**  
**Characterization of key aroma compounds in raw and cooked asparagus by the sensomics approach:**  
Insights into aroma formation during processing  
Peter Schieberle, peter.schieberle@ch.tum.de, Julia Scherb-Forster.Dept. of Food Chemistry, Technische Universitaet Muenchen, Freising, Bavaria Germany

The consumption of asparagus is constantly increasing, and it can be assumed that the characteristic aroma, which develops during cooking of the vegetable is a major driver of consumer liking. The variety clearly influences the aroma quality, but although first studies were already performed on the pattern of volatiles, in particular, of cooked asparagus, data on the key odorants contributing to the aroma of the vegetable are rather scarce. Furthermore, no systematic study on raw asparagus is yet available in order to draw conclusions on the generation of aroma compounds from precursors during cooking. By application of the molecular sensory science concept it was found that dimethylsulfide (DMS) showed by far the highest odor activity value in cooked asparagus followed by, amongst others, 2-sec. butyl-3-methoxypyrazine, 1octen-3-one, 2,3-butanaldehyde, 3-(methylthio)propionaldehyde and 2-acetyl-1-pyrroline. An aroma recombinant consisting of the 20 most odor-active compounds was judged to be similar to the aroma of cooked asparagus, but, after the addition of a newly identified sulfur compound with an intense garlic like odor, the overall aroma profile obtained was very close to that of the vegetable. The structural identification of the new compound will be reported. A comparison with the aroma compounds of raw asparagus indicated that, in particular dimethylsulfide (DMS), 2-acetyl-1-pyrroline, 3(methylthio)propionaldehyde, 2acetyl-4-tetrahydropyridine and (E,E)-2,4-decadienal were remarkable higher after cooking. On the basis of quantitative data on the precursor amino acid S-methylmethionine in different parts of the vegetable, its role in DMS formation in white as well as in green asparagus was elucidated.

**AGFD 56**  
**Polydiacetylene sensors for food safety applications**  
Sarah C. Hill, sch@clemson.edu, Yamin Htet, Meredith McSwain, Earl Ritchie, William T. Pennington.Dept. of Chemistry, Clemson Univ., Clemson, SC

Polydiacetylenes (PDAs) are conjugated polymers with interesting optical properties, useful for a variety of sensing applications, such as for temperature, mechanical impact, and detection of biological entities. The visible signals exhibited by PDA sensors make them preferential to electrochemical sensors for many applications, particularly within the food industry. The PDA 10,12-pentacosadiynoic acid (PCDA) has been incorporated into the polyurethane elastomer Tecoflex(TF) to create a polymer-blend which can serve as a colorimetric strain and temperature sensitive film, with potential use in the food packaging industry. PCDA “decorated” with amino acids exhibit a colorimetric response in the presence of bacterial moieties. In collaboration with the Food Science Dept. of Clemson Univ., PCDA liposomes decorated with tryptophan exhibit a colorimetric response in the presence of E. coli. Polymer blend films capable of detecting various types of bacteria, as well as PDA solutions to detect bacteria on food preparation surfaces will be discussed.

**AGFD 57**  
**Influence of time, temperature, and pH on efficiency ozonated water treatment to inactivate Salmonella enterica Typhimurium on green onion, grape tomato, and green leaf lettuce**  
Wenqing Xu, xuwq@udel.edu, Changqing Wu.Dept. of Animal and Food Science, Univ. of Delaware, Newark, DE

Fresh produce contaminated with Salmonella have led to several Salmonellosis outbreaks in US. Ozonated water is one of emerging techniques whose antimicrobial effect is mostly due to the solubility and stability of ozone in water. The focus of our study was to evaluate the influence of application time, temperature as well as pH on the ozonated water's efficacy of Salmonella inactivation on three different fresh produce. Results showed that Salmonella inactivation by bubbling ozone was time-dependent for three fresh produce. Temperature and pH, however, affected ozonated water's antimicrobial activities in varying degrees. Mild heat and low pH improved ozone efficacy to inactive Salmonella on tomatoes and lettuces but not on green onions. It is suggested that optimal condition for bubbling ozone application in food industry should be adjusted according to different target food matrices.

**AGFD 58**  
**Adulteration in milk: A solution to a familiar problem using high resolution liquid chromatography, quadrupole time-of-flight mass spectrometry, and multivariate data analysis**  
Gareth Cleland, Jennifer Burgess, Kenneth Rosnack, ken_rosnack@waters.com.Waters Corporation, Milford, MA

Economically motivated adulteration of food has
emerged as a growing problem in the food industry and has far reaching consequences that pose potential threats to the health of unsuspecting consumers. Adulteration may include unacceptable enhancements, substitutions of ingredients, or inaccurate/ misleading labeling of a product/ingredient. Highly informative analytical testing methods can help authenticate incoming raw materials and finished products. Using a generic approach to sample preparation, data collection and data processing, it is possible to isolate unknown adulterations. In the study, blind spiked milk samples were analyzed by high resolution chromatography coupled with high resolution accurate mass detection. A multivariate data analysis technique, partial least squares to latent structures data analysis (PLS-DA) was applied to data collected, enabling isolation of potential adulterations. Using structural elucidation tools, such as elemental composition and MassFragment™ alongside a database search, the isolated unknown adulterations in the spiked, commercially available, milk samples were identified.

**AGFD 59** UPLC-Quan-TOF MS profiling of emetic Bacillus cereus strains and quantitation of the emetic toxin cereulide by means of SIDA-IC-MS/MS  
Thomas Hofmann, thomas.hofmann@tum.de, Sandra Marxen, Andrea Rütschle, Tobias Bauer, Monika Ehling-Schulz, Timo Stark. Technische Univ. Munich, Chair of Food Chemistry and Molecular Sensory Science, Freising, Germany  
Although Bacillus cereus strains are well known to show a high variability in their potential to generate the emetic toxin cereulide, exact data are still not available due to the lack of fast, robust and sensitive high throughput methods for unequivocal identification and accurate quantitative toxin analysis. Therefore, a fast and robust high-throughput profiling method of different Bacillus cereus strains by means of UPLC in combination with quan-time-of-flight mass spectrometry was developed and used to discriminate Bacillus cereus strains into non, low, medium and high producer strains for their emetic toxin cereulide by means of multivariate statistical approaches. Moreover, a stable isotope dilution analysis (SIDA) was developed for the first time to enable the accurate quantitation of cereulide in foods using biosynthetic 13C6-cereulide as the internal standard. After method validation, this SIDA was successfully applied to the quantitation of cereulide in Bacillus cereus strains as well as food materials.

**AGFD 60** Detection of ergot alkaloids using peptide-graphene microarray sensors  
Jaclyn N. Koxk2, Charter D. Stinespring1, Edward M. Sabolsky2, Daniel G. Panaccon3, Robin S. Hissaml, robin.hissam@mail.wvu.edu. (1) Dept. of Chemical Engineering, West Virginia Univ., Morgantown, WV (2) Dept. of Mechanical and Aerospace Engineering, West Virginia Univ., Morgantown, WV (3) Division of Plant & Soil Sciences, West Virginia Univ., Morgantown, WV  
Detection of fungal toxins requires expensive and stationary equipment; however, a portable high sensitivity, high selectivity sensor for ergot alkaloids could greatly impact environmental and medical protocols. A sensor, developed using graphene films functionalized with peptides, is being investigated for detection of a model ergot alkaloid molecule. Peptide sequences have been designed to bind to both a graphene substrate and ergotamine molecules. The interaction between peptides and ergotamine has been investigated using high performance liquid chromatography and fluorescence spectroscopy. The conductive properties of graphene are known to change upon functionalization, and this change is being exploited to monitor when molecules, either peptides or the ergotamine, absorb on the surface. The peptides have been patterned on graphene substrates using dip-pen nanolithography, and this patterning enables measurements of conductivity by the transmission line method. Combining electronic sensitivity with selective biological interactions, a new method can be utilized to detect biological hazards.

**AGFD 61** Rapid detection of Listeria monocytogenes in milk using a novel piezoelectric cantilever (PEMC) sensor  
Harsh Sharma, hps24@drexel.edu, Raj Mutharasand. Dept. of Chemical and Biological Engineering, Drexel Univ., Philadelphia, PA  
We describe a very highly sensitive and rapid immunosensor-based approach for the detection of food-borne pathogen Listeria monocytogenes (Lc) in buffer and milk as a food matrix. The electrically-excited and electrically measured PEMC sensors show resonance frequency decrease as antigen binds to sensor. After immobilizing an IgG anti-Lc on the sensor it was installed in a flow cell, and then exposed in a flow format to the spiked samples. Successful detection up to as low a concentrations as 102 cells/mL was achieved. Secondary and tertiary antibody labeling was used for confirmation of sensor response. Sample concentrations tested were 102 to 105 cells/mL, and the sensor response was log-linear with antigen concentration in both buffer and milk.

**AGFD 62** Development of a capillary-driven microfluidic biosensor for foodborne pathogen detection  
Fei He, fhe@foodsci.umass.edu, Sam R. Nugen. Dept. of Food Science, Univ. of Massachusetts Amherst, MA  
Rapid detection for pathogen with high selectivity and sensitivity are critical in food safety. Conventional identification methods are relatively complicated and time consuming. Here, we developed a miniaturized disposable biosensor capable of rapid detection at low cost. Using poly (methyl methacrylate) (PMMA) as a substrate, our system consists of self-priming microfluidics with sealed conjugate pads for pathogen capture, electrowetting valves for timely reagent delivery, and an absorbent pad as a pumpless alternative for additional fluid draw. The results demonstrated the capillary-driven microfluidic device is rapid (< 30 minutes), required minimal sample volume (<10ul) and had appreciable sensitivity range (Limit of Detection is about 1fmol). The sensitivity, simplicity and portability of this novel device will allow for fast detection of food-borne pathogen at a low cost.

**AGFD 63** Fluorescent lateral flow assays for food safety  
Yuhong Wang, Charmaine Koo, ekoo@foodsci.umass.edu, Sam R. Nugen. Food Science, Univ. of Massachusetts, Amherst, MA  
Rapid analysis of food for pathogens, toxins and components
will help producers ensure safe and affordable foods. We have developed advanced lateral flow assays using highly fluorescent nanoparticles. The assays were used to detect nucleic acid sequences from pathogens with a higher sensitivity and lower limit of detection than traditional methods. Fluorescent nanoparticles (~15 nm) were synthesized and modified with nucleic acid probes for use in the assay. In comparison to gold nanoparticles which had a limit of detection of approximately 5 fmols, the limit of detection for fluorescent nanoparticles was several fold lower at 0.027 fmol. The use of fluorescence allows rapid, low-cost and portable quantification of pathogens while providing extremely low limits of detection.

AGFD 64  Comparison of antithrombotic activity and protective activities on alcohol gastric ulcer and immune system of different Fucoidan from Laminaria japonica  Xue Zhao1, zhaoxue@ouc.edu.cn, Bafang Li1, Anjin Chen2, Shizhu Dong1, Fang Li1, Jingfeng Wang1, Song Yuan1.(1) Food Sci. and Tech., Ocean Univ. of China, Qingdao, Shandong China(2) Qingdao Municipal Hospital, Qingdao, Shandong, China In this study, we compared effects of four fucoidan fractions with different molecular weight and sulfated ester content from Laminaria japonica on antithrombotic activity and their protective activities of immune function and alcohol-induced gastric ulcer to find a safe fucoidan with good activity from a wildly-cultured brown seaweed Laminaria japonica in China. The results showed that oral administration of all fucoidan can effectively improve the immune system by increasing hemolysin content, ability of macrophages for celiac macrophage and delaying hypersensitivity level. After oral administration of low molecular weight fucoidan, the depth of alcohol-induced gastric mucosal injury was shallower and the bleeding was significantly reduced, better than middle molecular weight. Fucoidan can significantly improve the antioxidant enzymatic system and inhibited the oxidation of lipid in blood. In antithrombotic activity, molecular weight seems play a more important role in the antithrombotic and anticoagulant activity by venous injection of fucoidan. In vivo middle molecular weight fucoidan fractions exhibited better antithrombotic activity in electrical induced arterial thrombosis than low molecular weight fucoidan. Fucoidan fractions with different molecular weight acted on the antithrombotic action by different effect on coagulant system, platelet, TFPI, TXB2 and 6-keto-PGF1alpha activities.

AGFD 65  Effect of blueberry anthocyanidin extract on plasma cholesterol in hamsters fed a high cholesterol diet Zhen-Yu Chen, zhenyuchen@cuhk.edu.hk, Yintong Liang.School of Life Sciences, Chinese Univ. of Hong Kong, China Interest in blueberry anthocyanidin extract (BAE) as a cholesterol-lowering nutraceutical is growing. The present study was to investigate the effect of BAE on blood cholesterol and gene expression of cholesterol-regulating enzymes in Golden Syrian hamsters maintained on a 0.1% cholesterol diet. Results showed dietary supplementation of 0.5% and 1.0% BAE decreased plasma total cholesterol (TC) in a dose-dependent manner. Supplementation of BAE was associated with a trend of increasing excretion of both neutral and acidic sterols. Real-time PCR analyses demonstrated BAE down-regulated the gene of NPC1L1, ACAT-2, MTP and ABCG, all of which are involved in cholesterol absorption. In addition, BAE was also able to down-regulate the gene expression of hepatic HMG-CoA reductase. It was concluded that hypocholesterolemic activity of BAE was most likely mediated by inhibition of cholesterol absorption or synthesis via its inhibition on gene expression of intestinal NPC1L1, ACAT-2 MTP and ABCG, and hepatic HMG-CoA reductase.

AGFD 66  Dietary flavonoids: Red-ox ingredients or just simple "travellers" of plant foods?  Mauro Serafini, seraﬁni_mauro@yahoo.it, Antioxidant Research Laboratory, National Inst. Food Nutrition (INRAN), Rome, Italy The extent to which antioxidant-rich plant foods are able to tune oxidative stress and the identification of the molecules involved is unclear. Flavonoids have been shown to display a strong in vitro antioxidant activity. However, the in vitro evidence might be somehow of limited impact due to the non-physiological concentrations utilized and to the low degree of absorption of flavonoids. Moreover, their extensive metabolism within the body, leading to molecules with different chemical structure and activity compared to the ones originally present in the food, have raised concerns about their antioxidant action in humans. The first systematic review of dietary intervention studies with plant foods and flavonoids on markers of antioxidant function and oxidative stress, will be presented. There is a strong need of increasing the existing knowledge on the efficacy of antioxidants in vivo to clarify if flavonoids are active red-ox ingredients or just ancillary “travellers” of plant foods.

AGFD 67  Plum fruit polyphenols differentially inhibit inflammation, and fat accumulation in cell models (adipocytes, macrophages, and HUVEC) associated to metabolic syndrome  Paula Castillo, Freddy Ibanez, Congmei Cao, Paula Simons, Luis Cisneros-Zevallos, lcisnero@ag.tamu.edu Horticultural Sciences, Texas A&M Univ., College Station, TX The effects of plum polyphenols against some components of the metabolic syndrome were studied using cell models including adipocytes to determine effects in differentiation, fat accumulation and inflammation representing events in fat tissue. In addition, we studied inflammation in macrophage cells and Human umbilical vein endothelial cells (HUVEC) associated to atherosclerosis events. Results indicated that plum polyphenols have multiple functions and could potentially work against the metabolic syndrome in different fronts simultaneously. A rich anthocyanin extract (RAE) inhibited adipogenesis or lipid accumulation by modulating key transcription factors, c/EBPalpha Ppar? and Ppara and reduced the inflammatory response in adipocytes or fat cells by modulating transcription factor NfκB and gene expressions of different pro-inflammatory cytokines. On the other hand, chlorogenic acid inhibited the inflammatory response in macrophages and HUVEC cells by modulating transcription factor NFκB and gene expressions of different pro-inflammatory cytokines and adhesion molecules associated to chronic inflammation and atherosclerosis.
IBHP accumulation. Maximum IBHP and IBMP were correlated, indicating that IBMP accumulation with Bordeaux cultivars may be dependent on fruit set, reached a maximum of >800 ng/L in some samples, and started to decline 2 weeks after veraison. Across sites, method was then used to quantify IBHP and IBMP during the growing season at multiple sites. IBHP was detectable soon after ripening grapes is poorly understood. IBHP was extracted by mixed mode cation exchange SPE in the presence of a deuterated herbaceous smelling 3-isobutyl-2-methoxypyrazine (IBMP). However, the relation of IBHP and IBMP in maturing and NY In winegrapes, 3-isobutyl-2-hydroxypyrazine (IBHP) is a likely biosynthetic precursor and degradation product of the ripening Sarah A Harris, Imelda Ryona, Gavin L Sacks, gls9@cornell.edu. Food Science, Cornell Univ. - NYSAES, Geneva, AGFD 72 Behavior of a putative 3-isobutyl-2-methoxypyrazine (IBMP) precursor during grape maturation and ripening Sarah A Harris, Imelda Ryona, Gavin L Sacks, gls9@cornell.edu. Food Science, Cornell Univ. - NYSAES, Geneva, NY In winegrapes, 3-isobutyl-2-hydroxypyrazine (IBHP) is a likely biosynthetic precursor and degradation product of the herbaceous smelling 3-isobutyl-2-methoxypyrazine (IBMP). However, the relation of IBHP and IBMP in maturing and ripening grapes is poorly understood. IBHP was extracted by mixed mode cation exchange SPE in the presence of a deuterated standard and silylated prior to GC-TOF-MS analysis, resulting in a detection limit of 20 ng/L for a 100 mL juice sample. The method was then used to quantify IBHP and IBMP among the growing season at multiple sites. IBHP was detectable soon after fruit set, reached a maximum of >800 ng/L in some samples, and started to decline 2 weeks after veraison. Across sites, maximum IBHP and IBMP were correlated, indicating that IBMP accumulation with Bordeaux cultivars may be dependent on IBHP accumulation.
respectively. The intracellular pH, as an indicator of proton secretion, was determined in HGT-1 cells. Furthermore, to investigate compound specific effects, beer bitter acids and organic acids were quantified by UPLC-MS/MS and HPLC-DAD, respectively. In the present study, the effects of different beers on mechanisms of gastric acid secretion were compared. To our knowledge, this is the first time that the identification and quantification of MPs in blueberry fruits were reported.

AGFD 74 Harvest, storage, and processing effects on 3-mercaptopentacosan-1-ol precursor concentrations in Sauvignon Blanc grape juice: Dimitra L Capone1,2, Cory A Black2, David W Jeffery1, david.jeffery@adelaide.edu.au, (1) School of Agriculture, Food and Wine, The Univ. of Adelaide, Waite Campus, Urrbrae, South Australia, (2) Research - Chemistry, The Australian Wine Research Inst., Urrbrae, South Australia. Of importance are the varietal aromas of Sauvignon Blanc, potent polyfunctional thiols, including 3-mercaptopentacosan-1-ol (3-MH), are typically associated with the desirable varietal aromas of these wines. However, varietal thiols are present as odorless, non-volatile conjugates in grape juices; the volatile compounds are released by yeast during fermentation. As such, thiol precursor studies present one avenue for gaining greater understanding of factors affecting varietal thiol concentrations in wine. We have conducted trials on the effects of fruit harvesting, processing and storage on the levels of 3-MH precursors in Sauvignon Blanc grape juice. HPLC-MS/MS analysis of conjugates in juice extracts was used to assess the various fruit treatments and synthesis of authentic and labelled standards was also undertaken. Results will be presented from our laboratory experiments and commercial scale trials to highlight some effects on thiol precursors from the different processing operations.

AGFD 75 Molecular insights into a unique fruit flavor: Durian (Durio zibethinus): Martin Steinhaus, ms@lrz.tum.de, Jia-Xiao Li, Peter Schieberle.Deutsches Forschungszentrum für Lebensmittelchemie (German Res. Ctr for Food Chemistry), Freising, Germany. The fruits of the tropical durian tree (Durio zibethinus Murr.), native to the island of Borneo, are highly appreciated particularly in Thailand, Singapore, Malaysia, and Indonesia for their delicate, sweet, and creamy flesh. Their peculiarity however is the distinctive and extremely intense odor of the fruit flesh, best being described as sulphur, roasted onion-like, with some sweet, fruity and seasoning-like aroma notes. In order to elucidate the compounds responsible for this unique fruit odor, aroma extract dilution analysis was applied to an extract obtained from ripe durian flesh by solvent extraction and SAFE. Based on high FD factors, some fruity and honey-like smelling ethyl esters, several sweet and seasoning-like smelling furanones, and particularly a series of sulphur, onion-like smelling 1,1-dithio compounds were identified as the most potent odorants in durian fruits. The structures of the sulphur compounds suggested acetaldehyde or propanal and hydrogen sulfide, methanethiol, and/or ethanethiol as basic precursors.

AGFD 76 Reactivity between 1-hydroxyethyl radicals and aroma active components in wine: Gal Y Kreitman, ggk5039@psu.edu, Ryan J Elias.Dept. of Food Science, The Pennsylvania State Univ., Univ. Park, PA. The shelf life in aromatic white wine is greatly affected by its oxidative stability. Volatile thiols, such as 3-mercaptopentacosan-1-ol (3-MH), are important contributors to the aroma of young, aromatic wines and are especially labile to oxidation. Oxidation of wine occurs by metal-catalyzed reduction of dioxygen which, ultimately, leads to the production of quinones and 1-hydroxyethyl radicals (1-HER). Previous studies have reported that the reaction between thiols and quinones accounts for the loss of 3-MH in wine; however, the susceptibility of 3-MH to oxidation by 1-HER has yet to be demonstrated. In the present study, the reaction between 1-HER and various wine components including 3-MH, cysteine, and glutathione was studied by using competitive spin trapping with electron paramagnetic resonance and mass spectrometry. These thiol compounds significantly inhibited spin adduct formation, indicating high reactivity towards 1-HER. Furthermore, the ability of metal chelators to inhibit 1-HER formation and subsequent 3-MH loss was investigated.

AGFD 77 Beer bitter acids regulate mechanisms of gastric acid secretion: Jessica Walker1, jessica.walker@univie.ac.at, Johannes Hell1, Kathrin I Litsch1, Michael Dresel2, Marc Pignitter1, Thomas Hofmann2, Veronika Somoza1, veronika.somoza@univie.ac.at, (1) Dept. of Nutritional and Physiological Chemistry, Univ. of Vienna, Austria (2) Chair of Food Chemistry and Molecular and Sensory Sciences, TU Munich, Freising, Germany. The worldwide popular beverage beer is known to stimulate gastric acid secretion. However, the effects of different beer types or beer constituents have not been investigated. In the present study, the effects of different beers on mechanisms of gastric acid secretion were compared. To investigate compound specific effects, beer bitter acids and organic acids were quantified by UPLC-MS/MS and HPLC-DAD, respectively. The intracellular pH, as an indicator of proton secretion, was determined in HGT-1 cells. Furthermore, the
could be well eluted by 70 mL 100% ethanol with an elution rate of 60 mL/h. The reducing capability, ability of inhibiting lipid
material at 20:1 (v/w). The absorption parameters of AB-8 resin separation were as follows: the column volume, 14.5 mL;
were established as follows: the extraction of 50% ethanol (v/v) was taken for 2 h at pH 4.0-4.2 and 8°C with the ratio of solvent
to health too. In this study, the proanthocyanidins were analyzed by RP-HPLC and UPLC-MS. The extraction conditions of hops
proanthocyanidins have a great impact on non-biological stability and oxidant resistance of beer, and it is good for human
attenuated their pro-stimulatory effect. This study gives new insights into the understanding of how wine and its constituents
influence mechanisms of gastric acid secretion, although addition of ethanol to a biomimetic mixture of wine organic acids
gastric acid secretion, are the wine constituents chiefly responsible for this effect. Furthermore, we confirmed that ethanol also
demonstrates that gastric acid secretion on a functional and gene regulatory level is differently affected by red wine vs. white
wine in healthy subjects and in parietal cells in culture. Organic acids, by acting on extracellular proton transport involved in
gastric acid secretion, are the wine constituents chiefly responsible for this effect. Furthermore, we confirmed that ethanol also
stimulates mechanisms of gastric acid secretion, although addition of ethanol to a biomimetic mixture of wine organic acids
attenuated their pro-stimulatory effect. This study gives new insights into the understanding of how wine and its constituents
influence mechanisms of gastric acid secretion.

AGFD 78 Arsenic in juice – are the results reliable? William R Mindak, william.mindak@fda.hhs.gov. Center for Food
Safety and Applied Nutrition, US FDA, College Park, MD The issue of arsenic in fruit juices has been in the news for several
months. National attention was drawn to the issue by various organizations. This attention suddenly increased the demand for
analysis of juice for arsenic. Analytical laboratories with little or no prior experience with food analysis were asked to perform
analyses of juice for low levels of arsenic. Some methodologies used produced data possibly biased high by as much as a factor
of three to five. Arsenic determination in food using inductively coupled plasma-mass spectrometry is a common and
appropriate technique for determining arsenic in food. However, one must understand potential interferences to produce
reliable results. Instrument analysis parameters as well as the test sample preparation procedure can greatly influence the
accuracy of total arsenic results. Details of common mistakes and their influence on accuracy will be discussed.

AGFD 79 Development of a LC-UV-MS method for the determination of ginsenosides in standard reference material
Christian M, White, christian.white@nist.gov, Karen W. Phinney. Analytical Chemistry Division, National Inst. of Standards
and Technology, Gaithersburg, MD Ginsenosides are a family of triterpene saponins that are thought to be the primary
compounds responsible for the reported health benefits gained from consuming ginseng as a dietary supplement. Ginsenosides
prevalent in both Panax ginseng (Asian ginseng) and Panax quinquefolius (American ginseng) include ginsenosides Rb1, Rb2,
Rc, Rd, Re, and Rg1. NIST is currently developing standard reference materials containing ginsenosides and ginseng-derived
materials. This work discusses the development of method using liquid chromatography coupled with ultraviolet absorbance
detection and mass spectrometry for the determination of ginsenosides in solution. The LC-UV-MS method is used to certify
the amount of ginsenosides Rb1, Rb2, Rc, Rd, Re, and Rg1 present in a calibration solution standard reference material.

