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International News on Fats, Oils, and Related Materials

Highlights from the 100th AOCS Annual Meeting & Expo

Celebrating 100 years of service

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July 2009 Volume 20 (7) 401–488

Departments and Information

AOCS Mission Statement
To be a global forum to promote the exchange of ideas, information, and experience, to enhance personal excellence, and to provide high standards of quality among those with a professional interest in the science and technology of fats, oils, surfactants, and related materials.

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100th AOCS Annual Meeting & Expo

Our in-depth coverage of this historic event includes:

Calendar

Bold type: *new listing*
For details on these and other upcoming meetings, visit www.aocs.org/meetings.

August

August 2–4, 2009. 5th Annual Practical Short Course on Water Issues & Technologies, College Station, Texas, USA. Information: http://foodprotein.tamu.edu/separations/scwater.php.

August 10–15, 2009. World Soybean Research Conference VIII/Soybean Industry Forum, Yayuncun (Asian Games Village), Beijing, China. Information: www.wsrc2009.cn/en/index.asp.

August 16–20, 2009. 238th National Meeting of the American Chemical Society, Washington, DC. Information: http://portal.acs.org/portal/Navigate?nodeid=2053.

August 23–28, 2009. 11th Annual Practical Short Course on Texturized Vegetable Protein & Other Soy Products, Texas A&M University, College Station, Texas, USA. Information: e-mail: mnriaz@tamu.edu; http://foodprotein.tamu.edu/extrusion/sctvp.php.

August 24–25, 2009. 4th Practical Short Course on Functional Oils: Omega-3 Fatty Acids. Market Trends, Nutrition & Health, Utilization in Food Systems, Courtyard Marriott Chicago Downtown, Chicago, Illinois, USA. Information: www.bioactivesworld.com; www.smartshortcourses.com.

September

September 1–5, 2009. 50th International Conference on the Bioscience of Lipids, Regensburg, Germany. Information: e-mail: info.icbl@klinik.uni-regensburg.de; www.icbl2009.de.

September 9–15, 2009. FEBS Advanced Course: Lipid Signaling and Disease, Hotel Mara, Ortona, Italy. Information: www.negrisud.it/febs2009.

September 13–16, 2009. AACC International Annual Meeting 2009, Baltimore Convention Center, Baltimore, Maryland USA. Information: http://meeting.aaccnet.org.

September 13–16, 2009. 123rd AOAC Annual Meeting & Exposition, Philadelphia, Pennsylvania, USA. Information: www.aoac.org/meetings1/123rd_annual_mtg/main_2.htm.

September 15–17, 2009. HBA Expo, Jacob Javits Center, New York City, USA. Information: www.hbaexpo.com.

September 16–18, 2009. oils+fats, International Trade Fair for the Production and Processing of Oils and Fats Made from Renewable Resources, New Munich Trade Fair Centre, Munich-Riem, Germany. Information: www.oils-and-fats.com.

September 21–23, 2009. Atlantic Bioenergy Conference 2009, Delta Beauséjour, Moncton, New Brunswick, Canada. Information: www.atlanticbioenergy.ca.

September 21, 2009. Short Course on Refining, Handling, and Applications of Palm Oil, Hilton Cartagena, Cartagena, Colombia. Information: www.aocs.org/Palma.

September 22–25, 2009. XVI Conferencía Internacíonal sobre Palma de Aceíte y Exopalma, Centro de Convenciones, Cartagena de Indias, Colombia. Information: www.fedepalma.org/conferencia2009.

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AOCS Meeting Watch

September 21, 2009. Short Course on Refining, Handling, and Applications of Palm Oil, Hilton Cartagena, Cartagena, Colombia. Information: www.aocs.org/Palma.

September 26–27, 2009. 9th AOCS Practical Edible Oil Refining Short Course, Process Optimization, Equipment and Technology Selection, and On-Line Process Control, Sydney, Australia. Information: www.aocs.org/meetings.

September 26–27, 2009. Lipid Oxidation and Antioxidants Short Course, Sydney, Australia. Information: www.aocs.org/meetings.

October 2–3, 2009. Crystallization of Lipids Conference, Toronto, Ontario, Canada. Information: www.aocs.org/meetings.

October 4-6, 2009. 23rd Meeting of the Canadian Section of the AOCS: Fats and Oils Functionality in Processed Foods,·Le Méridien King Edward Hotel, Toronto, Ontario, Canada. Information: www.aocs.org/meetings.

November 14–15, 2009. 3rd Practical Short Course, Industrial Uses of Vegetable Oils: Biodiesel, Ink, Biobased Solvents, and Lubricants, The Westin Grand München Arabella Park, Munich, Germany. Information: www.aocs.org/meetings/biodiesel09.

November 15–17, 2009. 2nd International Congress on Biodiesel: The Science and the Technologies, The Westin Grand München Arabella Park, Munich, Germany. Information: www.aocs.org/meetings/biodiesel09.

May 16–19, 2010. 101st AOCS Annual Meeting and Expo, Phoenix Convention Center, Phoenix, Arizona, USA. Information: http://Annual_Mtg.aocs.org; phone: +1-217-359-2344; fax: +1-217-351-8091; e-mail: meetings@aocs.org.

For in-depth details on these and other upcoming meetings, visit www.aocs.org/meetings.

September 23–25, 2009. International Forum on Emerging Technologies in Food Processing—Providing a Secure and Safe Food Supply, Campbell Alumni Center, University of Illinois, Urbana, USA. Information: William Artz, phone: +1-217-333-9337; fax: +1-217-333-9329; e-mail: wartz@illinois.edu; http://fshn.illinois.edu/food_processing_forum.

September 26–27, 2009. 6th International Symposium on Deep-Frying, Sydney, Australia. Information: www.eurofedlipid.org.

September 26–27, 2009. 9th AOCS Practical Edible Oil Refining Short Course, Process Optimization, Equipment and Technology Selection, and On-Line Process Control, Sydney, Australia. Information: www.aocs.org/meetings.

September 26–27, 2009. Lipid Oxidation and Antioxidants Short Course, Sydney, Australia. Information: www.aocs.org/meetings.

September 27–30, 2009. World Congress on Oils and Fats and 28th ISF Congress, Sydney Convention and Exhibition Centre, Darling Harbor, Sydney, Australia. Information: www.isfsydney2009.com.

October

October 2–3, 2009. Crystallization of Lipids Conference, Toronto, Ontario, Canada. Information: www.aocs.org/meetings.

October 4-6, 2009. 23rd Meeting of the Canadian Section of the AOCS: Lipid Functionality in Processed Foods,·Le Méridien King Edward Hotel, Toronto, Ontario, Canada. Toronto, Ontario, Canada. Information: www.aocs.org/meetings.

October 7, 2009. Biofuels Markets Mexico and Central America, Mexico City, Mexico. Information: www2.greenpowerconferences.co.uk/v8-12/Prospectus/Index.php?sEventCode=BF0907MX.

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2710 South Boulder Drive
P.O. Box 17190
Urbana, IL 61803-7190 USA
Phone: +1-217-359-2344
Fax: +1-217-351-8091
E-mail: publications@aocs.org

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How Wonderful! What a Celebration! Happy Birthday, AOCS!

It was an epic, joyous, jubilant, colorful, and unbelievable event, an event rich in our history, filled with pageantry and entertainment, caricature portraits, music, great food, plenty of giveaways, and memorabilia. It was picturesque, exciting, filled with camaraderie and the meeting of the minds, a reunion of old acquaintances and meeting of new friends, and well-planned spousal events—it was our 100th anniversary at Rosen Shingle Creek, Orlando, Florida, USA.

The meeting opened with a ribbon cutting at the Expo Pavilion in the presence of all AOCS past presidents in attendance and ended with a happy birthday song and cutting of the anniversary cake. The Gala celebration was punctuated with a red carpet greeting line of past presidents, actors posing as celebrity paparazzi photographers and interviewers, live band music, dance, karaoke, and great food. The past presidents formed an honor greeting line into the Gala at the outside terrace of Rosen Shingle Creek. Two of our elder presidents, Drs. Applewhite and Baldwin, were on hand to greet the guests. It was the largest assembly of AOCS past presidents in one place, a once-in-a-lifetime event, and that is why they all came, and we certainly appreciate them. They helped us mark the occasion, and we received their blessing and words of wisdom. It should, however, be noted that AOCS officially turned 100 years old on May 20, 2009.

Attendance at the 2009 AOCS Annual Meeting & Expo (AM&E) was slightly down due in part to the world economic downturn and the H1N1 swine flu scare. Overall, the total registration was 1,495, with 1,237 as full technical registrants. Almost 500 oral presentations, 230 posters, one exhibitor showcase session, and nine hot topics were presented. Three short courses in lipid oxidation, edible oil refining, and new tools for surfactant and polymer characterizations were held prior to the AM&E. The Expo had 95 exhibitors. The quality of the technical presentations continued to improve, but of course, we can do better. I encourage the Division officers to start now to solicit program and topic ideas from their members to ensure an even better and forward-looking cutting-edge technical program at the next AM&E in Phoenix, Arizona, USA, in 2010.

Daniel Burrus (founder and CEO, Burrus Research) was the keynote speaker at the Business Meeting and Awards Breakfast. His address was well received. His topic was "Technotrends: The Big Ideas that are Changing Everything." He dazzled everyone and challenged AOCS to take a giant leap into the future. According to him, "the problem is not the problem," strategic insight is needed to see the future, the future fact is that "technology change will accelerate," and three of the tech-driven trends he discussed were: networking, dematerialization, and virtualization. He told our Society that we need the young and the old, that we should be able to learn from each other, and that we must involve the young in task forces and committees. This confirmed what I believe and have been saying, in that the future of AOCS and its second century belongs to the current students and young professionals. We must nurture them, engage them—for they are full of good ideas—and have them learn from us and the past. We must build the bridge that connects the first and the second century now.

Burrus also discussed "hard trends" (predictable and must happen) versus "soft trends" (might happen). He said that it is easy

Now that we have celebrated our accomplishments in the past 100 years, we must "raise the bar a little higher" for the next 100 years. The way we worked yesterday will not be the best way to work tomorrow—we must embrace new technology and the younger generation for the greater good of the Society in its second century.

to ride the technology horse in the direction the horse is going. But, if we do nothing, we will be left behind. To this end, AOCS is expending much effort and resources to make our website accessible to the world and the society hopes to use the web as a revenue-generating tool in the future. Our relationship with Springer has been great both financially and in increased visibility of our journals.

Other AM&E highlights included the Hall of Presidents, an AOCS historic exhibit; the AOCS Lab, a computer lab with demonstrations and tutorials for online learning programs; AOCS Connect, for social networking; Job Target, for career services; Laboratory Proficiency Program reporting; Manuscript Central for editors and authors (SpringerLink); golf tournaments; soap exhibits and giveaway; Student Common Interest Group silent auction; student mentoring session and luncheon; the AOCS Bookstore; Section and Division luncheon and dinner events; receptions and drinks at the Expo Hall; and optional tours to the Kennedy Space Center, Orlando City, and Farris & Forster's Famous Chocolate party.

The gavel was passed to Ian Purtle as the first AOCS President of the second century.

At the AM&E Governing Board meeting in Orlando, Florida, on May 3 and 7, 2009, the following major decisions were made:

- The Board approved 223 new members that joined between February 6 and April 7, 2009. This includes 158 new active members, 63 students, and two corporate members.
- Board approved eight Emeritus members.
- The Board approved the Foundation Board restructure proposal and recommended that the Foundation Board do the same.
- Board approved extending Max Norris' term as Division Council Representative for one year while the Board reviews the Division Council structure.
- The AOCS Foundation Board was dissolved so that the new structure can be implemented as soon as possible. The Governing Board supports extending the Foundation Board chairman's term during this transition if the Foundation Board requests it.

I am very grateful to the centennial organizing committee, the exhibitors, sponsors, volunteers, AOCS staff, and all of you who attended and celebrated our 100th anniversary. Congratulations to all the award winners. You make us proud!

So, as I sign off as the Centennial President, I want to assure you that the affairs of the Society are in good hands (the current President and the new Board), and the second AOCS century is poised for greater achievements and transformations. If you heard the keynote speaker, Daniel Burrus, then you will agree with me that AOCS must shift from "incremental change to transformation" in how we sell, market, communicate, collaborate, and innovate in all things pertaining to AOCS and its products.

It has been my honor and privilege to serve you during this historic moment and I hope I have not let you down—that you are proud that you made the right choice in electing me as your president.

Those who missed the live celebration of our 100th anniversary, as well as those who were lucky to be present, should visit www.flickr.com/photos/aocs/ for the pictures capturing the moments during the event. This issue of *inform*, as well as other issues throughout the year, will contain coverage on the centennial celebration.

Now that we have celebrated our accomplishments in the past 100 years, we must "raise the bar a little higher" for the next 100 years. The way we worked yesterday will not be the best way to work tomorrow—we must embrace new technology and the younger generation for the greater good of the Society in its second century. Thank you and congratulations for a successful celebration. May you stay young, healthy, and come back to witness the next celebrations in 25, 50, and 100 years!

Casimir C. Akoh
AOCS President, 2008–2009

Oilseeds of the future: Part 3

Catherine Watkins

The final collection of questionnaire responses in a series of three articles highlighting trait-modified oilseeds in the global R&D pipeline concludes with a look at work in safflower, soy, and sunflower.

SAFFLOWER *(Carthamus tinctorius)*

Arcadia Biosciences, Davis, Illinois, USA

What: High-GLA (more than 40% γ-linolenic acid) safflower oil.

How: Genetic modification.

Benefits: Arcadia's GLA safflower plants produce concentrations two to four times higher than traditional sources, with yields of more than 40% GLA oil. High-GLA safflower will be used as a replacement for borage oil and will be used in supplements, medical foods, and cosmetics.

When: "We are in the process of completing pre-commercialization activities," the company notes. Seed is currently available for planting for a Phase I rollout. However, as a proprietary product, seed will not be made available for sale. As for when oil might be available for use by the food industry, Arcadia says: "We are currently finalizing data and preparing our premarket notification submission to the US Food and Drug Administration for GLA safflower. We cannot speculate on how long their review will take, but a typical submission usually takes several months for the agency to complete its review. In the meantime, we are wrapping up commercialization activities so we are ready to begin commercialization once the regulatory process is complete."

Samples: Samples are expected to be available in the third quarter of 2009.

Contact: Frank Flider, vice president business development (frank.flider@arcadiabio.com).

Photo by Jack Dykinga. Courtesy of the US Department of Agriculture.

SOY *(Glycine max)*

Embrapa Soybean, Londrina, Paraná State, Brazil

What: Former AOCS Governing Board member Mercedes Carrão Panizzi reports that her group is working on a number of traits in soy, including:

- Null-lipoxygenase beans, or soybean minus the three isoenzymes L1, L2, and L3 responsible for the objectionable, beany flavor that appears in soy foods that are not well processed.
- Reduced trypsin inhibitor beans for improved protein digestibility.
- High protein content beans.
- Reduced α-linolenic acid beans for lowering *trans* fatty acid content in foods.
- Large seed size for tofu production.
- Small seed size for the production of sprouts and natto.
- Vegetable-type soybeans for use as edamame.