AGFD 80 Enrichment of antioxidant activity of sweet potato by electric treatment Kazunori Hironaka, kazuhiro@agr.u-
ryukyu.ac.jp, Manamu Omoto. Dept. of Regional Agricultural Engineering, Univ. of the Ryukyus, Nishihara, Okinawa Japan
Increased consumer interests in the health benefits of foods have led to significant development of nutraceuticals and
functional foods. Sweet potato (Ipomoea batatas), with its variety of uses, is among the world's most important food crops. Its
world production was 127 million tones. It ranks among the world's 7 most important food crops (along with wheat, rice,
maize, potato, barley, and cassava). This study was initiated to improve antioxidant activity of potatoes by using electric
study. No studies exist on electric treatment of sweet potato. Sweet potatoes were immersed in a 0.1% NaCl solution for 2
min and subsequently treated with 0, 10, 20, 30, 40, 50, 100, 200 and 300 mA (DC) for 5 min in a parallel copper plate.
Antioxidant activity and phenols were measured. Results indicated that there were no changes in antioxidant activity and
polyphenol content between 0-50mA, but beyond 100 mA, marked increases in antioxidant activity and polyphenol content
were observed. Especially, the electric treatment of 200 mA increased the antioxidant activity (1.4 times), total phenol content
(1.6 times) as compared with non-treatment. This study indicates that electric treatment can be useful for enriching antioxidant
activity of sweet potatoes.

AGFD 81 Effects of red wine, white wine, & wine constituents on gastric acid secretion in healthy subjects and in
parietal cells in culture Kathrin I Liszt1, kathrin.liszt@univie.ac.at, Reinhard Eder2, Monika Marek2, Jessica Walker1,
Veronika Somoza1, veronika.somoza@univie.ac.at. (1) Dept. of Nutritional and Physiological Chemistry, Univ. of Vienna,
Vienna, Vienna, Austria(2) Federal College and Research Inst. for Viticulture and Pomology, Klosterneuburg, Lower Austria,
Austria Alcoholic beverages such as beer and wine are well known to potently stimulate gastric acid secretion. This study
demonstrates that gastric acid secretion on a functional and gene regulatory level is differentially affected by red wine vs. white
wine in healthy subjects and in parietal cells in culture. Organic acids, by acting on extracellular proton transport involved in
gastric acid secretion, are the wine constituents chiefly responsible for this effect. Furthermore, we confirmed that ethanol also
stimulates mechanisms of gastric acid secretion, although addition of ethanol to a biomimetic mixture of wine organic acids
attenuated their pre-stimulatory effect. This study gives new insights into the understanding of how wine and its constituents
influence mechanisms of gastric acid secretion.

AGFD 82 Separation and antioxidation properties of proanthocyanidins in hops Yumei Li, lcf@hr.126.com, Chunfeng
Liu. Dept. of Key Laboratory of Industrial Biotechnology, Ministry of Education, Jiangnan Univ., Wuxi, Jiangsu, China Hop
proanthocyanidins have a great impact on non-biological stability and oxidant resistance of beer, and it is good for human
health too. In this study, the proanthocyanidins were analyzed by RP-HPLC and UPLC-MS. The extraction conditions of hops
were established as follows: the extraction of 50% ethanol(v/v) was taken for 2 h at pH 4.0-4.2 and 8°C with the ratio of solvent
to material at 20:1 (v/w). The absorption parameters of AB-8 resin separation were as follows: the column volume, 14.5 mL;
sample concentration, 1.8 mg/mL; sample volume, 3 mL; sample flow velocity, 20 mL/h. The adsorbed hop proanthocyanidins
could be well eluted by 70 mL 100% ethanol with a elution rate of 60 mL/h. The reducing capability, ability of inhibiting lipid
peroxidation, ability of antioxidant in linoleic acid system, and ability of scavenging hydroxyl free radical of different hop proanthocyanidins oligomers during wort boiling were very well.

AGFD 83  Fast Blue BB microassay method for determination of total phenolics in beverages and fruits  Marjorie B. Medina, marjorie.medina@ars.usda.gov, Qiongqiong Li1,2, (1) Eastern Regional Research Center, U.S. Dept. of Agriculture, Agricultural Research Service, Wyndmoor, PA (2) Bor S. Luh Food Safety Research Center, Dept. of Food Science and Technology, Shanghai Jiao Tong Univ., Shanghai, China  The Fast Blue BB chemical method was developed to measure total plant phenolics through direct coupling interactions. Optical density (420 nm) of the azo complex formed was proportional to the phenolic concentrations. The microassay was optimized for the 96-well plates utilizing 200 µL samples or standards and 0.04% to 0.06% Fast Blue BB. Linear correlations (R) of gallic acid (0 - 500 µg/mL) were 0.9996 (+/-0.0002 SD) in 58 assays. Total phenolics in the samples expressed as gallic acid equivalent (GAE) by the microassay was 95% of the original test tube method (R=0.9980) in 28 juice samples and 101% in eight fruit samples. Gallic acid and catechin calibration standards were compared in 50 samples. Total phenolics in tea, coffee and fermented beverages will also be presented. The Fast Blue BB microassay method is simple, robust and has <10% RSD reproducibility. The microassay method is faster than the original tube method with reduction of materials and labor cost.

AGFD 84  Antivirulence activities of flavonoids, limonoids, and diketopiperazines  Amit Vikram1,2, amv55@pitt.edu, Guddadarangavanhallly K. Jayaprakasha2, Xiaowen Renee Bina1, Suresh D. Pillai2,3, James E. Bina1, Bhimanagouda S. Patil1,(1) Microbiology and Molecular Genetics, Univ. of Pittsburgh, Pittsburgh, PA (2) Horticultural Sciences, VFIC, Texas A&M Univ., College Station, TX (3) Food Safety & Environmental Microbiology Program, Texas A&M Univ., College Station, TX  Emergence of widespread antibiotic resistance has led to increased interests in the development of alternative therapeutic strategies such as antivirulence agents to fight bacterial infections. Secondary metabolites present very diverse scaffolds that are endowed with various bioactivities. Antivirulence activities of flavonoids, limonoids, and diketopiperazines (DKPs) were evaluated for antivirulence activity in the Gram-negative pathogens Escherichia coli O157:H7, Salmonella Typhimurium LT2, Vibrio harveyi and Vibrio cholerae. Several compounds were identified as potent virulence inhibitors in E. coli O157:H7 and V. harveyi that appeared to function by interfering with bacterial cell-cell signaling including naringenin, a flavanone, and several limonoids such as obacunone, nomilin, ichangin and isolumonic acid. In addition, naringenin and obacunone appeared to specifically inhibit type three secretion system in S. Typhimurium. Studies with V. cholerae suggested that certain DKPs were potent inhibitors of major virulence determinants. Altogether, a number of secondary metabolites were identified that functioned as antivirulence inhibitors in multiple bacterial pathogens. The research work was supported by the Designing Foods for Health through the Vegetable & Fruit Improvement Center, Grant No. USDA-NIFA 2008-34402-19195, 2010-34402-20875 (BSP) and award numbers R01AI091845 and R21AI092007 from the National Inst. of Allergy and Infectious Diseases (JEB).

AGFD 85  Mechanism of inhibition of advanced glycation end products by bioactive compounds present in okra seed extracts: A comparison with the well known inhibitor aminoguanidine  Bishambar Dayal1, dayalbi@umdnj.edu, Robin George1, Michael Lea2,(1) Medicine and biochemistry/Molecular biology, UMDNJ-New Jersey Medical School, Newark, NJ (2) Biochemistry and Molecular Biology, UMDNJ-New Jersey Medical School, Newark, NJ  Advanced glycation end products (AGEs) have been associated with the micro-vascular complications in diabetes and other age-related neurodegenerative diseases. Recently we reported the bioactivity of okra seed extracts as potential inhibitors of advanced glycation end products (AGFD #95(2010),AGFD#157(2012). The studies involved examination of structurally defined flavonoids: quercetin-3-mono and di-glucoisides, kaempferol-3-mono-glucoiside, 3,5,7,3',4'- pentahydroxy flavonol-3-O-alpha-L-arabinofuranoside and rutinoside (Quercetin-3-O-rhamnosyl-glucoside). These compounds also showed potent antioxidant and antiproliferative activities. The present studies describe the mechanism of inhibition of advanced glycation end products by the bioactive compounds present in okra seed and their comparison with 2-aminoguanidine, a well known inhibitor of glycation. We incubated bovine serum albumin (BSA) and histone proteins with fructose, ribose, mannose and glucose with and without okra seed extract. After incubation the fluorescence of AGEs was measured with a fluorescence spectrophotometer (excitation 360 nm, emission 460 nm). After 7 days of incubation the fluorescence data exhibited an inhibition of glycation by the okra seed extract which was identical to the inhibition of glycation with 2-aminoguanidine in a dose dependent manner. We also noticed that okra vegetable mucilage, cinnamon and Withania somnifera (Ashwagandha) under these conditions did not exhibit any glycation inhibitory activity. Examination of inhibitory activity of okra seed extract with histone proteins did not exhibit a change in the intensity of fluorescence spectrum compared to BSA. We believe that glycosylation of BSA in the presence of okra seed extract leads to a change in the conformation of the protein probably due to an increased exposure of tryptophan residues. On the other hand, the non-enzymatic glycosylation of histones does not present a favorable glycosylation site and therefore no inhibition. Detailed mechanistical implications of protein glycation inhibition with the 3-hydroxy substituted flavonoids present in okra seed extract and its comparison with 7-hydroxy substituted flavonoids will be also discussed.

AGFD 86  Portable nanoparticle-based sensor for the discovery of food antioxidants  Erica M. Sharpe, eandrees@clarkson.edu, Silvana Andreescu.Dept. of Chemistry and Biomolecular Science, Clarkson Univ., Potsdam, NY  With the increased awareness of nutrition and the advocacy for healthier food choices, there is a need for a simple, easy-to-use
test that can reliably measure the quality and content of food antioxidants. We report development of a portable nanoparticle-based sensor for the detection of antioxidants. The platform is based on immobilized nanoparticles that show a distinct color change in contact with antioxidants by means of redox and surface chemistry reactions. The sensor operates in a variety of environments and food products; it does not require specialized equipment or external reagents and can be used by unskilled personnel and the general population. This presentation will discuss fabrication and performance evaluation of this assay for the detection of common food antioxidants, and describe functionality of the assay in real samples, including tea, a variety of juices and food extracts. Validation of this sensor against commonly used USDA assays will be discussed.

AGFD 87  Alkylresorcinol as the major active components in wheat bran for colon cancer prevention  Yingdong Zhu, yzhul@ncat.edu, Dominique Soroka, Shengmin Sang.Center for Excellence in Post-Harvest Technologies, North Carolina Agricultural and Technical State Univ., Kannapolis, NC  Many studies have found that dietary cereal fibers protect against colon cancer, however, not all cereal fibers are equally effective. Wheat bran is the only cereal bran that shows consistent protection against colon cancer in laboratory animal models. We and others have reported that phytochemicals in wheat bran instead of fiber are the major active components for colon cancer prevention. However, the active components are still unknown. Using human colon cancer cells (HCT-116 and HT-29) as the guiding assay, we purified and identified fourteen 5-alk(en)ylresorcinols (ARs) from the active fraction of wheat bran. Among them, (10’Z,13’Z,16’Z)-5-(nonadeca-10’,13’,16’-trieryl)resorcinol is a novel compound and five ARs were purified as individual compounds for the first time. We evaluated the growth inhibition of these compounds on human colon cancer cells. Our results indicate that increasing the length of the side chain will diminish the inhibitory activity, and the existence of a double bond and a carbonyl group will strengthen such an activity. To further study the structure-activity relationship of ARs, we synthesized more than 20 ARs derivatives, the effects of the length of the alkyl side chain, the substitution pattern of the functional groups on alkyl side chain as well as the substitution pattern on the benzene ring will be discussed in this presentation.

AGFD 88  Activity-guided discovery of antioxidative and antidiarrheal components in bark extract of Garcinia buchananii  Timo Stark1, timo.stark@tum.de, Onesmo B Balenb2, Toshiaki Matsutomi1, Sofie Löschl, Thomas Hofmann1. (1) Chair of Food Chemistry and Molecular Sensory Science, Technical Univ. Munich, Freising, Germany (2) Dept. of Biological Sciences, Univ. of Idaho, Moscow, ID  The extracts and pure isolates from Garcinia plant species, genus Garcinia, family Guttiferae, exhibit multiple important biological activities such as antioxidant, anti-diarrheal, anti-inflammatory, analgesic, antimicrobial and anticancer. Stem and root bark extracts of G. buchananii are traditionally used to treat diarrhea, dysentery, abdominal pain, and a range of infectious diseases in Sub-Saharan Africa. In order to identify antioxidant and/or anti-diarrheal components in the bark extract of G. buchananii, activity-guided fractionation using in vitro tests (H2O2 scavenging and ORAC assays for antioxidative activity) and guinea pig distal colon (anti-diarrheal activity) were performed and the most active principles were identified by means of UPLC-TOF-MS analysis, 1D- and 2D-NMR and circular dichroism (CD) spectroscopy. Finally, reconstitution experiments were done to evaluate additive and/or synergistic effects of the bioactive compounds identified. Garcinia buchananii is rich in important natural remedies.

AGFD 89  Cranberry fruit & leaves (Vaccinium macrocarpon) as a source of antimicrobial natural products  Catherine C. Neto1, cneto@umassd.edu, Anthony R. Dovell1, Ravikumar C Boddet1, Steven Kwasny2, Timothy J. Opperman2, Frank J. Scarano1. (1) UMass Cranberry Health Research Center, Univ. of Massachusetts Dartmouth, North Dartmouth, MA (2) Microbiotix, Inc., Worcester, MA  Cranberry is known for urinary tract health benefits against E. coli bacteria. Fruit and leaves of North American cranberry (Vaccinium macrocarpon) were investigated for compounds possessing antimicrobial activities against a variety of bacteria and yeasts. Both leaves and fruit were found to be a rich source of A-type proanthocyanidin oligomers (PACs) and querectin glycosides. MALDI-TOF MS analysis of cranberry leaf PACs showed a composition similar to that of fruit PACs, with oligomers of 2-12 degrees of polymerization. Several querectin glycosides previously identified in fruit were plentiful in leaves, with querectin-3-O-galactoside the major constituent. Cranberry leaf and fruit PACs inhibited biofilm formation by S. aureus with MBIC of 1.5-3.1 µg/mL; flavonol glycoside fractions also caused inhibition. Biofilm formation by oral bacterial communities and the growth of Candida species were selectively inhibited by both fruit and leaf PACs. Thus, both cranberry leaves and fruit may be a useful source of antimicrobial compounds.

AGFD 90  Protective effect of steryl ferulate from bamboo shoot on experimental nonbacterial prostatitis in rats  Lina Xiong1, byluzju@gmail.com, Baiyi Lu1, Weisu Huang3, Huafang Cai2, Yanxi Luo2, Yinzhou Hu1. (1) The Dept. of Food Science and Nutrition School of Biosystems Engineering and Food Science, Zhejiang Univ., Hangzhou, Zhejiang China (2) Inst. of Materia Medica, Zhejiang Academy of Medical Sciences, Hangzhou, Zhejiang China (3) The Dept. of Applied Technology, Zhejiang Economic & Trade Polytechnic, Hangzhou, Zhejiang, China  The protective effects of steryl ferulate from bamboo shoot (SFB) and its mechanisms on nonbacterial prostatitis (NBP) were investigated using experimental rat model and gene expression microarray. SFB could significantly inhibit absolute prostate weight, prostate index, total acid phosphatase, prostatic acid phosphatase and the expression levels of 238 genes, while SFB significantly increased density of lecithin corporules and the expression levels of 111 genes. Histologically, SFB treatment significantly suppressed the severity of the lesion in NBP rats. Gene ontology for functional analysis revealed that, biological processes (fibrinolysis, inflammatory response, etc.), cellular components (high-density lipoprotein particle, protein-lipid complex, etc.), molecular functions
(enzyme inhibitor activity, peptidase inhibitor activity, etc.) were altered. Canonical pathway analysis indicated, metabolism of xenobiotics by cytochrome P450 and PPAR signaling pathway as the most important pathways. Thus, SFB may be useful for treatment of NBP by affecting the expression of genes in the related pathways.

AGFD 91  Effect of dietary tocopherol isomers on inflammatory response of adult- and infant-derived intestinal cell lines  Ingrid Elisia, elisia@interchange.ubc.ca, David D. Kitts.Dept. of Food, Nutrition and Health, Univ. of British Columbia, Vancouver, Canada  The effect of dietary tocopherol (Toc) isomers, including alpha-Toc, gamma-Toc and delta-Toc, in modulating inflammatory response of intestinal cell lines derived from adult (Caco-2) and infant (FHs74Int) origin were determined. Toc isomers exhibited anti-inflammatory effect by reducing IL8 secretion from Caco-2 cells challenged with interferon gamma/phorbol myristate acetate (IFNg/PMA). An opposing trend however was observed in the infant FHs74Int cells regardless of IFNg/PMA stimulation. At the same time, differential regulation of NFkB pathway signaling pro-inflammatory cytokines and Nrf-2 pathway signaling expression of antioxidant enzymes by Toc isomers in the two cell lines was observed. Delta-Toc was most effective in stimulating both NFkB and Nrf-2 pathways. In addition, the transcript level of two key enzymes involved in glutathione synthesis was down-regulated by delta-Toc in the infant FHs74Int cells, while no difference was observed in adult Caco-2 cells, suggesting potential differences in glutathione biosynthesis that may affect oxidative status thus IL8 expression.

AGFD 92  Lipid oxidation and its effects on postmortem appearance  Cameron Faustman, cameron.faustman@uconn.edu.Animal Science, Univ. of Connecticut, Storrs, CT  Lipid oxidation decreases the redox stability of oxymyoglobin and can negatively affect the appearance of fresh meat. Evidence for this has included delayed discoloration of meat by both exogenous antioxidant ingredient application and dietary delivery of antioxidants to livestock. We have used the alpha, beta-unsaturated aldehyde, 4-hydroxy-2-nonenal (HNE) as a model secondary product of linoleic acid oxidation to study this effect. HNE has consistently decreased redox stability of oxymyoglobin in vitro and does so in a concentration-dependent manner through covalent alkylation of histidine residues. Myoglobins obtained from different species and myoglobin mutants have been used to demonstrate that the number and location of histidine residues in the protein's primary structure are critical to its susceptibility to reaction with HNE. Interestingly, a greater concentration of myoglobin and its autoxidation enhance lipid oxidation; this facilitates a complementary interaction that leads to exacerbated oxidation of each and forms the basis for compromised meat quality.

AGFD 93  Design of edible nanoemulsion-based delivery systems for lipophilic food components  David J McClements, mcclements@foodssci.umass.edu.Dept. of Food Science, Univ. of Massachusetts, Amherst, MA  There is a need for edible delivery systems to encapsulate, protect and release bioactive and functional lipophilic constituents within the food, medical, and pharmaceutical industries. Nanoemulsions are particularly suited for the design and fabrication of these delivery systems. This talk briefly reviews the advantages and limitations of nanoemulsions as delivery systems, as well as methods of fabricating and characterizing them. Nanoemulsion-based delivery systems can be produced from food grade (GRAS) ingredients (e.g., lipids, proteins, polysaccharides, and surfactants) using simple processing operations (e.g., mixing, homogenizing, and thermal processing). They have certain advantages over conventional emulsions, including optical clarity, improved physical stability, and potentially higher bioavailability. The biological fate of nanoemulsions is also discussed. This knowledge can be used to design nanoemulsion-based delivery system for specific applications, such as encapsulation, controlled digestion, and targeted release.

AGFD 94  Flavor-based approach to address obesity  Sriniv Subramanian, srini.subramanian@firmenich.com. Global Innovation and Design, Firmenich Inc, Plainsboro, NJ  Obesity has reached an epidemic level in the developed countries including the US and has become a challenge in many developing countries. The importance of energy balance in the prevention and treatment of obesity in an increasingly obesogenic environment is well recognized by the scientific community. This presentation will focus on the nutritional aspects of diet as one of the approaches to help mitigate the obesogenic environment. The US dietary guidelines and recommendations include the reduction of intake of saturated fats and added sugar in our diets. Flavor-based solutions in lowering the caloric intake and thus influencing the energy balance will be discussed as an approach, among others, to addressing the obesity epidemic.

AGFD 95  Oxidative stability of lipid dispersions in the presence of bioactive polyphenols: Elucidation of pro-oxidant mechanisms  Ryan Elias, elias@psu.edu.Dept. of Food Science, Pennsylvania State Univ., Univ. Park, PA  Polyphenols are widely regarded as antioxidants. However, polyphenol oxidation has been shown to generate hydrogen peroxide (H2O2), which can compromise the oxidative stability of foods and may explain the pro-oxidant activity of these compounds in previous studies. Recent work in our lab has helped to elucidate these pro-oxidant mechanisms in lipid dispersions, which appear to be primarily catalyzed by transition metals and accelerated in the presence of some food components, including metal chelators and nucleophilic compounds. Using the tea polyphenol (-)epigallocatechin-3-gallate (EGCG) as a model phenolic, we have systematically evaluated the conditions wherein this phenolic exerts net antioxidant or pro-oxidant activity in a model oil-in-water emulsion. Overall, we observed that chelator class and pH had a profound effect on EGCG stability, as did the
AGFD 96  Role of water-lipid interfaces in the oxidation of lipids  Eric A Decker, edecker@foodsci.umass.edu. Dept. of Food Science, Univ. of Massachusetts, Amherst, MA  Lipid oxidation in many food systems is promoted by transition metals decomposing lipid hydroperoxides into free radicals at lipid-water interfaces. In oil-in-water emulsions, emulsion droplet interfacial properties such as charge and thickness impact lipid-metal interactions. Lipid-water interfaces also exist in bulk oils due to the ability of the minor components of oil to form association colloids. The formation of the water-oil interface in association colloids will increase lipid oxidation rates as well as the prooxidant activity of transition metals. Lipid-water interfaces also impact the activity of antioxidants. When emulsifier conditions favor maximizing antioxidant concentrations at the water-oil interface, antioxidant activity is increased. It will be important to develop a more thorough understanding of how the physical and chemical properties of oil-water interfaces impact the activity of both prooxidants and antioxidants at water-oil interfaces so that new innovative antioxidant technologies can be developed.

AGFD 97  Fifty years of smelling sulfur: From Allium chemistry to olfactory detection of sulfur compounds  Eric Block, eblock@albany.edu. Dept. of Chemistry, SUNY - Albany, NY  The most distinctive characteristic of garlic, onion and other genus Allium plants is the formation of strong-smelling organosulfur compounds when they are cut. These sulfur compounds are thought to protect the plants from predators. After a brief overview of the history of genus Allium plants in civilization, I will describe our research elucidating the chemical processes that occur when alliums are cut, e.g., Allium chemistry, how the characteristic properties of Allium organosulfur compounds can be exploited in environmentally friendly bird repellents and pesticides, and how my fascination with strong-smelling organosulfur compounds led to a mouse model in which copper ions play a key role in the activation of olfactory receptors highly sensitive to organosulfur compounds.

AGFD 98  Where have all the polyphenols gone?  Joe Vinson, joe.vinson@scranton.edu, Colin A Peters, Jr., Vikram Chopra. Dept. of Chemistry, Univ. of Scranton, Scranton, PA  One lingering question in the area of polyphenol research is the lack of mass balance. Three samples are measured; plasma, urine and feces. Plasma concentration of polyphenols or their metabolites is seldom as high as 10 microM and usually < 1 microM. The level in the urine is usually < 1 microM. Based on 2.5 L of total human plasma this calculates to be 0.3 mg for a molecular weight of 300 for the polyphenol/metabolite in 1 L of urine (24 hour) and 0.75 mg in plasma (1 microM). The fecal excretion is not well studied and thus unknown, but for black tea the combined excretion of catechins in all three routes is only 2% of dose. We investigated red blood cells (RBC) equilibrated with 12 polyphenols and their metabolites, and 8 polyphenols and their glycosides equilibrated with blood. Intracellular RBC levels (HPLC) for 10 microM polyphenol in the media were in the microM range for RBC when incubation was with RBC and less in blood where other proteins can bind polyphenols. From blood there was some methylation of the polyphenols. Thus RBC can metabolize polyphenols and can carry as much polyphenols or their metabolites as found in plasma. The physiological implications of this finding will be discussed.

AGFD 99  Health benefits of fruit polyphenols: Clinical evidence of fruit-derived polyphenol action in the postprandial state, and effects on blood pressure  Britt Burton-Freeman, bburton@iit.edu. Illinois Inst. of Technology, Inst for Food Safety and Health, Bedford Park, IL  There is increasing evidence that the postprandial state is an important contributing factor in the development of chronic diseases. Modern day diets are characterized by high-calorie meals rich in processed, readily available carbohydrate and fat leading to exaggerated postprandial elevations in blood glucose and triglycerides, triggering a biochemical cascade resulting in oxidative stress, inflammation, dyslipidemia, insulin resistance and endothelial dysfunction. These postprandial changes repeated multiple times daily, and often with limited recovery, eventually lead to atherosclerotic risk factors and coronary artery disease. Polyphenolic compounds from various plant foods are the subject of increasing attention touted for their multiple benefits promoting health and disease risk reduction. Polyphenolic compounds are most commonly known for their antioxidant properties; however, more recently they are recognized for their direct and indirect effects on cell signaling pathways imparting anti-inflammatory effects and improving metabolic- and endothelial- dysfunction. Certain fruits or their derived products have been investigated for their role in maintaining system balance during the described challenges of postprandial metabolism. Berry fruits, grapes, wine, and grape seed extract show particular promise in this area, although the science is young. Accordingly, only few studies have extended findings to examine the effects of supplementation on traditional coronary risk factors. The aim of this presentation will be to provide an overview of the clinical evidence of fruit-derived polyphenol action in the postprandial state, and effects of grape seed extract specifically on blood pressure regulation. Concluding remarks will include thoughts on research needs for advancing the clinical polyphenol evidence-based science and research considerations for the food industry to ensure delivery of health opportunities to consumers.

AGFD 100  Chardonnay grape seed flour reduces plasma lipids & increases expression of hepatic genes for cholesterol and fat synthesis in hamsters fed a high fat diet  Rebecca Lipson1, rebecca.lipson@sonomaceuticals.com, Torey Arvik1, Glenn Bartley3, Hyunsook Kim2, Wallace Yokoyama3. (1) Sonomaceuticals, Santa Rosa, CA (2) Dept. of Nutrition, Univ. of California, Davis, Davis, CA (3) Western Regional Research Center, USDA, Agricultural Research Service, Albany, CA  Chardonnay is a white grape variety with seed high in polyphenolics (over 10% by weight), a class of compounds with
known bioactivity. Compared to male Syrian hamsters fed a high fat (HF) diet, animals fed a diet supplemented with flour made from chardonnay seeds (HFC) displayed a reduction in weight gain as well as lower blood lipid levels. These improved physiological changes correlate with the observed up-regulation of hepatic genes related to cholesterol and bile acid synthesis (CYP51, HMGCR, SREBP2, CYP7A1) when compared to control. This suggests that the grape seed flour may reduce re-absorption of cholesterol and/or bile acid, therefore decreasing levels in the liver. Reduction in weight gain in the HFC group may be explained by hepatic gene up-regulation for fat oxidation (ACOX1) and down-regulation of fat synthesis (SCD1). The expression of adipose genes related to inflammation and adipocytokine production were also analyzed.

AGFD 101  Transplacental chemoprevention by dietary indole-3-carbinol (I3C) in a mouse model of T-cell lymphoblastic leukemia/lymphoma (T-ALL)  Abby D Benninghoff1, abby.benninghoff@usu.edu, Deanna P Larson1, Brittany C Packard1, Trevor J Fish1, Amanda M Hagman1, Shelbie MFrauen1, Makda S Gebre1, Korry J Hintze2, David E Williams3 (1) Dept. of Animal, Dairy and Veterinary Sciences, Utah State Univ., Logan, UT 2) Dept. of Nutrition, Dietetics and Food Sciences, Utah State Univ., Logan, UT 3) Dept. of Environmental and Molecular Toxicology, Oregon State Univ., Corvallis, OR In mice, transplacental exposure to the chemical carcinogen dibenzo[def,p]chrysene (DBC) causes development of T-ALL in young adult offspring leading to early mortality. Maternal consumption of the bioactive food chemical I3C, present in cruciferous vegetables, confers protection to offspring against DBC-initiated T-ALL. In this study, we investigated the timing of dietary I3C exposure prior to and during pregnancy and compared the efficacy of I3C to its major acid condensation product, 3,3’-dindolylmethane (DIM). I3C (500 ppm or 2000 ppm) fed during gestation and lactation provided significant (P<0.01) protection against DBC-initiated T-ALL in offspring (29% and 76% survival, respectively, compared to 14% for control animals). Pre-feeding dams prior to pregnancy with 2000 ppm I3C did not enhance this protection. However, dietary DIM (350 ppm) did not alter cancer outcome. These data suggest that I3C, or other acid condensation product, is likely responsible for the transplacental chemoprevention observed in this murine model of T-ALL.

AGFD 102  Chardonnay grape seed flour, not red grapes, reduce plasma cholesterol and body weight gain in hamsters on high fat diets  Torey Arvik1, torey.arvik@sonomaceuticals.com, Rebecca Lipson1, Glenn Bartley3, Hyunsook Kim2, Wallace Yokoyama3.1 (1) Sonomaceuticals, Santa Rosa, CA (2) Dept. of Nutrition, Univ. of California, Davis, CA (3) Western Regional Research Center, USDA, Agricultural Research Service, Albany, CA The polyphenolic content of red wine is commonly associated with decreased risk of cardiovascular disease. However, some white grape seed varieties contain comparatively more polyphenolics than red seeds. Male Syrian hamsters were fed high fat diets containing 10% grape seed flours from chardonnay (CH), cabernet sauvignon (CS) and syrah (SY) grapes for three weeks. Low density lipoprotein (LDL) and very low density lipoprotein (VLDL) cholesterol respectively decreased by 66% and 72% with a diet containing CH, but not CS or SY, seed flour supplementation. Hamsters on the CH supplemented diet also had 31% reduced weight gain despite similar food intake to the CS and SY groups. Liver and epidyidal adipose weights were lower in the CH fed hamsters. The bioactivity of CH seed flour may be explained by its higher content of catechin and epicatechin compared to CS or SY.

AGFD 103  Nutritional and pharmaceutical applications of bioactive compounds of some edible berries and tropical fruits  Shela Gorinstein1, gorin@cc.huji.ac.il, Sylwia Flis2, Zenon Jastrzebski2, Hanna Leontowicz3, Maria Leontowicz3, Zeev Tashma1, Patricia Arancibia-Avila4, Sumitra Poorvarodom5, Milan Suhaj6, Simon Trakhtenberg7.(1) Inst. for Drug Research/School of Pharmacy, The Hebrew Univ. of Jerusalem, Jerusalem, Israel(2) Dept. of Pharmacology, National Medicines Inst., Warsaw, Poland(3) Dept. of Pharmaceutical Sciences, Warsaw Univ. of Life Sciences, Warsaw, Poland(4) Dept. of Basic Sciences, Universidad del Bio-Bio, Chillan, Chile(5) Dept. of Soil Sciences, King Mongkut's Inst. of Technology, Bangkok, Thailand(6) Food Research Inst., Bratislava, Slovakia(7) Kaplan Medical Center, Rehovot, Israel Extracts from Chilean and Polish berries and Thai tropical fruits decreased the proliferation of HT-29 and SW48 human colorectal cancer (CRC) cell lines. This effect was concentration dependent. The inhibition of cancer cell proliferation correlated with the levels of polyphenols, flavonoids and the antioxidant activities of investigated samples. DPPH kinetic measurements were used to compare, distinguish and discriminate the antiradical activity among berry extracts by multivariate analysis. The interaction between two flavonoids (catechin and quercetin), bovine serum albumin (BSA) and polyphenol extracts of berries and fruits was investigated by 3-D fluorescence and FTIR spectroscopy. The new kind of berries and fruits has a strong ability to decrease the intrinsic fluorescence of BSA and is comparable with quercetin. Supplementation of diets with berries and fruits positively affects plasma lipid profile, and antioxidant activity in rats fed cholesterol containing diets. The main histopathological changes were detected in the liver and aorta of rats fed a high-cholesterol diet without fruit supplementation. These changes were minor in rats with fruit supplementation. In conclusion, these findings suggest that the intake of berries and fruits, as a source of natural antioxidants, may reduce colon cancer risk. The consumption of berries and fruits as a supplementation to everyday human diet and for pharmaceutical applications is important for health effects.

AGFD 104  Total Western Diet (TWD) increases azoxymethane induced aberrant crypt foci (ACF) compared to the AIN93G diet  Korry J Hintze1, korry.hintze@usu.edu, Abby D Benninghoff2, Robert E Ward1. (1) Nutrition, Dietetics and Food Science, Utah State Univ., Logan, UT (2) Animal, Dairy and Veterinary Sciences, Utah State Univ, Logan, UT The new TWD emulates average American intakes (at the NHANES 50th percentile) for micro- and macronutrients based on nutrient density. Mice were fed either TWD or AIN93G basal diets supplemented with or without 0.2% green tea extract in the drinking
induced cachexia and allergen-induced type 1 hypersensitivity. Reduced inflammatory mediator release in CLA fed animals

Dietary CLA reduces clinical signs of acute and chronic inflammatory processes. In acute inflammatory disorders, dietary CLA reduced endotoxin-AGFD 109

AGFD 108 CLA's role in biochemical processes

Yeonhwa Park, ypark@foodsci.umass.edu, Yooheon Park, Jun Ho Kim, Jonggun Kim, Heeseok Lee.Dept. of Food Science, Univ. of Massachusetts, Amherst, Amherst, MA Since its discovery as an anti-cancer component from ground beef, conjugated linoleic acid (CLA) has shown other biologically beneficial effects. One of the most interesting activities of CLA is its ability to reduce body fat, while improving lean and bone mass. CLA has tremendous effects on lipid metabolism and these effects of CLA contribute, either directly or indirectly, to its effects on muscle and bone metabolisms or vice versa. CLA fed animals showed increased activity levels and endurance capacity, which may link to its effects on increasing energy expenditure and fat utilization. In addition, CLA shifted bone marrow mesenchymal stem cell balance between bone marrow adiposity and bone cell formation in favor of bone mass, resulting in reducing marrow adipocytes and increasing osteoblasts. These suggest a great potential for CLA to be used to improve body composition along with current efforts to control obesity and osteoporosis.

AGFD 109 Dietary CLA reduces clinical signs of acute and chronic inflammatory disease

Mark E Cook, mcook@wisc.edu.Animal Science, Univ. of Wisconsin-Madison, WI Dietary CLAs are now recognized as naturally occurring anti-inflammatory fatty acids of animal origin. In acute inflammatory disorders, dietary CLA reduced endotoxin-induced cachexia and allergen-induced type 1-hypersensitivity. Reduced inflammatory mediator release in CLA fed animals

AGFD 106 CLA and its effect on dairy cow fertility with emphasis on low level inflammatory processes

Giuseppe Bertoni, giuseppe.bertoni@unicatt.it, Paolo Grossi, Erminio Trevisi.Istituto di Zootechnica, Università Cattolica del Sacro Cuore, Piacenza, Italy Low fertility and health are a major concern for dairy farms. In the last decades fertility decreased together with the increase of milk yield, but milk yield does not seem the main cause, since not always the most productive cows are the less fertile. Recently a strong negative relationship among inflammation in transition, milk yield and fertility has been observed. Surprisingly, cows with the highest milk yield showed a better energy balance and fertility, but the lower inflammatory status. Despite the results from CLA-based experiments are still “in progress”, CLA supplementation in late pregnancy/early lactation of dairy cows exerts positive effects on reproduction, on inflammatory consequences (lower, likely for the inhibition of NFkB responsible of inflammatory gene expression) and on glucose/energy balance. This suggests to be reasonable a positive relationship between CLA feeding and better fertility through the reduction of inflammation effects and glucose/energy balance improvement.

AGFD 107 Isomers of conjugated linoleic acid as important nutrients in the dairy cow

Kevin J Shingfield, kevin.shingfield@mtt.fi.Animal Production Research, MTT Agrifood Research Finland, Jokioinen, Hame, Finland Development of fore stomach fermentation in ruminants is associated with the formation of a wide range of positional and geometric isomers of conjugated linoleic acid (CLA) synthesized during ruminal biohydrogenation of dietary 18:2n-6 and 18:3n-3. More than 15 individual isomers of CLA have been detected in digesta at the omasum or duodenum with the amounts available for absorption being highly dependent on diet composition. Little is known about the metabolic fate and physiological activity of most CLA isomers in the hostruminant. However, ruminant tissues contain a wide range of CLA isomers indicating that these serve as substrates for essential functions including phospholipid synthesis. Virtually all of the evidence pertaining to the biological activity of CLA in cattle is based on post-ruminal infusions or feeding studies examining the effects of synthetic sources enriched in cis-9, trans-11 and trans-10, cis-12. Dietary supplements of rumen protected synthetic CLA (PR-CLA) decrease milk fat content in lactating cows, changes that are often accompanied by an increase in milk and milk protein yield and/or improved energy status. Effects of RP-CLA on lactational performance may, at least in part, to be mediated via the repartitioning of energy towards body tissues in the absence of changes in heat production or diet digestibility. Data highlight a role of CLA in minimizing excessive mobilization of body tissues during periods of energy insufficiency in the dairy cow.

AGFD 105 Synthesis of CLA isomers and their effect on milk fat production

Dale E Bauman, deb6@cornell.edu.Animal Science, Cornell Univ., Ithaca, NY, USAnimal Science, Cornell Univ., Ithaca, NY CLA in ruminant source foods originates as intermediates in the biohydrogenation of unsaturated fatty acids by rumen bacteria. There are over 20 CLA isomers in ruminant fat, most at trace levels. Under certain dietary conditions rumen fermentation shifts, increasing production of intermediates from minor biohydrogenation pathways, some of which are potent inhibitors of milk fat synthesis. Trans-10, cis-12 CLA has been most extensively studied and a 25% inhibition is observed at 0.02% of the diet in dairy cows. Effects are specific for milk fat; yields of milk and other milk components are unaffected. Mechanisms involve the SREBP transcription system and a coordinated reduction in mammary expression of genes for key lipogenic enzymes. Two additional CLA isomers have been found to inhibit milk fat synthesis, trans-9, cis-11 and cis-10, trans-12. Overall, CLA isomers produced in ruminant fermentation provide an example of nutrigenomics which offers exciting opportunities for agricultural application.
was evident within the first 90 seconds of antigen stimulation. Dietary CLA was also effective in reducing disease associated chronic autoimmune inflammation. In a model of spontaneous autoimmune lupus, CLA extended survival 1.7 fold and reduced end stage body weight wasting by 25%. Severity of chronic autoimmune arthritis was reduced 30% up to 84 days after the onset of disease. The trans-10, cis 12-isomer of CLA appeared to have the greatest anti-inflammatory affect on collagen-induced arthritis, however, cis-9, trans-11-CLA was also shown to be effective in reducing disease progression. While CLA can decrease pro-inflammatory cytokines and eicosanoids in early stages of inflammation, dietary CLA continues to have anti-inflammatory effects long after plasma pro-inflammatory mediators have returned to baseline levels. New data shows that dietary CLA restored to normalcy a perturbed plasma metabolome associated with chronic inflammation. Our current hypothesis is that CLA may be a key upstream regulator of a feed forward loop that perpetuates inflammatory responses.

AGFD 110 CLA in obesity Leah D Whigham, Leah.Whigham@ars.usda.gov. USDA-ARS Human Nutrition Research Center, Grand Forks, ND Among the multitude of physiological effects of CLA, the effect on body composition is one of the most controversial. Dozens of studies have assessed the effect of CLA on body composition in humans. They have varied in duration, design, subject selection criteria, and dose and isomer composition of CLA. Several studies have been underpowered or insufficiently designed (short duration or low dose) to detect an effect. Meta-analyses indicate CLA has a modest beneficial effect on fat loss and fat-free mass accretion in humans. Fat loss is dose dependent and nearly linear for about the first 6 months of treatment (0.09 ± 0.08 kg/wk, P < 0.001). Fat-free mass increases (0.3 kg ± 0.7 kg, P = 0.05), but is not time or dose dependent. In studies of natural weight gain (in growing children and adults over the holiday season), CLA also decreases body fatness. Additionally, studies using the same 36-item questionnaire found that CLA decreases adverse events. The body of evidence supports modest beneficial effects of CLA on body composition. These effects, coupled with decreased adverse events, have the potential to be clinically relevant.

AGFD 111 CLA in cardiovascular disease Robert J. Nicolosi, nicolosi.robert@yahoo.com. Dept. of Nutritional Sciences, Univ. of Connecticut-Storr's, CT Conjugated linoleic acid is a mixture of positional and geometric isomers of octadecadienoic acid, the two major ones being cis9,trans11 and trans10,cis12 that occurs naturally in the diet. CLA is produced by biohydrogenation in ruminant animals and, as such, comes from dairy products and ruminant meats. There have been numerous in vitro, preclinical and clinical studies conducted which, although the findings are not always in agreement have demonstrated beneficial effects of CLA, as it relates to certain risk factors associated with cardiovascular disease (CVD). However, total and LDL cholesterol-lowering, the traditional markers for reductions in risk factors of early and more advanced stages of CVD by either nutritional and pharmaceutical interventions are not always associated with CLA administration, an observation we and many others have reported in preclinical studies in hamsters, rabbits and other animal species as well as clinical trials. Several studies report on CLA effects related to anti-inflammatory and anti-oxidative activity and the more recent associations with weight loss and/or increase in lean body mass. Although a recently published study showed that higher adipose tissue 9c,11t-CLA was associated with reduced risk of myocardial infarction, a clear mechanism remains to be elucidated. With the general recognized as safe (GRAS) status of CLA for use in foods, further studies of the mechanism(s) of action of CLA should be considered a high priority for investigation.

AGFD 112 Perspectives on CLA Michael W. Pariza, mwpariza@wisc.edu. Dept. of Food Science, Univ. of Wisconsin-Madison,WI Conjugated linoleic acid (CLA) occurs naturally in the milk and body fat of ruminant animals. In 1986 it was shown that CLA inhibited chemically-induced epidermal neoplasia in mice, thus establishing that CLA possessed biological activity. Since then more than 2000 publications on CLA have appeared in the scientific literature, and it is now established that the two main biologically-active CLA isomers (c9t11 and t10c12 CLA), acting alone or in concert, are able to induce the known physiological effects of CLA. CLA presents many facets that are applicable to research on novel food ingredients, including the importance of pursuing promising if unexpected research leads, the discovery of multifunctional effects and the search for biochemical mechanisms to explain those effects, the importance of collaboration, the challenges and opportunities that arise from worldwide research interest, and the importance of perseverance in obtaining the data needed to assure safety, efficacy, and regulatory acceptance.

AGFD 113 Ecology of geosmin producing Streptomyces and biocontrol of geosmin contamination in Chinese liquor Hai Du, duhaid88@yahoo.com.cn, Hu Lu, Haiyan Wang, Yan Xu. Dept. of Jiangnan Univ., State Key Laboratory of Food Science and Technology, Key Laboratory of Industrial Biotechnology of Ministry of Education, School of Biotechnology, Wuxi, Jiangsu, China Geosmin, a volatile microbial metabolite that is responsible for the earthy odor, frequently and seriously deteriorates the aroma of foods and aquatic products. In former studies, we have also identified geosmin as the source of earthy odor in Chinese liquor. Diverse Streptomyces spp. act as geosmin producer in Chinese liquor-making process, but the ecology of these strains in liquor making is not well understood. Some geosmin-producing Streptomyces secrete anti-fungal compounds against the functional yeasts and moulds. Therefore, the presence of Streptomyces may cause the imbalance of microbial community of brewing system. Our studies have revealed that geosmin-producing Streptomyces are widely distributed during Daqu incubation, and that multiple processing and climate factors can affect their distribution and diversity. More importantly, the growth of geosmin-producing Streptomyces is inhibited when pH is below 5, both in liquid state and in solid state, while the normal fermentation of Chinese liquor is in acidic environment (pH 3-5). Recent work has also shown that some dominant
Nonivamide, a capsaicin analog, increases dopamine and serotonin release in SH-SY5Y cells via a TRPV1-independent pathway

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It is well-known that the chili pepper component capsaicin and its analogs bind to the vanilloid receptor 1 (TRPV1), which evokes a sharp, burning pain in mammals. Current research reveals that capsaicin-induced TRPV1 activation increases dopamine release in dopaminergic neurons. We demonstrate that capsaicin and its analog nonivamide increase dopamine and serotonin release in human neural SH-SY5Y cells. Since nonivamide, like capsaicin, is a known agonist of TRPV1, this receptor is likely to be involved in neurotransmitter signaling. We found that co-incubation of capsaicin with the selective TRPV1 inhibitor trans-tert-butylocyclohexanol (BCH) significantly reduces neurotransmitter release in SH-SY5Y cells. Surprisingly, no significant effect on nonivamide-evoked neurotransmitter release after inhibition of the TRPV1 receptor with BCH was detected. Our data therefore indicate a novel, so far unidentified signaling pathway for nonivamide-induced dopamine and serotonin release, both involved in mechanisms regulating satiation.

Oxidative stability of cashew nut (Anacardium occidentale) oil

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The stability of cashew nut oil against oxidative stability was tested in this study. Oil was extracted from sun-dried freshly harvested cashew nuts using the Folch method. The oil was exposed to the atmosphere at room temperature (25°C) for 20 days and measurements of iodine, peroxide and TBA values were taken at 5-day intervals. The highest increase (121%) was recorded in the TBA value over the 20-day period, while the increase in peroxide value was 48%. The iodine value decreased by 44%. The trend observed is believed to be a consequence of the fatty acid profile of cashew nut oil and the unique molecular events of each parameter measured. The results suggest a predisposition of cashew nut oil to oxidative rancidity at room temperature, and a consequent need for specialised storage conditions in order to maintain product stability.

Optimization by the uniform design and modified simplex method of the separation of biogenic amines in hop pellets by HPLC

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The HPLC separation method of eight biogenic amines has been optimized through uniform design and modified simplex method. An initial simplex was structured by uniform design and a Chromatographic Response Function (CRF) was chosen in order to measure the effect of separation, after four factors had been selected including NH4Ac concentration in solvent A, flow rate, column temperature and derivatization time. The 21st experiment indicated optimum conditions with the highest CRF value. The correlation coefficients are from 0.9915 to 0.9993. The LOD for the amines ranges from 0.007 mg L⁻¹ to 0.029 mg L⁻¹. And the RSD is less than 1.96%. With this condition, seven amines had been detected in hop pellets except Histamine. Considering hop pellets addition is very small (less than 0.1%) in China, the contents of biogenic amines have little influence during brewing, as well as in beer.

Enhancement of the US National Residue Program for meat, poultry, and egg products

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The Food Safety and Inspection Service (FSIS), the FDA, and Environmental Protection Agency are reviewing its current strategy for testing chemical compounds in the National Residue Program (NRP). Under consideration is the process for identifying and ranking chemicals for testing in food, strengthening testing for these chemical hazards, and improving processes for regulatory action taken in response to chemical violations. The goal is a sampling program that tests more effectively for chemical compounds of public health concern, and is flexible in responding to emerging...
hesperetin and hesperidin improved Aβ-impaired glucose utilization by inhibiting Aβ-induced autophagy in neuronal cells. Regulation of Aβ-stimulated autophagy could increase insulin-stimulated neuronal glucose uptake. Moreover, treatment with transporters (GLUTs) and insulin signaling cascades. Confocal images of autophagy punctate further confirmed that down-activation promoted the phenomenon of impairment of neuronal energy metabolism, including glucose uptake, glucose was used to impair insulin-stimulated glucose utilization in Neuro-2A cells. Our data found that Aβ-stimulated autophagy impaired glucose utilization through regulating cellular autophagy in insulin-stimulated neuronal cells. A toxic Aβ1-42 peptide could be applied to flavor protection. The jasmine essential oil was successfully entrapped into nanocapsule or microcapsule, with narrow size distribution (75 nm; 47 µm) and high entrapment yield (87.6%; 85.2%).

**AGFD 119 Determination of gibberellic acid in malt and beer** Jinjing Wang, jjwang@jiangnan.edu.cn, Zhen Xu, Chunfeng Liu, Yongxian Li, Qi Li. Jiangnan Univ., Wuxi, Jiangsu China Gibberellic acid is a plant growth regulator which can speed up the germination of barley and improve the quality of malt when it is added to the malt during malting process. However, it is a suspicious cancerogen that may cause respiratory system disease and liver cancer according to RTECS standard. In this study we developed an efficient method for gibberellic acid measurement by ultra performance liquid chromatograph tandem mass spectrometry. The recovery rate ranged from 70% to 78%. The limit of dertermination reached 0.6µg/L and the relative standard deviation was less than 8.9%. Moreover, gibberellic acid was found to be degraded into a new compound during malting. This compound existed throughout the brewing process in the final beer. The results of this study would give a new direction on residual gibberellic acid detection and benefit the brewery industry.

**AGFD 120 Characterization of pectin from Citrus sinensis (sweet orange) juice** Ashley Galant, ashley.galant@ars.usda.gov, Wilbur Widmer, Gary Luzio, Randall Cameron. Citrus and Subtropical Products Research Unit, USDA, Ft. Pierce, FL In plants, pectin is one of a group of long-chain polysaccharides that are synthesized for the purposes of maintaining cellular structural integrity. While its core element is a backbone of α-(1,4)-galacturonic acid residues, its chemical composition can be quite variable, encompassing arabinan- and galactan-based decorations, methyl and acetyl esterification, etc. Due to its relative abundance and utility as a thickening agent, pectin is incorporated into a wide variety of food products. As in plants, the presence of different modifications can alter pectin's rheological properties, making pectin from some sources better suited to particular applications. Globally, the majority of pectin is extracted from oranges, and while the yield and composition of pectin from orange peels have been relatively well characterized, comparatively less is known about the pectin found in processed orange juice. Here we report new insights on the chemical composition of pectin from frozen concentrated orange juice.

**AGFD 121 Formation of micro/nanoparticle via complex coacervation between gelatin and gum Arabic** Yi Lv, yilv2011@hotmail.com, Xiaoming Zhang. School of Food Science and Technology, Jiangnan Univ., Wuxi, Jiangsu, China The reaction of complex coacervation between gelatin and gum arabic was investigated with the variation of pH (6.5-2.5) and biopolymers mixing ratio (2:1, 1:1 and 1:2, w/w), for the purpose of micro/nanoparticle preparation. Turbidity measurements with HCl or in situ acidifier glucono-d-lactone at 600 nm were separately employed to study the formation of soluble and insoluble complexes, which corresponded to the nanoparticle and microparticle fabrication. For each mixing ratio, the significant two structural transitions were observed, as well as the optimal pH for making micro/nanoparticle. Such results were further testified by evolution of size distribution and microscopic observation (nanoparticle: transmission electron microscopy; microparticle: optical microscopy). Due to the wide range of sources for gelatin and gum arabic, such reaction could be applied to flavor protection. The jasmine essential oil was successfully entrapped into nanocapsule or microcapsule, with narrow size distribution (75 nm; 47 µm) and high entrapment yield (87.6%; 85.2%).

**AGFD 122 Cytoprotective effects of hesperetin and hesperidin against amyloid β-induced impairment of glucose transport through down-regulation of neuronal autophagy** Shang-Ming Huang, Shin-Yi Tsai, Gow-Chin Yen, gcyen@nchu.edu.tw. Department of Food Science and Biotechnology, National Chung Hsing Univ., Taichung, Taiwan Republic of China This study investigated whether flavonoids, such as hesperetin and hesperidin, inhibited Amyloid β(Aβ)-impaired glucose utilization through regulating cellular autophagy in insulin-stimulated neuronal cells. A toxic Aβ1-42 peptide was used to impair insulin-stimulated glucose utilization in Neuro-2A cells. Our data found that Aβ-stimulated autophagy activation promoted the phenomenon of impairment of neuronal energy metabolism, including glucose uptake, glucose transporters (GLUTs) and insulin signaling cascades. Confocal images of autophagy punctate further confirmed that down-regulation of Aβ-stimulated autophagy could increase insulin-stimulated neuronal glucose uptake. Moreover, treatment with hesperetin and hesperidin improved Aβ-impaired glucose utilization by inhibiting Aβ-induced autophagy in neuronal cells.
These findings suggest that down-regulation of autophagy may be one of the approaches to control the impairment of energy metabolism leading to neuronal injury in the early development of Alzheimer's disease, and hesperetin or hesperidin may be a potential agent in the preventing of Alzheimer's disease progression.