How: Conventional breeding.

Benefits: The availability of special cultivars can improve soybean processing, with the aim of producing better quality soy products.

When: The market for soybeans in Brazil has undergone "impressive growth" in the last five years, Panizzi notes. Through conventional breeding, specialty characteristics can be introduced, making the varieties more suitable for different uses and processing. Toward this end, Embrapa Soybean has released for commercial cultivation the cultivars BRS 213 (null lipoxygenase), BRS 257 (null lipoxygenase), BRS 258 (for organic production—mild flavor, large seed size, and yellow hilum), BRS 216 (small seed size—10 g/100 seeds), and BRS 267 (large seed size, superior flavor, suitable for tofu, flours, and soymilk). BRS 267 can be consumed as a green vegetable when harvested at the R6 stage.

When: "At the moment, breeding lines are in the field for evaluation," Panizzi writes. BRS 258, BRS 257, and BRS 267 are available on the Brazilian market. However, the last two varieties have a limited amount of available seeds, because these cultivars are for niche markets.

Samples: Commercial varieties are available only for those institutions that have an agreement with Embrapa's International Secretariat.

Contact: Mercedes Carrão Panizzi, senior researcher and plant breeder (mercedes@cnpso.embrapa.br).

Monsanto Co., St. Louis, Missouri, USA

What: High-oleic, low-saturate, low-linolenic soybeans, with oleic acid increased from 24% to 75%, linoleic acid decreased from 52% to 15%, and α-linolenic acid decreased from 8% to <3%.

How: Genetic modification

Pioneer Hi-Bred

Pioneer Hi-Bred's Jordan Spear examines the company's high-oleic soy plants.

Benefits: Zero grams *trans* fat, reduced saturated fat, high in monounsaturated fat. For processors and food companies, the oil constitutes an additional alternative in soy with high fry and heat stability.
When: Seed and oil will be available in three to five years.
Samples: Samples are available in pail quantities.
Contact: Rick Wilkes, director, Food Application (Richard.S.Wilkes@monsanto.com).

Monsanto Co., St. Louis, Missouri, USA
What: High-stearate soybeans, with stearic acid content increased from 5% to 15–20%. The fatty acid targets for this oil are: palmitic (9%), stearic (15–20%), oleic (23%), linoleic (43%), and α-linolenic (<4%).
How: Conventional breeding.
Benefits: Oil from these soybeans will have zero grams *trans* fat and will serve as a solid fat alternative, according to Monsanto. For processors, the oil will constitute an additional soybean alternative to meet solid fat functionality.
When: Seed and oil will be available in three to five years.
Samples: Samples are available in pail to drum quantities.
Contact: Rick Wilkes, director, Food Application (Richard.S.Wilkes@monsanto.com).

Monsanto Co., St. Louis, Missouri, USA
What: Stearidonic acid-enriched soybeans (in collaboration with Solae, LLC), with stearidonic acid levels increased from 0% to 20%. The fatty acid targets for this oil are: stearidonic (20%), palmitic (12%), stearic (4%), oleic (20%), linoleic (24%), and α-linolenic (10%).
How: Genetic modification.
Benefits: Ingestion of the oil "helps maintain a healthy heart by significantly increasing levels of eicosapentaenoic acid in red blood cells," Monsanto says. In addition, the oil represents a sustainable, plant-based source of omega-3 fatty acids that will maintain the flavor and shelf life of traditional foods.
When: Seed and oil will be available in three to five years.
Samples: Available in pail quantities.
Contact: Rick Wilkes, director, Food Application (Richard.S.Wilkes@monsanto.com).

Pioneer Hi-Bred, a DuPont business, Johnston, Iowa, USA
What: Increased oleic acid, reduced polyunsaturates and saturates resulting from silencing genes encoding Δ^{12}-desaturase. All introduced elements are derived from soybean.
How: Genetic modification.
Benefits: "High-oleic soybeans offer nutritional benefits with broader applications than other available soybean oil products," Pioneer spokesperson Julie Kenney says. "They contain more than 75% oleic acid, significantly increasing the stability of the oil. High-oleic soybean oil is a *trans* fat solution with a 20–25% reduction in saturated fats and more than three times the monounsaturated fat compared to commodity soybean oil," she notes.
When: High-oleic soybeans will be available for planting in 2010, regulatory approval and ongoing field testing pending. They are in the pre-introduction phase of the DuPont Crop Genetics Research and Development pipeline. The soybeans are on track for a limited introduction in 2009, regulatory approval and ongoing field testing pending. US regulatory submissions were completed in 2006. The FDA completed its review of high-oleic soybeans earlier in 2009. Pioneer is also seeking regulatory approval in key soybean export markets.
Product summary: High-oleic soybean oil can be used in many of the applications in which partially hydrogenated oils traditionally have been used, according to Pioneer. The stability of the high-oleic oil makes it suitable for use as a heavy-duty frying medium for industrial and food service operations, and for use as spray oil on crackers, nuts, candies, and baked goods. "It is an extremely flexible base stock that allows processors to blend it with other oils to meet specific end-user specifications. It may also be blended or interesterified with solid fats to meet the requirements of the baking industry," Kenney reports.
Samples: A limited quantity of high-oleic soybean oil is available for industry sampling/testing.
Contact: John Muenzenberger, Pioneer senior marketing manager (john.muenzenberger@pioneer.com).

University of Guelph, Ontario, Canada
What: "We have been using chemical mutations, i.e., induced by ethyl methane sulfonate, to develop different oil profiles in soybean such as low linolenic (~2.5%), high linoleic

(about 70%), low palmitic (about 3%), high stearic (up to 19%), and combinations thereof," Associate Professor and Soybean Breeder Istvan Rajcan says.

"We have also been developing high-oil soybeans with the aim of producing cultivars with up to 25% oil in the seed. We are at 24% in some of our breeding lines now," Rajcan continued. For the nonoil traits, Rajcan's group has been developing high- and low-isoflavone soybeans, soybeans with enhanced or altered tocopherol (vitamin E) content, and some new protein profiles. All of these were developed through classical genetic approaches using natural variation in the soybean.

How: Conventional breeding for about 70% of the program and genetic modification, primarily glyphosate resistance (Roundup Ready®) for the rest.

Benefits: Zero *trans* fat for food manufactured with the low-linolenic varieties and a more healthful oil lower in saturated fat for the low-palmitic varieties. The high-tocopherol oil will be a more healthful oil with higher stability. And the high- or low-isoflavone trait will produce a more healthful oil for adults and for infant formula, respectively.

When: Some low-linolenic cultivars are being released now. In addition, several high- and low-isoflavones lines are ready for release, along with some high-tocopherol lines. The low-palmitic lines are still under development and are perhaps five to six years from release. The high-oil lines are more advanced, perhaps three to four years from release.

Samples: Samples of the low-linolenic seed may be available in 2010 upon request. Interested parties should contact Rajcan regarding seed samples for the other traits.

Contact: Istvan Rajcan, associate professor and soybean breeder (irajcan@uoguelph.ca).

SUNFLOWER

Advanta Semillas, Nutrisun Business Unit, Mar del Plata, Buenos Aires, Argentina

What: High-stearic, high-oleic sunflower oil (Nutrisun).

How: Conventional breeding (mutagenesis).

Benefits: Alternative to oils higher in *trans* fat and saturates for almost every food application.

When: Commercial introduction in 2009 in Argentina and Europe.

Samples: Samples are available now.

Contact: Lucas Pan (Lucas.Pan@acvantasemillas.com.ar).

Catherine Watkins is associate editor of inform. *She can be reached at cwatkins@aocs.org.*

Briefs

The journal *Nature* has established a free Lipidomics Gateway website at www.lipidmaps.org for researchers interested in lipid biology. Featured tools include resources from the LIPID MAPS (LIPID Metabolites and Pathways Strategy) consortium. The latter is a multi-institutional effort created in 2003 to identify and quantify, using a systems biology approach and sophisticated mass spectrometers, all of the major—and many minor—lipid species in mammalian cells, as well as to quantify the changes in these species in response to perturbation.

■■■

Eurofins' laboratory in Suzhou, China, has been awarded ISO 17025 status by the German accreditation body DACH. It is the first laboratory to have achieved this level of accreditation in China, the company said. DACH is the German Accreditation Agency in chemistry.

■■■

ACGIH® and the American Industrial Hygiene Association (AIHA) have forged an alliance that, if approved by the boards of both organizations, "will result in a sustainable member organization and a scientific organization. AIHA will administer a single, US industrial hygiene membership organization. ACGIH will autonomously focus on practice standards and guidelines." ACGIH is based in Cincinnati, Ohio, USA; AIHA has headquarters in Washington, DC, USA.

■■■

Japan's Marubeni Corp. has signed a deal with leading Brazilian agrifood company Amaggi Exportação e Importação for the procurement of soybeans, corn, and other grains to enable stable supplies for Japan and China. The new allies also agreed to consider joint investments in port facilities in South America to enable smoother exportation of the farm produce, Marubeni said. The agreement is aimed at securing stable supplies of the farm products without relying on major US agri-food companies, Marubeni sources said, according to a report by the *Kyodo News International* newspaper. ■

News & Noteworthy

Oilseeds in India

The following is excerpted from the US Department of Agriculture's (USDA) Global Agriculture Information Network Report No: IN9051, entitled "India Oilseeds Annual Report." The report was written by Amit Aradhey and is available at http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Commodity%20Report_OILSEEDS%20_New%20Delhi_India_4-15-2009.pdf. Note: The relevant Marketing Year (MY) is 2009–2010 unless otherwise mentioned.

Assuming normal weather conditions, USDA forecasts MY 2009–2010 (October–September) total oilseed production (soybean, peanut, rapeseed/mustard, cottonseed, sunflowerseed, and copra) in India at around 36.5 million metric tons (MMT), up 7% from the 2008–2009 revised production estimate of 34 MMT. Total domestic oilseed use for 2009–2010 is forecast to increase to 36 MMT, up 2.8 MMT from the 2008–2009 level.

Oil meal production in 2009–2010 is forecast at 17.2 MMT, 9% higher than in 2008–2009 owing to higher oilseed production and increased crush. Meanwhile, 2008–2009 oil meal production is revised down by 500,000 metric tons (MT) to 15.8 MMT reflecting lower production. Feed use of oil meals in 2009–2010 is forecast to increase by 5% to 11.2 MMT from 2008–2009 level of 10.7 MMT. Assuming Indian oil meal prices remain competitive in the international market, 2009–2010 oil meal exports are forecast to increase by 27% to 6 MMT. However, 2008–2009 total oil meal exports are revised downward by 700,000 MT to 4.5 MMT as Indian oil meal prices turned uncompetitive in international markets.

TOTAL OILSEEDS

Production. USDA forecasts 2009–2010 total edible oil production at 7.6 MMT, up by 9% over 2008–2009 owing to an anticipated increase in total oilseed production and larger crush. Most of the increase is likely to be in rapeseed, peanut, and soybean oil. Edible oil production in 2008–2009 is estimated close to 7.0 MMT, which included 2.1 MMT of rapeseed

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oil, 1.6 MMT of peanut oil, 1.4 MMT of soybean oil, and 1 MMT of cottonseed oil, and smaller quantities of coconut and sunflower oil. Other minor edible oils not included in this report (totaling 1.7 MMT) are rice bran oil, sesame seed oil, safflower oil, and niger seed oil. Sesame seed oil is a premium oil, exported in significant quantities to cater to the demand of high-end overseas buyers.

Consumption. Edible oil consumption in 2009–2010 is forecast to increase by 6% to 14 MMT mostly owing to the increasing population and softening of prices owing to good supply conditions. The vegetable oil deficit in 2009–2010 is expected to be over 6 MMT, which is likely to be met through imports. In order to fulfill the growing demand, edible oil manufacturers in India are expanding their refining capacity and promoting new, more healthful cooking oils that are region specific. Refined palmolein, sunflower, rice bran, and safflower oils are now promoted by Indian manufacturers as healthful oils. Cottonseed oil is also finding an increasing place in the India diet, closely competing with peanut oil.

Edible oil consumption in 2008–2009 is estimated at 13.1 MMT, with imported oil constituting 53% of the total share (43% during last MY). At 5 MMT, palm oil continues to be the primary edible oil consumed owing to its relatively low price, versatility in blending with other edible oils, and increased usage by the confectionary, margarine, and vanaspati (partially hydrogenated vegetable oil) industries. The second most-consumed edible oil is soy oil (2.2 MMT), followed by rapeseed oil (2.1 MMT), and peanut oil (1.5 MMT). Cottonseed oil is largely used for blending purposes owing to its easy blending properties with higher-priced oils because of its light color and neutral odor.

Although the edible oil consumption pattern in India was traditionally region specific (coconut, peanut, and sunflower oil in south India, peanut and cottonseed oil in Gujarat; rapeseed oil in northeast India; soybean oil in central India, etc.), lower vegetable oil prices for imported oils in recent years have prompted consumers to switch to nontraditional oils. Per capita edible oil consumption in India is increasing and is estimated at 12.5 kg for 2008–2009, which is far below the world average per capita consumption of 20 kg.

Most of the oil purchased by household or institutional users (food processors, restaurants, and hotels) is in loose form. Only a small percentage is sold in branded, packaged form. With prices of edible oils falling across the domestic market, the consumption of packaged edible oils is likely to increase as the difference between premium and economy products narrows. However, with the recent notification by the government of India mandating packaged food manufacturers to declare nutrition information on product labels, the sale of packaged edible oil is likely to be affected in the long run. While per capita consumption of vegetable oil is relatively low in India, as a result of this notification consumers seeking more details on *trans* fats will be able to obtain this nutritional information on package labels. (Refer to GAIN report No. IN9033 for further information.)

Trade. Edible oil imports in 2009–2010 are forecast at around 6 MMT, 12% below 2008–2009 imports owing to a likely increase in domestic production and large carryover stocks. USDA estimates 2008–2009 edible oil imports at 7 MMT, with palm oil constituting around 83% of total imports, the rest mostly soy and sunflower oil. Palm oil imports in 2008–2009 are revised upward to 5.8 MMT from the earlier estimate of 4.6 MMT; soybean and sunflower oil imports are revised upward by over 200,000 MT, to 850,000 MT and 320,000 MT, respectively.

Imports of edible oils during the first six months of the 2008–2009 MY were up by 73% at 4.2 MMT. Imports of palm and soy oil were up by 65% and 38%, respectively, owing to a steep fall in their international prices and Indian government efforts to keep prices lower by reducing or abolishing import duties. Higher world production and lower freight costs made sunflower seed oil prices almost at par with soy oil, leading to larger imports. However, palm oil continues to be the primary imported oil owing to its lower prices vis-à-vis other oils and India's geographical proximity to major palm oil-exporting countries. Lower international prices for edible oils combined with a zero import duty for crude vegetable oils have made imports attractive for refiners, who are building up inventories in the hope of making large profits later.