AGFD 123 Effect of common additives and brewing time on polyphenolic antioxidant capacity of Nilgiri & Tibetan tea
Suresh Tewani, stewani@citytech.cuny.edu, Akshay Grewal,(1) Chemistry, NYC College of Technology - CUNY, Brooklyn, NY Polyphenol contents in tea, via their antioxidant properties, are considered to have health benefits against several degenerative diseases. Studies have shown that commonly used additives and brewing time could influence the antioxidant capacity of these polyphenols. Two popular teas, Nilgiri and Tibetan, were used to evaluate the effect of brewing time and addition of milk, tea masala, honey and ascorbic acid on the Polyphenolic Antioxidant Capacity (PAC). Total PAC was measured spectrophotometrically by the Folic-Ciocalteu method. PAC of Tibetan tea increased with longer brewing time, however PAC for Nilgiri tea was unaffected. For both teas, addition of milk or tea masala increased PAC, while addition of honey decreased it. Addition of ascorbic acid increased PAC for Nilgiri tea but not for Tibetan tea. These results are significant because common variables in making teas can have substantial effect on its benefits.

AGFD 124 Antioxidative activity of organic vs. conventional milk
Moushumi Paul, moushumi.paul@ars.usda.gov, Diane L Van Hekken.Dairy and Functional Foods Research Unit, USDA-ARS-NAA-ERRC, Wyndmoor, PA Some dairy proteins exhibit antioxidative activity, a property used for marketing foods as beneficial to American consumers. However, factors in milk production and processing that influence this activity are not fully understood. In this study, commercially available homogenized and pasteurized milk samples from conventional and organic dairies were assayed for antioxidative activity. Water-soluble protein mixtures were extracted and activities of samples were measured using the Oxygen Radical Absorbance Capacity (ORAC) assay. Values were compared to determine if the farming system under which the milk is produced exhibited any effect. Results show that activities of milk samples are comparable (58-67 µmol TE/oz) to other products marketed as antioxidant sources, e.g. vegetables and nuts (20-100 µmol TE/g). Additionally, commercially available homogenized and pasteurized milk produced conventionally and organically had similar activities. Assessing the effect of farming system on the activities of milk products will provide consumers information to select a healthy diet.

AGFD 125 Structure-activity relationship of aliphatic compounds for nematocidal activity against pine wood nematode (Bursaphelenchus xylophilus)
Sang-Chul Shin, shinse99@forest.go.kr, Il-Kwon Park.Division of Forest Insect Pests and Diseases, Korea Forest Research Inst., Seoul, Republic of Korea Nematicidal activity of aliphatic compounds was tested to determine a structure-activity relationship. There was a significant difference in nematicidal activity among functional groups. In a test with alkanols and 2E-alkenols, compounds with C8-C11 chain length showed 100% nematicidal activity against pine wood nematode, Bursaphelenchus xylophilus at 0.5 mg/mL concentration. C6-C10 2E-alkenals exhibited >95% nematicidal activity, but the other compounds with C11-C14 chain length showed weak activity. Nematicidal activity of aliphatic compounds with C7-C11 chain length was strong. Compounds belonging to hydrocarbons, alkanals and alkanolic acetates showed weak activity at 0.5 mg/mL concentration. Nematicidal activity of active compounds was determined at lower concentrations. At 0.25 mg/mL concentration, whole compounds except C8 alkanol, C8 2E-alkenol and C7 alkanolic acid showed >80% nematicidal activity. C9-C11 alkanols, C10-C11 2E-alkenols, C8-C9 2E-alkenals and C9-C10 alkanolic acids showed >80% nematicidal activity at 0.125 mg/mL concentration. Only C11 alkanol exhibited strong nematicidal activity at 0.0625 mg/mL concentration, the lowest concentration that was tested.

AGFD 126 Determination and confirmation of oxytetracycline, chlortetracycline, and tetracycline in bovine kidney by LC-MS/MS
Lauren Girard, Lauren.Girard@fda.hhs.gov, Shani Smith, Mayda Lopez, Phil Kijak, Shixia Feng.CVM, USDA, Laurel, MD Oxytetracycline (OTC), tetracycline (TC), and chlortetracycline (CTC) are three approved tetracyclines commonly used to treat bacterical infections in cattle. Tolerance of 12ppm has been established for the sum of the three tetracyclines residues in bovine kidney. The current regulatory method for these antibiotics is a microbiological assay which is non-specific, time consuming, and does not provide information on the amount of each drug present when multiple drugs are used to treat an animal. The objective of this study is to validate a faster and specific LC-MS/MS method for the determination and confirmation of the three tetracyclines in bovine kidney and then bridge it to the microbiological method. The new method involves performing liquid and solid phase extraction. Kidney samples are chromatographically resolved with a Polar-RP Synergi column and analyzed by triple quadrupole tandem mass spectrometry. The method has been thoroughly validated according to relevant FDA guidelines.

AGFD 127 2-Monoacglycerol acyl migration: Effect of fatty acid desaturation
David L Compton, david.compton@ars.usda.gov, Jospeh A Laszlo, Michael Appell, Karl E Vermillion, Kervin O Evans.National Center for Agricultural Utilization Research, Agricultural Research Service, USDA, Peoria, IL 2-Monoacylglycerols (2-MAG) are key synthetic intermediates used for the synthesis of ABA-type triacylglycerols where B is a highly unsaturated fatty acid at the glycerol sn-2 position and A are medium-chain saturated fatty acids at the glycerol sn-1,3 position. ABA-type structured lipids are an integral part of research conducted to understand human physiological effects of the gut, liver and brain. This research investigated the effect of desaturation on spontaneous acyl migration in 2-MAG. Density functional modeling of C18:1, C18:2,
and C18:3 2MAG predicted that desaturation had little effect on acyl migration, yielding activation energies of 36.26, 35.65, and 37.18 kJ mol\(^{-1}\), respectively, all of which were within the error of calculation, 4.18 kJ mol\(^{-1}\). 1H NMR kinetic measurements yielded relative energies of activation two fold higher than the predicted values, 73.3, 68.0, and 72.9 kJ mol\(^{-1}\), respectively, but confirmed that desaturation had very little effect on acyl migration rates.

**AGFD 128  Next generation of superfruits: Enhancing anthocyanin rich black raspberries**  Jungmin Lee1, jungmin.lee@ars.usda.gov, Michael Dosssett2, Chad E. Finn3. (1) Horticultural Crops Research Unit worksite, USDA-ARS, Parma, ID (2) Pacific Agri-Food Research Centre, Agriculture and Agri-Food Canada, Agassiz, B.C. Canada(3) Horticultural Crops Research Unit, USDA-ARS, Corvallis, OR  Our research group has worked the last seven years on developing black raspberries with improved disease resistance and phytochemical traits. We have been awarded USDA/NIFA-Specialty Crops Research Initiative (SCRI) funding to continue our project as a multi-region and international collaboration enhancing black raspberries. Current interest in the rich color of black raspberries, and their historical use as an effective dye, derive from their anthocyanin composition and content. Here, we report our findings on 1044 analyzed samples, including new data from 78 wild populations representing 18 states and two Canadian provinces. All were collected as wild seedlings, grown in a common environment, and evaluated over two growing seasons. Total anthocyanins in normally pigmented fruit ranged from 39-996 mg/100 mL-1 (expressed as cyanidin-3-glucoside; 25 fold difference), confirming that not all black raspberries are equal in natural pigment production. We have also identified a unique mutant black raspberry that lacks rutinoside-containing anthocyanins. Until the discovery of this mutant, the anthocyanins of black raspberries were considered to comprise of (in elution order): cyanidin-3-sambubioside, cyanidin-3-xylosylrutinoside, cyanidin-3-glucoside, cyanidin-3-rutinoside, pelargonidin-3-rutinoside, and peonidin-3-rutinoside. A reassessment of the literature, concurrent with our data, showed that some reports had misidentified cyanidin-3-xylosylrutinoside as cyanidin-3-sambubioside-5-rhamnoside. We recently published a review article to rectify many such conflicting issues with black raspberry information. Our presentation will incorporate some of these findings.

**AGFD 129  Super gas barrier of all polymer multilayer films**  David Hagen1, david_hagen@neo.tamu.edu, Jaime C. Grunlan1,2, jgrunlan@neo.tamu.edu, You-Hao Yang2. (1) Dept. of Mechanical Engineering, Texas A&M Univ., College Station, TX (2) Dept. of Chemical Engineering, Texas A&M Univ., College Station, TX  Thin films of branched polyethyleneimine (PEI) and poly(acrylic acid) (PAA), prepared using layer-by-layer assembly, have been studied in an effort to produce all-polymer thin films with low oxygen permeability. Altering the pH of PEI and PAA results in large thickness variations (from 90 nm to 4.74 μm for 30-bilayer films). Cross-linking these films with glutaraldehyde (GA) resets exponential growth by inhibiting polymer interdiffusion. AFM images show the surface morphology of PEI/PAA changes according to pH, with surface roughness ranging from 2.1 to 49.1 nm. An oxygen transmission rate below 0.005 cm3/(cm2 day) is obtained with an 8 bilayer film of PEI at pH 10 and PAA at pH 4, having a thickness of only 305 nm. This unique thin film barrier (PO2 < 3.2 × 10-21 cm3 (STP) cm/(cm2 s Pa)) is a promising alternative to current polymeric membranes, flexible electronics, and food packaging materials.

**AGFD 130  Dietary flavonoids induced the activity of P-glycoprotein, an efflux drug transporter**  Chung-Ping Yu, ping0718@gmail.com, Parameswaran Hariharan, Shang-Yuan Tsai, Yu-Chi Hou, Pei-Dawn Lee Chao. School of Pharmacy, China Medical Univ., Taichung, Taiwan Republic of China  Flavonoids are polyphenol antioxidants widely present in fruits, vegetables and dietary supplements. P-glycoprotein (P-gp) is an efflux transporter associated with drug absorption and drug resistance. This study investigated the effect of various dietary flavonoids on the transport activity of P-gp. Six flavonoid aglycones (quercetin, baicalein, naringenin, hesperetin, genistein and daidzein) and their respective glycosides (rutin, baicalin, naringin, hesperidin, genistin and daidzin) were compared for their influence on the intracellular accumulation of rhodamine 123, a typical P-gp substrate, in LS 180 cells. The results showed that all flavonoid aglycones and their glycosides significantly decreased the intracellular accumulation of rhodamine 123. Among the tested flavonoids, hesperetin and naringenin exhibited stronger acute activation effects, while for longer incubation daidzein and genistein were stronger activators. Dietary flavonoids enhanced the efflux activity of P-gp and may result in decreased absorption of medicines which are P-gp substrates.

**AGFD 131  Milk Thistle decreased oral bioavailability of cyclosporine via activation of Pgp**  Pei-Dawn Lee Chao1, pdlchao@gmail.com, Shih-Ying Yang2, Shang-Yuan Tsai1, Yu-Chi Hou1. (1) School of Pharmacy, China Medical Univ., Taichung, Taiwan Republic of China (2) Graduate Inst. of Pharmaceutical Chemistry, China Medical Univ., Taichung, Taiwan  Milk thistle (MT) has been used as a nutraceutical for liver protection worldwide. Cyclosporine (CsA, Neoral®), an important immunosuppressant with narrow therapeutic window, is widely used in transplant patients for preventing allograft rejection. This study investigated the effect of MT on the pharmacokinetics of CsA, a probe drug of P-gp and CYP 3A. Rats were orally administered CsA with and without MT in a parallel design. The blood concentrations of CsA were determined by a fluorescence polarization immunoassay. The results showed that 0.5 and 1.0 capsule/kg of MT significantly decreased the Cmax of CsA by 78% and 80%, and reduced the AUC0-540 by 74% and 79%, respectively. Mechanism studies indicated that MT induced the function of P-gp, whereas CYP3A was not affected. In conclusion, MT decreased the bioavailability of CsA through activating P-gp. Transplant patients treated with Neoral® should avoid MT to minimize the risk of allograft rejection.
AGFD 132 Effects of green tea ingestion on the changes of immune responses after high-intensity exercise  Shih-Hua Fang, shfang@ntce.edu.tw. Inst. of Athletics, National Taiwan Univ. of Physical Education and Sport, Taichung, Taiwan Excessive amounts of high-intensity exercise may impair immune function. Green tea contains various polyphenolic flavonoids and the beneficial health effects may be mediated by its potent anti-oxidative activity and immunomodulatory effects. In a randomized crossover design, 14 chouchoukball players played for two competitive training matches which were separated by a 1-week resting period. Participants ingested placebo (PL) or green tea (GT) 1 h before the match. Blood samples were collected before consumption of beverages and immediately post-exercise. There was a significant increase in CD4+/CD8+ ratio, CD4+/CD69+ cell and CD14+/TLR2+ cell after game. Additionally, the percentage of CD56+ CD16+ cell significantly increased on GT, but not on PL. At the same time, there was a significant reduction in phagocytic capacity on GT. These major findings suggest that green tea ingestion not only elevated innate immune responses after intensive exercise but also compromised inflammation by decreasing the level of muscle damage.

AGFD 133 Pharmacokinetics and tissue distribution of resveratrol and emodin in rats after intake of Polygonum cuspidatum Yu-Chi Hou1, hou5133@gmail.com, Shiuan-Pey Lin1, Meng-Hao Wu2, Shang-Yuan Tsai1, Pei-Dawn Lee Chao1.(1) School of Pharmacy, China Medical Univ., Taichung, Taiwan (2) School of Pharmaceutical Sciences and Chinese Medicine Resources, China Medical Univ., Taichung, Taiwan The rhizome of Polygonum cuspidatum (PC) contains polyphenols such as resveratrol and emodin. In order to understand the pharmacokinetics and tissue distribution of polyphenols in PC, rats were given water extracts of PC. At predetermined time points, blood samples were withdrawn via cardipuncture. In addition, after 7 doses of PC (2 g/kg), the brain, liver, lung, kidney, and heart were collected. The concentrations of resveratrol and emodin as well as their metabolites in plasma and tissues were assayed by using HPLC. The results showed that the major forms in plasma were glucuronides/sulfates of resveratrol and glucuronides of emodin, whereas no free forms were detected. In the studied organs, the conjugated metabolites of resveratrol and emodin were the major molecules, except emodin present mainly as free form in liver. In conclusion, conjugated metabolites of resveratrol and emodin are predominant in the circulation and most organs after intake of PC.

AGFD 134 Preparation, characterization, and utilization of polyphenol-modified gelatin products  Maryann M Taylor, maryann.taylor@ars.usda.gov, Marjorie B Medina, Eleanor M Brown, CK Liu.USDA ARS ERRC, Wyndmoor, PA Vegetable tannins, polyphenolic extracts from plant materials, are used for production of heavy leathers for saddles, belts and shoe soles. Our research is oriented toward utilization of technical gelatins to make products for leather processing. Polyphenolic acids were investigated for their ability to modify gelatin. They can react under oxidizing conditions with side chain amino groups of peptides to form cross-links in proteins and could give products with enhanced properties. Before investigating individual polyphenolic acids, we tested tannins (e.g. quebracho), for their utility in gelatin crosslinking, and found that tannin-modified gelatin products had improved physical properties (gel strength, viscosity). Molecular weight determinations showed extensive alterations in the gelatin profile. Products were applied in leather processing and phenolic content was determined. Results indicated that leather products with improved quality could be attained using materials from sustainable, environmentally friendly resources.

AGFD 135 Photodegradation of the herbicide Imaethapyr on soybean and corn wax  Amanda M Nienow, anienow@gustavus.edu, Megan Crow, mcrow@gustavus.edu, Maja C Johnson.Chemistry, Gustavus Adolphus College, St. Peter, MN Imaethapyr is an herbicide commonly used in the Midwestern U.S. on corn and soybean crops. Previous studies have observed photolysis as one of the major pathways of environmental degradation. The goal of this study was to determine the rate of degradation of imazethapyr on plant waxes, considering that the herbicide is applied directly to crops in the field. Imaethapyr solutions were irradiated on glass, aqueous, corn wax, and soybean wax surfaces under simulated UV light and analyzed using HPLC. The imazethapyr degraded the fastest on the aqueous and glass surfaces. The soybean wax was notably slower, and the corn wax showed little degradation. This suggests that the composition of the plant wax has a significant slowing effect on the degradation rate of imazethapyr. Current work is underway to characterize the waxes to understand the reason wax affects degradation, as well as studying degradation of imazethapyr on plant leaves.

AGFD 136 Fate of conjugated steroid hormones in concentrated animal feeding operation wastewater  Yonghong Zou, yhzou@illinois.edu, Brian Meschewski, Wei Zheng.Illinois Sustainable Technology Center, Univ. of Illinois Urbana-Champaign, Champaign, IL Concentrated animal feeding operations (CAFOs) generate large volumes of animal wastes including manure-contaminated wash and runoff water. An emerging threshold issue to this practice, however, is the potential transfer of organic contaminants such as veterinary pharmaceuticals and animal hormones from the CAFO water to soil, which may subsequently enter into the surrounding aquatic environments by leaching and runoff. In this study, the degradation kinetics and mechanisms of three hormone conjugates (17α-estradiol-3-sulfate, 17β-estradiol-3-sulfate, and estrone-3-sulfate) in aqueous solutions blended with CAFO wastewater under aerobic and anaerobic conditions were investigated. The degradation of the three conjugated hormones in the CAFO wastewater was predominated by biodegradation. The anaerobic biodegradation of three conjugates was much slower than aerobic biodegradation. Their degradation pathways were also proposed based on the identified metabolites. The information in this study is useful for assessing the potential environmental risk of steroid hormone contaminants associated with CAFO wastewater land application.
AGFD 137 New antibacterial germacrene from Verbesina negrensis Steyer
t Marcelo J Nieto1, mnieto@siue.edu, Flor D Mora1,2, Lara Alpan3, Vance McCracken3.(1) Dept. of Pharmaceutical Sciences, Southern Illinois Univ. Edwardsville, Edwardsville, IL (2) Dept.o de Farmacognosy a y Medicamentos Organicos, Universidad de Los Andes, Merida, Venezuela (3) Dept. of Biological Sciences, Southern Illinois Univ. Edwardsville, IL Verbesina, an annual-to-herbaceous perennial from the Americas, represents the largest genus of the Heliantheae tribe in the Asteraceae family. Several Verbesina species are used to treat a variety of disorders, including urinary and gastrointestinal tract complaints. Importantly, many Heliantheae compounds also possess antiparasitic, antifungal, and antioxidant activity. The most common secondary metabolites found in Verbesina genus are the eudesmanes. In addition, germacrenes, flavonoids, guanidine alkaloids, acetylenic compounds, and several other terpenes with a great variety of hydrocarbon skeletons have been isolated. The active chloroform extract obtained from the aerial parts of Verbesina negrensis was subjected to a bioassay-guided fractionation using disk-diffusion assays. This approach allowed the isolation and identification of the novel active compound 6ß-cinnamoyloxy-1ß-hydroxy-10a-metoxy-3-oxo-germacra-4,5Z-ene (1). Subsequent MIC tests revealed growth inhibition (64 µg/mL) against both Enterococcus faecalis (ATCC 29212) and Staphylococcus aureus (ATCC 25923) for Verbesina fractions containing 1. These results constitute the first report of active compounds from Verbesina negrensis.

AGFD 138 Larvicidal activity of seaweeds from northeastern Brazil and of a halogenated sesquiterpene against the dengue mosquito (Aedes aegypti) Everson M. Bianco, Luana Pires, Geanne K. N. Santos, Kamilla A. Dutra, Thiago N. V. Reis, Edson R. T. P.P. Vasconcelos, Adilma L. M. Cocentino, Daniela M.A.F. Navarro, navarrrix@uol.com.br Dept. of Fundamental Chemistry, Federal Univ. of Pernambuco, Recife, Pernambuco Brazil Aedes aegypti is considered the main vector of a group of arboviruses responsible for dengue and yellow fever. In searching to find natural products that could be employed in the effective control of this mosquito, the larvicidal activities of crude extracts from 15 seaweed species from northeastern Brazil have been determined. Extracts of Canistrocarpus cervicornis, Laurencia dendroidea, Hypnea musciformis and Chaetomorpha antennina at concentrations of 300ppm showed ~50% mortality against fourth instar larvae of A. aegypti. The strongest larvicidal activities (>91% mortality at 50ppm) were obtained with extracts of L. dendroidea. A halogenated sesquiterpene, identified at elatol was isolated by sequential fractionation of the n-hexane extract of this species of seaweed, which exhibited potent larvicidal activity with an LC50 value of 10.7 ppm. The large scale isolation of elatol from seaweed could represent an interesting prospect for the production of a novel agent against the dengue mosquito.

AGFD 139 Effect of nitrogen treatment on the antioxidant capacity of Aronia melanocarpa grown in Maryland Blessing C. Aroh1, bcaroh@umes.edu, Baruch Volks1, Shudeep Mathew2, Andrew G. Ristvey2, Victoria V. Volks1.(1) Natural Sciences, The Univ. of Maryland Eastern Shore, Princess Anne, MD (2) Way Research and Education Center, P. O. Box 169, Univ. of Maryland Extension, Queenstown, MD Aronia Melanocarpa is a landscape quality plant which by properties is an ideal candidate for organic fruit production; and it contains high concentrations of flavonoids, considered potent antioxidants. Recent studies have implicated the relationship between in-field plant nutrient fertility and antioxidant production in Aronia. Here we present the antioxidant content data for samples of aronia melanocarpa as a function of different age, amount of time spent in the sun or shade, and nitrogen treatment levels of crops. ORAC factor, anthocyanin and polyphenols content are tested in order to determine the treatment that produce the highest capacity of antioxidants in Aronia. We have shown that that the level of nitrogen treatment in the soil does, in fact, influence the antioxidant capacity significantly. Detailed measurements and analysis of all data will be presented and discussed.

AGFD 140 Assessing exposure to BPA for infants, toddlers, and adults Karen R. Hatwell1, karen.hatwell@fda.hhs.gov, Jeremy J. Mihalov2, Allan B. Bailey1.(1) Division of Food Contact Notifications, US FDA, College Park, MD (2) Division of Biotechnology and GRAS Notice Review, US FDA, College Park, MD The US FDA (FDA) used laboratory results, literature data on BPA levels in various food categories, and statistical techniques utilizing food consumption data from the National Health and Nutrition Examination Survey (NHANES) to calculate the dietary exposure to bisphenol A (BPA) for infants, toddlers, and adults from the consumption of infant formula, toddler food, canned foods and the use of infant feeding bottles. The approach was made public in October 2008 and will be described therein.

AGFD 141 Assessing the exposure to organotin compounds from food contact applications Karen R. Hatwell, karen.hatwell@fda.hhs.gov, Petra N. Turowski, Allan B. Bailey.Division of Food Contact Notifications, US FDA, College Park, MD In order to assess the safety of organotin compounds (OTCs) from food contact applications, the US FDA (FDA) reviewed the available chemistry information on food contact applications, including the US regulatory status, uses, levels in food, and available consumer exposure estimates. The approach will be described therein.

AGFD 142 Microbial transformation of fluthiacet-methyl Appavu Chandrasekaran1, appavu.chandrasekaran@fmc.com, Shaaban ElNaggar1, Shaaban.elnaggar@fmc.com, Sridhar Gopishetty2, Mark Schocken3, Venkiteswaran Subramanian2, Larry Dostal2. (1) FMC Corporation, Ewing, NJ, (2) The Univ. of Iowa Center for Biocatalysis and Bioprocessing, Coralville, IA (3) Exponent, Inc., Sudbury, MA Fluthiacet-methyl (FM), acetic acid, [2-chloro-4-fluoro-5-[(tetrahydro-3-oxo-1 H,3H-[1,3,4]thiadiazolo-[3,4-a]pyridazin-1-ylidene]amino]phenyl]thiolo]-methyl ester, is a low use rate post-emergence herbicide. FM
is marketed by FMC Corporation under the trade name Cadet® for control of certain annual broadleaf weeds in corn and soybeans. The aims of this study were to use microbes to generate analytical standards for metabolites of FM and also to obtain insight into the metabolism of FM. For initial screening, twelve microbial strains representing bacteria, actinomycetes and fungi that are known to contain cytochrome P450 monoxygenase or related enzymes were selected. The microorganisms used in this study included Bacillus megaterium, Cunninghamaella elegans, Mycobacterium smeagis, Streptovercillium griseocarneum, Penicillium chrysogenum, Psuedomonas putida, Candida tropicais, Nocardia carolina, Streptomyces griseus, Streptomyces rimosus, Rhizopus sp. and Absidia pseudocylindraspora. Following incubation of FM at a concentration of 0.4 mg/mL with microbial cultures for 144 hours, the media were extracted with ethyl acetate after pH adjustments. The extracts were initially analyzed by TLC and then by HPLC. Metabolites were tentatively identified by chromatographic comparison to reference standards and their identities were confirmed by HPLC-MS. TLC chromatograms of the extracts revealed that eight of the twelve microorganisms metabolized FM with high yield, while the other four metabolized FM to a lesser extent. The major metabolite that was common to all microbes included an isomerization product of the FM acid. The ester hydrolysis product and a sulfoxidation product were also observed. The data also indicated the formation of hydroxy metabolites by several microbes in addition to ketone reduction. The hydroxylation appeared to occur on the pyridazine ring and the reduction of the ketone in the five-membered ring. In conclusion, all twelve of the naturally occurring microbes that were used in this study were able to metabolize FM. FM is metabolized via multiple pathways that included hydrolysis, isomerization, sulfoxidation, hydroxylation and ketone reduction. Some of these microbes can be utilized to synthesize analytical standards for FM metabolites. The data also suggest that given the low use rate and rapid degradation by microorganisms, thuliacet-methyl will not be persistent in the environment.