To boost domestic supplies of edible oils and rein in prices, the government has taken the following measures:

- Through an official notification issued on March 24, 2009, the government abolished the 20% import duty on crude degummed soybean oil imposed on November 18, 2008 (see GAIN report IN 9020), bringing it on par with other crude vegetable oils, thus providing a level playing field for soybean oil in the Indian market. Following the duty removal, India placed an order for the commercial import of 35,000 MT of US soybean oil during the week of March 20–26, which is the first commercial US soybean oil purchase since 2002.
- Extended the stock limits on edible oil for another six months effective April 7, 2009 (see http://pib.nic.in/release/release.asp?relid=48395).
- Extended the ban on exports of edible oils (loose edible oil in bulk) with effect from March 17, 2009, through March 16, 2010 (DGFT Notification No. 98 (RE-2008) / 2004-2009).
- With the easing of inflation in early December 2008, the government lifted the ban on soy oil futures imposed on May 7, 2008.

Although imports of biotech food products are restricted, the government gave a special exemption on June 22, 2007, to commercial imports of soy oil derived from Roundup Ready soybeans while government regulators reviewed the industry's application for importation. No other biotech food products are officially permitted for commercial importation or are awaiting approval for import to date. The regulation restricts imports of many biotech products including soybean and soy-based processed food products. Most of the cottonseed oil produced and consumed in India now is also genetically modified, as Bt cotton accounts for over 80% of the total cotton produced in India.

Bunge buys Raisio's margarine business

Raisio will sell its margarine business to Bunge Ltd., the companies announced on

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Acquisitions/ mergers

Supreme Oil Co., a manufacturer of vegetable oil-related products based in Englewood, New Jersey, USA, has acquired the Mike Rose mayonnaise, dressing, and sauce facility in Nashville, Tennessee. The Nashville facility, along with the company's existing New Jersey and Alabama plants, will produce vegetable oils, mayonnaise, salad dressings, margarine, butter blends, vinegar, barbeque, and other specialty sauces, largely for the private-label market.

Commodities

CANOLA/RAPESEED OIL

A **free-trade agreement** between **Canada** and members of the **European Free Trade Association** (EFTA) will be effective July 1, 2009, reducing or eliminating the export tariff on crude canola oil. The EFTA countries include Iceland, Liechtenstein, Norway, and Switzerland. This free-trade agreement is the first of its kind between Canada and European countries, according to the Canola Council of Canada.

■■■

A breakthrough from a joint research project conducted by **Pork CRC** and the **Australian Oilseeds Federation** could save pork producers in that country more than $450,000 annually by allowing them to use **canola meal** more efficiently, according to AllAboutFeed.com. By using near-infrared spectroscopy, the research developed rapid analysis technology to assess how well pigs digest canola meal, allowing producers to analyze meal quality and value rapidly and cost-effectively. More information about the technology is available from John Spragg at jspragg1@optusnet.com.au.

CACAO/CHOCOLATE

Archer Daniels Midland Co. announced on May 29, 2009, that it has completed the acquisition of the **Schokinag-Schokolade-Industrie Herrmann GmbH & Co. KG**, following approval by relevant antitrust authorities. The acquisition was announced on January 23, 2009. ADM Schokinag, based in Mannheim, Germany, and one of Europe's leading producers of industrial chocolate and cocoa powder, has manufacturing facilities in Mannheim and in Manage, Belgium, as well as sales offices in Ludlow, England, and Bakersfield, California, USA.

■■■

The **Swedish Chocolate, Confectionery and Biscuit Manufacturers' Association** (Chokofa) and the **World Cocoa Foundation** (WCF) will work together to improve conditions in cacao-growing communities in Côte d'Ivoire and Ghana and help ensure a sustainable supply. Chokofa members, who include Kraft Foods, Lindt & Spüngli, Mars, Ferrero, Nestlé, Haribo, and Cadbury, account for more than 90% of sales of chocolate and confectionery in the Swedish market, according to ConfectioneryNews.com.

■■■

The **Italian Republic** has failed to fulfill its obligations under Directive 2000/36/EC relating to cocoa and chocolate products and Directive 2000/13/EC on the labeling of foodstuffs by restricting the use of the adjective "puro" or the phrase "pure chocolate" to the sales names of chocolate products that contain only cocoa butter but do not contain vegetable fat other than cocoa butter. The ruling of the **Court of Justice of the European Communities**, Case C-47/09, is available at http://eur-lex.europa.eu.

FISH OIL/MEAL

Omega Protein Inc. of Houston, Texas, USA, has received the 2009 award for sustainability from Friend of the Sea, an international, sustainable fisheries organization. Omega manufacturers fish oil for the supplements and ingredients markets.

■■■

Alicorp (Callau, Peru) has opened a $50 million fish oil production plant in the northern Peruvian region of Piura, according to www.livinginperu.com. The project, the report noted, is a partnership with **Ocean Nutrition Canada** (Dartmouth, Nova Scotia, Canada).

■■■

A research team in Taipei has successfully extracted **docosahexaenoic acid (DHA) from squid skin**, a fisheries official told the *Taipei Times* newspaper. According to the report, squid skins are tough and unpalatable; they are usually processed into powder that is used as an additive in animal and livestock feed.

OLIVE OIL

"**Olive phenol extracts** from waste from olive-oil production (alperujo) have been obtained by microwave-assisted extraction and used for edible oil enrichment," scientists in Cordoba, Spain report in the *Journal of Agricultural and Food Chemistry* (57:2797–2802, 2009). "The extracts as such or after extractant removal were used to enrich edible oils of different fatty acid composition by liquid-liquid or solid-liquid extraction, respectively. The distribution ratios of the phenols in the different oils [olive-orujo (the waste of milled olives from which low-quality oil is obtained), sunflower, high oleic-acid content sunflower, coconut, and linseed] showed a given order as a function of phenol polarity and molecular weight, with higher distri-

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May 14, 2009, in a transaction valued at €80 million ($113 million). The deal will make Bunge a significant purchaser of the Raisio cholesterol-lowering sterol ingredient Benecol. The transaction is expected to close in the third quarter of 2009, pending regulatory approvals.

Included in the transaction are Raisio's plants in Finland and Poland, as well as several brands, including Keiju, Makuisa, Masmix, and Pyszny Duet. Bunge will also have a licensing agreement concerning the Sunnuntai and Carlshamn Mejeri brands. About 330 of Raisio's Finnish and Polish employees will be transferred to Bunge. The transaction will not affect contract cultivation of oilseeds in Finland, Raisio said.

In other Bunge news, the company has purchased the assets of Mid-Atlantic Vegetable Shortening, Inc., an edible oil packaging business that services bakery, food processor, and foodservice customers in the northeastern United States. Mid-Atlantic, which is based in Kearny, New Jersey, USA, packages liquid oils, shortenings, margarines, and butter blends made from a variety of oils.

Ozone causing crop damage

Rising surface ozone concentrations are damaging nearly $2 billion in annual US soybean crops, a NASA (National Aeronautics and Space Administration) study of satellite measurements indicates.

The study, headed by NASA Langley Research Center in Hampton, Virginia, was presented at the American Geophysical Union Joint Assembly meeting in Toronto on May 24 and looked at five years of soybean yields, surface ozone, and satellite measurements of tropospher ozone levels in three Midwest states. Indiana, Illinois, and Iowa are three of the biggest soybean producers in the US and had peak crop damage in the hundreds of millions of dollars—part of more than $2 billion nationwide.

"In the 19th and early 20th century, background surface ozone concentrations were relatively low so that an increase of 25%—or 5 to 10 parts per billion—didn't affect living organisms," said Jack Fishman, a research scientist at NASA Langley's Science Directorate. "But now, we've crossed the line where you can expect to see modest increases in surface ozone result in crop growth being stunted."

In related news, the US National Science Foundation has released a report on climate change. It is available at www.nsf.gov/news/special_reports/climate/pdf/NSF_Climate_Change_Report.pdf.

Antioxidant claims based on ORAC/DPPH questioned

New research from AOCS member Eric Decker and his team at the University of Massachusetts in Amherst (USA) suggests that basing antioxidant activity claims on results of basic antioxidant assays such as ORAC and DPPH (2, 2´-diphenyl-l-picrylhydrazyl) could be deceptive.

"Free radical scavenging assays such as ORAC [Oxygen Radical Absorbance Capacity] and DPPH were not able to consistently predict the ability of compounds to inhibit lipid oxidation in cooked ground beef," they wrote in the *Journal of Agricultural and Food Chemistry* (*57*:2969–2976, 2009).

"While simple one-dimensional free radical scavenging assays can be helpful in evaluating the antioxidant mechanisms of a compound, the data from these assays should not be used to imply that compounds with high free radical scavenging capacities are good antioxidants in food systems.

"The major drawback of the free radical scavenging assays is that they do not measure the ability of a compound to chelate metals, partition into lipids where oxidation is prevalent, or interact with other antioxidants and prooxidants (e.g., metals) in a food product," they concluded.

Almond market expanding

The almond market will continue to benefit from expanding global demand, according to Rabobank Food & Agribusiness Research and Advisory (FAR) Vice President Marieke de Rijke. Growth in the export market is owing to several key factors: marketing, additional supply, and last year's low value of the US dollar.

"Exports have grown significantly in recent years," said de Rijke in a Rabobank podcast. "We have seen a huge increase in demand due to the efforts of marketing organizations. They have focused on promoting the health benefits of almonds, and have communicated this all over the world. So, not only in the United States but in many foreign countries, demand for almonds has grown."

As a result of increased consumption levels and high grower prices, which made almonds more attractive, growers increased production volume. In fact, during the last decade, more than 250,000 acres of almonds have been added.

In addition to higher inventory, a water shortage in California—the main supplier of almonds for the world—is impacting the supply of almonds. The state is in its third year of drought, which will limit the water some growers will be able to give their trees and reduce almond yields in 2009.

In the longer term, exports are likely to grow as more become aware of the health benefits. China, India, and Russia are expected to drive much of the consumption growth. For example, 80% of India's population is vegetarian, and are increasingly using almonds as a protein source.

The podcast is available at http://news.rabobankamerica.com/pr/rb/electronic/rabocast_almonds_derijke_v3.mp3

FDA guidance: Food imports

Small companies involved in the import and export of foods in the United States may benefit from a guidance document published by the US Food and Drug Administration (FDA) and the US Department of Health and Human Services.

The document offers an update on the prior notice interim final rule, which was published in the *Federal Register* in November 2008, as issued under the 2002 Bioterrorism Act. The guide is intended to help any entity, regardless of size, to comply with the regulations that require the submission to FDA of prior notice of food, including animal feed, that is imported or offered for import into the United States. FDA is now allowing more time for importers to inform the agency of food product imports, extending the window for doing so from the current five days before arrival to 15 or 30 days, depending on the mode of notification. The amended regulations went into effect on May 6, 2009.

The guidance document is available at www.cfsan.fda.gov/~acrobat/fsbtpn2.pdf.

How plants survive near Chernobyl

Twenty-two years after the Chernobyl nuclear power station accident in the Ukraine—the worst in history—scientists are reporting insights into the mystery of how plants have managed to adapt and survive in the radioactive soil near Chernobyl. Their research is the first to probe how production of key proteins in plants changes in response to the radioactive environment, according to the scientists. The report appeared in the ACS' *Journal of Proteome Research* (*8*:2915–2922, 2009).

Martin Hajduch and colleagues at the Slovak Academy of Sciences note in the new study that plants growing in the Chernobyl area following the April 26, 1986, disaster somehow adapted to the radioactive environment and thrived. But until now, nobody knew what biochemical changes in the plants accounted for this miracle and enabled plants to adapt.

The researchers found that soybean seeds exposed to radiation produced different amounts and types of protein than seeds from unexposed plants. The proteins protected the seeds from the radio-contaminated environment. Interestingly, plants from contaminated fields produced one-third more of a protective protein called betaine aldehyde dehydrogenase—the same protein known to protect human blood from radiation damage. ■

bution factors for more polar and lower molecular-weight phenols," wrote M.V. Giron and colleagues of the University of Cordoba.

PALM OIL

The **World Wildlife Fund** (WWF) told FoodNavigator.com that it will increase its monitoring of how manufacturers source their palm oil over the next six months after a "poor industry response to purchasing sustainable shipments of the ingredient." The environmental organization claims that only 1% of the certified palm oil currently on the market has been used since becoming available last year.

New ventures

Purac has developed a new product based on calcium lactate that it says can reduce acrylamide formation in snacks by up to 80%, according to FoodNavigator.com. Purac is a subsidiary of the bakery supplies and food ingredients firm **CSM** (Diemen, Netherlands).

■■■

Saudi Arabia edible oil manufacturer **Savola Group** will increase its edible oil refining capacity in that country to 400,000 MT/year when a new refining unit opens at the end of 2009. The added capacity will be used to boost the company's market share in the Levant, Syria, and Iraq, according to Savola's chief executive, Zouhair Eloudghari, in a report by the Datamonitor newswire.

■■■

Danisco has introduced a new enzyme called LysoMax that enhances degumming for vegetable oil refiners; it claims the product will increase yields and use less water and energy. "The method has no negative impact on oil quality and does not require further investments in equipment," according to Danisco.

■■■

Maine Natural Oils LLC—a new company operating out of an 18-wheel trailer truck—has taken toll processing on the road, according to www.MaineBiz.biz. The company's oil press can process one ton of seeds a day, producing 1,400 pounds (640 kilograms) of meal, and 600 pounds (300 kilograms) of oil. Maine Natural Oils either buys the oil it presses or gives it back to the farmer for biodiesel production. If the company purchases the oil, it is distributed for food use. Trader Joe's may be a future customer, according to the report. ■

Biofuels News

Briefs

The National Renewable Energy Laboratory (Golden, Colorado, USA) has issued an online interactive map of the 2,000-plus service stations in the United States that supply E85 (85% ethanol, 15% gasoline). Also plotted on the map are all the ethanol biorefineries across the country, as well those under construction. There is also a map for biodiesel facilities. The maps may be accessed at http://rpm.nrel.gov/transatlas/launch.

■■■

The European Algae Biomass Association (EABA) had its official debut early in June with its Conference & General Assembly, held in Florence, Italy. The organization was founded to foster synergies among science and industry, while cooperating with decision-makers to promote the development in research and technology regarding algae. The organization wants to find ways to bring the price of algal biomass down to an economical level and to produce a reliable, quality product. The EABA web site is www.eaba-association.eu.

■■■

PetroAlgae (Melbourne, Florida, USA), one of the better-capitalized companies trying to make it big in the algae-to-biofuels market, has appointed three executives to staff an office in Washington, DC, "to work closer with the Obama administration, Congress, nonprofit groups and the business community to help reduce America's dependence on fossil fuels."

■■■

US ethanol fuel use will rise to 12 billion gallons (45 billion liters) by 2010, according to Archer Daniels Midland Co. (ADM; Decatur, Illinois, USA), up from 10.5 billion gallons (40 billion liters) in 2009. Supporters have urged increasing blend rates of ethanol in gasoline above the current 10%, but the Environmental Protection Agency said it will take a year to evaluate whether a higher percentage of ethanol will harm car engines. ADM said it would consider acquiring existing ethanol facilities from bankrupt biofuels makers, but on a very selective basis. ■

GENERAL

New US fuel efficiency standards

US President Barack Obama announced a national policy to increase fuel efficiency for all new vehicles sold in the country beginning in 2012. The new standards will apply to model years 2012–2016. By 2016, cars, light trucks, and sport utility vehicles (SUVs) must meet a combined average fuel economy standard of 35.5 mpg (6.6 L/100 km), or an increase of more than 8 mpg. The 2016 target would be reached four years earlier than the current deadline set by the US Congress in December 2007 (see *inform 19*:25, 2008).

Obama said the country can save 1.8 billion barrels of oil over the lifetime of vehicles sold in the country over the next five years. This amount is more than the total amount of oil imported in 2008 from Saudi Arabia, Venezuela, Libya, and Nigeria combined. Or, as the president said, "This is the projected equivalent of taking 58 million cars off the road for an entire year" and is equivalent to reducing US carbon emissions by 900 million metric tons.

The price of a car may increase by $600 in response to these new standards, in addition to the $700 increase expected under the 2007 law. However, Obama countered that a driver could save $2,800 owing to the improved gas mileage.

China to tighten fuel economy standards for cars, trucks

The New York Times reported in May that Chinese officials are drafting more stringent standards of fuel economy, to be announced in 2010, than the ones that took effect in January 2009. According to An Feng, a leader in formulating China's existing fuel economy regulations, automakers will be required to improve fuel economy by an additional 18% by 2015.

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Average fuel economies for China's family vehicles are higher than those in the United States, in no small measure because Chinese cars generally are smaller than US cars. Also, the smallest cars in China are subject to a 1% sales tax, whereas sport cars and SUVs having the largest engines are subject to a 40% sales tax, making the purchase of a fuel-efficient small car an economically wise decision.

The Chinese method for calculating fuel economy is not the same as in the United States. For example, China's minimum standards are based only on urban fuel efficiency, not highway driving. Nevertheless, according to the *Times*, Mr. An estimated the present fuel economy in China for a new car, minivan, or SUV is 35.8 miles per gallon (mpg; 6.6 L/100 km) based on the US measurement system of corporate averages; this will increase to 42.2 mpg (5.6 L/100 km) in 2015.

BIODIESEL

Three biodiesel plants to consolidate

Renewable Energy Group (Ames, Iowa, USA) entered into agreements to consolidate with three commercial-scale biodiesel plants. Involved in the transaction are Western Iowa Energy, LLC, which operates 30-million-gallons-per-year (MGY) (100 million liters per year) facility in Wall Lake, Iowa; Central Iowa Energy, LLC, which operates a 30-MGY facility in Newton, Iowa; and Blackhawk Biofuels, LLC, which operates a 45-MGY facility in Danville, Illinois (see *inform 20*:25, 2009).

The facilities represent an additional 105 MGY of wholly owned production capacity, which would allow the combined entity to better position itself to meet anticipated demand from the petroleum industry's distillate fuel market.

EU may extend antidumping duties

The European Commission (EC) implemented plans to impose temporary antidumping and antisubsidy duties on imports

of biodiesel from the United States as of March 13, 2009 (*inform 20*:219, 2009). The initial period for these duties was to be for four months.

Most European Union (EU) members indicated on May 28 that they would support an EC plan to extend these duties for as much as five years.

EU producers of biodiesel have complained that US government subsidies to US-produced biodiesel have cut into their market.

According to Reuters, investigations since March by the EC have led to revisions in the duties initially imposed. For example, Archer Daniels Midland Co. (Decatur, Illinois, USA) would see an additional duty of €359 ($500) per metric ton of biodiesel exported to the EU. The duty initially imposed was €261 ($364). On the other hand, Cargill (Minneapolis, Minnesota) would pay €214 ($298) per metric ton, down from €275 ($383).

2008 biodiesel production down in Europe, US

In late April, biodiesel producers in Spain announced they were running at just 9% of capacity, although they were hoping that duties imposed by the EU on US imports (see preceding article) would help revive production. However, the biofuels division of the APPA (Asociación de Productores de Energías Renovables), a Barcelona-based renewable energy industry group, warned that imports from countries such as Argentina, Malaysia, and Indonesia could also become as damaging as those from the United States, because their imports are also subsidized. For 2008, APPA calculated that 71% of the 586,000 metric tons of biodiesel sold in Spain was imported.

The Union zur Förderung von Oel- und Proteinpflanzen (UFOP) reported that sales of biodiesel and vegetable oil-based fuel in Germany declined strongly in 2008 compared with 2007: down 36.6% for biodiesel and down 46% for vegetable oil-based fuel.

Joe Jobe, chief executive officer of the National Biodiesel Board (Jefferson City, Missouri, USA) said, "A review of the March biodiesel production numbers shows commercial biodiesel production fell to 30 million gallons [110 million liters]. If this continues, it will reduce industry production to half of the 700 million gallons [2.6 billion liters] produced in 2008…. At last count, 176 plants in the US enabled production of almost 2 billion gallons [7.6 billion liters] of homegrown, renewable fuel per year, but many plants sit idle and at least 20 have gone out of business."

GreenFuel Technologies closes

One of the early companies to enter the business of growing algae as a source of oil for biofuels closed its doors on May 13. Online news agency CNET News quoted investor Duncan McIntyre of Polaris Venture Partners as saying that GreenFuel Technologies (Cambridge, Massachusetts, USA) is a "victim of the economy." Investors are looking for ways to sell the company's intellectual property and assets.

In the latter part of 2008 GreenFuel had announced its joint project with Aurantia, SA (Madrid, Spain) to develop and scale up algae farming technologies at the Holcim cement plant near Jerez, Spain. The intention had been to show that CO_2 contained in flue gases from cement manufacture could be used to grow algae for use in fuel, feeds, and foods (see *inform 19*:802, 2008).

Results from biofuel test flight

In late December 2008 Air New Zealand (ANZ) performed a biofuel test flight using a Boeing 747-400 plane (see *inform 20*:88,

Bayer CropScience

Are jatropha advantages overstated?

Indian experience with jatropha has found that the plants do indeed grow in wastelands, but if high yield is to be achieved the plants must be cared for, according to Suman Jha, a researcher with R.R. Shah at Navsari Agricultural University (Gujarat, India).

A jatropha farm was established in 2005 on parched, desolate land in the Vyasa district of the state of Gujarat. The project ended in May 2009, and *The National*, a newspaper out of Abu Dhabi, quoted R.R. Shah, the dean of agribusiness at Navsari: "There is no yield. . . . The literature said that with dry land, after four years' growth, you can get a yield of 1 kg per plant. For us, it is hardly 200 g per plant." Findings from 22 other agricultural colleges across India were similarly discouraging.

Jha has tried growing the plants with fertilizer, intermingled with other crops and trees. In those plantings, yield has been as much as 4 kg per plant. *The National* quoted Jha as saying, "This is not a wasteland crop. It needs fertilizer, water and good management. Yes, it grows on wasteland, but it doesn't give you any yield."

London-based D1 oils reportedly has planted about 257,000 hectares of jatropha, mainly in India (see *inform 19*:739, 2009). D1 has also had trouble harvesting anything near 500 g of seed per plant. Early mortality of young plants has destroyed many plants per hectare, but the company anticipates the surviving plants will continue to grow and produce. D1 hopes to achieve 1 kg/hectare by the fourth year after planting. Maximal yield is not expected before the eighth year.

D1 has also contracted for planting jatropha in Africa. In water-scarce Swaziland, some jatropha farmers have found that the plants need regular watering, in contradiction to widely disseminated claims that jatropha does well under water-limited conditions. To enhance opportunities for profits some farmers have turned food-growing land over to jatropha production, limiting their ability to produce food.

Questions are arising in Swaziland regarding the appropriateness of jatropha as a cash crop for its farmers. Sicelo Simelane, from Yonge Nawe,

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2009). At the time, ANZ announced that there had been no operational problems during the 2-hour test flight from Auckland, which was powered by a 50/50 blend of jatropha-based fuel and standard jet fuel.

ANZ released the analysis of scientific data gathered during the flight at the end of May. Extrapolation from the results showed that fuel burn could be reduced by 1.2% and carbon dioxide emissions by 60–75% on an average 12-hour 747 flight compared with a flight powered by 100% standard jet fuel.

ANZ wants to use 10% alternative fuels (for flights and ground operations) by 2013, but ANZ General Manager-Operations and Chief Pilot Dave Morgan told ATW Online (atwonline.com/news/story.html?storyID=16733) that jatropha may not be the most nearly ideal feedstock for ANZ because it cannot be grown in New Zealand.

The New York Times (www.nytimes.com/gwire/2009/05/29/29greenwire-plant-derived-fuels-could-be-certified-for-fli-24118.html) quoted Bill Glover, managing director of environmental strategy for Boeing Commercial Airlines, as saying that jet fuels derived from algae, camelina, and jatropha could be approved and be replacing petroleum fuels as early as 2010. The technology is ready, he indicated—now enough nonfood feedstock plants need to be grown so that economic quantities of oil can be obtained from them.

Chocolate in the fast lane

On May 5 a team from the Warwick Innovative Manufacturing Research Center at the University of Warwick in the United Kingdom unveiled the world's first Formula 3 car designed and made from sustainable and renewable materials. It was fueled by 30% biodiesel derived from chocolate waste from the Cadbury's plant in Birmingham.

According to research team member Kerry Kirwin, "Components made from plants form the mainstay of the car's make-up, including a race specification steering wheel derived from carrots and other root vegetables, a flax fiber and soybean oil foam racing seat, a woven flax fiber bib, plant oil-based lubricants and a biodiesel engine configured to run on fuel derived from waste chocolate and vegetable oil. It also incorporates a radiator coated in a ground-breaking emission destroying catalyst. "

a public interest nongovernmental organization in Swaziland working on issues of environment and sustainable development to prevent and reduce the impact of inappropriate development on the environment and people, was quoted by Friends of the Earth as saying, "[T]he reality is that biofuel developments are firmly controlled by northern companies which are taking over our land at an incredible pace, and are bringing about serious socio-economic and environmental impacts on our communities, food security, forests and water resources" (www.foe.co.uk/resource/press_releases/jatropha_27052009.html).

D1 company spokesman Graham Prince stated that D1 decided that its jatropha plantings in Swaziland had produced "disappointing results" and that D1's planting joint venture with BP, D1-BP Fuel Crops Ltd., has withdrawn from Swaziland (www.biofuelreview.com/content/view/1916/1/). Prince also said, "We have never claimed that jatropha will grow on all marginal or waste land. . . . We have made very clear in our recent materials that marginal land is likely to deliver only marginal yields. We have never claimed that jatropha is a plant-and-forget crop." ■

RENEWABLE DIESEL

Neste Oil breaks ground for renewable diesel plant

On May 26 Neste Oil (Espoo, Finland) laid the foundation stone for its renewable diesel plant in the Port of Rotterdam. The annual production of the finished plant will be 800,000 metric tons, making it the largest renewable diesel plant in Europe. About €670 million is needed to complete the plant, which will employ over 100 persons.

"With this plant in the Netherlands, Neste Oil will become the leading renewable diesel producer supplying Europe from the Netherlands. Our investment also signals Neste Oil's commitment to driving forward latest innovation with our NExBTL technology in Europe," said Matti Lievonen, president and chief executive officer of Neste Oil, in a company press release. NExBTL is Neste Oil's renewable diesel.

The plant's capacity to produce 800,000 metric tons annually will be a major step forward to reaching the European Union's target of 10% renewable fuels in transport.

ConocoPhillips–Tyson collaboration ends

ConocoPhillips Company announced in mid-May the end of its collaboration with Tyson Foods Inc. (Springdale, Arkansas, USA) to make renewable diesel from animal fat. The tax credit for co-processing of renewable diesel with petrodiesel was cut from $1.00 to $0.50 as part of the credit market bailout bill passed in late 2008, and *The Wall Street Journal* (online.wsj.com/article/SB124224783714216593.html) quoted Tyson spokesman Gary Mickelson as saying, "Tyson and ConocoPhillips continue to discuss ways to resume the project. However, until the full tax credit is reinstated, production will likely remain suspended."

ConocoPhillips had been producing about 1,000 barrels per day of renewable diesel from animal fats generated by Tyson's meat-processing operations at its Borger, Texas, USA, refinery.

Although major oil companies have publicized their intentions to produce cleaner fuels, this announcement illustrates that lower profits stemming from the economic downturn of 2008–2009, as well as adverse legislation, can constrict good intentions.

ETHANOL

Bioethanol enters Japanese markets

Nippon Oil Corp. began selling gasoline blended with bioethanol at some 1,000 affiliated gas stations in the Tokyo metropolitan area in June. Ethanol content will be just over 0.4% bioethanol. Nippon Oil is starting with a low ethanol content owing to concern regarding its corrosive effects on engines. Also, Japan does not yet have a stable supply of ethanol, and according to *The Nikkei Weekly* (May 4 edition), it would be difficult to mass-produce bioethanol within the country.

Petrobras (Petroleo Brasileiro SA) will follow suit as early as the third quarter of 2009. The Brazilian state-run oil company has built a fuel-blending facility in Chiba Prefecture, and will also use an oil refinery in Okinawa Prefecture that it acquired in 2008. At one time, Petrobras bought bioethanol from other firms and marketed it through their affiliates. Prospects for growth in bioethanol markets have prompted the company to make its own bioethanol and sell it worldwide.

Valero invests in Qteros

When Texas-based petroleum refiner Valero Energy acquired seven corn-based ethanol plants from bankrupt VeraSun Energy (Sioux Falls, South Dakota, USA), the nation's largest independent oil refiner became ethanol's third-largest player. It also acquired VeraSun's stake in Qteros (formerly Sun Ethanol), a company located in Amherst, Massachusetts, USA. Qteros was founded to develop the potential of the Q microbe (*inform 18*:785–788, 2007) to produce ethanol from the cellulose in biomass.

According to Qteros' chief executive officer and former head of DuPont's biofuels division, Bill Frey, "Investment from established energy companies like Valero enables us to continue developing and scaling up our technology. Qteros . . . plans to open a pilot plant this year as we continue preparations to expand to commercial-scale production." ■

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Health & Nutrition

A recent study by Lim and Kakuda of the University of Guelph, Ontario, Canada, in the *Journal of Food Science* (*74*:C233–C240, 2009) has shown that electrospun corn zein fibers were able to encapsulate (–)-epigallocatechin gallate (EGCG) and, in so doing, increase EGCG stability in water. EGCG is a plant polyphenol found in tea and was chosen as a model bioactive compound for this study due to its antioxidative and antimicrobial activities and presumed health benefits. The authors expect that electrospun zein fibers may serve as a delivery system in foods for a number of bioactive compounds.

■■■

The European Food Safety Authority (EFSA) has suggested that the level of carbohydrates be revised upward when the European Commission's proposed regulation on nutrition labeling is written. The proposed upper levels currently are: energy (2000 kcal), total fat (70 g), saturated fat (20 g), total sugars (90 g) and salt (6 g, or 2.4 g sodium). The proposed regulation also suggests a reference intake of 230 g for carbohydrates, or 46% of total energy. That is below the lower intake limits recommended in European countries, which are generally between 50 and 55% of intake. The panel therefore proposed a labeling reference intake for carbohydrate at 260 g, or 52% of energy, for a 2000 kcal diet.