AGFD 143 Synthesis and biological activity of a tangeretin bioisosteric compound Shiming Li1, shiming@rutgers.edu, Jennifer Zhang2, Min-Hsiung Pan3, Jianhan Wang4, Chi-Tang Ho1, ho@aesop.rutgers.edu,(1) Dept. of Food Science, Rutgers Univ., New Brunswick, NJ (2) West Windsor-Plainsboro High School South, West Windsor, NJ (3) Dept. of Seafood Science, National Kaohsiung Marine Univ., Kaohsiung, Taiwan, (4) Babson College, Babson Park, MA Tangeretin, one of the major components of polymethoxyflavones existing in citrus peels, has shown to exhibit many biological properties including anti-inflammatory and anti-carcinogenic activities. Our previous study has also found that 5-desmethyalted tangeretin, naturally occurring in citrus peels in a minor amount, showed stronger bioactivity than that of its 'parent compound' tangeretin. However, it has been observed that the aqueous solubility of 5-desmethyalted tangeretin is too low to portray accurate readings from bioactivity tests. To obtain good bioavailability and effective bioactivity evaluation of 5-desmethyalted tangeretin, we have designed its 'pro-drug' form, or bioisosteric compound, 5-acetyloxy-6,7,8,4'-tetramethoxyflavone. In the presentation, we report the synthesis, purification and biological study of 5-acetyloxy-6,7,8,4'-tetramethoxyflavone.

AGFD 144 Isolation and biological activity screening of (-)-epicatechin gallate from green tea Shiming Li1, shiming@rutgers.edu, Jianhan Wang2, Min-Hsiung Pan3, Chi-Tang Ho1, ho@aesop.rutgers.edu,(1) Dept. of Food Science, Rutgers Univ., New Brunswick, NJ (2) Babson College, Babson Park, MA (3) Dept. of Seafood Science, National Kaohsiung Marine Univ., Kaohsiung, Taiwan Tea (Camellia sinensis), has attracted public attention because of accumulating scientific evidence linking tea consumption with health promoting benefits. Fresh tea leaves contain four major tea catechins, namely (-)-epicatechin (EC), (R)-epigallocatechin (EGC), (R)-epicatechin gallate (ECG) and (S)-epigallocatechin galate (EGCG). These green tea catechins are reported to have many biological activities including anti-oxidant, anti-carcinogenic, anti-obesity, and reducing the contents of RCS (reactive carbonyl species) and ROS (reactive oxygen species) that are evidenced to have detrimental effects for human health. Many in vitro and in vivo biological studies have been performed for EGCG because of its ready availability. In this presentation, we report our study in the isolation, purification and biological study of another rich catechin in green tea - ECG. By employing an LH-20 Sephadex column with mixed eluting solvents of ethanol and water, we have successfully isolated pure ECG and our initial screening of its biological activity showed that ECG has anti-inflammatory property. Our results demonstrate that ECG downregulates inflammatory inducible nitric oxide synthase (iNOS) and cyclooxygenase-2 (COX-2) gene expression by inhibiting the activation of NFkB in macrophages.

AGFD 145 Toxicology evaluation of Meso-Zeaxanthin Shiming Li1, shiming@rutgers.edu, Xinde Xu2, xuxinde-2000@hotmail.com, Lihua Zhang2, Bin Shao2, Xiaoxia Sun2, Shuangming Ye2, Leiming Yu2, Mingqing Jiao2, Chi-Tang Ho1.(1) Dept. of Food Science, Rutgers Univ., New Brunswick, NJ (2) Xinchang Pharmaceutical Factory, Zhejiang Medicine Co., Ltd., Xinchang, Zhejiang China Meso-Zeaxanthin belongs to xanthophyll family of carotenoids. Meso-Zeaxanthin, zeaxanthin and lutein have closely related structures, have high concentration in macula, and are believed to play a major role in protecting retinal constituents from free radicals. Scientists became interested in exploring potential health benefits of Meso-Zeaxanthin because Meso-zeaxanthin is not present in the human blood or other organ tissues, but it can be found in human eyes. Meso-zeaxanthin represents approximately 25% of the total amount of zeaxanthin in fovea of retina, whereas 15% in the whole retina. More and more evidences show that the presence of meso-zeaxanthin is the result of transformation from retinal lutein in the eyes especially within the retina. Recently, xanthophylls like lutein, (R,R)-Zeaxanthin and (R,S)-Zeaxanthin have attracted more and more attention in the fields of medicine, nutrition and functional food. Therefore, a complete toxicological assessment of meso-zeaxanthin has been performed, including genotoxicity, acute oral toxicity and a 90-day sub-chronic toxicity. We have found that Meso-Zeaxanthin has no acute toxicity and no genotoxicity, the use of Meso-Zeaxanthin is safe at
dose of 300 mg/kg bw/day in rats for 90-day feeding, application of a 100-fold safety factor to the rat study, the ADI level is 3 mg/kg bw/day. Thus, it is indicated that Meso-Zeaxanthin is safe for human consumption from our extensive study.

**AGFD 146 Larvicidal activity of Bowdichia virgilioides extracts against Aedes aegypti L. (Diptera: Culicidae)** Patricia Cristina Bezerra da Silva, patricia.c.bezerra@hotmail.com, Daniela Maria do Amaral Ferraz Navarro, Jefferson C. Santos, Andrea L. B. D. Santana, Claudia A. Maranhão, Kamilla A. Dutra, Geanne K. N. Santos.Dpt. of Fundamental Chemistry, Federal Univ. of Pernambuco, Recife, Pernambuco CEP Brazil In the search for natural chemical control against Aedes aegypti L., many researches are developed and encouraged in order to find new insecticidal substances from plants. In this work, the larvicidal effect of ethanolic and cyclohexanic extracts of stem bark of Bowdichia virgilioides was tested on A. aegypti. The larvicidal activity, based on the percentage of larval mortality, was evaluated after 48h exposure to the treatments. The cyclohexanic extract showed 100% mortality at 50 mg/L. Using a bioassay-directed fractionation of the extract, the active constituent was isolated and characterized as a fraction with a mixture of the alkaloids: medicarpin and maackiain, that showed a LC50 of 18 mg/L. Its structures were established on the basis of 1H and 13C NMR spectra, GC-MS analysis and by comparison with the literature values. Our results suggest that medicarpin and maackiain may be considered as a promising natural mosquito larvicidal agent.

**AGFD 147 Biosensor detection of staphylococcal enterotoxin A and B in cultures after removal of Protein A with immuno-affinity chromatography** Marjorie B. Medina1, Qiongqiong Li1,2, Melissa.Li@ars.usda.gov, Xiaomin Yao2.(1) USDA, Agricultural Research Service, Eastern Regional Research Center, Wyndmoor, PA (2) Bor S. Luh Food Safety Research Center, Dept. of Food Science and Technology, Shanghai Jiao Tong Univ., Shanghai, China A surface plasmon resonance (SPR) biosensor method was developed for detection of staphylococcal enterotoxins A (SEA) and B (SEB) in cultures after removal of Protein A with affinity chromatography. Protein A is also produced in bacterial cultures interferes with immunoassay techniques resulting in inaccurate detection of SEA or SEB and fouling of the sensors. Four strains of Staphylococcus aureus were cultures and the toxins were analyzed with an SPR biosensor sandwich immunoassay technique. Analysis of two batches of cultures showed that strain S-6 produced 5.76 µg/mL SEB but also contained 96.5 ng/mL SEA; FRI-100 produced 2.40 µg/mL SEA and 27.88 ng/mL SEB; FRI-196 produced 801 ng/mL SEA with 88.5 ng/mL SEB; and FDA-196e produced 113.6 ng/mL SEA with 9.95 ng/mL SEB. SEA and SEB were co-produced by these strains, and immuno-affinity clean-up allowed at least 5 - 12 separate analysis with RSDs below 12%. Artificially inoculated food samples will be analyzed using these procedures.

**AGFD 148 Antimicrobial properties of cumin oil nanoemulsions** Limin Guo1,2, guolm_xj@163.com, Shiqi Xul, Qian Zhang2, Qingrong Huang1.(1) Food Science, Rutgers Univ., New Brunswick, NJ (2) Inst. of Agro-Food Storage and Science &Technology, Xijiang Academy of Agricultural Sciences, Urumqi, Xinjiang, China The effects of oil-in-water nanoemulsions on cumin oil extracted by supercritical fluid have been investigated to improve its stability and application. Cumin oil nano-emulsion was prepared by high pressure homogenization through mixing with modified starch and medium-chain triacylglycerol (MCT), followed by spray drying. Response surface methodology revealed that 12% cumin oil nano-emulsions formed at S0 ratio (cumin oil concentration to mixed surfactant concentration) 1:1 and applied high pressure 1000MPa for 10 cycles had droplet size below 150 nm. The rheological parameters of the nanoemulsions were tested with several formulations and ratios of cumin oil and MCT. The antimicrobial activities of crude oil and emulsions with and without surfactants were analyzed to evaluate the delivery system of nanoemulsion. The results suggested that, despite of Ostwald ripening, the droplet size of cumin oil nanoemulsion remained stable in a prolonged storage time of more than five weeks.

**AGFD 149 Chemical diversity of capsinoids and polyphenols in Capsicum spp** Daniel J Giurleo1,2, dgiurleo@gmail.com, Kelsey A Gustafson1,2, kelseyagustafson@gmail.com, Jafar Chaudhry1, Jasminder Singh1, Thomas Villani1,2, Albert Ayeni1, Tom Orton1, Ed Dager1, Robert Pyne1, Chung Park1, Qingli Wu1,2, James Simon1,2,(1) Dept. of Plant Biology and Pathology, Rutgers Univ., New Brunswick, NJ (2) Dept. of Medicinal Chemistry, Ernest Mario School of Pharmacy, Rutgers Univ., Piscataway, NJ Chili peppers are one of the most popular spices consumed for centuries all over the world due to their piquancy and pungency. The ease in their hybridization has led to exciting new variations in flavor, color, shape and pungency within and between Capsicum species and new varieties. Capsaicin and dihydrocapsaicin are the two compounds, which are primarily responsible for a pepper's pungency. In this study, the content of capsaicin and dihydrocapsaicin in 3 C. spp. and prospective C. chinense-C. frutescens hybrids of 70 pepper varieties and lines were quantified using HPLC. Additionally, total polyphenols were determined using the Folin-Ciocalteu assay and spectrophotometric methods and antioxidants measured via the ABTS assay. Significant variation in alkaloid content and polyphenols was observed both between and within species.

**AGFD 150 Lactobacillus plantarum fermentation of protein enhanced cassava flour** Maria U. Rosales-Soto1, marsoales@wsu.edu, D. Scott Mattinson2, Peter Gray1, Joseph R. Powers1.(1) Dept. of Food Science, Washington State Univ., Pullman, WA (2) Dept. of Horticulture and Landscape Architecture, Washington State Univ., Pullman, WA Suitability of Lactobacillus plantarum strain 6701 was investigated for use as starter for fufu, a common cassava-based staple in West Africa, using high protein-genetically modified (zeolin, sorparezin, sorparezin plus pro-vitamin A and pro-vitamin A enhanced) and
wild type cassava flours in lab-scale fermentation for 4 days. Initial lactic acid bacteria count in uninoculated (control) and inoculated wild type cassava were 5.19 and 8.19 log CFU/g, respectively. After 3 days, the LAB count in L. plantarum sample was similar to uninoculated control. The added strain rapidly increased titratable acidity e.g. 0.24 to 0.96% lactic acid at 24 h to 1.18% at 96 h with wild type cassava. Volatile compounds such as nonanal and 1-hexanal were detected in all cassava samples at 0 h. Results of this study showed that use of L. plantarum is feasible for production of fufu from transgenic cassava while increasing the consumption of a more nutritious product.

AGFD 151 Volatile compounds in milled/no-mill Queso Fresco during storage  Diane L Van Hekken, diane.vanhekken@ars.usda.gov, Susan K Iandola, Michael H Tunick. Dairy & Functional Foods Research Unit, USDA, Agricultural Research Service, Wyndmoor, PA The profile of volatile compounds that contribute to the flavor of Queso Fresco (QF), a popular high-moisture Hispanic-style cheese, is not well defined. The effects of curd milling on the volatile compounds in QF were determined for cheeses aged at 4C for up to 8 wks. Volatiles from preheated cheese were absorbed onto a DVB/CAR/PDMS SPME fiber and separated on a GC-MS system using a DB5 column. Profiles for the volatile compounds changed as the cheeses aged, with 12 compounds identified at wk 1, 14 at wk 4, and 20 at wk 8. Nonanal was prominent in fresh and wk 4 cheeses while 2, 3-butanediol, hexanoic acid, 3-methyl butanal, octanoic acid and phenyl ethyl alcohol were prominent at wk 8; profiles were similar among the milling treatments. The lipolysis and proteolysis that occurred in QF during aging had a greater impact on the volatile compounds present in the cheese than the curd-milling step. Manufacturers of QF can omit the traditional time-consuming milling step without concern for altering its flavor-producing volatile compounds.

AGFD 152 Bioassay-guided isolation of cytotoxic constituents from Carex vulpinodea seeds  Daniel Niesen1, Antonio Gonzalez-Sarrias1, Tao Yuan1, Geneive E. Henry2, Navindra P. Seeram1, nseeram@uri.edu. (1) Univ. of Rhode Island, Bioactive Botanical Research Laboratory, Dept. of Biomedical and Pharmaceutical Sciences, College of Pharmacy, Kingston, RI, (2) Susquehanna Univ., Dept. of Chemistry, Selinsgrove, PA Recent studies from our group have identified bioactive stilbenoids, including resveratrol oligomers, from previously uninvestigated Carex species collected in Pennsylvania, US. This is of great interest to the nutraceutical industry given that resveratrol, a constituent of grape and red wine, has attracted immense research attention due to its potential human health benefits. Here Carex vulpinodea seeds were evaluated using cytotoxicity-assy guided isolation against human colon cancer (HCT-116; Caco-2) cells. Hopeaphenol (IC50 = 2.5 micro M), a resveratrol tetramer, was identified as a major bioactive compound along with other polyphenols including quercetin and eriodictyol. Thus, given the wide prevalence and underutilization of Carex species in the US, these plants may have potential application in the nutraceutical industry. Also, this is the first reported study of C. vulpinodea species.

AGFD 153 Anticancer and structure activity related (SAR) studies of maple gallotannins  Antonio Gonzalez-Sarrias, Tao Yuan, Navindra P. Seeram, nseeram@uri.edu.Bioactive Botanical Research Laboratory, Dept. of Biomedical and Pharmaceutical Sciences, College of Pharmacy, Univ. of Rhode Island, Kingston, RI Gallotannins are hydrolyzable tannins found in berries, tea, wine and other plant foods. Here we conducted anticancer and structure activity related (SAR) studies of twelve gallotannins isolated from sugar (Acer saccharum) and red (Acer rubrum) maple species which are primarily used to produce maple syrup. The gallotannins, ginnalins A-C and maplexins A-I, differ in the number of galloyl groups connected to a 1,5-anhydro-D-glucitol core. The gallotannins were evaluated for antiproliferative effects against human colon (HCT-116) and breast (MCF-7) cancer cells. While the gallotannins with one galloyl group were not active, those with two galloyls were more active than those with three galloyls (IC50 = 28-50 vs. 64-112 mg/mL). Also, maplexins GD, which contained two galloyls, induced apoptosis and arrested cell cycle (in S-phase) of the cancer cell lines. However, ginnalin A, which also contained two galloyls, arrested cell cycle but did show apoptogenic effects against the cancer cells. Thus, the anticancer effects of maple gallotannins are influenced by the number of galloyl groups and are mediated by apoptosis and cell cycle arrest.

AGFD 154 Anti-inflammatory effects of a solid lipid curcumin particle formulation  Pragati Nahar, Maureen Driscoll, Angela Slitt, Navindra P. Seeram, nseeram@uri.edu.Ddept. of Biomedical and Pharmaceutical Sciences, College of Pharmacy, Univ. of Rhode Island, Kingston, RI The polyphenol spice, curcumin is known to have anti-inflammatory effects, but its therapeutic use is hampered by its poor bioavailability. Recently, a novel curcumin formulation, a solid lipid curcumin particle (SLCP) (Longvida®) was shown to have increased bioavailability in human volunteers. Here we evaluated SLCP’s anti-inflammatory effects in lipopolysaccharide stimulated RAW 264.7 murine macrophages. At concentrations ranging from 10-50 micro g/mL, SLCP significantly decreased nitric oxide, PGE2 and IL-6. Transient transfection experiments using a nuclear factor kappa B (NFk-B) reporter construct indicated that SLCP inhibits the transcriptional activity of NFk-B at 10 and 50 micro g/mL. Thus, these results suggest that SLCP decreases the pro-inflammatory mediators, nitric oxide, PGE2, and IL-6, by inhibiting the activation of NF-kB. The effects of SLCP on various proteins involved in the NF-kkB pathway are currently being evaluated to aid in elucidating its anti-inflammatory mechanisms of action.

AGFD 155 Inhibitory effects of sumac fruit extracts and pentagalloyl glucose on mushroom tyrosinase enzyme  Hang Ma, Liangran Guo, Tao Yuan, Maxwell Edmonds, Wei Lu, Navindra P. Seeram, nseeram@uri.edu.Ddept. of Biomedical and Pharmaceutical Sciences, College of Pharmacy, Univ. of Rhode Island Hyperpigmentary disorders, such as melasma, are due to the accumulation of abnormal melanin. The tyrosinase enzyme is involved in the biosynthesis of melanin and natural
products with tyrosinase inhibitory effects are of great interest to the nutraceutical and cosmeceutical industries. Sumac (Rhus coriaria) fruit contain polyphenols including pentagalloyl glucose (PGG) and is commonly utilized in the Middle East and Turkey as a food spice. Here, two sumac fruit extracts (R. coriaria and R. copallinum) were evaluated for anti-tyrosinase and anti-melanogenesis properties. The total polyphenolic content for the R. coriaria and R. copallinum extracts were 20.94 and 18.18% gallic acid equivalents, respectively. In the tyrosinase enzyme inhibitory assay, PGG (IC50 = 570.3 micro M) was comparable to the positive controls, kojic acid and arbutin (IC50 = 440 micro M and 1.7 micro M, respectively). Our results demonstrate the inhibitory effects of sumac fruit extracts and PGG on tyrosinase enzyme, showing their anti-melanin formation potential. The effects of the samples on anti-melanogenesis activity in B16F10 murine melanoma cells are under evaluation.

AGFD 156 Exposure assessment of 4-methylimidazole (4-MEI) from caramel coloring for the U.S. population  Diana L. Doell, Diana.Doell@fda.hhs.gov, Daniel E. Folmer, Hyoung S. Lee, Susan E. Carberry. FDA, College Park, MD  Concerns have been raised regarding the health effects of 4-methylimidazole (4-MEI), a contaminant found in caramel colors produced using ammonium compounds (Class III and IV Caramels). FDA is conducting a robust exposure assessment to better understand the dietary intake of caramel colors and 4-MEI. Foods that contain caramel color were identified, grouped into broad food categories, and then matched with food codes from the combined 2003-2008 National Health and Nutrition Examination Survey. Dietary intakes of the foods in each category, as well as the intake of Class III and IV Caramels and of 4-MEI from the use of these caramel colors in the identified foods were calculated for the U.S. population aged 2 years or more and for various age groups. The exposure to 4-MEI from the use of caramel coloring will be discussed.

AGFD 157 New method of 1-methylcyclopropene storage, handling, and application for fruits and vegetables  Yagang Zhang, ygzhang@illinois.edu, Wumanjiang Eli. Chinese Academy of Sciences, Xinjiang Technical Inst. of Physics and Chemistry, Urumqi, Xinjiang China  1-Methylcyclopropene is used to slow down the ripening of fruit and maintain the freshness. Due to its reactivity, 1-MCP is traditionally mixed with cyclodextrin to form inclusion complex. We report here a strategy to facilitate the ease of use of 1-MCP. 1-MCP was synthesized and cooled below its boiling point to be a liquid. Gases such as difluoroethane, trifluoroethane, tetrafluoroethane, propane, butane are compressed into liquid. Liquid 1-MCP is dissolved in mixture of liquid of fluorocarbons and hydrocarbons. The mixture of liquids contains 1%-2% (w %) of liquid 1-MCP. Liquid hydrocarbons such as propane and butane are used to promote the solubility of 1-MCP while fluorocarbons are used to help maintaining a safe composition. The mixture is stored in a can of gas duster. When the can is activated, gas flows out through the nozzle of gas duster can to treat the fruits and vegetables to help maintain their freshness.

AGFD 158 Flavonoids interacting with copper (II) affects α-synuclein aggregation  Niyogushima Juliely, njuliely@broncos.uncfsu.edu, Shubo Han, shan@uncfsu.edu Dept. of Chemistry and Physics, Fayetteville State Univ., Fayetteville, NC  Incomplete reduction of molecular oxygen can generate reactive oxygen species (ROS) during normal metabolism. Excess ROS oxidize alpha synuclein, a naturally unstructured protein, accelerating protein oligomerization and linking to PD. Flavonoids are among the most effective antioxidants to avoid excess ROS and to protect proteins from oxidation. On the other hand, flavonoids coordinate with metal ions, showing inconsistent antioxidant activities. UV-Vis spectrophotometry and cyclic voltammetry was first performed in this research to determine flavonoid-metal complex ratios and formation constants in PBS buffer. Quercetin, rutin, naringenin, kaempferol, flavanol, and catechin, were found to interact with Cu(II) at 1:1 ratio with diverse stability. Alpha synuccein aggregation was found to be inhibited by the presence of the flavonoids/Cu(II) complex in fluorescence test in a mechanism different from flavonoids inhibition.

AGFD 159 Impact of bioactive food components on drug metabolizing enzymes in human colon cells  Melanie M. Erzinger, melanie.erzinger@hse.ethz.ch, Cédric Bovet, Katrin M Hecht, Shan J Sturla. Inst. of Food, Nutrition and Health, ETH Zurich, Switzerland  By modulating the expression of drug metabolizing enzymes, structurally diverse bioactive food components such as isothiocyanates, selenium, and dithiolthiones, may influence the efficacy of anticancer DNA alkylating agents. The broad goal of this work is to understand how exposures to bioactive food components can alter cellular metabolic capacity and drug cytotoxicity. In this study, the responses of human colon cells to sodium selenite, sulforaphane or dithiolethione were evaluated. Activities and expression levels of targeted reductases were measured by a combination of spectroscopic assays and proteomics measurements. Induced changes in molecular profiles were correlated with drug toxicity outcomes. The results of this study illustrate responses to varied food components, how these compounds may impact drug efficacy, and apply a new experimental tool with potential applications for identifying food components that may influence enzyme expression and/or drug action.

AGFD 160 Maximizing hop flavor profiles through supercritical fluid extraction  Rudy A. Baskette, rudy.baskette@supercriticalfluids.com, Kenneth J. James. Supercritical Fluid Technologies Inc., Newark, DE  Supercritical fluid extraction (SFE) has proven to be successful in oil extraction from natural products. The technique is useful to produce oils of standardized concentration of active ingredients and products with much higher concentration (higher yields and purity) and quality (with less creation of artifacts) than traditional methods. Hops can add remarkable depth to the flavor profile of a beer by amplifying fruity, spicy, woody, or citrus flavors. To extract maximal flavor profiles, a two step supercritical fluid extraction (SFT-110) was performed on four uniquely flavored types of hops. GC analysis identified the concentration of
AGFD 161  Determination of phenolic content, free radical scavenging capacities, & identification of phenolic compounds using HPLC-DAD-ESI-MSn of 40 varietal honeys from Florida  Sara Marshall1, saramars@ufl.edu, Keith Schneider1, Jerry Hayes2, Liwei Gu1.(1) Dept. of Food Science and Human Nutrition, Univ. of Florida, Gainesville, FL (2) Apiary Inspection, Florida Dept. of Agriculture and Consumer Services, Gainesville, FL  Honey contains phenolic compounds; the type and concentration of these compounds vary depending on the floral source and geographical location where it is produced. Forty varietal honeys were sampled from different regions of Florida. These honeys were evaluated for their antioxidant capacity, total phenolic content, and free radical scavenging capacity. Avocado honey had a total phenolic content of 1570.2 micro g GAE/ml, which was higher than all other Florida varieties and a certified Manuka honey. Total phenolic values ranged from 250.6-1570.2 mg/ml. The ORAC values for the samples ranged from 1.478-27.993 micro mol TE/g of sample. Tupelo, avocado and a wild-type honey showed the highest ORAC values. The correlation between the total phenolic values and the ORAC values was r=0.577. The manuka honey had ORAC values close to the median value. Abscisic acid was identified in multiple honeys using HPLC-DAD-ESI-MSn.

AGFD 162 Adsorption of calcium in cocoa fruit, leaves, and bean shells measured with ion-selective electrodes  Michelle Z. Torres-Toledo, zuly1_m@hotmail.com, Angel Luis Perez-Gonzalez, guingo1989@hotmail.com, Carlos A. Mejias-Cruz, Ashley C. Paz-Figueroa, Mayra Ocasio, Alvaro J. Pena-Quevedo, alvaro_pena@pucpr.edu.College of Science - Dept. of Chemistry, Pontifical Catholic Univ. of Puerto Rico-Arecibo, PR  Caffeine is associated to adsorption of many metals in solution. Its capability to form metal complex is well known. Cocoa is a fruit that contains theobromine and caffeine and both compounds have strong similarities, therefore both compounds are capable to trap metal in their structure. In recent studies, cocoa beans and chocolate were associated with calcium adsorption in the body. This study is focus in measure the presence of calcium in different parts of a cocoa plant grown in Puerto Rico: leaves, fruit and shell beans. Also, this research is presenting how much calcium can be adsorbed depending of the conditions of the cocoa products. Simple and useful methodology for the analysis of cocoa products will be presented.

AGFD 163 Coffee used-residues for organic adsorption and calcium adsorption using ion-selective electrodes  Sahylis S. Salazar-Mateo, sahylis_salazar@hotmail.com, Dharma Martinez, dharma20@live.com, Carlos A. Mejias-Cruz, Angel Luis Perez-Gonzalez, Mayra Ocasio, mocasio@pucpr.edu, Alvaro J. Pena-Quevedo, alvaro_pena@pucpr.edu.College of Science - Dept. of Chemistry, Pontifical Catholic Univ. of Puerto Rico-Arecibo, PR  Coffee is a very common beverage that contains large amounts of caffeine. However, most of the product is thrown away as a black residue that could hold caffeine. Caffeine is known for the adsorption of metals in solution. Also, this residue is abundant in insoluble organic compounds that can adsorb other substances. This study is focus in measure the amounts of calcium that coffee residues can absorb. Also, this research is presenting the potential to use this organic residue to adsorb organic acid such as acetic acid. Simple methodology for the study of coffee and caffeine treatment will be discuss.