■■■

The American Cancer Society has awarded 143 national research and training grants totaling more than $51 million in the second of two grant cycles for 2009. The grants go into effect beginning July 1, 2009. Among the grants is one given to Wei-Qun Ding of the University of Oklahoma Health Sciences Center (Oklahoma City, USA), who will explore anticancer activity of docosahexaenoic acid (DHA). Ding has found that DHA inactivates an enzyme that is important for the growth of tumor cells, and this grant will further the understanding of DHA's anticancer activity and provide a biological basis for the development of novel strategies in cancer prevention and therapy using DHA. ■

Cholesterol regulation

Researchers at the University of Texas (UT) Southwestern Medical Center (Dallas, USA) have found that a protein responsible for regulating "bad" cholesterol in the blood works almost exclusively outside cells, providing clues for the development of therapies to block the protein's disruptive actions.

"The fact that it works mostly extracellularly provides more opportunities to develop different kinds of therapies," said Jay Horton, professor of internal medicine and molecular genetics and co-author of the study, which appeared in the *Journal of Biological Chemistry* (*284*:10561–10570, 2009).

The protein, called PCSK9, disrupts the activity of a key molecule known as the low-density lipoprotein receptor, or LDLR. This molecule, which is manufactured and secreted in the liver, latches onto the LDLR. This binding, however, triggers a chain of biochemical reactions that leads to the destruction of the LDLR. With fewer receptors available, more of the so-called bad cholesterol remains in the bloodstream.

Horton said these new findings show that PCSK9 principally acts as a secreted protein to cause the degradation of LDLR. "Therefore, approaches to block the protein's activity in the blood should be successful in reducing plasma cholesterol levels," he said.

To determine whether PCSK9 works inside or outside the cell, the researchers designed peptides—the building blocks of proteins—to jam the interaction between PCSK9 and the LDLR. They then added the peptides to a cultured cell medium to see if they could block the activities of PCSK9. The peptides prevented the secreted PCSK9 from binding to the surface of the LDLR.

Horton said the fact that PCSK9 performs its destructive duties outside cells provides more opportunities for drug development.

"It's much easier to design inhibitors of PCSK9 function to work outside a cell than to develop a small molecule that works inside a cell," he said.

The researchers also discovered how a mutation in the LDLR gene causes a condition called hypercholesterolemia in some people. The mutation increases the binding of the LDLR to PCSK9, leading to excessive degradation of the receptor and extremely high cholesterol levels. Horton

said degradation is bad news for LDLR.

"You want as many of these receptors as possible to clear the LDL from your blood," he said.

Horton's previous studies have shown that mice lacking PCSK9 have LDL cholesterol levels less than half those of normal mice.

Studies by other UT Southwestern researchers have found that people with mutations in the PCSK9 gene, which prevented them from making normal levels of the PCSK9 protein, had LDL cholesterol levels 28% lower than individuals without the mutation and were protected from developing coronary heart disease. That research was led by Jonathan Cohen, professor of internal medicine, and Helen Hobbs, director of the Eugene McDermott Center for Human Growth and Development.

BfR acts on glycidol

The German Federal Institute for Risk Assessment (BfR) has issued an alert regarding high levels of fatty acid esters of glycidol in palm fats. Based on analytical results from the official German laboratory (CVUA, or Chemischen und Veterinäruntersuchungsämter) in Stuttgart, BfR notes that there are no analytical methods permitting the determination of glycidol levels; such levels can only be estimated.

Nonetheless, because glycidol is classified as a probable human carcinogen based on animal studies, the agency has called on manufacturers of infant formulae, in particular, to mitigate the apparently high levels of fatty acid esters of glycidol in their products. (Because precise determination is impossible, BfR has hypothetically assumed that one kilogram of edible fat contains one milligram glycidol.)

"BfR is of the opinion that there is an urgent need for the development and validation of a suitable detection method for glycidol fatty acid esters," the official statement said. "Likewise, there is a need for research on the conversion of glycidol fatty acid esters into glycidol in the human body."

Further, the agency stated that the detection of glycidol fatty acid esters in refined vegetable fats "has no impact on the fundamental statements on the risk assessment of 3-MCPD [3-monochloropropane-1,2-diol] fatty acid esters which also occur in these fats." (See *inform 20*:200–202, 2009, for more on 3-MCPD.)

The full report is available at www.bfr.bund.de.

Curcumin reveals its secret

Scientists from the University of Michigan (Ann Arbor, USA) are reporting discovery of the secret behind the fabled healing power of the main ingredient in turmeric—a spice revered in India as "holy powder."

In the study, Ayyalusamy Ramamoorthy and colleagues point out that turmeric has been used for centuries in folk medicine to treat wounds, infections, and other health problems. Although modern scientific research on the spice has burgeoned in recent years, scientists until now did not know exactly how curcumin works inside the body.

Using solid-state NMR (nuclear magnetic resonance) spectroscopy, the scientists discovered that molecules of curcumin act like biochemical disciplinarians. They insert themselves into cell membranes and make the membranes more stable and orderly in a way that increases cells' resistance to infection by disease-causing microbes.

Their study on the ingredient, curcumin, appears in the *Journal of the American Chemical Society* (*131*:4490–4498, 2009).

In other new work on curcumin, a small animal study showed that supplementing the animals' high-fat diet with curcumin reduced body-weight gain and total body fat, even though food intake was not affected, when compared to a nonsupplemented high-fat-diet group. The work was led by nutritionist Mohsen Meydani at the Jean Mayer USDA Human Nutrition Research Center on Aging (HNRCA) at Tufts University in Boston, Massachusetts. Meydani is director of the HNRCA's Vascular Biology Laboratory. The study appeared in the *Journal of Nutrition* (*139*:919–925, 2009).

Scientists think they have unlocked the secrets of the "holy powder," turmeric. Courtesy of Wikimedia Commons

Fat and long-term memory formation

University of California-Irvine (UCI; USA) researchers have found that eating fat-rich foods triggers the formation of long-term memories of that activity. The study adds to their recent work linking dietary fats to appetite control and may herald new approaches for treating obesity and other eating disorders.

Daniele Piomelli, the Louise Turner Arnold chair in neurosciences, teamed with UCI's James McGaugh, one of the world's leading learning and memory researchers, to examine how dietary fats facilitate memory retention.

Piomelli's previous studies identified how oleic acids from fats are transformed into oleoylethanolamide (OEA) in the upper region of the small intestine. OEA sends hunger-curbing messages to the brain to increase feelings of fullness. At elevated levels, OEA can reduce appetite, produce weight loss, and lower blood cholesterol and triglyceride levels.

Piomelli and McGaugh discovered that OEA also causes memory consolidation, the process by which superficial, short-term memories are transformed into meaningful, long-term ones. It does this, Piomelli said, by activating memory-enhancing signals in the amygdala, part of the brain involved in the consolidation of memories of emotional events.

The researchers found that administering OEA to rodents improved memory retention in two different tests. When cell receptors activated by OEA were blocked, memory retention effects decreased.

"OEA is part of the molecular glue that makes memories stick," Piomelli said. "By helping mammals remember where and when they have eaten a fatty meal, OEA's memory-enhancing activity seems to have been an important evolutionary tool for early humans and other mammals."

Dietary fats are important for overall health, helping with the absorption of vitamins and the protection of vital organs.

While the human diet is now rich in fats, this was not the case for early humans. In fact, fat-rich foods in nature are quite rare.

"Remembering the location and context of a fatty meal was probably an important survival mechanism for early humans," Piomelli said. "It makes sense that mammals have this capability."

Today, he noted, such memory enhancement may not be so beneficial. While OEA contributes to feelings of fullness after a meal, it could also engender long-term cravings for fatty foods that, when eaten in excess, can cause obesity.

Currently, Piomelli said, drugs that mimic OEA are in clinical trials for triglyceride control. He is interested in learning whether they could improve consolidation in people with memory problems.

The study appeared in the *Proceedings of the National Academy of Sciences* (*106*:8027–8031, 2009).

Omega-3 from plants unlikely prostate cancer cause

Contradicting some previous findings, a research review and meta-analysis by investigators at the San Francisco VA Medical Center (SFVAMC) and the University of California, San Francisco (UCSF), USA, suggest that dietary α-linolenic acid (ALA), an omega-3 fatty acid found in plants, is unlikely to be a cause of prostate cancer.

"This is significant because almost 90% of the omega-3 acids consumed by Americans is ALA from plants," says lead author Joel A. Simon, a staff physician at SFVAMC and a professor of clinical medicine and epidemiology and biostatistics at UCSF. "Fortunately, we found only a very modest risk that was no longer evident once we controlled for publication bias."

Publication bias, a long-observed phenomenon in scientific literature, is the tendency of researchers to not submit findings for publication that are neutral or negative—which in this context would be findings that do not indicate an association between ALA and prostate cancer risk, explains Simon.

Simon and his team pooled the results from 16 studies examining a potential association between ALA and prostate cancer conducted from 1963 to 2007. Initially, they found a 20% increased risk of prostate cancer when comparing the highest with the lowest levels of ALA, as measured by dietary intake, blood levels, and adipose (fat) tissue levels among study participants. "This difference was just barely statistically significant," says Simon.

However, he says, there was significant heterogeneity among the studies—that is, large inconsistencies in the findings that tended to undermine any conclusion of increased risk. And when the researchers adjusted for publication bias, the risk disappeared.

Yet another factor gives the authors confidence that ALA is probably not linked with prostate cancer risk, according to Simon: Recent large prospective studies that were specifically designed to look for prostate cancer risk factors found no such link.

The authors caution that, at the "highest levels" of consumption, there may be a "small increased risk" of prostate cancer; however, they characterize this conclusion as "highly qualified" because of heterogeneity and publication bias.

"This makes me feel considerably better about eating plant foods rich in α-linolenic acid," concludes Simon.

The study appeared in a supplement to the *American Journal of Clinical Nutrition* (*89*:1558S–1564S, 2009).

Soy and reproduction in men

Mark Messina and colleagues from St. Catherine University (St. Paul, Minnesota, USA) and the University of Minnesota (USA) have published a meta-analysis aimed at determining whether isoflavones exert estrogen-like effects in men by lowering sex hormones, including testosterone. The study analyzed 15 placebo-controlled treatment groups with baseline and ending measures; 32 reports involving 36 treatment groups were assessed in simpler models to ascertain the results. Studies were only included in the review if they were (i) published in a peer-reviewed journal in English; (ii) included adult men who consumed soy foods, isolated soy protein, or isoflavone extracts (from soy or red clover); and (iii) assessed circulating testosterone, sex hormone-binding globulin (SHBG), free testosterone, and free androgen index (FAI).

Results of the meta-analysis found no significant effects of soy protein or isoflavone intake on testosterone, SHBG, or FAI. The authors concluded that the results suggest that neither soyfoods nor isoflavone supplements alter measures of bioavailable testosterone concentrations in men.

The study was published online ahead of print in *Fertility and Sterility* (doi:10.1016/j.fertnstert.2009.04.038). ■

Briefs

The European Commission (EC) has published a document outlining "question and agreed answers concerning the correct implementation of Regulation (EC) No 648/2004 on detergents." It is available at http://ec.europa.eu/enterprise/chemicals/legislation/detergents/docs/faq_detergent_regulation_march2009.pdf.

■■■

India's Godrej Industries is expanding its surfactants capacity by 35% to 1,500 metric tons (MT)/month at its Valia site in Gujarat. The $2 million project will also double glycerin capacity to 500 MT/month, according to the company.

■■■

Cognis announced it has opened an affiliate in Mumbai, India. Cognis India will be a wholly-owned subsidiary of the Cognis Group (Monheim, Germany), and will operate under the name of Cognis Specialty Chemicals Pvt. Ltd. Cognis first opened a liaison office in India in February 2008.

■■■

French specialty chemicals company Rhodia will continue to produce surfactants and polymers at its Mississauga facility in Ontario, Canada, the company told *ICIS Chemical Business* in May. This is in light of Rhodia's sale of its polyamide-based engineering plastics line manufactured at the plant to Alloy Polymers of Richmond, Virginia, USA.

■■■

Croda International (Goole, UK) told *Chemical Week* magazine in May it will close its Bromborough, UK, site by the end of 2009. The plant makes glycerin, fatty acids and esters, and surfactants, and generated sales of £45 million ($73 million) in 2008, Croda said. Croda acquired the Bromborough plant in 2006 as part of the acquisition of Uniqema from ICI.

■■■

Beige Holdings, the largest contract manufacturer in South Africa, announced it will move into private label brands as consumers turn to value brands in the aftermath of the credit meltdown in the United States, according to AfricaNews.com. The company's clients include Unilever and Tiger Brands. ■

S&D News

Edgar Acosta (left) receives the SDA Distinguished Paper Award from Rich Sedlak of The Soap and Detergent Association (SDA) at the 100th AOCS Annual Meeting & Expo in Orlando, Florida, USA. Courtesy of Brian Sansoni/SDA.

JSD-SDA Award presented

Three researchers at the University of Toronto are the recipients of the 2009 Soap and Detergent Association (SDA) Distinguished Paper Award, which recognizes the most outstanding research article published during the preceding year in the *Journal of Surfactants and Detergents*. Sponsored by SDA and the Surfactants and Detergents Division of the American Oil Chemists' Society (AOCS), the award was presented at AOCS' 100th Annual Meeting & Expo in Orlando, Florida, USA.

"The Characteristic Curvature of Ionic Surfactants" (*JSD 11*:145–158, 2008) was written by researchers Edgar Acosta, Arti Bhakta, and Jessica Yuan from the University of Toronto's Department of Chemical Engineering and Applied Chemistry.

"Surfactants are extremely versatile but largely misunderstood molecules," said Acosta. "In our article, we described a simple method to characterize one of their properties—their relative hydrophilic/lipophilic nature."

The research protocol developed by Acosta and his team builds on more than 30 years of phase behavior studies of microemulsions (the clear, stable liquid mixtures of oil, water, and surfactant) and the concept of hydrophilic-lipophilic difference.

"The new parameter, the 'characteristic curvature,' will tell you if a given surfactant is hydrophilic or lipophilic, but more importantly, you can use it to predict important properties of surfactant-oil-water systems," said Acosta.

"In our lab, the characteristic curvature has simplified our work tremendously. For example, we used it to understand how to work with complex surfactant mixtures extracted from acid crude oils (naphthenates). We also used it to design hard-surface cleaners and washing solutions for a range of substrates and cleaning conditions.

"It is now part of our routine studies and we expect that it will be useful to col-

CONTINUED ON NEXT PAGE

leagues involved in soap and detergent research."

Surfactant sensor elucidated

An inexpensive surfactant sensor based on 1,3-didecyl-2-methylimidazolium-tetraphenylborate (DMI-TPB) as the sensing complex was studied for endpoint detection during potentiometric titration of anionic surfactants in industrial effluents by Croatian scientists led by Dubravka Madunic-Cacic of Saponia Chemical, Pharmaceutical and Foodstuff Industry in Osijek, Croatia. "Low levels (down to 10^{-6} M) of anionic surfactants [sodium dodecylbenzene sulfonate (NaDBS) and dodecylsulfate (NaDDS)] were successfully titrated using 1,3-didecyl-2-methylimidazolium chloride (DMIC) as a standard cationic titrant," the researchers reported in the journal *Sensor Letters* (*7*:50–56, 2009).

"The estimated detection limit was 0.03 mg/L using the titrant at a concentration of 0.1 mM. The sensor is used for determination of anionic surfactants in diluted industrial detergent products and industrial effluents," Madunic-Cacic and colleagues noted.

The researchers concluded: "The results obtained agree satisfactorily with the standard extraction-spectrophotometric MBAS [methylene blue-active substances] method and are comparable with the results obtained using a commercially available surfactant electrode."

Recession changes laundry habits

The economic downturn apparently has caused a change in how—and how often—people launder their clothing, which could over time affect the S&D market.

In fact, 60% of US consumers surveyed by Information Resources Inc. (as reported by the *Pittsburgh Post-Gazette* newspaper) said they were now wearing clothing multiple times between washings to save money. The Chicago-based market research firm also found 48% of shoppers are using dry cleaners less often, and more than 80% are washing only full loads of laundry.

In a similar vein, appliance maker Whirlpool Corp. (Benton Harbor, Michigan, USA) announced a 36% drop in first-quarter net sales. And a spokesperson for detergents maker Proctor & Gamble (P&G; Cincinnati, Ohio, USA) told the newspaper that P&G has noticed some users of its premium brand have switched to a lower-priced product.

Another Chicago-based market research firm, Mintel International, has revised its market projections, based on the recession. The firm, according to the *Post-Gazette*, originally projected that total US sales of products such as powdered and liquid laundry detergents, bleach, and fabric softeners would increase 2.1% in 2008 to $9.98 billion. Instead, the researchers

S&D research roundup

The suspected carcinogen 1,4-dioxane, alleged to be a by-product of the alcohol ethoxylation process, is not a by-product of ethoxylation at all but instead can occur from the sulfation reaction to produce alcohol ethoxy sulfates (AES), according to Lee Matheson of Sasol North America. Matheson spoke at the 2009 AOCS Annual Meeting & Expo (AM&E) and announced that Sasol and Chemithon have developed methods of minimizing 1,4-dioxane content in personal care products and detergents. The presence of minute traces of 1,4-dioxane and formaldehyde in baby products was recently highlighted by a consumer group known as the Campaign for Safe Cosmetics.

Matheson said the reduction in 1,4-dioxane in AES occurs through an "appropriate choice of sulfation feedstock," and the use of proper equipment, sulfation, and neutralization procedures.

■■■

Results of a wfk Cleaning Technology Research Institute study on reduction of energy and detergent in professional laundries have been published in *Tenside Surfactants Detergents* (*4b*:48–52, 2009). In brief, the study—which was led by H.G. Hloch—found that after "the use of suitable textiles, optimization of laundering and drying processing, application of suitable detergents, and installation of an online-particle control system in the tumble dryer, the specific water consumption was reduced from about 40 L/kg [litres/kilogram] to 20 L/kg. In addition, the detergent dosage was reduced to 60%."

■■■

Yuyu Sun and Zhengbing Cao of the University of South Dakota (Sioux Falls, USA) are reporting development of the first broad-spectrum antimicrobial paint, a material that can simultaneously kill not just disease-causing bacteria but also mold, fungi, and viruses. Designed to both decorate and disinfect homes, businesses, and health-care settings, the paint is the most powerful yet developed, according to the study. The paint shows special promise for fighting so-called "superbugs," antibiotic-resistant microbes that infect hospital surfaces. The researchers note that although antimicrobial paints already are being sold they are only effective against a narrow range of disease-causing microorganisms, limiting their usefulness. Their study appeared in the American Chemical Society journal *Applied Materials & Interfaces* (*1*:494–504, 2009).

■■■

New thermoresponsive surfactants with chelating properties "hold most promise for the development of new solvent-free extraction processes," according to a study from the University of Versailles led by S. Prévost that appeared in *Tenside Surfactants Detergents* (*46*:100–104, 2009). ■

estimated that the gain was just 0.3%, to $9.8 billion. Likewise, a 2.2% annual growth rate originally forecast for 2009 was revised to a projection that total category sales will instead drop 0.2% this year.

RECESSION GOOD FOR BAR SOAPS?

Laundry habits aren't the only habits to change in light of the recession. According to Perth Soap Manufacturing Inc.'s Grant Lawson, consumers have returned to bar soaps in droves, shying away from more expensive liquid soaps.

Lawson, who owns the company, told the Canadian Broadcasting Corp. that Perth is producing about 250,000 bars of soap per day. Bar soap sales in the United States—where Perth does the majority of its business—have increased by almost 30% since the beginning of the year, he said.

Life-cycle assessments questioned

Life-cycle assessments (LCAs) may not be the best way to measure the overall environmental performance of a product, according to a new study by Germany's Öko Institut commissioned by European consumer organization ANEC and reported by ENDS Europe, an environmental reporting service.

LCAs can be useful when comparing different product groups or production methods, according to ENDS. But their use of generic impact data and typical margin of error of 10–20% makes them "not well suited" to comparing similar products.

The study says LCAs do not take sufficiently into account nonquantifiable environmental impacts such as biodiversity loss and site-specific impacts such as pollutant and noise emissions.

The authors suggest using an alternative "environmental data sheet" for product comparisons that combines LCAs indicators with indicators from other "type I" assessment tools such as those used under the EU's flower ecolabel. "This should be seen as the way forward and developed further," they conclude.

The study is available at www.anec.eu/attachments/ANEC-R&T-2008-ENV-005final.pdf.

Henkel dedicates new NA headquarters

The washers and dryers in the laundry laboratories at Henkel's new North American consumer products headquarters in Scottsdale, Arizona, USA, are now running on solar power, thanks to the recent installation of solar panels on the roof of the building. The solar panels will provide 56,700 kilowatts of electricity a year to run the washers and dryers in the labs. Excess power from the solar panels is fed into the building grid. Henkel estimates that the solar panels will offset 83,000 pounds (38,000 kg) of carbon dioxide a year and 2.9 million pounds (1.3 million kilograms) of carbon dioxide over the life of the system.

Henkel uses the washers and dryers in its laundry labs to develop and test new laundry products. Henkel is also in the process of installing a solar thermal water heating system that will provide hot water for the laboratories. This system will provide 15 million BTUs (16 million kilojoules) of energy per year and will offset 28,000 pounds (13,000 kg) of carbon dioxide a year, the company said.

Danish ruling against Unilever and P&G

Denmark's Supreme Court ruled in May that detergents must be labeled in accordance with European Commission rules on the classification, labeling, and packaging of chemical substances.

The decision marked the end a five-year dispute between the Danish government and consumer product giants Unilever and Procter & Gamble. The companies had asserted their right to label their products in accordance with guidelines drawn up by industry association AISE (the Association for Soaps, Detergents and Maintenance Products, based in Brussels).

"With this judgment we have firmly established that the sector cannot just follow its own labeling rules," environment minister Troels Lund Poulsen said in a statement. ■

People News/ Inside AOCS

Ahmed to become Tate & Lyle CEO

On April 10, the *Sunday Telegraph* newspaper reported that Tate & Lyle (London) had hired a recruitment firm to search for a new chief executive officer (CEO) to replace **Iain Ferguson**. Ferguson had been under fire in recent months owing to disappointing company earnings. Another setback is that Tate & Lyle received a legal decision in April that it cannot prevent Chinese copies of its sucralose sweetener Splenda.

Javed Ahmed, currently head of Reckitt Benckiser's European business, will take over from Ferguson by November 15, 2009. He has been with Reckitt for 17 years. Ahmed is expected to lead Tate & Lyle in its efforts to reduce its dependence on sugar.

Codexis names vice presidents

Codexis (Redwood City, California, USA), a company that develops industrial biocatalysts, including enzymes and microbes, has appointed **David Anton** as senior vice president for research and development (R&D), with responsibility for R&D activities for both the company's bioindustrials and pharmaceuticals. Previously he had been head of Codexis Bioindustrials. **John Grate** has assumed the newly created position of senior vice president, science and innovation, and chief science officer. Grate had previously been senior vice president, technology and innovation, and chief technology officer.

Butler to be administrator of GIPSA

The Grain Inspection, Packers and Stockyards Administration (GIPSA) of the US Department of Agriculture will be administered by **J. Dudley Butler** as a result of his appointment by Secretary of Agriculture **Tom Vilsack**. Butler has been an attorney in private practice for over 30 years and is a certified mediator and arbitrator. He has also been involved in cattle, timber, and farming operations. Butler has spent much of his professional life in Mississippi.

GIPSA facilitates the marketing of livestock, poultry, meat, cereals, oilseeds, and related agricultural products, and promotes fair and competitive trading practices for the overall benefit of consumers and American agriculture.

New officers for soyfoods association

The Soyfoods Association of North America (SANA), a nonprofit trade association promoting soy food consumption, has new officers. **Mohammed Obanni**, senior director of research and development and quality assurance of Hain-Celestial Group (Melville, New York, USA), has assumed the role of president. **Aaron Skyberg** of SK Food International (Fargo, North Dakota, USA) is vice-president for the 2009–2010 term.

The organization works to establish and adopt industry standards for soy foods and to focus on the acceptance of soy foods by various state and federal agencies, for example, in federal nutrition programs.

Biotechnology Heritage Award to Monsanto's Fraley

At the 10th annual Biotechnology Industry Organization (BIO) convention held in Atlanta, Georgia (USA), **Robert T. Fraley** was presented the 2009 Biotechnology Heritage Award by the Chemical Heritage Foundation and BIO on May 20. He is presently executive vice president and chief technology officer at the Monsanto Company (St. Louis, Missouri, USA).

In the presentation Fraley was called "the father of agricultural biotechnology." He has been with Monsanto for 25 years, and presently oversees Monsanto's integrated crop and seed agribusiness technology and research. During his tenure, his research and vision of the future of agricultural biotechnology convinced executives that biological solutions could meet the world's expanding food needs with a lower environmental impact.

In Memoriam

Desmond John New

AOCS emeritus member Desmond J. New died on April 6, 2009, at the age of 81. At the time of his death, he resided in Islington, Ontario, Canada.

New received a bachelor's degree in agriculture from McGill University in 1951 and then joined the baking laboratory at Canada Packers Inc. in Toronto. In 1956 he went to General Mills in Minneapolis, then to Durkee Famous Foods in Chicago in 1960. New returned to Canada in 1962 to manage the new edible oil refinery at Monarch Fine Foods in Toronto. When Unilever took over Monarch, he was placed in charge of oil buying. He retired in 1993.

New was an AOCS member for almost 53 years.

He is survived by his wife of 54 years, Sheila, four sons, and two grandsons.

OPW Fluid Transfer reorganizes

Several strategic organizational changes have been completed by OPW Fluid Transfer Group (OPWFTG; Mason, Ohio, USA). The company's four business units and eight global operations have been streamlined into two global business groups.

Appointments in the Global Transportation Business Unit include the following: **Tom Zant**, vice president; **Kevin Cook**, director; **Simon Hill**, director; and **Dan Taylor**, site manager for the company's Kansas city manufacturing operation.

In the Global Chemical & Industrial Business Unit, **Jeff Reichert** is vice president, and **Greg Carrino** is director.

Additionally, **Steve Van Pee** has been appointed chief financial officer of the company. He will oversee the financial consolidation of OPWFTG's domestic and international operations. ■

Book Review

Fatty Acids in Foods and their Health Implications, Third Edition
Ching Kuang Chow (editor)
CRC Press, 2008
1281 pages
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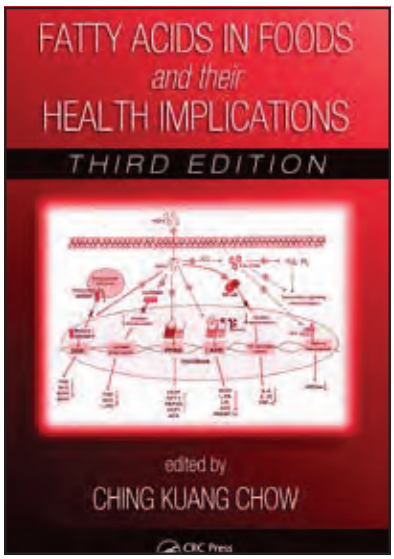
Elizabeth Kamau-Mbuthia

Fatty Acids in Foods and their Health Implications provides a comprehensive discussion of fatty acids and their health implications from various perspectives. It starts by describing the classification and nomenclature of fatty acids in clear and concise terms in a historical context. Fatty acids and their food sources are highlighted. The introduction is very well done, which makes it particularly useful for beginners in the area of fatty acids. The chemical and physical properties of the fatty acids are presented, including the different processes that occur in relation to these properties, as well as their functions in body processes and their importance to human life. The analysis of the lipids in various food products is discussed, indicating the challenges and pitfalls encountered. These chapters will be relevant to food scientists, biochemists, and students interested in nutrient properties. The fatty acids found in a wide assortment of food products (meat and meat products, milk fat, poultry and egg products, fish and shellfish, vegetables and vegetable products, oilseeds, fruit and fruit products, food cereal grains and grain products, fermented food products, and convenience foods), their types and contribution to total energy intake and importance in human health are well explained. The discussion would be very useful to students learning about macronutrients in human nutrition.

Fish, as a healthful food product, is reviewed, and related controversies are discussed, while the factors affecting fatty acid oilseed composition are highlighted. *Trans* fatty acids, their dietary sources, their methods of estimation and quantification, as well as their detrimental health effects based on reviews of human studies relating them to risk of cardiovascular heart disease (CHD) over the years, are discussed. This topic has important implications in the area of public health.



The oil content and fatty acid composition of various plant species are discussed. Fat-based fat substitutes are also discussed; they are considered more important than ever as alternatives by the health-conscious segment of the population. The role of the food industry in this issue is highlighted. The effect of heating and frying on oil and fatty acid stability, including the changes that occur during cooking and the challenges faced in trying to determine these changes, are presented. The absorption and transport of dietary lipids, the effect of dietary fatty acids on lipid metabolism, the issue of cholesterol and the mechanisms involved in absorption and utilization, are all described. This area has become a topic of substantial public health interest, particularly with respect to chronic diseases, such as CHD.

The bioavailability of selected essential minerals in relation to fatty acids is discussed, including their relevance to public health. An interesting topic discussed is the effect of the interaction of fatty acids, carbohydrates, and lipids on carbohydrate metabolism. This topic has been comprehensively reviewed and the existing controversies are highlighted. The role of this topic on weight loss is discussed, which is of substantial importance in the etiology of chronic diseases.