AGFD 164 Physicochemical properties of UHP-assisted cationic starches  Yoon-Je Chang, skyykysyj@gmail.com, Young-Rok Kim, Cheon-Seok Park, Byung-Yong Kim, Moo-Yeol Baik.Dept. of Food Science and Biotechnology, Kyung Hee Univ, Yongin, Gyeonggi, Republic of Korea  The utilization of native starch is limited because of its water insolubility and its tendency to form unstable pastes and gels. Therefore, starch is usually modified to improve its functionality for industrial applications. UHP-assisted cationic corn and tapioca starches were synthesized by the reaction with 2,3-epoxypropyltrimethylammonium chloride (ETMAC) under alkaline condition. The reaction was carried at 500MPa for 10min. Physicochemical properties of cationic starches were characterized using elemental analysis, Fourier-transform infrared (FT-IR) spectroscopy and nuclear magnetic resonance (NMR) spectroscopy. Conventional cationic corn and tapioca starches showed 0.95-1.16 and 1.5 of degree of substitution (DS), respectively. DS of UHP-assisted cationic starches were 0.42 and 0.88, respectively. The FT-IR and NMR spectra indicated that ETMAC is an appropriate cationizing reagent in this case, which substituted the cationic moieties onto starch backbone. This result provides basic and fundamental information cationic starch derivatives prepared by etherification and their possible application in Food industry.

AGFD 165 Characterization of lactase conjugated to magnetic nanoparticles  Joey N. Talbert, jtalbert@foodsci.umass.edu, Julie M. Goddard.Dept. of Food Science, Univ. of Massachusetts - Amherst, MA  Lactase conjugated to nanomaterials represents an area of significant potential to the food industry as a means to produce health-promoting ingredients, reduce waste, and enable diagnostics. The purpose of this work is to investigate the influence of particle size on activity retention of lactase covalently conjugated to magnetic nanoparticles of 18 nm, 50 nm, and 200 nm in diameter using carbodiimide chemistry. Specific activity, kinetics, zeta potential, and particle size were evaluated for the conjugates. After attachment, activity retention was 70%, 39%, and 14% compared to the free enzyme for the 18 nm, 50 nm, and 200 nm conjugates, respectively. Results suggest increased activity retention with decreasing particle size can be attributed to surface interactions between the enzyme and support. This work provides improved understanding of the relationship between
AGFD 166  Potent dendritic antioxidants without pro-oxidant effects  Choon Young Lee1, lee1cy@cmich.edu, Ajit Sharma1, Rebecca Uzarski2, Cyprien Nanah1, Rich Held1, Rom Baral1, Samik Upadhyaya1. (1) Chemistry Dept., Central Michigan Univ., Mt. Pleasant, MI (2) Biology Dept., Central Michigan Univ., Mt. Pleasant, MI  Our body is continuously experiencing the presence of transition metal ions, which have the potential to induce oxidative stress-mediated disorders. However, antioxidants that present in the presence of transition metal ions may produce pro-oxidant effects and irreversibly damage biomolecules. We herein report unique dendritic antioxidants, made of naturally occurring antioxidants, syringaldehyde and vanillin. The surface consists of phenolic hydroxyl groups and electron donating ring substituents and the interior is composed of metal chelating groups. Compared to the starting materials and other popular antioxidants like quercetin and vitamin E, these novel materials exhibited highly potent radical scavenging activities (IC50 < 5 micro M). The antioxidants also demonstrated strong protective effects on human low-density lipoprotein, lysosome, and DNA. The novel antioxidants in the presence of physiological concentration of copper ions showed little or no DNA damage. On Chinese hamster ovary cells, cell viability at 50 micro M was unaffected over 5 days.

AGFD 167  Cis-stilbene glycoside and trans-stilbene glycoside from Polygonum multiflorum suppress PEPCk gene expression and gluconeogenesis in HepG2 cell  Wenping Tang1, Pei-Hsuan Hsieh1, pinkjulytang@hotmail.com, Min-Hsiung Pan2, Chi-Tang Ho1.(1) Dept. of Food Science, Rutgers Univ., Nan-Tzu, NJ (2) Dept. of Seafood Science, National Kaohsiung Marine Univ., Nan-Tzu, Kaohsiung Taiwan  Phosphoenolpyruvate carboxykinase (PEPCk) is the key enzyme catalyzing the first step in hepatic gluconeogenesis. Insulin could repress PEPCk transcription, therefore lowering glucose production. Compounds that are able to repress PEPCk expression could constitute a new class of hypoglycemic agents. Polygonum multiflorum (PM) is a tonic and anti-aging agent in traditional Chinese medicine. We have demonstrated that PM crude extract has remarkable antidiabetic effect in a type 2 diabetic mice model. To search for the efficacious compounds in the extract responsible for this effect, we evaluated trans-stilbene glycoside (SG) which is the major active compound of PM, and cis-SG which could be induced from trans-SG with UV light, with PEPCk assay. We established the assay in HepG2 cell line and recorded changes in PEPCk gene expression with RT-PCR. Studies using inhibitors of specific subcellular biochemical pathways were performed to potentially elucidate a mode of action of the two compounds.

AGFD 168  Development of a chemical profile produced in the fermentation of gluten-free beverages  Drew Budner, dbudner@whitworth.edu, Deanna Ojennus.Dept. of Chemistry, Whitworth Univ., Spokane, WA  Commercial gluten-free and low-gluten beverages are becoming more available in the US. However, many of the flavors and aromas associated with fermentation of malted barley are absent in gluten-free beverages. Since flavor is composed of both taste and aroma it is desirable to fully characterize the differences in the chemical profile between fermented beverages using gluten-free fermentable sources and barley-derived sources. Volatile compounds were collected from the head space above an aliquot of fermented beverage using a solid phase microextraction (SPME) fiber. Volatile compounds are thermally removed from the fiber and injected onto a GC column with detection by MS. Quantification is performed using internal standards which are added to the fermented beverage prior to extraction with the volatile chemicals. Compounds present in the aqueous phase were separated and quantified using reverse-phase HPLC.

AGFD 169  Highly sensitive quantification of unconjugated metabolites of trenbolone acetate in bovine serum by liquid chromatography-tandem mass spectrometry  Qingsong Cai1, qingsong.cai@tiehh.ttu.edu, Jiafan Wang1, George P. Cobb2, Todd A. Anderson1.(1) Dept. of Environmental Toxicology/Inst. of Environmental and Human Health, Texas Tech Univ., Lubbock, TX (2) Dept. of Environmental Science, Baylor Univ., Waco, TX  Trenbolone acetate (TBA) is a synthetic anabolic steroid. It has been used alone or combined with other estrogens as a powerful growth promoter in cattle husbandry practices for decades. Upon ear implantation, TBA is rapidly hydrolyzed to 17beta-trenbolone (b-TBOH), the active form which could be further biotransformed to trendione (TBD) and 17alpha-trenbolone (a-TBOH). When used appropriately, they have proven beneficial in veterinary medicine. However, inappropriate use of these compounds can result in negative effects, mediated primarily through endocrine disruption. Therefore, the need to quantify these metabolites in bovine serum is of interest from pharmacokinetics and chemical residue monitoring perspectives. Radioimmunoassay (RIA), gas chromatography–mass spectrometry (GC–MS) and liquid chromatography–tandem mass spectrometry (LC–MS/MS) have been used to quantify TBA metabolites in biological samples. However, RIA method is less specific due to antibody cross-reactivities. GC–MS analysis is often problematic because these metabolites are thermally labile. LC–MS/MS is the method of choice; nevertheless, it has been demanding in determination of native steroids at low pg/mL levels. Herein, a highly sensitive LC–MS/MS method using electrospray ionization (ESI) was developed for the determination of the three major TBA metabolites in bovine serum. The sample preparation essentially involved solid-phase extraction and pre-column derivatization. The derivatives were separated by reversed-phase LC and detected with MS/MS. Several derivatizing reagents including Girard T hydrazine, Girard P hydrazine, dansyl hydrazine, hydroxylamine hydrochloride and 2-hydrizinopyridine were compared in terms of sensitivity and specificity for the ESI-MS/MS detection of oxosteroids. The method was tentatively validated according to the European Commission Decision 2002/657/EC guidelines.
AGFD 170  Comparison of anti-inflammatory activities of several novel compounds in a mouse ear edema model
Wenping Tang1, pinkjulytang@hotmail.com, Shining Li1, Yue Liu2, Mou-Tuan Huang2. (1) Dept. of Food Science, Rutgers Univ., New Brunswick, NJ (2) Dept. of Chemical Biology, Rutgers Univ., Piscataway, NJ  Inflammation is associated with a vast variety of human diseases, including cancer, heart disease, asthma, etc. Therefore anti-inflammatory activity is important for screening compounds for possible health benefits. We utilized 12-O-tetradecanoylphorbol-13-acetate (TPA)-induced mouse ear edema model to evaluate and compare the potential anti-inflammatory effects of several novel compounds from natural origins, including cis-stilbene glycoside and trans-stilbene glycoside from Polygonum multiflorum, epicatechin gallate (ECG) from green tea, sinensetin, 5'-demethyl tangeretin and 4-acetyl-6,7,8,4'-tetramethoxy flavones from citrus peels. In addition, the effect on inflammatory biomarkers, such as proinflammatory cytokines and arachidonic acid metabolites, are reported as well. A single topical application of TPA to ears of female CD-1 mice induced a time- and dose-dependent increase in edema as well as levels of proinflammatory cytokines interleukin-1 beta (IL-1 beta) and interleukin-6 (IL-6), which are effectively suppressed by tested compounds. We also explored the structural-activity relationship by comparing their different activities.

AGFD 171  Anti-inflammatory activity of Shiitake mushroom-derived beta-1,3;1,6-glucan, lentinan, through modulation of TNF receptor 1 (TNFR1) distribution in intestinal epithelial cells  Yosuke Nishitani1, nishitani@people.kobe-u.ac.jp, Masashi Mizuno2. (1) Team of Health Bioscience, Org. of Adv. Science and Technology, Kobe Univ., Kobe, Hyogo, Japan (2) Dept. of Agrobioscience, Graduate School of Agriculture, Kobe Univ., Kobe, Hyogo, Japan  Glucans have been known to exhibit immunomodulating activities. However, it is unclear whether glucans can modulate gut immune system. Here, we study gut anti-inflammatory activity of lentinan. In dextran sulfate sodium-induced colitis mice, lentinan significantly improved body weight loss, shortening of colon length, histological score of the colon, and pro-inflammatory cytokines mRNA expression in inflamed tissue. In an in vitro gut-inflammatory model consisted of Caco-2/RAW264.7, lentinan exerted inhibitory effects on IL-8 mRNA expression and NF-kB activation in Caco-2 cells. Immunofluorescent analysis showed that TNFR1 on the basolateral side of Caco-2 cells was remarkably decreased by lentinan treatment while it was uniformly distributed without lentinan or incubation on ice. A clathrin-mediated endocytosis inhibitor, monodansylcadaverine, canceled lentinan inhibition of IL-8 mRNA expression. These results suggest that lentinan exerts gut anti-inflammatory activity through inhibition of IL-8 mRNA expression associated with TNFR1 endocytosis in intestinal epithelial cells.

AGFD 172  Investigation on bitter taste-active compounds in Omija (Schisandra chinensis Baillon) tea  Minji Kih, kkul2727@naver.com, Young-Suk Kim, yskim10@ewha.ac.kr. Dept. of Food Science and Engineering, Ewha Womans Univ., Seoul, Republic of Korea  Bitter taste-active compounds in Omija tea infusions were investigated using a series of analytical fractionations such as ultrafiltration, gel filtration chromatography (GFC), and RP-HPLC and sensory evaluations. To screen the key compounds imparting bitter taste, a taste dilution analysis (TDA) was performed by determining the taste dilution (TD) factors for each fraction obtained as explained. On the base of ultrafiltration, the low molecular weight (<1 kDa) fraction of Omija tea was found to have stronger bitterness than the high molecular weight one. The low molecular weight fraction (fraction IIn II) was then subjected to GFC to obtain 8 fractions (fraction II?1~8) before TDA was performed on each fraction. Due to their high TD factors, fraction II-2, II-3, II-4, and II-6 were considered to contain the main contributors to the bitter taste of Omija tea. Therefore, these fractions were further separated by RP-HPLC. The sequential application of RP-HPLC and TDA allowed the comparatively strong bitter-taste compounds with high bitter-taste activity to be determined. The structural identification of those compounds will be made by LC-MS/MS and NMR.

AGFD 173  Metabolic profiling of blood plasma in high-fat diet induced obese mice fed different rice cultivars  A-Young Lee1, ao0511@naver.com, Hyun Chung1, Hea-Won Kim2, Cheon-Seok Park3, Sung-Jun Lee2, Young-Suk Kim1, yskim10@ewha.ac.kr (1) Dept. of Food Science and Engineering, EwhaWomans Univ., Seoul, Republic of Korea (2) Dept. of Food Bioscience and Technology, Korea Univ., Seoul, Republic of Korea (3) Dept. of Food Science and Biotechnology, KyungHee Univ., Yongin, Republic of Korea  Metabolites of blood plasma from high-fat diet (HFD) induced obese mice were analyzed using gas chromatography coupled with time-of-flight mass spectrometry (GC-TOF/MS) after fed four different diets, including corn starch (CS), garcinia cambogia (GC), white rice (WR), and black rice (BR) for 8 weeks. GC-TOF/MS data sets were then applied to principal component analysis (PCA), a multivariate analysis, to access metabolic differences between biological specimens. In total, twenty five metabolites, including 4 carbohydrates, 6 lipids, 5 organic acids, and 10 amino acids, were identified in blood plasma of mice fed HFD. The order in the levels of glucose, galactose, and cholesterol among 4 treatment groups was as follows; CS > WR > GC (= BR). The levels of some fatty acids such as propanoic acid, butanoic acid, and hexadecanoic acid significantly increased in plasma of mice in CS group than that obtained from mice in BR group, whereas the level of 9,12-octadecadienoic acid was higher in mice of BR group than CS group (p<0.05). For amino acids, the levels of leucine, proline, and threonine markedly increased in plasma from mice fed CS compare to ones in BR group (p<0.05). A PCA score plot illustrated the separation of samples according to duration of feeding by principal component 1 (PC 1) (29.9 %) and also diet groups by PC 2 (15.8 %). HFD induced obese mice fed four different diets were divided into two groups: BR group vs. CS, GC, and WR groups. The major metabolites contributing to this clustering were mannose, isoleucine, threonine, and phenylalanine.
AGFD 174 Heavy metals analysis of coffee and cocoa beans cultivated in Puerto Rico using X-Ray Fluorescence
Carlos A Mejias-Cruz, cmejias78@yahoo.com, Michelle Z. Torres-Toledo, zuly1_m@hotmail.com, Ashley C. Paz-Figueroa, christal.paz@gmail.com, Leonardo Hernandez-Torres, leonardojhernandez.1@gmail.com, Ruben Cruz-Lucena, Mayra Ocasio-Velazquez, Alvaro J. Pena-Quevedo, alvaro_pena@upcr.edu.College of Science-Dept. of Chemistry, Pontifical Catholic Univ. of Puerto Rico-Arecibo, PR Puerto Rico is well known for the quality of their coffee, however many mountain farms also grow cocoa trees. Coffee and cocoa are prone to contain heavy metals because caffeine capacity to form metal complex. Cocoa beans were recently associated with small but relevant amounts of lead (Pb), but coffee had no reports of any heavy metal presence. This study is focus in measure the presence of heavy metals, especially lead in cocoa and coffee products. Also, this research is presenting the amount of heavy metals in specific soils at Puerto Rico. Most of the samples will be analyzed by portable XRF to obtain fast results.

AGFD 175 Conventional and ultra high pressure (UHP) assisted cationization of dextrin
Ahra Cho, hoiloverara@nate.com, Seung-Hyun Choi, Byung-Yong Kim, Cheon-Seok Park, Young-Rok Kim, Moo-Yeol Baik.Kyung Hee Univ., Dept. of Food Science and Biotechnology, Yongin, Gyungggi Republic of Korea Cationic polysaccharide derivatives have been generally used in paper, textile and cosmetic industries due to their reusability and biodegradability. Cationic dextrin was prepared by conventional and UHP-assisted eterification of dextrin using 2,3-epoxypropyltrimethylammonium chloride (ETMAC) under alkaline condition. The molar ratios of AGU/ETMAC were 1:1.5, 1:1.77, the amount of NaOH were 1.5g, 0.53g and reaction temperature was 25°C. UHP-assisted cationization was carried out at 100, 300, 500MPa for 30minutes. Nitrogen contents of cationic dextrin were evaluated by Kjeldahl method and degree of substitution (DS) was calculated. Their DS were ranged from 0.58 to 1.56. The FT-IR and NMR spectrum indicated the presence of C-N bond, which is not present in native dextrin. This is a clear proof of incorporation of cationic moieties onto the backbone of the dextrin. This result shows that UHP-assisted cationization can be an effective method and provides basic information on physicochemical properties of UHP-assisted cationic dextrin.

AGFD 176 Monitoring anti-impotence drugs and its analogs in foods
Ilhyun Kang1, ilhyunkang@korea.kr, Jae-Ho Oh2, Kisung Kwon3.(1) Food Chemical Residues Division / Food Safety Evaluation Dept., Korea FDA, Cheongwon-gun, Chungcheongbuk-do 363-700, Republic of Korea (2) Food Chemical Residues Division / Food Safety Evaluation Dept., Korea FDA, Cheongwon-gun, Chungcheongbuk-do, Republic of Korea (3) Food Chemical Residues Division / Food Safety Evaluation Dept., Korea FDA, Cheongwon-gun, Chungcheongbuk-do, Republic of Korea Illegal compounds such as drugs and its synthetic analogues have been detected in foods until a recent date in Korea. Especially, unknown compounds that have the modified chemical structure of anti-impotence drugs such as sildenafil, vardenafil, and tadalafil were frequently detected in various foodstuffs. Illegal compounds that have modified chemical structure of the drugs have been used to avoid the government inspection. The adulteration of foods with drug analogues is potentially dangerous for human health because it is not proved their safety at all. In order to ensure food safety, we investigated the actual condition of the suspected samples and monitored about 112 internet sales foods and domestic retail foods. Two simultaneous analytical methods were established using HPLC/PDA and confirmed with LC/MS for 31 analogues and 5 anti-impotence drugs. Anti-impotence drugs and its analogues were detected in 16 items. Tadalafil was detected with range of 4,139 to 65,315mg/kg in 8 items. Sildenafil with range of 3,621 to 394,438mg/kg in 8 items. Anti-impotence drugs analogues such as octylnortadalafil and demethylsildenafil was detected with range of 1,174 to 214,094mg/kg in 4 items. Hydroxythiohomosildenafil was detected 14,717mg/kg in one item. This research was supported by Grant Number 11161kfdal151 and 12161kfdal111 form the KFDA.

AGFD 177 Centrifugal partition chromatography isolation & chemical identification of lipophilic antioxidant constituents from avocado pulp (Persea americana)
Dariana G Rodriguez-Sanchez1, dariana@gmail.com, Christian 1 Silva-Platas2, Gerardo J Garcia-Rivas2, Carmen Hernandez-Brenes1,2.(1) Dept. of Biotechnology and Food, Tecnologico de Monterrey, Monterrey, Nuevo Leon Mexico(2) Dept. of Basic Research and Transfer, Tecnologico de Monterrey, Monterrey, Nuevo Leon Mexico Avocado fruit is widely consumed worldwide and is also a particularly rich source of health related lipophilic phytochemicals such as monounsaturated fatty acids, tocopherols, carotenoids, acetogenins and sterols. However, the study of their contribution to overall lipophilic antioxidant capacity has received far less attention when compared to the characterization of avocado hydrophilic phytochemicals. The present study was undertaken with the purpose of characterizing the chemical nature of the main contributors to the antioxidant capacity of the fruit. Guided by an in vitro assay that tested for hydrophilic and lipophilic antioxidant activities, an acetonic extract from lyophilized P. americana pulp was fractionated by centrifugal partition chromatography; revealing that lipophilic antioxidant capacity of the fruit was much higher than hydrophilic. Further purification and characterization of antioxidant fractions by HPLC-PDA, HPLC-MS-TOF and 1D/2D NMR led to the identification of perezene-A, perezene-B, persin and (Z,Z)-1-Acetoxy-2,4-dihydroxyheneicos-12,15-diene as the main lipophilic antioxidants present in avocado pulp.

AGFD 178 Decontamination of Salmonella enterica on blueberries by washing with organic acid, ozone, and mild heat
Yingying Li, yyli@udel.edu, Changqing Wu, Wenqing Xu, Melissa Ehrich. Dept. of Animal and Food Science, Univ. of Delaware, Newark, DE To improve food safety of blueberries, five washing treatments were evaluated for their efficiency to
inactivate surface inoculated Salmonella on the blueberries, compared to distilled water wash and 200 ppm chlorine wash. At least a two log reduction was observed after washing with 5 min-washes of 1mg/mL citric acid, 1% SDS solution, 6.25ppm ozone water, a combination of 1mg/mL citric acid and ozone, and mild hot water treatment at 50C. The uses of 1mg/mL citric acid and a combination of 1mg/mL citric acid and ozone achieved significant log reductions. Meanwhile, various quality tests, including testing of color, texture, pH, total phenolic and total anthocyanins content, were performed to determine the impacts of the treatments on quality of blueberries. None of these washing solutions decreased the total phenolic and total anthocyanins content. Neither sensory quality analysis detected a significant difference between treated and untreated blueberries.

AGFD 179 Induction of apoptosis and inhibition of proliferation on prostate cancer cells by bitter melon extract  Chan Ho Jang, chanho@udel.edu, Changqing Wu.Dept. of Animal and Food Sciences, The Univ. of Delaware, Newark, DE   Bitter melon (Momordica charantia) is known for containing several biologically active compounds which are related to its anti-oxidant and anti-cancer activities. Although many studies about bitter melon have focused on breast cancer, it has also protective effects against other cancers with reduction in the risk of lung cancer and prostate cancer. In this study, human prostate cancer cells, LNCaP and C4-2B, which is one of the most common cancers in men in the US, have been used to investigate an efficacy of bitter melon extract (BME) as an anti-cancer agent. The treatment of BME on prostate cancer cells has shown that it induced cell apoptosis and inhibited cell proliferation in a dose dependent manner. In conclusion, the results have shown that bitter melon extract induces apoptotic cell death and inhibits the cell growth on prostate cancer. Therefore, bitter melon has a potential to prevent and reduce the risk of prostate cancer.

AGFD 180 Antiproliferative and anticytotoxic effects on human prostate cancer cell line and in vitro antioxidant activities of Taxillus nigrans (Hance) Danser  Wenqing Xu, yxu@jiangnan.edu.cn, Michael Qian1, michael.qian@oregonstate.edu, Yan Xu2, yxu@jiangnan.edu.cn,(1) Dept. of Food Science and Technology, Oregon State Univ., Corvallis, OR (2) Key Laboratory of Industrial Biotechnology of Ministry of Education & School of Biotechnology, Jiangnan Univ., Wuxi, Jiangsu, China   Chinese rice wine has been the most popular traditional alcoholic beverage in China for thousands of years due to its unique flavor. In this study the volatile compounds in Chinese rice wine were extracted with LiChrolut EN sorbents and eluted with dichloromethane. The extract was separated into acidic and neutral fractions. The neutral fraction was further separated into 16 fractions by silica gel normal phase liquid chromatography performed on a FPLC system. The aroma compounds in each fraction were analyzed by GC–O and GC–MS. A total of 78 aroma-active compounds were identified by GC-O and GC-MS in this study, and the results suggested that the most potentially important aroma compounds in neutral fraction were geosmin, benzaldehyde, ethyl butanoate, ethyl hexanoate, 3-methylbutanal, 2-furfural, and 3-methylbutanol. The most potentially important aroma compounds in the fractions were vanillin, acetic acid, 3-methylbutanoic acid, furfural, guaiacol, and gamma-nonalactone.

AGFD 181 Identification of aroma compounds in Chinese rice wine by normal phase liquid chromatography fractionation followed by gas chromatography-olfactometry  Shuang Chen2,1, shuang.chen@oregonstate.edu, Michael Qian1, michael.qian@oregonstate.edu, Yan Xu2, yxu@jiangnan.edu.cn,(1) Dept. of Food Science and Technology, Oregon State Univ., Corvallis, OR (2) Key Laboratory of Industrial Biotechnology of Ministry of Education & School of Biotechnology, Jiangnan Univ., Wuxi, Jiangsu, China   Theaflavins as an active antioxidant and a natural pigment and pharmacologically active molecule which obtained from thousands of years due to its unique flavor. In this study the volatile compounds in Chinese rice wine were extracted with LiChrolut EN sorbents and eluted with dichloromethane. The extract was separated into acidic and neutral fractions. The neutral fraction was further separated into 16 fractions by silica gel normal phase liquid chromatography performed on a FPLC system. The aroma compounds in each fraction were analyzed by GC–O and GC–MS. A total of 78 aroma-active compounds were identified by GC-O and GC-MS in this study, and the results suggested that the most potentially important aroma compounds in neutral fraction were geosmin, benzaldehyde, ethyl butanoate, ethyl hexanoate, 3-methylbutanal, 2-furfural, and 3-methylbutanol. The most potentially important aroma compounds in the fractions were vanillin, acetic acid, 3-methylbutanoic acid, furfural, guaiacol, and gamma-nonalactone.

AGFD 182 Study on continuous biosynthesis of theaflavins by immobilized laccase in a packed bed reactor  Heyuan Jiang1, jhy300@yahoo.com, Bin Wang1,2, Jianyong Zhang1, Yongdong Huang1,2,(1) Dept. of Food Science and Technology, Chinese Academy of Agricultural Sciences, Hangzhou, Zhejiang China (2) Graduate School, Chinese Academy of Agricultural Sciences, Beijing, China  Theaflavins as an active antioxidant and a natural pigment and pharmacologically active molecule which obtained from black tea were bioprocessed in a packed bed reactor using immobilized laccase(EC1.10.3.2,From Trametes spp).In this study, we used D152(macroreticular weak acidic acrylic acid cation exchange resin) as a matrix to immobilize laccase extracted from Trametes spp.then we utilized this bio-materials to transform tea catechins into theaflavins consecutively in a packed bed reactor. Four mainly facts were considered in this experiment as following:temperature,substrate flow ratio,oxygen flow rate,pH and substrate concentration. As a result, we selected the temperature at 28C, substrate flow ratio 2.0mL/min, oxygen flow rate 55mL/min,pH5.7 and substrate concentration 10mg/mL as an optimized condition to biosynthesize theaflavins at a highly efficiency. This experiment conditions will give a reference for large scale producing theaflavins basically.

AGFD 183 HPLC-fluorescence studies of the changes in secondary metabolites during progression of Huanglongbing disease in sweet orange leaves  John A Manthey1, John.Manthey@ars.usda.gov, Faraj M Hijaz2, Jose R Reyes-De-Corcuera2, Svetlana Y Folimonova2, Craig L Davis2, Shelley E Jones2,(1) U.S. Horticultural Research Lab, USDA-ARS-USHRL, Ft. Worth, Texas, USA (2) Univ. of Florida, Gainesville, Florida, USA

The results showed that bitter melon extract induces apoptotic cell death and inhibits the cell growth on prostate cancer. Therefore, bitter melon has a potential to prevent and reduce the risk of prostate cancer.

Study on continuous biosynthesis of theaflavins by immobilized laccase in a packed bed reactor

Heyuan Jiang1, jhy300@yahoo.com, Bin Wang1,2, Jianyong Zhang1, Yongdong Huang1,2,(1) Dept. of Food Science and Technology, Chinese Academy of Agricultural Sciences, Hangzhou, Zhejiang China (2) Graduate School, Chinese Academy of Agricultural Sciences, Beijing, China

Theaflavins as an active antioxidant and a natural pigment and pharmacologically active molecule which obtained from black tea were bioprocessed in a packed bed reactor using immobilized laccase(EC1.10.3.2,From Trametes spp).In this study, we used D152(macroreticular weak acidic acrylic acid cation exchange resin) as a matrix to immobilize laccase extracted from Trametes spp.then we utilized this bio-materials to transform tea catechins into theaflavins consecutively in a packed bed reactor. Four mainly facts were considered in this experiment as following:temperature,substrate flow ratio,oxygen flow rate,pH and substrate concentration. As a result, we selected the temperature at 28C, substrate flow ratio 2.0mL/min, oxygen flow rate 55mL/min,pH5.7 and substrate concentration 10mg/mL as an optimized condition to biosynthesize theaflavins at a highly efficiency. This experiment conditions will give a reference for large scale producing theaflavins basically.
Pierce, FL (2) Inst. of Food and Agricultural Science, Univ. of Florida, Lake Alfred, FL. Huanglongbing (HLB) disease caused by the bacterium Candidatus Liberibacter asiaticus (Clas) threatens major portions of citrus production in the U.S. Efforts have been made to detect early changes in the metabolome of leaves of Clas-infected plants. The current study uses HPLC-fluorescence to analyze metabolite profiles of leaves of Hamlin and Valencia sweet orange trees during the progression of the HLB disease. Parameters for fluorescence detection of leaf metabolites in orange leaves were optimized, and this study showed that the concentrations of many leaf metabolites were influenced by the progression of HLB. Three main classes of compounds detected by fluorescence included hydroxycinnamates, coumarins, and polymethoxylated flavones. Other minor-occurring classes of fluorescent compounds were also detected, and structural studies of these classes by HPLC-MS are in progress.

AGFD 184 Challenges of ionic liquid GC column for beer and wine volatile analysis Yanping L. Qian, Michael C. Qian, michael.qian@oregonstate.edu. Food Science and Technology, Oregon State Univ., Corvallis, OR. The ionic composition of beer and wine is best analyzed by GC or GC-MS with a polar capillary column such as Wax or FFAP stationary phase column, due to high concentrations of alcohols and volatile fatty acids in the sample. However, such phases are not thermally stable and resulting in high background noise at elevated temperature. It is desirable to have a column with high polarity and thermal stability for volatile analysis using GC-MS. Ionic liquids are a class of compounds consisting of organic cations associated with inorganic or organic anions. They are very polar and have low volatility. Several ionic liquid (SLB) capillary GC columns were studied for the suitability of volatile analysis in beer and wine. The results showed that SLB columns can separate most volatile compounds effectively, and have very high thermal stability. However, the SLB columns tested have too strong interactions with acids (octanoic and decanoic acids), resulting in poor chromatography for these compounds.

AGFD 185 Polyunsaturated fatty acids (PUFAs) production from microalgae cultured in fermentation wastewater Ping Wang1, Bin Wang2, wangb@rowan.edu. (1) School of Food and Chemical Engineering, Beijing Technology and Business Univ., Beijing, China (2) Dept. of Civil and Environmental Engineering, Rowan Univ., Glassboro, NJ. Polyunsaturated fatty acids (PUFAs) production from microalgae has gained much acceptance because of the higher PUFAs content in microalgae compared to fish oil. Industrial wastewaters are potential resources for production of microalgae PUFAs. Four species (Y1, Y2, Y3, and Y4) of green algae Chlorella sp. were screened and cultured in fermentation wastewater for PUFAs yield. The algal dry weight (DW) varied within a narrow range from 14.03 to 18.62 g/L for the tested four species. However, the lipid yield from Y4 (60% of DW) was much greater than that from other three species (43 ± 3% of DW). The species Y4 also yielded higher PUFAs contents compared with others. Specifically, the linolenic acid (LNA) was 189.19 mg/g DW in Y4 but only 42 ± 7 mg/g DW in other three species, and stearic acid content was 4.9 mg/g DW in Y4 but only 1.6 ± 0.3 mg/g DW in others. However, Y4 had the same linoleic acid content as that in Y2, 59 mg/g DW, which was 30% - 100% greater than that in Y1 and Y3. Based on the result from this study, the discharge of COD can be reduced by 2,205 tons in a fermentation enzyme plant where 38,589 tons of Chlorella sp. are produced yearly.

AGFD 186 Chemical profiles of cumin essential oil with different extraction methods Limin Guo1, xjnljglm@xaas.ac.cn, Qian Zhang1, Brandon A. Bogusz2, Shuping Zou1, Shiming Li2, Chi-Tang Ho2, Qingrong Huang2, qhuang@AESOP.Rutgers.edu. (1) Xinjiang Academy of Agricultural Sciences, Urumqi, Xinjiang China (2) Dept. of Food Science, Rutgers Univ., New Brunswick, NJ. Extractive profiles of essential oil from Cumin seeds using six different organic solvents, i.e. hexane, heptane, octane, cyclohexane, ethyl acetate, ethanol, with hydro-distillation (HD) was explored and compared with the profile cumin seed oil extracted with supercritical fluids technology. The effect of different temperature at 40, 50, 60, 70, 80, 100, and 120°C and pressure of 1500 psi and extraction cycles (2, 3, 4, 5) on chemical profiles, content and yield of the extractive were also investigated by GC and GC-MS. Conditions and parameter feasible on extract of cumin oil for further research will be presented.

AGFD 187 Study of the interactions between limonene and starch from various origins using reversed-flow gas chromatography techniques John Kapolos1, jkapolos@teikal.gr, L. Delporte2, A Koliadima3. (1) Dept. of Food Technology, T.E.I. of Kalamata, Greece (2) Haute Ecole Provinciale de Hainaut Condorcet, Mons, Belgium (3) Dept. of Chemistry, Univ. of Patras, Greece. This work aims for the development of a tool for studying the interaction between aroma compounds and food ingredients such as starch. Reversed flow gas chromatography, a sub-technique of inverse gas chromatography was applied and the interaction between limonene and starch from different origin (potato, corn, rice and wheat) was used. Using appropriate mathematical analysis, physiochemical parameters like rate constants for adsorption k1, surface reaction k2, and surface diffusion coefficients Dy were calculated for the interaction between limonene and starch and the influence of the different starch granules from potato, corn, rice and wheat was investigated. Diffusion coefficients of limonene vapours in the helium at various temperatures were calculated. These are in accordance with those calculated theoretically. For rice and potato, k1 remains almost constant while for corn and wheat, a minimum value at 60°C was observed because of the glass transition of starch. For rice, potato and corn, k2 increases slowly with the temperature. A reaction between limonene and wheat starch seems to take place at high temperatures. This is in agreement with the corresponding k1 values, because at high temperatures is almost constant and very low, indicating no adsorption of limonene. Although the temperature increment should induce the granule swelling, and limiting the void space, the thermal agitation seems to be the prevalent factor affecting the surface diffusion of limonene and an increment of Dy values with the temperature was observed.
AGFD 188 Application of allyl isothiocyanate in foods for pathogen control Tony Z. Jin1, tony.jin@ars.usda.gov, Weiguo Sang2.(1) USDA-ARS-ERRC, Wyndmoor, PA (2) Life Science & Biotechnology, Ningbo Univ., Ningbo, Zhejiang China Allyl isothiocyanate (AIT), a major essential oil component of cruciferous plants such as cabbage, broccoli, mustard, and horseradish, has long been used as a pungent food flavoring agent. In recent years, there has been growing interest in the use of AIT for pathogen control. This presentation will report our recent studies using AIT as an antimicrobial agent to inactivate foodborne pathogens, such as Listeria monocytogenes, E. coli O157:H7 and Salmonella spp. in various foods. AIT was directly mixed with foods or incorporated in biopolymer coatings or films and then released to food surface from the coatings or films. The reduction of pathogens in foods was determined, and sensory quality of AIT-treated food samples was evaluated. Results demonstrate that AIT is a very effective antimicrobial agent against those pathogens. Sensory evaluation indicates the odor threshold of AIT in food was dependent on the type of food and application method.

AGFD 189 Peppermint oil nanoemulsion colloidal system assembly for prolonged efficacy against gram-positive bacterial strains Rong Liang1, rongliang1983@126.com, Fang Zhong1, Qingrong Huang2, Charles F. Shoemaker3 (1) Dept. of Food Science and Technology, Jiangnan Univ., Wuxi, Jiangsu China(2) Dept. of Food Science, Rutgers, New Brunswick, NJ (3) Dept. of Food Science and Technology, Univ. of California, Davis, CA Peppermint oil-in-water nanoemulsions stabilized by food grade biopolymer emulsifier (modified starch, MS) were prepared using high pressure homogenization. Phase separation always occurred for the system which was due to low specific gravity (0.8673×103kg/m3) and high water solubility of peppermint oil. In this research the unstable phenomenon can be inhibited by using a mixed oil phase with peppermint oil and a medium chain triacylglycerol. The nanoemulsions were further characterized by particle sizes, rheological properties and store stabilities. As a potential antimicrobial delivery system for peppermint oil, the minimum inhibitory concentration (MIC) and time-kill dynamic processes against two Gram-positive bacterial strains of Listeria monocytogenes Scott A and Staphylococcus Aureus ATCC 25923 were investigated. Compared with the bulk peppermint oil the formulated nanoemulsions showed long-term antibacterial activities by suppressing the growth of foodborne pathogens. The results reveal that this nanoemulsion technology can imp rove the application of natural essential oil in the food system.

AGFD 190 Antimicrobial activities of plant essential oils and their application to improve food safety of fresh produce and meat products Changqing Wu, changwu@udel.edu, Yingjian Lu, Xin Dong, Wenqing Xu.Dept. of Animal and Food Sciences, Univ. of Delaware, Newark, DE Plant essential oils and their components have a broad spectrum of antimicrobial activities and GRAS status. They demonstrate great potential as natural food antimicrobials to meet consumers' rising demands for natural food products. We found that thyme oil (2 mg/ml) or a thymol (0.4 mg/ml) 5min wash achieved more than 4 log reductions of Salmonella enterica serovars on surface-inoculated grape tomatoes, and their efficacy were comparable to a chlorine wash at 200 ppm. The antimicrobial washes also dramatically reduced the risk of potential transmission of pathogens from tomatoes to washing solutions, and had minimal effects on the total phenolic, ascorbic acid content, color, aroma, and visual quality of treated grape tomatoes. A novel antimicrobial formulation is also explored by the combination of essential oils with organic food plus, hydrogen peroxide, and surfactants. This formulation was studied as a washing solution for both fresh produce and poultry meats to improve the food safety.

AGFD 191 Use of gaseous essential oils to control foodborne human pathogenic bacteria on fresh produce Xuetong Fan1, xuetong.fan@ars.usda.gov, Juan Yun1,2, Xihong Li2. (1) Eastern Regional Research Center, USDA, ARS, Wyndmoor, PA (2) Key Laboratory of Food Nutrition and Safety, Tianjin Univ. of Science and Technology, Tianjin, China Fresh produce has been implicated in a number of outbreaks of foodborne illnesses caused by human pathogenic bacteria. Intervention technologies are needed to reduce the risk of pathogen contamination. Gaseous antimicrobials offer advantages to aqueous chemical sanitizers as gases and are more effective in reaching sites such as crevices, stomata, or cracks that pathogens may hide in. Recent studies suggest that essential oils and their active components when used as a vapor reduced populations of E. coli O157:H7, Salmonella spp. and many other bacteria, suggesting a potential for their use on fresh fruits and vegetables to enhance microbial safety. Low volatility of some essential oils, toxicity, damage to product quality, and odor as limiting factors for commercial application will be discussed. A case study using gaseous cinnamon, oregano, and mustard essential oils, cinnamaldehyde, carvacrol, and allyl isothiocyanate to inactivate Salmonella on tomatoes will be presented.

AGFD 192 Antifungal activity of clove oil extracted by steam distillation, hydrodistillation, and supercritical carbon dioxide Wenqiang Guan1, gwq18@163.com, Ruixiang Yan2. (1) College of Biotechnology and Food Science, Tianjin Univ. of Commerce, Tianjin, China(2) Tianjin Key Laboratory of Postharvest Biology, National Engineering and Technology Research Center for Preservation of Agricultural Products, Tianjin, China Clove oils were extracted from clove buds using supercritical CO2, steam distillation and hydrodistillation, and the effect of the clove oils and its major components on selected fungi that caused postharvest decay of fruits was studied. Minimum inhibitory concentration of clove oil extracted by steam distillation on Botrytis cinerea, Alternaria spp. Emericella nidulans (Eid.) and Penicillium expansum was 2.5 micro L/mL, and minimum bactericidal concentration were 5.0, 5.0, 5.0, 2.5 micro L/mL, respectively. Among the three extraction methods, antimicrobial activities of the oils in decreasing order was steam distillation, supercritical CO2 , and hydrodistillation. Eugenol and Eugenol acetate were the main antifungal ingredients of clove oil, and had strong inhibitory effect on Botrytis cinerea and...
Penicillium expansum, while beta-caryophyllene could not inhibit the growth of the fungi. Beta-Caryophyllene did not have any synergistic inhibitory effect on fungi with Eugenol or Eugenol acetate.

**AGFD 193  Antifungal activity of cinnamon oil and clove oil in vitro and in vivo fruit tests**  Xihong Li1, lixihong606@163.com, Yage Xing2, Qinglian Xu2, Juan Yun1 (1) Dept. of Food Engineering and Biological Technology, Tianjin Univ. of Science & Technology, Tianjin, China(2) Dept. of Bioengineering, Xihua Univ., Chengdu, Sichuan China  Preservative agents are often required to reduce microbiological decay of foods for long term storage. In this study, the antimicrobial activities of cinnamon and clove oils were investigated. Results showed that cinnamaldehyde (approximately 76.4% v/v) and eugenol (approximately 83.0%) were the main constituents of cinnamon and clove oils, respectively. In an in vitro experiment, the minimum inhibitory concentration (MIC) of cinnamon oil against R. nigricans, A. flavus and P. expansum was 6.8, 1.7 and 1.7 micro L/mL, respectively. On the other hand, the MIC of clove oil against A. flavus, P. citrinum and R. nigricans was 25, 25 and 50 micro L/mL, respectively. In an in vivo study, cinnamon and clove oils at concentrations of 34 micro L/mL showed a complete control of all three fungi in wound-inoculated jujube fruit. These results revealed that cinnamon and clove oils have a potential to be used as natural antifungal agents for fruit preservation.

**AGFD 194  Focus on agricultural residues: Microstructure of almond hull**  Delilah F Wood1, de.wood@ars.usda.gov, Tina G Williams1, Richard D Offeman1, Paul Mann2, William J Orts1.(1) Bioproducts, Chemistry and Engineering Research Unit, USDA ARS WRRC, Albany, CA (2) Bio Fuels and Mass Consulting, Caldwell, ID  Agricultural residues have historically been used as animal feed or burned for disposal. These residues, therefore, have little economic value and may end up becoming disposal problems because tighter air quality control measures may limit burning of the residues. Therefore, value-added products made using agricultural residue components would resolve the disposal problem and provide alternative resources for energy, building materials or packaging. Residues are inexpensive to acquire but their transport to conversion plants may be cost-prohibitive. Nevertheless, investigations into the value-added use of the residues need to continue because the residues present opportunities for exploitation especially given the continuing increase in the cost of petroleum products that provide us with energy and an enormous variety products. Microscopy has provided valuable structural information on the formulation of various products. Here, we focus on almond hulls, their native microstructure and their microstructure following various enzymatic treatments.

**AGFD 195  Screening of fluoroquinolone residues in caprine milk using a portable time-resolved fluorometer**  Guoying Chen, guoying.chen@ars.usda.gov.Eastern Regional Research Center, USDA. Agricultural Research Service, Wyndmoor, PA  Fluoroquinolone (FQ) residues in caprine milk were screened by terbium-sensitized luminescence (TSL). After extraction and cleanup using Oasis HLB columns, TSL was measured at lambda ex = 300 nm and lambda em = 546 nm using a portable fluorometer. A common threshold was established at xF50-3 sigma sigmaF50, where xF50 and sigmaF50 were the mean and standard deviation, respectively, of TSL intensities of milk samples (n=18) spiked with flumequine (FLU) at 50 ng/g, its maximum residue limits (MRL) set by the European Union. Enrofloxacin, ciprofloxacin, and danofloxacin at their respective MRLs had higher TSL responses, so could be screened below their MRLs. Among 48 blind samples, each randomly spiked with one FQ at up to 200% of its MRL, 36 were screened correctly without false negative. This rapid protocol can reduce a sample pool to a small fraction for confirmation, hence improve throughput and save assay costs.

**AGFD 196  Using temperature sweeps to investigate rheology of bioplastics**  Michael H Tunick, michael.tunick@ars.usda.gov, Charles I. Onwulata.Eastern Regional Research Center, Dairy & Functional Foods Research Unit, USDA-Agricultural Research Service, Wyndmoor, PA  As part of research toward production of protein-based bioplastics, small amplitude oscillatory shear analyses were performed in the temperature sweep mode to examine protein blends in the presence of wheat flour and glycerol. The elastic modulus (G') of these samples was much higher than the viscous modulus (G'?), indicating a strong protein network, except in a transition region where the values of G' and G'? changed rapidly. The ratio of G'? to G' for blends containing calcium caseinate and soy protein isolate decreased sharply through the transition region, but increased to a peak in samples containing egg albumin, fish protein isolate, wheat gluten, and whey protein isolate. Synergistic effects apparently accounted for differences between the results obtained from some of the blends and those expected from the data from the individual proteins. Temperature sweeps highlight the different properties of protein gels, which should help in the interpretation of the characteristics of novel bioplastics.

**AGFD 197  Detection of food allergens: Current analytical methods and future needs**  Lauren S. Jackson, Lauren.Jackson@fda.hhs.gov.Division of Food Processing Science & Technol., FDA/CFSAN, Bedford Park, IL  Food allergies affect an estimated 10-12 million people in the U.S., and the prevalence appears to be increasing. Consumers with food allergies rely on food labels to accurately disclose the presence of allergenic ingredients. However, undeclared allergens can inadvertently appear in a product through incorrect labeling, improper handling of rework, cross-contact during manufacture and insufficient equipment cleaning procedures. Reliable methods to detect and quantify food allergens are needed to control them during manufacture, ensure compliance with food labeling, and ultimately improve consumer protection. However, the ability to detect and quantify allergenic proteins or foods depends greatly on the type of allergen, the type of food in which they are present, and how the food has been processed. Analytical tools available to detect allergenic
proteins or foods include immunochemical approaches, DNA detection methods, and LC-MS/MS techniques. The choice of method used depends on the purpose of the test, the food matrix, the extent and manner in which the food is processed, the turn-around time, portability and cost. All methods must be validated in-house and with the food matrix to ensure confidence in the results. New approaches are currently under development to improve the reliability of analytical results, and for simultaneous detection of multiple allergens.

**AGFD 198** Targeted unknown LC(ESI+)-Q/TOFMS approaches for food verification  
Alyson E. Mitchell, aemitchell@ucdavis.edu, Jihyun Lee.Dept. of Food Science & Technology, Univ. of California-Davis, CA  
Chemical verification of fruit, vegetables, grain, spices, herbs and their extracts is analytically challenging as dozens, or even hundreds of compounds must be identified in a wide variety of matrices. These foods are of interest as they provide an array of phytochemicals, including flavonoids that promote health. Flavonoid composition in plants is dictated by genetics and differs between species and cultivars. Improvements in processed food quality may be achieved by using cultivars with desirable flavonoid profiles and/or through addition of flavonoid rich extracts. Identification of distinguishing flavonoid profiles for cultivar and extract verification is complicated as flavonoids have different patterns of hydroxylation and/or methoxylation and occur as O-glycoside, or less frequently C-glycosides. The sugars of the O-glycosides are generally bound at either C-3 or C-7 positions, whereas C-glycosides are attached at C-6 or C-8. These residues can be further acylated. Herein, LC(ESI+)-Q/TOFMS was used to provide qualitative information on the occurrence of a library of targeted unknown flavonoids in several cultivars of onions. The targeted unknown library was developed using Phenol-Explorer (http://www.phenol-explorer.eu/compound_classes). An exact mass list of the potential flavonoids, including glycosidic and acylated forms, was compiled in Microsoft Excel and imported into MassHunter Software (Agilent Technologies). Extracts were analyzed by scanning TOF/MS for exact mass. Ions corresponding to library hits >70% were then targeted for further MS/MS identification (target unknowns). PCA modeling of targeted unknowns could be used to distinguish cultivars.

**AGFD 199** Identification of seed oils  
Ivan C Lee, ivan.e.lee2.civ@mail.mil, Adam S Gamson.Sensors and Electron Device Directorate, US Army Research Laboratory, Adelphi, MD  
Identification of the seed oils (poppy, cotton, canola and soybean) was achieved using viscosity measurement and reverse phase high performance thin layer chromatography (HPTLC). The viscosity measurement indicates that poppy seed oil and cotton seed oil have different viscosity from 22 to 50 degree C. To maximize HPTLC separation of oils, different solvent mixtures were studied. We have identified several solvent mixtures such that the seed oil does not need to be broken down chemically to fatty acids before HPTLC analysis.

**AGFD 200** Antioxidant activity of the volatile and non-volatile extracts of sweet fennel seeds (Foeniculum vulgare) grown in Egypt  
Mohamed Saad Shaheen, mohamedshaheen70@yahoo.com. Aroma & Flavor Chemistry Dept., National Research Center, Cairo, Egypt  
The present study was conducted to examine the chemical composition, total phenols, total flavonoids and antioxidant activity of essential oil, methanol and ethanol extracts of fennel seeds grown in Egypt. The seed essential oil yield from fennel seeds was found to be (2.81 % w/w). GC and GC–MS analyses of the fennel essential oil revealed the presence of nine compounds, with trans-anethole (90.3%), trans-sabinene hydrate (4.71%) and alpha-Pinen (2.76%) as the major aroma components. The methanol and ethanol fennel seed extracts contained appreciable levels of total phenolic contents (912.23 and 642.1GAE, mg/100g, respectively) and total flavonoid contents (495.68 and 268.4 CE, mg/100g). The ethanol extract of fennel seeds exhibited good DPPH, beta-Carotene, ABTS and H2O2 radical scavenging activity in comparison with the methanol extract and essential oil. The results of the present investigation demonstrated significant (p < 0.05) variations in the antioxidant activities of fennel essential oil and extracts.

**AGFD 201** Emulsion electrospinning of novel core/shell nanofiber mats for the controlled release of bactericidal cinnamonaldehyde  
Katrina A Rieger, krieger@engin.umass.edu, Jessica D Schiffman.Chemical Engineering, Univ. of Massachusetts Amherst, MA  
Health-care associated infections (HAIs) are gaining attention due to the increase in drug-resistant bacteria. Approximately 5% of hospitalized patients will contract an HAI; making advances in medical sanitation a top public health priority. Thus, the development of novel surface coatings that release broad-spectrum biocidal agents is imperative. A promising solution is cinnamonaldehyde (CA), a non-toxic essential oil component, which historically has been used to fight bacterial infections. The utilization of O/W emulsion electrospinning was employed to construct core/shell nanofiber mats. Each nanofiber fabricated consists of a chitosan/polyethylene oxide shell wrapped around a CA core. Electrospinning process parameters were optimized to ensure that continuous, cylindrical fibers were synthesized. Scanning electron and fluorescence microscopy of the overall fiber morphology, as well as the core/shell structure, respectively, confirm that CA was successfully encapsulated. Advantages of the core/shell structure include the prevention of an initial burst release and protection of the essential oils from oxidation.

**AGFD 202** Renewable 2-undecanone from Cuphea sp. oil through a ketonization reaction  
Michael A. Jackson, michael.jackson@ars.usda.gov, Steven C. Cermak.USDA/ARS/NCAUR, Peoria, IL  
The objective of this work was to demonstrate the viability of the cross ketonization reaction of the triacylglycerol from Cuphea sp. and acetic acid in a fixed-bed plug-flow reactor. The seed oil from Cuphea sp. contains up to 71% decanoic acid and the reaction of this fatty acid with acetic acid yields the fragrance compound and insect repellent 2-undecanone. To this end, we screened several ketonization catalysts.
AGFD 203 Essential oil flavor release from chewing gum: Method development and correlation to sensory perception

David V Zyzak, david.zyzak@wigley.com, Armando Castro, Gloria Sheldon, Leslie Morgret, Jeremy Schiefeling.