The fatty acid composition of cell membranes and their effect on cell functions are presented, and the discussion includes the current knowledge in this subject area. This topic is important in understanding molecular mechanisms that can lead to or prevent lipid-related disorders. A discussion of a relatively new area of research on fatty acids and their role in cellular signaling is introduced, and existing knowledge gaps indicating a need for further research are highlighted.

A detailed review of human and animal studies relating the role and benefits of dietary fatty acids in various health conditions

CONTINUED ON NEXT PAGE

and diseases is included. These research subject areas include neonatal and infant growth and cognitive development, maternal and child health, aging, auto-immune related conditions, liver disease, diabetes, and CHD, among others. Although the results from different studies in these reviews are conflicting in some cases, the reader is made aware of what has been done, where evidence is inconclusive, and the knowledge gaps that indicate the need for further research.

Other issues discussed include the role of omega-3 polyunsaturated fatty acids on body energy homeostasis. Included is a review of the research showing that this topic has implications on the amount of body fat and body weight and therefore is of great public health interest. Another topic discussed is that of feelings of satiety from high-fat foods and high-carbohydrate foods, although the author states that additional research is needed in this subject area.

The book is very well written. It covers all the important issues that resonate with many people in relation to chronic diseases and their associated risk factors. The book uses relatively simple language appropriate for undergraduate students, but it also includes the more advanced information suitable for graduate students in nutrition, food science, and biochemistry. It also has something to offer the health-conscious general population as well as health care workers trying to understand the factors involved in the etiology of diseases. The fact that each subject area includes a review of the related studies makes the information very credible. It is a book worth procuring, either to read or to use as a reference source.

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Elizabeth Kamau-Mbuthia has a master's degree in public health from the Curtin University of Technology in Western Australia, specializing in public health nutrition, and a Ph.D. from the University of Vienna, Austria, specializing in public health nutrition. Her research interests include nutrition epidemiology, maternal and child health, and nutrition education. She is also currently chair of the Department of Human Nutrition and Pre-Clinical Studies at Egerton University in Kenya. She can be reached at ekambu@yahoo.com.

Patents

Published Patents

Process for the preparation of hydrocarbon fuel

Srinivas, D., *et al.*, Council of Scientific and Industrial Research, 1/27/2009, US7482480B2

The present invention provides a process for the preparation of hydrocarbon fuels, which comprises contacting fatty acid glycerides with alcohols in the presence of a solid, double metal cyanide catalyst at a temperature in the range of 150 to 200°C for a period of 2–6 hr and separating the catalyst from the above said reaction mixture to obtain the desired hydrocarbon fuel.

Method for the production of a solid fragrance concentrate

Heinz, R., *et al.*, Bell Flavors & Fragrances Duft und Aroma GmbH, 2/3/2009, US7485610B2

The invention relates to a method for the production of a solid fragrance concentrate, by absorption of a liquid fragrance or fragrance mixture in a solid or solid mixture, using one or several surfactants and/or co-surfactants, solid at normal temperatures as solid or solid mixture, whereby the liquid fragrance or fragrance mixture is dissolved in the above at a temperature above the solidification temperature of the solid or solid mixture and the solution subsequently solidified by cooling. The solid or solid mixture comprises fatty alcohol(s) or a mixture of fatty alcohol(s) and fatty acid(s) and/or fatty alcohol ethoxylate and/or polyethylene glycol.

Continuous process for decarboxylating carboxylic acids

Omeis, M., *et al.*, Evonik Degussa GmbH, 2/3/2009, US7485756B2

A continuous process for decarboxylating carboxylic acids proceeds using carbonyl compounds with a high boiling point as a catalyst in a solvent at reaction temperature, to obtain a catalyst solution; metering a carboxylic acid into the catalyst solution as an aqueous solution, aqueous suspension or as a water-comprising solid, to obtain a reaction mixture; and continuously removing a mixture of CO_2, solvent, water, and a reaction product or mixture of reaction products from the reaction mixture as a vapor.

Solvated nonionic surfactants and fatty acids

Queen, C., Croda Uniqema Inc., 1/20/2009, US7479473B2

A liquid and readily flowable composition includes (a) a room-temperature-solid solute, such as (i) a nonionic surfactant, preferably having a hydrophile-lipophile balance from about 11.1 to about 18.4, (ii) a C_8–C_{14} fatty acid, or combinations thereof; (b) an alkoxylated fatty alkanolamide; and (c) water, if needed. The alkoxylated fatty alkanolamide, which is substantially liquid at room temperature, solvates the solid solute to form a homogeneous composition that is liquid and readily flowable at room temperature. The select classes of nonionic surfactants include polyalkylene oxide carboxylic acid esters, ethoxylated fatty alcohols, poloxamers, alkyl polysaccharides, or combinations thereof. Useful alkoxylated fatty alkanolamides include propoxylated fatty ethanolamides.

Patent Applications

Glycerol derivatives and methods of making same

Kodali, D., c/o Dorsey & Whitney LLP, 11/27/2008, US20080293602A1

Symmetrical polyols, polyol esters, polyesters, polyurethanes, triazoles, and polyvinylethers derived from glycerol and methods of making the symmetrical polyols, polyesters, polyurethanes, polyhydroxyvinylethers, and triazoles are discussed. Also provided is a method of making serinol [2-amino-1,3-propanediol].

Novel nanocatalyst for edible oil hydrogenation

Hussain, S., *et al.*, Quaid-e-Azam University, 12/25/2008, US20080318766A1

The present invention reports a lanthanum-doped nickel/alumina catalyst for the hydrogenation of oils resulting in very low saturated fats, high polyunsaturated fats requiring specific particle size, surface area and porosity of the catalyst; the invented catalyst produces less pressure drop during processing and provides an easily filterable system resulting in an economically practical solution to hydrogenate oils for use by humans and animals.

Wax-free cosmetic composition in foam form

Styczen, P., *et al.*, L'Oréal, 1/1/2009, US20090004131A1

A composition in the foam form having a continuous oily phase and at least one silicone polymer structuring agent for the oily phase, the composition being devoid of wax.

Spreadable dairy product

Beutler, E., *et al.*, c/o Winston & Strawn LLP, 1/1/2009, US20090004344A1

The present invention provides a dairy-based spreadable product that does not need any emulsifying or thickening additives. This shelf-stable spread includes sweetened condensed milk having a fat content of 2 to 25% by weight and a water content of 15 to 35% by weight. It is substantially free of emulsifiers and thickeners, not caramelized and thickened by shear so that it has a firmness corresponding to a maximum compression force of at least 20 g measured by a Texture Analyser TA.HD*i* equipped with a 5 kg load cell.

Glycerol feedstock utilization for oil-based fuel manufacturing

Trimbur, D., *et al*., Solazyme Inc., 1/1/2009, US20090004715A1

The invention provides methods of manufacturing biodiesel and other oil-based compounds using glycerol and combinations of glycerol and other feedstocks as an energy source in fermentation of oil-bearing microorganisms. Methods disclosed herein include processes for manufacturing high-nutrition edible oils from nonfood feedstock materials such as waste products from industrial waste transesterification processes. Also included are methods of increasing oil yields by temporally separating glycerol and other feedstocks during cultivation processes. Also provided herein are oil-bearing microbes containing exogenous oil production genes and methods of cultivating such microbes on glycerol and other feedstocks.

Epoxidized esters of vegetable oil fatty acids as reactive diluents

Bloom, P., Archer Daniels Midland Co., 1/1/2009, US20090005508A1

The present invention is directed to compositions containing epoxidized esters of vegetable oil fatty acids, and to methods of making such compositions. The esters are C_{1-6} alkyl or C_{2-6} alkenyl, monoglycerol or diglycerol, C_{4-6} polyol or glycol esters of a vegetable oil fatty acid. The compositions include latex coating compositions comprising the epoxidized esters; epoxy resin compositions comprising the epoxidized esters; thermoset plastic compositions comprising the epoxidized esters; and polyvinyl chloride compositions comprising the epoxidized esters. The invention is also directed to epoxidized monoglycerides or diglycerides, and epoxidized C_{4-6} polyol esters of vegetable oil fatty acids.

Gas phase process for monoalcohol production from glycerol

Hulteberg, C., *et al*., Primafuel Inc., 1/1/2009, US20090005614A1

A method of producing short chain alcohols from glycerol generated as a byproduct of biodiesel production is provided.

Modified vegetable protein having low levels of phytic acid, isoflavones, and ash

Wong, T., *et al.*, Solae LLC, 1/8/2009, US20090011083A1

This invention is directed to a vegetable protein composition comprising a protein material having low levels of isoflavones, low levels of phytic acid and/or phytates, and moderate levels of ribonucleic acids. Many vegetable compositions described additionally have high protein content, low manganese content, low ash content, and enhanced storage stability in liquid form. Processes for preparing such vegetable protein compositions are also disclosed.

Method for obtaining a vegetable plant protein fraction, in particular for producing vegetable ice cream

Eisner, P., *et al.*, Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V., 1/8/2009, US20090011107A1

A method for obtaining a vegetable protein fraction, in particular for producing vegetable ice cream, is described wherein vegetable parts are added to water or to an aqueous solvent in order to dissolve and/or disperse vegetable proteins from the vegetable parts, and wherein one or more vegetable protein fractions are separated from the aqueous mixture thus obtained by the separation. According to the method, one or more substances having lipophilic or amphiphilic boundary surfaces are added to the aqueous mixture in order to separate one or more vegetable protein fractions, to which dissolved and/or dispersed proteins having lipophilic or amphiphilic groups in the mixture attach. The substances including the attached proteins are separated from the mixture. A vegetable protein fraction having particularly good emulsifying characteristics is obtained by the method, the protein fraction being advantageous as an emulsifier in the production of vegetable ice cream.

Pressure-regulated supercritical fluid fractionation of oil seed extraction materials

Marentis, R., Mor Technology LLC, 1/8/2009, US20090011112A1

Generally, a method of pressure-regulated supercritical fluid fractionation of oilseed extraction materials, which can be utilized to refine oil seed extraction material established in an amount of supercritical fluid. Specifically, a method of pressure-regulated supercritical fluid fractionation of corn germ extraction material to produce a refined corn oil extraction material.

Dry analytical element for lipase measurement

Kageyama, S., and Tanaka, H., Birch Stewart Kolasch & Birch, 1/8/2009, US20090011450A1

A dry substrate for pancreatic lipase analysis having high selectivity with respect to pancreatic lipase in a body fluid, which comprises at least one development layer and/or reagent layer containing diglyceride or triglyceride of long-chain alkyl fatty acid having 12 to 22 carbon atoms, monoglyceride lipase, and a glycerine measurement reagent, wherein the development layer and/or the reagent layer comprise two or more types of anionic surfactants and at least one type of the anionic surfactant is alkylarylsulfonate.

Patent information is compiled by Scott Bloomer, a registered US patent agent with Archer Daniels Midland Co., Decatur, Illinois, USA. Contact him at scott_bloomer@admworld.com.

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CONTENTS

Extracts & Distillates

Lipidomics—A personal view

Christie, W.W., *Lipid Technol. 21*:58–60, 2009.

The science of lipidomics may not be as new as many current practitioners believe, but the methods that are being applied today, especially those involving electrospray ionization–mass spectrometry, are indeed novel and extremely powerful. They are enabling a much better understanding of the functions of lipids in tissues and of the relationship to human disease states. Shotgun lipidomics, i.e., direct mass spectrometric analysis of complex lipid extracts without chromatographic steps, gives rapid access to a great deal of compositional data. On the other hand, there are limitations to even this technique, and there are still occasions when chromatographic, and chemical and enzymatic degradative, methods are necessary.

Substrate specificity in phospholipid transformations by plant phospholipase D isoenzymes

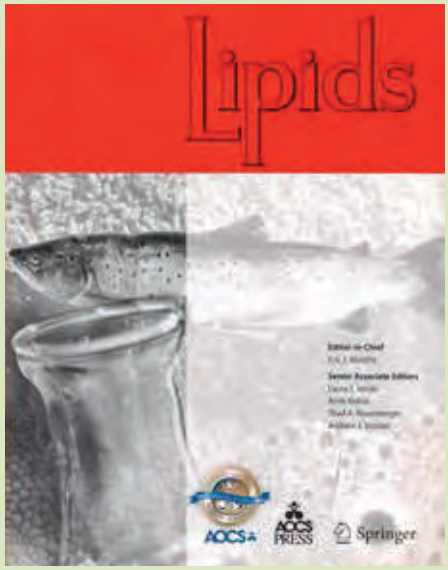
Dippe, M., and R. Ulbrich-Hofmann, *Phytochemistry 70*:361–365, 2009.

Phospholipase D (PLD) catalyzes the hydrolysis and transesterification of glycerophospholipids at the terminal phosphodiester bond. In many plants, several isoforms of PLD have been identified without knowing their functional differences. In this paper, the specificities of two PLD isoenzymes from white cabbage (*Brassica oleracea* var. *capitata*) and two from opium poppy (*Papaver somniferum* L.), which were recombinantly produced in *Escherichia coli*, were compared in the hydrolysis of phospholipids with different head groups and in the transphosphatidylation of phosphatidylcholine with several acceptor alcohols. In a biphasic reaction system, consisting of buffer and diethyl ether, the highly homologous isoenzymes are able to hydrolyze phosphatidylcholine, glycerol, ethanolamine, inositol, and with one

AOCS Journals

Journal of the American Oil Chemists' Society (June)

- Co-crystals of beeswax and various vegetable waxes with sterols studied by X-ray diffraction and differential scanning calorimetry, Mellema, M.
- Rapid determination of free fatty acid in extra virgin olive oil by Raman spectroscopy and multivariate analysis, El-Abassy, R.M., P. Donfack, and A. Materny
- Partitioning of carboxylic acid between oil and water phases. Experimental, correlation, and prediction, Campanella, A., B.A. Mandagarán, and E.A. Campanella
- Designs of bioreactor systems for solvent-free lipase-catalyzed synthesis of fructose–oleic acid esters, Pyo, S.-H., and D.G. Hayes
- Study of some experimental parameters in the synthesis of triacylglycerols with CLA isomers and structural analysis, Blasi, F., S. Maurelli, L. Cossignani, G. D'Arco, M.S. Simonetti, and P. Damiani
- Anti-rancidity effects of sesame and rice bran oils on canola oil during deep frying, Farhoosh, R., and R.E. Kenari
- Profiles of lipid components, fatty acid compositions, and triacylglycerol molecular species of adzuki beans (*Vigna angularis*), Yoshida, H., Y. Tomiyama, N. Yoshida, and Y. Mizushina
- Lipid components of North American wild rice (*Zizania palustris*), Przybylski, R., D. Klensporf-Pawlik, F. Anwar, and M. Rudzinska
- Effect of the presence and absence of potatoes under repeated frying conditions on the composition of palm oil, Kalogianni, E.P., C. Karastogiannidou, and T.D. Karapantsios
- Synthesis, characterization, and performance of amine modified linseed oil fatty amide coatings, Alam, M., A.R. Ray, S.M. Ashraf, and S. Ahmad
- ^{1}H NMR and multivariate calibration for the prediction of biodiesel concentration in diesel blends, Monteiro, M.R., A.R.P. Ambrozin, L.M. Lião, E.F. Boffo, E.R. Pereira-Filho, and A.G. Ferreira
- Production of high oleic palm oils on a pilot scale, Ramli, M.R., W.L. Siew, and K.Y. Cheah
- Sterols and oxidized sterols in feed ingredients obtained from chemical and physical refining processes of fats and oils, Ubhayasekera, S.J.K.A., and P.C. Dutta