Design, Science, and Technology, Wm Wrigley Jr Company, Chicago, IL. The two essential oils mentha piperita (peppermint) and mentha spicata (spearmint) are commonly used in confections due to their refreshing qualities. Chewing gum application of flavors is both exciting and challenging. Due to its inherent lipophilic properties, chewing gum bases have a tendency to retain much of the hydrophobic flavor molecules. This phenomenon prompts scientists to explore opportunities to improve flavor release from gum bases through various technologies such as encapsulations, coatings, addition of modifiers, etc. In addition, there are challenges with the development of methods to measure flavor release during the chewing of gum. This presentation will discuss a method aimed at understanding flavor release during the chewing of gum and application to flavor release of volatiles from mentha piperita.

AGFD 204 Headspace solid-phase microextraction (HS-SPME) gas chromatography-mass spectrometry (GC-MS) analysis of the essential oils from the aerial parts of Artemisia vulgaris L. reveal the possible existence of new chemotypes

Jack D Williams, jwilliams@mercyhurst.edu, Tianyue Xie, Dom N Acharya. Chemistry and Biochemistry, Mercyhurst Univ., Erie, PA. Artemisia vulgaris L. was collected from North Eastern Ohio, Pennsylvania, North Western New York and New Jersey. Gas chromatography-mass spectrometry (GC-MS) was used to indentify the analytes present in the essential oils obtained by hydodistillation of the aerial parts of the plant and the volatiles extracted by headspace solid-phase microextraction (HS-SPME) of the crushed leaves and flowers. Significant differences were found in the analyze composition of Artemisia vulgaris L. from geographically different regions suggesting the likely presence new chemotypes.

AGFD 205 Light therapy with no external device: A novel approach to skin care

Vito Cataldo, vito.cataldo@lonza.com, Vince Gruber, Francesca Muia. Lonza Personal Care, South Plainfield, NJ. A novel source of low-level light was generated by extracting polyphenolic compounds from the morinda citrifolia fruit and binding them to a mineral substrate. The polyphenols absorb ultraviolet light and fluoresce red light, known to trigger physiological responses. These fluorescent particles were then blended with a proprietary mixture of yeast amino acids, and the combination promotes bioactivity in the skin. Multiple testing methods were employed to study the effects on skin. A MatTek full thickness tissue model was used to evaluate elastin expression in vitro, and results indicate that a 2% treatment provides a greater than 50% increase in elastin expression. A full face, double blind testing model was used in vivo, demonstrating that a 5% treatment provides a significant increase in skin elasticity and a subsequent decrease in the appearance of fine lines and wrinkles. This efficacy on extracellular matrix proteins results in improvements of skin appearance and structure.

AGFD 206 Dissolution models for estimating glycemic potential of food materials

Charles Onwulata, Charles.Onwulata@ars.usda.gov. Eastern Regional Research Center, USDA ARS, Wyndmoor, PA. The rate of dissolution of food materials may affect levels of nutrients and their availability for absorption within the human digestive system. The rate of absorption can further be mitigated by the viscosity of the surrounding medium. We modeled the rates of dissolution of variously formulated foods in media of different viscosity. Dissolution modalities for starch and protein materials were determined in water with 1 to 5% sodium alginate, or simulated gastric fluids. Depending on the structure of material, protein or starch, or type of media, dissolution rates varied significantly. Dissolution rates correlated with potential glycemic values for model foods formulated with whey protein concentrate (WPC) and cashew pulp fiber (CPF) designed to reduce overall starch content. Glycemic potential was characterized by the rapidly available glucose determined after 20 minutes (RAG), or the slowly available glucose determined after 120 minutes (SAG).
AGFD 208 Isolation and characterization of natural blue pigments from underexplored sources  Andrew G. Newsome, anewso2@uic.edu, Richard B. van Breemen, Dept. of Medicinal Chemistry and Pharmacognosy, Univ. of Illinois at Chicago, IL  Consumer preference for natural food ingredients has increased in recent decades, and the natural food colorant market has grown to over $1 billion dollars annually. A variety of red, orange, and yellow natural colorants are approved and in use, but there still exists a lack of available blue and purple natural colorant options. The occurrence of blue colored compounds in the natural world is relatively rare. The isolation, identification, and characterization of natural blue and purple pigments obtained from underexplored natural sources such as from marine microorganisms will be discussed.

AGFD 209 Simultaneous HPLC analysis of six polymethoxyflavones and six 5-demethylated polymethoxyflavones from citrus peel  Shiming Li1, shiming@rutgers.edu, Wan-Ling Chuang2, Tsai-Wei Yang2, Tzou-Chi Huang2, Chi-Tang Ho1, ho@aesop.rutgers.edu. (1) Dept. of Food Science, Rutgers Univ., New Brunswick, NJ (2) Dept. of Food Science, National Pingtung Univ. of Science and Technology, Pingtung, Taiwan  Citrus peels are the richest source of polymethoxyflavones (PMFs) and hydroxylated polymethoxyflavones (OH-PMFs), which have been reported to exhibit many biological activities, such as anti-inflammatory and anti-carcinogenic properties. Majority of the biological activity study were performed with such a mixture of PMFs and OH-PMFs as orange peel extracts (OPE), both in vitro and in vivo. It has been observed that bioactivity data vary with OPEs from different resources, manufacture procedures, orange species, and tissues. It is of great significance and urgency to have an analytical method developed in quantifying PMFs and OH-PMFs in citrus peels to understand the inconsistency of the bioactivity data coming from various contents of individual PMFs and OH-PMFs in OPE used for testing. The ultimate goal is to reduce or eliminate the variability of bioactivity data caused by incomplete or non-characterization of OPEs and to further enhance substance reproducibility and obtain consistent results in biological analysis. Separated HPLC analyses of PMFs and OH-PMFs of OPEs have been performed and reported previously from our laboratory and others as well. Herein we report an HPLC analytical method to simultaneously measure PMFs and OH-PMFs in OPEs and OPE containing products.

AGFD 210 Flavor issue problem-solving using modern analytical techniques  Linda Psota-Kelty, linda.psota-kelty@iff.com, Sharon Brown, Hui Han, Nina Sheller, Neil DaCosta, Amanda Bussetti. International Flavors and Fragrances, Union Beach, NJ  In flavors, issues such as off-notes, sediments, or off-colors can occur. Various analytical techniques can be used to determine what the issues are and, therefore, possible ways to correct them. A combination of various analytical techniques has been used to problem-solve including: GC-MS using liquid injections, headspace injections, solid probe, and pyrolysis. Other techniques have been used including: micro-infrared analysis, scanning electron microscopy with elemental detection and liquid chromatography. This talk will briefly describe the most relevant techniques and will give examples of various scenarios where these techniques can help in solving these types of possible occurrences.

AGFD 211 LC-MS spectroscopic fingerprinting on analysis of diploid and tetraploid Gynostemma pentaphyllum  Haiming Shi1, hmshi@sjtu.edu.cn, Zhuohong Xie2, Yang Zhao2, Pei Chen3, Liangli L Yu2. (1) Dept. of Food Science and Technology, Shanghai Jiao Tong Univ., Shanghai, China (2) Dept. of Nutrition and Food Science, Univ. of Maryland, College Park, MD (3) Food Composition Laboratory, USDA, Beltsville, MD  Gynostemma pentaphyllum has been traditionally used in food, tea, and folk medicines for its potential health properties. Flavonoids and saponins are considered as major health components. This research was performed to develop an effective method for discrimination and quality evaluation of G. pentaphyllum and its derived nutraceutical and food products. To obtain chemical profile of active constituents in G. pentaphyllum of different genotypes (diploid and tetraploid) and different parts (leaf and whole-plant) of plants, two fingerprinting approaches were developed by means of HPLC-DAD-MS and F(flow-injection)-MS to analyze flavonoids and saponins, respectively. The results showed that chemical profiling combined with chemometric approaches including PCA and PLS-DA analysis may serve as an effective way for QC/QA of commercial G. pentaphyllum products.

AGFD 212 Novel catalytic performance of a β-galactosidase with high regioselective glucosidase activity on B1,2-glucosidic linkage  Hui-da Wan, huidawan@126.com, Yong-mei Xia. State Key Laboratory of Food Science and Technology, School of Chemical and Material Engineering, Jiangnan Univ., Wuxi, Jiangsu, China  A novel catalytic performance of beta-galactosidase from Aspergillus sp. was found in enzymatic hydrolysis of stevioside, commonly used as a noncaloric sugar substitute. Among three different kinds of glucosidic linkage in Stevioside, only β-1,2 glucosidic bond of sophorosyl moiety at C13 of stevioside was selectively cleaved with a conversion as high as 94.0%. This new catalytic character afforded a sweeter rubusoside originally existed in Chinese sweet tea plant (Rubus suavissimus S. Lee). Moreover, the beta-galactosidase from Aspergillus sp. displayed slightly weaker transglycosylation activity and 5.9% of yield of transglycosylation products formed in 24h with a high enzyme loading.

AGFD 213 Heat-induced protein aggregate correlated with trypsin inhibitor inactivation in soymilk processing  Zhi C Xu, xuzhicun123@163.com. Dept. of Food Science, Jiangnan Univ., Wuxi city, Jiangsu, China  Soymilk contains many functional components, but also Kunitz trypsin inhibitor (KTI) and Bowman-Birk inhibitor (BBI) which have trypsin inhibitor activities (TIA). TIA assay, ultracentrifugation, particle size distribution and Tricine-SDS-PAGE were used to examine TIA
inactivation in soymilk. TIA assay showed residual TIA decreased with elevated temperature. Ultracentrifugation showed low residual TIA soymilk had more precipitate than the high one, and the residual TIA had high correlation coefficient (R2>0.9) with precipitate amount. It was found >80% residual TIA was concentrated in the supernatant, and KTI and BBI in supernatant still existed as their protein molecules, while KTI and BBI in precipitate (large protein aggregate) had two states, incorporated into protein aggregate by disulfide or by noncovalent bonds. Thus, it was suggested the residual TIA was mostly resulted from the free KTI and BBI in supernatant and the TIA deactivation was resulted from the KTI and BBI incorporation into protein aggregate.

AGFD 214 pH, NaCl, biopolymer ratio and concentration effects on the complex coacervate formation from soy protein isolate and gum Arabic  Die Dong, dongdiedie@126.com. Dept. of Food Science and Technology, Jiangnan Univ., Wuxi, Jiangsu, China Turbidity and β-potential measurements were used to examine the formation of complex coacervates from soy protein isolate (SPI) and gum Arabic (GA) as a function of pH (6.5-2.0), NaCl (0-1000 mM), SPI/GA ratio (1/4-8/1 w/w) and GA concentration (0.0125-0.20% w/v). At the SPI/GA ratio (1/1) in absence of NaCl, critical pH values of the mixture were appeared at 4.40, 3.55, 3.15, and 2.40, respectively. The critical pH values were increased with SPI/GA ratio. When SPI/GA mixing ratios changed from 1/4 to 8/1, the turbidity curve shifted to larger pH. When SPI was 0.05% and GA changed from 0.0125 to 0.20%, the turbidity curve shifted to lower pH. <5.0 mM NaCl had little effect on SPI/GA interactions, while =10 mM NaCl promoted complex coacervate formation. When NaCl was =100 mM, complex coacervate formation was suppressed. It was extremely suppressed at 1000 mM NaCl.

AGFD 215 Microbiological and near IR studies of leather from hides presoaked in formulations that can remove hardened bovine manure  Mila L. Aldema-Ramos, mila.ramos@ars.usda.gov. US Dept of Agriculture, Government, 600 E. Mermaid LN, Wyndmoor, PA. New efficient eco-friendly soaking methods are urgently needed to clean manure from raw hides for storage. There are ~35 M bovine hides shipped abroad from the U.S. annually. High concentration of surfactant (~0.15% (w/v)) and biocide (~0.10% (w/v)) in commonly used soaking solution are functional for eliminating microbial contamination, but quite unfriendly to the environment, also inefficient in removing the damaging adobe-type manure. When crude glycrol, sodium carbonate and chlorine dioxide are included in soaking formulation containing lesser surfactant (~0.0375%w/v) and biocide (~0.025%w/v), the efficiency of hardened manure removal improved. Significant manure smell reduction and still substantial microbial growth inhibition are observed. No chemical and structural alterations on finished leather samples made from the presoaked hides are observed utilizing non-denaturing near Infrared (nIR) spectroscopy technique. Quality of leather products made from hides presoaked in newly developed soaking formulations also showed significant improvement in its mechanical properties compared to control leather.

AGFD 216 Polymer-clay nanobrick wall thin films as foil replacement for food packaging  David Hagen1, david_hagen@neo.tamu.edu, Jaime C Grunlan1,2, jgrunlan@neo.tamu.edu, Morgan Priolo1. (1) Dept. of Mechanical Engineering, Texas A&M Univ., College Station, TX (2) Dept. of Chemical Engineering, Texas A&M Univ., College Station, TX Thin, transparent films of sodium montmorillonite clay (MMT) and polyethylenimine (PEI) have been prepared using layer-by-layer assembly. An oxygen transmission rate below the detection limit of commercial instrumentation (0.005 cm3/m2·day) is achieved for films less than 231 nm thick. This level of oxygen barrier, which is unprecedented for a clay-filled polymer composite, is believed to be due to a nanobrick wall structure comprised of completely exfoliated clay bricks in polymeric mortar. By increasing the MMT solution concentration from 0.2% to 2%, the detection limit is reached with 24 PEI/MMT bilayers (thickness of 120 nm). When poly(acrylic acid) is used to replace every other layer of MMT, the detection limit is reached with just 4 quadslayers (thickness of 51 nm), due to an increased spacing between clay layers. These films are good food packaging candidates due to their high transparency (95% average light transmission) and exceptionally low oxygen transmission rates.

AGFD 217 Hydrangea with yellow inflorescences via chemical manipulation  Henry D. Schreiber, HS@vmi.edu, Corinne M. Lariviere, Andrew H. Jones, Judith B. Cain. Dept. of Chemistry, Virginia Military Inst., Lexington, VA. The inflorescences of many Hydrangea macrophylla cultivars are red, purple, or blue, depending on the soil pH. The red color in the inflorescence sepal is attributed to the pigment delphinidin-3-glucoside; whereas in acidic soil aluminum ions are assimilated into the hydrangea, eventually forming a blue complex with this pigment. Other hydrangeas lack this pigment and have white sepals. Sepal colors such as yellow and orange have remained elusive in hydrangea inflorescences. Studies have shown that molybdenum, in addition to aluminum, forms blue complexes with delphinidin or sepal extracts in model solvents. However, cut stems of red hydrangea inflorescences, when placed in molybdenum-containing solutions, displayed little if any bluing, but instead a yellowing; and cut stems of white hydrangea showed distinct yellowing in color. This yellowing may be due to the formation of phospho-molybdate in the sepal. Field trials have shown that sprays and/or soil additives of molybdenum-citrate result in yellow blooms, as long as one is sufficiently careful not to add excess or toxic amounts of molybdenum. Analogous to the chemical manipulation (aluminum, pH) of the soil to change hydrangea sepals from red to blue or vice versa; it may now be possible to change hydrangea sepals from white to yellow through molybdate additions.
AGFD 218 Hydroperoxide lyase immobilized on ceramic hydroxyapatite with better stability than the membrane bound hydroperoxide lyase  Qing Qing Liu, liuqing_861006@163.com, Xiang Zhen Kong, Cai Meng Zhang, Ye Ming Chen, Yu Fei Hua.School of Food Science and Technology, Jiangnan Univ., Wuxi, Jiangsu, China  Hydroperoxide lyase (HPL) from amaranth tricolor was immobilized on the ceramic hydroxyapatite (CHT). A maximum activity of 2.85±0.1 U/g CHT (wt) and a yield of 80% were obtained under optimized HPL-CHT coupling condition. The optimum pH was 6.0, 6.0 and 7.5 for free, membrane and CHT-immobilized HPL while the optimum reaction temperature was 30, 30 and 35°C, respectively. After incubating at 55°C for 30 min, the residual activity of CHT-immobilized HPL was 64.13%, while those of free and membrane HPL were 0. Km values showed CHT (239.10 microM) imposed a higher substrate diffusion resistance than membrane (171.57 microM). Furthermore, recycling assays showed that CHT-immobilised HPL was more stable than membrane HPL. When the substrate concentration varied in the range of 66.7-400 microM, CHT-immobilised HPL retained above 90% of the initial activity after five reaction cycles while the activity of membrane bound HPL was decreased to zero after three reaction cycles.

AGFD 219 Purification & characterization of convicilin, a vicilin-like globulin, from Korean pine (Pinus koraiensis)  Tengchuan Jin2, Yang Wang2, Yu-Wei Chen2, Silvia M. Albillos5, Mahendra H. Kothary4, Tong-Jen Fu3, Boyce Tankersley6, Tara H. McHugh1, Yu-Zhu Zhang1,2, yuzhu.zhang@ars.usda.gov. (1) ARS-PWA-WRRC, USDA, Albany, CA (2) Dept. of Biological Sciences, Illinois Inst. of Technology, Chicago, IL (3) National Center for Food Safety and Technology, U.S. Food & Drug Administration, Bedford Park, IL (4) Center for Food Safety and Applied Nutrition, U.S. Food & Drug Administration, Laurel, MD (5) National Center for Food Safety and Technology, Illinois Inst. of Technology, Bedford, IL (6) Chicago Botanic Garden, Glencoe, IL  A vicilin-like globulin seed storage protein, termed convicilin, was isolated for the first time from Korean pine (Pinus koraiensis) by a combination of anion exchange, hydrophobic interaction, and gel filtration chromatography. The protein is less abundant than vicilin in low-salt extracts of mature Korean pine seeds. SDS-PAGE analysis revealed that convicilin was post-translationally processed. The N-terminal peptide sequences of its components were determined. These peptides could be mapped to a protein translated from an embryo abundant transcript. Similar to vicilin, native convicilin appeared to be homotrimeric. Circular dichroism (CD) and differential scanning calorimetry (DSC) analyses revealed that this protein is less resistant to thermal treatment than pine vicilin. Its transition temperature was 75.57°C compared with 84.13°C for vicilin. The urea induced folding-unfolding equilibrium of pine convicilin monitored by intrinsic fluorescence could be interpreted in terms of a two-state model, with a Cm of 4.41±0.15 M.

AGFD 220 Evaluation the physicochemical properties of wheat flour and shelf-life of fresh noodles as affected by ozone treatment  Man Li, mammanjy1987@163.com, Kexue Zhu, Wei Peng, Huiming Zhou.School of Food Science and Technology, Jiangnan Univ., Wuxi, Jiangsu, China  In this study, the effect of ozone treatment on the microorganism mortality in wheat flour and shelf-life of fresh noodles were investigated, as well as the physicochemical properties of wheat flour and textural qualities of cooked noodles. Results showed that the total plate count (TPC) can be largely reduced in wheat flour exposed for 30 min and 60 min in ozone gas. Flour and noodle sheet whiteness, dough stability, and viscosity properties of wheat starch were all improved by ozone treatment. Free cysteine content in wheat flour was shown to decrease significantly (P < 0.05) as the treat time increased, while no significant difference was observed in the activity of polyphenol oxidase (PPO). In addition, ozone treated noodles were generally higher in firmness, springiness, and chewiness, while lower in adhesive ness. Microbial growth and darkening rate of fresh noodles made from ozone treated flour were delayed significantly (P < 0.05).

AGFD 221 Room-temperature synthesis of ZnO-based nanocomposites for food applications  Jiang Yang, jyang44@wisc.edu, Liang Shi, Sundaram Gunasekaran.Dept. of Biological Systems Engineering, Univ. of Wisconsin-Madison, WI  Zinc (Zn) is an essential micronutrient and serves important and critical roles in our growth, development, and well-being. Nonetheless, Zn is deficient in the diet of many segments of the world population. Hybrid inorganic–organic nanocomposite materials have currently attracted much interest because of their multi-functionalities. Herein, we report facile and simple room-temperature approaches for synthesis of ZnO-based nanocomposites, which will survive the gastric environment, readily absorbed due to the nanoscale. Nanocrystalline zinc oxide (ZnO) particles coated with whey protein isolate (WPI) were fabricated in the weak basic aqueous solution condition at near room temperature. The X-ray diffraction and transmission electron microscopy measurements confirmed the nanoscaled composite structure of ZnO–WPI. The average composite granules size was about 300 nm and the embedded ZnO nanoparticles were uniform and monodisperse with an average diameter of 65 nm. Pectin–ZnO nanocomposite was prepared in the aqueous solution condition at room temperature. The Fourier transform infrared, X-ray diffraction, and transmission electron microscope (TEM) measurements confirmed the nanoscaled structure of pectin–ZnO composite. According to the TEM observation, the average composite granules size was about 150 nm and the embedded ZnO nanoparticles were uniform with an average diameter of 70 nm. These nanocomposites provide promising future food applications.

AGFD 222 Hydroperoxide lyase from Amaranthus tricolor to generate (2E)-hexenal that could be efficiently separated by salt-adding steam distillation  Jie Xiong, xj_1287@163.com, Xiangzhen Kong, Yeming Chen, Yu Fei Hua.School of Food Science and Technology, Jiangnan Univ., Wuxi, Jiangsu, China  (2E)-hexenal was widely used in flavors and perfumes, but it was mainly from chemical synthesis. In this study, naturally originated hydroperoxide lyase (HPL) from Amaranthus tricolor was used to catalyze the 13-hydroperoxy-9,11E,15Z-octadecatrienoic acid (13-HPOT) to generate (2E)-
hexenal, and salt-adding steam distillation was used for the separation of \((2E)\)-hexenal. A maximum yield of 1092.2mg/L \((2E)\)-hexenal was obtained with a high substrate concentration (40mmol/L 13-HPOT) under conditions: pH 7.5, 20C, 12 U/mL HPL, 1 mmol/L butylated hydroxytoluene (BHT), 15 mmol/L Dithiothreitol (DTT). Then the separation of \((2E)\)-hexenal was conducted by salt-adding steam distillation. It was found that AlCl3 had the greatest effect on separating \((2E)\)-hexenal, followed by CaCl2, NaCl and KCl. The distillate yields with AlCl3, CaCl2 and NaCl addition were 93.2%, 92.1%, 88.6%, while the distillate yield without salt was 81.2%. This study was very meaningful for \((2E)\)-hexenal large-scale production by a green method.

AGFD 223 Chemical tools for investigation of multiple herbicide resistance (MHR) in black grass (Alopecurus myosuroides) Christopher R Coxon1, Christopher.coxon@durham.ac.uk, Hannah E Straker1, David J Wortley3, Federico Sabbadin3, Jonathan D Sellars1, Ian Cummins2, David Hughes4, Patrick G Steele1, Robert Edwards3. (1) Dept. of Chemistry, Durham Univ., Durham City, UK (2) School of Biological and Biomedical Sciences, Durham Univ., Durham City, United Kingdom (3) Dept. of Biology, Univ. of York, UK (4) Jealott's Hill International Research Centre, Syngenta, Bracknell, Berkshire, UK

The acquired ability of a plant population to overcome herbicides of various chemotype and mode of action is regarded as multiple herbicide resistance (MHR). This problem is particularly prevalent in weeds of wheat, including ryegrass (Lolium) and black grass (Alopecurus myosuroides), placing economic burden on arable farmers and increasing concerns over food shortages for an ever increasing world population. Compared with herbicide-susceptible black grass, resistant populations have been shown to contain elevated levels of antioxidant polyphenols and oxidised/reduced forms of glutathione (GSH), as well as a GST (AmGSTF1), potentially involved in xenobiotic metabolism. This up-regulation, which was able to induce an MHR-like phenotype when transformed in Arabidopsis thaliana, is consistent with non-target site resistance. This presentation will discuss these developments together with an exploration of small molecule solutions to multiple herbicide resistance.

AGFD 224 Improving physicochemical and biological properties of psyllium through sulfation, hydroxypropylation, and succinylation Yuge Niu1, yugeniu@gmail.com, Zhuohong Xie2, Wei Liu3, Liangli Lucy Yu1,2. (1) Dept. of Food Science and Technology, Shanghai Jiao Tong Univ., Shanghai, China (2) Dept. of Nutrition and Food Science, Univ. of Maryland, College Park, MD (3) School of Life Science and Technology, China Pharmaceutical Univ., Nanjing, Jiangsu, China

Sulfation, hydroxypropylation and succinylation were conducted to improve the physicochemical and biological properties of psyllium by introducing the strong anionic groups and hydrocarbon chain branches into the molecule. Sulfation reduced the swelling capacity of psyllium by 75%, but increased the water uptake ability by 2.03-fold. The Bile acid-binding capacity of sulfated psyllium was 8.4-fold of that observed for psyllium. Hydroxypropylation reduced 49.72% hardness and 56.48% adhesiveness of psyllium gels. Hydroxypropyl psyllium also had greater in vitro bile acid-binding capacities and higher swelling ability. Succinylation reduced the swelling ability and gelling properties of psyllium, and increased its water uptake abilities by 1.65-fold and bile-acid binding capacities by 2.80-fold. The results suggested that these chemical modifications could be potential approaches for obtaining novel derivatives of psyllium with improved physicochemical and biological properties for application in functional foods or other consumer products.


Rice bran, a by-product of the rice milling industry, contributes about 10 percent to the weight of the whole grain rice. Because they contain high amounts of structurally different bioactive compounds, brans from pigmented rice varieties have the potential to serve as so-called functional foods that can promote human health. The potential anticancer properties of red rice bran were evaluated on several cancer cell lines by microculture tetrazolium assay. Based on the calculated IC50 (micro g/ml) values, red bran extract exhibited strong inhibitory effects on HeLa, AGS and HepG2 cancer cells. Subsequent fractionation of red bran extract demonstrated that the fraction rich in proanthocyanidins had the greatest activity. Concentrations of proanthocyanidin in red bran of a set of rice germplasm were evaluated. More than 4 fold differences in proanthocyanidin concentration were observed. The study suggested that red bran has the potential to serve as a functional food supplement for human consumption.

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