Lipids (June)

- Cholesterol synthesis inhibitor U18666A and the role of sterol metabolism and trafficking in numerous pathophysiological processes, Cenedella, R.J.
- Inhibition of fatty acid synthase by Orlistat accelerates gastric tumor cell apoptosis in culture and increases survival rates in gastric tumor bearing

mice *in vivo*, Dowling, S., J. Cox, and R.J. Cenedella

- Over-expression of the anti-apoptotic protein Bcl-2 affects membrane lipid composition in HL-60 cells, Cantrel, C., A. Zachowski, and B. Geny
- StAR overexpression decreases serum and tissue lipids in apolipoprotein E-deficient mice, Ning, Y., L. Xu, S. Ren, W.M. Pandak, S. Chen, and L. Yin
- Common variants of *ABCB4* and *ABCB11* and plasma lipid levels: A study in sib pairs with gallstones, and controls, Acalovschi, M., S. Tirziu, E. Chiorean, M. Krawczyk, F. Grünhage, and F. Lammert
- Bile acids conjugation in human bile is not random: New insights from ^{1}H-NMR spectroscopy at 800 MHz, Gowda, G.A.N., N. Shanaiah, A. Cooper, M. Maluccio, and D. Raftery
- Plasma lipid levels of rats fed a diet containing pork fat as a source of lipids after splenic surgery, Dinis, A.P.G., R.G. Marques, F.C. Simões, C.F. Diestel, C.E.R. Caetano, D.J.F. Secchin, J.F.N. Neto, and M.C. Portela
- Cloning and characterization of the Δ6 polyunsaturated fatty acid elongase from the green microalga *Parietochloris incise*, Iskandarov, U., I. Khozin-Goldberg, R. Ofir, and Z. Cohen
- Cloning and molecular characterization of the acyl-CoA:diacylglycerol acyltransferase 1 (DGAT1) gene from *Echium*, Mañas-Fernández, A., M. Vilches-Ferrón, J.A. Garrido-Cárdenas, E.-H. Belarbi, D.L. Alonso, and F. García-Maroto
- A simplified method to distinguish farmed (*Salmo salar*) from wild salmon: Fatty acid ratios versus astaxanthin chiral isomers, Megdal, P.A., N.A. Craft, and G.J. Handelman

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exception also phosphatidylserine but with different individual reaction rates. In transphosphatidylation of phosphatidylcholine, they show significant differences in the rates of head group exchange but with the same trend in the preference of acceptor alcohols (ethanolamine > glycerol > L-serine). For L- and D-serine a stereoselectivity of PLD was observed. The results suggest a physiological relevance of the different hydrolytic and transphosphatidylation activities in plant PLD isoenzymes.

Changes in plasma membrane lipids, aquaporins, and proton pump of broccoli roots, as an adaptation mechanism to salinity

López-Pérez, L., M. del Carmen Martínez-Ballesta, C. Maurel, and M. Carvajal, *Phytochemistry 70*:492–500, 2009.

Salinity stress is known to modify the plasma membrane lipid and protein composition of plant cells. In this work, we determined the effects of salt stress on the lipid composition of broccoli root plasma membrane vesicles and investigated how these changes could affect water transport via aquaporins. *Brassica oleracea* L. var. *Italica* plants treated with different levels of NaCl (0, 40, or 80 mM) showed significant differences in sterol and fatty acid levels. Salinity increased linoleic (18:2) and linolenic (18:3) acids and stigmasterol but decreased palmitoleic (16:1) and oleic (18:1) acids and sitosterol. Also, the unsaturation index increased with salinity. Salinity increased the expression of aquaporins of the PIP1 and PIP2 [PIP: plasma membrane intrinsic protein] subfamilies and the activity of the plasma membrane H^+-ATPase. However, there was no effect of NaCl on water permeability (P_f) values of root plasma membrane vesicles, as determined by stopped-flow light scattering. The counteracting changes in lipid composition and aquaporin expression observed in NaCl-treated plants could allow maintenance of the membrane permeability to water and a higher H^+-ATPase activity, thereby helping to reduce partially the Na^+ concentration in the cytoplasm of the cell while maintaining water uptake via cell-to-cell pathways. We propose that the modification of lipid composition could affect membrane stability and the abundance or activity of plasma membrane proteins such as aquaporins or H^+-ATPase. This would provide a mechanism for controlling water permeability and for acclimation to salinity stress.

Mitochondria do not contain lipid rafts, and lipid rafts do not contain mitochondrial proteins

Zheng, Y.Z., K.B. Berg, and L.J. Foster, *J. Lipid Res. 50*:988–998, 2009.

Lipid rafts are membrane microdomains involved in many cellular functions, including transduction of cellular signals and cell entry by pathogens. Lipid rafts can be enriched biochemically by extraction in a nonionic detergent at low temperature, followed by flotation on a sucrose density gradient. Previous proteomic studies of such detergent-resistant membranes (DRM) are in disagreement about the presence of mitochondrial proteins in raft components. Here, we approach the status of mitochondrial proteins in DRM preparations by employing stable isotope labeling by amino acids in cell culture to evaluate the composition of differentially purified subcellular fractions, as well as high-resolution linear density gradients. Our data demonstrate that F_1/F_0 ATPase subunits, voltage-dependent anion selective channels, and other mitochondrial proteins are at best partially copurifying contaminants of raft preparations.

Comprehensive supercritical fluid chromatography × reversed phase liquid chromatography for the analysis of the fatty acids in fish oil

François, I., and P. Sandra, *J. Chromatogr. A 1216*:4005–4012, 2009.

The separation of the phenacyl esters of the fatty acids originating from a fish oil extract by means of a comprehensive analysis using silver-ion (SI) supercritical fluid chromatography (SFC) and reversed-phase liquid chromatography (RP-LC) in the first and second dimensions, respectively, is described. The combination ensured a high orthogonality and peak capacity, particularly when compared with the comprehensive RP-LC × 2RP-LC separation achieved by using a configuration with two columns

CONTINUED ON NEXT PAGE

in parallel in the second dimension. The construction of the SI-SFC × RP-LC interface consists of two two-position/ten-port switching valves, of which one is equipped with two loops packed with octadecyl silica particles. Compared with the SFC × RP-LC configuration described in an earlier publication, the peak capacity in the second dimension was increased. Water was added not only as make-up fluid to the SFC effluent to ensure analyte focusing but also as rinsing medium of the loops prior to the transfer of the fractions to the second dimension. In the SFC dimension, high efficiency and loadability were obtained by coupling two wide-bore columns (4.6 mm inside diameter) in series. Evaporative light-scattering and ultraviolet detection with standard and high-pressure flow cells was evaluated in terms of data acquisition speed and suppression of signal interferences originating from the supercritical carbon dioxide (CO_2) expansion.

Metabolomics reveals a novel vitamin E metabolite and attenuated vitamin E metabolism upon PXR activation

Cho, J.-Y., D.W. Kang, X. Ma, S.-H. Ahn, K.W. Krausz, H. Luecke, J.R. Idle, and F.J. Gonzalez, *J. Lipid Res. 50*:924–937, 2009.

Pregnane X receptor (PXR) is an important nuclear receptor xenosensor that regulates the expression of metabolic enzymes and transporters involved in the metabolism of xenobiotics and endobiotics. In this study, ultra-performance liquid chromatography, coupled with electrospray time-of-flight mass spectrometry (TOFMS), revealed altered urinary metabolomes in both *Pxr*-null and wild-type mice treated with the mouse PXR activator pregnenolone 16α-carbonitrile (PCN). Multivariate data analysis revealed that PCN significantly attenuated the urinary vitamin E metabolite α-carboxyethyl hydroxychroman (CEHC) glucuronide together with a novel metabolite in wild-type but not *Pxr*-null mice. Deconjugation experiments with β-glucuronidase and β-glucosidase suggested that the novel urinary metabolite was γ-CEHC β-D-glucoside (Glc). The identity of γ-CEHC Glc was confirmed by chemical synthesis and by comparing tandem mass fragmentation of the urinary metabolite with the authentic standard. The lower urinary CEHC was likely due to PXR-mediated repression of hepatic sterol carrier protein 2 involved in peroxisomal β-oxidation of branched-chain fatty acids. By using a combination of metabolomic analysis and a genetically modified mouse model, this study revealed that activation of PXR results in attenuated levels of the two vitamin E conjugates and identification of a novel vitamin E metabolite, γ-CEHC Glc. Activation of PXR results in attenuated levels of the two vitamin E conjugates that may be useful as biomarkers of PXR activation.

Meta-analysis of animal fat or animal protein intake and colorectal cancer

Alexander, D.D., C.A. Cushing, K.A. Lowe, B. Sceurman, and M.A. Roberts, *Am. J. Clin. Nutr. 89*:1402–1409, 2009.

In the recent World Cancer Research Fund/American Institute for Cancer Research report of diet and cancer, it was concluded that there is limited but suggestive evidence that animal fat intake increases the risk of colorectal cancer. To clarify this potential relation, we conducted meta-analyses across a variety of subgroups, incorporating data from additional studies. Analyses of high compared with low animal fat intakes and categorical dose-response evaluations were conducted. Subgroup analyses, consisting of evaluations by study design, sex, and tumor site were also performed. Six prospective cohort studies with comprehensive dietary assessments, contributing 1,070 cases of colorectal cancer and ≈1.5 million person-years of follow-up, were identified. The summary relative risk estimate (SRRE) for these studies was 1.04 (95% CI: 0.83, 1.31; P for heterogeneity = 0.221) on the basis of high compared with low intakes. When data from case-control studies were combined with the cohort data, the resulting SRRE was 1.15 (95% CI: 0.93, 1.42) with increased variability (P for heterogeneity = 0.015). In our dose-response analysis of the cohort studies, no association between a 20-g/d increment in animal fat intake and colorectal cancer was observed (SRRE: 1.02; 95% CI: 0.95, 1.09). In a separate analysis of three prospective cohort studies that reported data for animal protein or meat protein, no significant association with colorectal cancer was observed (SRRE: 0.90; 95% CI: 0.70, 1.15). On the basis of the results of this quantitative assessment, the available epidemiologic evidence does not appear to support an independent association between animal fat intake or animal protein intake and colorectal cancer.

Walnuts and fatty fish influence different serum lipid fractions in normal to mildly hyperlipidemic individuals: A randomized controlled study

Rajaram, S., E.H. Haddad, A. Mejia, and J. Sabaté, *Am. J. Clin. Nutr. 89*:1657S–1663S, 2009.

Increased consumption of n-3 (omega-3) fatty acids decreases the incidence of coronary heart disease (CHD). The objective was to determine whether walnuts (plant n-3 fatty acid) and fatty fish (marine n-3 fatty acid) have similar effects on serum lipid markers at intakes recommended for primary prevention of CHD. In a randomized crossover feeding trial, 25 normal to mildly hyperlipidemic adults consumed three isoenergetic diets (≈30% total fat and <10% saturated fat) for 4 wk each: a control diet (no nuts or fish), a walnut diet (42.5 g walnuts/10.1 mJ), or a fish diet (113 g salmon, twice/wk). Fasting blood was drawn at baseline and at the end of each diet period and analyzed for serum lipids. Serum total cholesterol and low density lipoproteins (LDL) cholesterol concentrations in adults who followed the walnut diet (4.87 ± 0.18 and 2.77 ± 0.15 mmol/L, respectively) were lower than in those who followed the control diet (5.14 ± 0.18 and 3.06 ± 0.15 mmol/L, respectively) and those who followed the fish diet (5.33 ± 0.18 and 3.2 ± 0.15 mmol/L, respectively; $P < 0.0001$). The fish diet resulted in decreased serum triglyceride and increased high density lipoprotein (HDL)-cholesterol concentrations (1.0 ± 0.11 and 1.23 ± 0.05 mmol/L, respectively) compared with the control diet (1.12 ± 0.11 and 1.19 ± 0.05 mmol/L, respectively) and the walnut diet (1.11 ± 0.11 mmol/L, $P < 0.05$, and 1.18 ± 0.05 mmol/L, $P < 0.001$, respectively). The ratios of total cholesterol/HDL cholesterol, LDL cholesterol/HDL cholesterol, and apolipoprotein B/apolipoprotein A-I were lower ($P < 0.05$) in those who followed the walnut diet compared with those who followed the control and fish diets. Including walnuts and fatty fish in a healthy diet lowered serum cholesterol and triglyceride concentrations, respectively, which affects CHD risk favorably. ■

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Meet Young-Hee Cho

By the time this profile is printed, 2009 Honored Student Young-Hee Cho hopes to have successfully defended her dissertation.

Cho, a doctoral student of Julian McClements at the University of Massachusetts (UMass) Department of Food Science, is a native of Gwangju, Republic of Korea. After she received her master's degree in food and nutrition from Chonnam National University, Cho joined the Korea Food Research Institute (KFRI), "which has a great reputation for food research in Korea," she reports.

"Working at KFRI, I had the opportunity to develop commercial products and learn about research in the food industry. It was a turning point in my life and it brought out my eagerness to expand and solidify my knowledge of food science," Cho explains.

Once at UMass, Cho's overall objective was to design and fabricate structured delivery systems for functional food components.

"Recently, multilayer emulsions have been developed as structured delivery systems based on the electrostatic interaction between proteins and polysaccharides," she notes. Multilayer emulsion delivery systems consist of lipid droplets coated by nanolaminated biopolymer layers. Potentially, the interfacial characteristics of multilayer emulsions can be modulated by assembling biopolymer blends with different molecular characteristics. It has been shown that multilayer emulsions have better functionality than conventional emulsions, such as preventing lipid oxidation and increasing stability despite environmental stresses.

"The ultimate objective of my study is to carry out research that would lead to a better fundamental understanding of the major factors that determine the formation, stability, and properties of multilayer emulsions, and then to utilize this information to develop nutraceutical delivery systems," she says. "In my work, we systematically examined the influence of droplet concentration, droplet size, droplet charge, and polysaccharide concentration on the formation and stability of multilayer emulsions."

Young-Hee Cho, a 2009 Honored Student, poses in Seattle, Washington, USA, while attending the 2008 AOCS Annual Meeting & Expo.

Cho and McClements developed an electroacoustic measurement system as an analytical method of characterizing the *in situ* interfacial properties of multilayer emulsions. Then they used the method to study the interactive or competitive adsorption behavior of protein and polysaccharide molecules with droplet surfaces. They also studied the digestibility of the emulsions by simulating *in vitro* small intestine conditions.

Once she has her Ph.D. in hand, Cho hopes eventually to combine the best of both the academic and industrial worlds and develop a new delivery system containing a bioactive lipid such as fish oil or lycopene. In the meantime, she says she is "searching for a position in research and development in the food industry." ■

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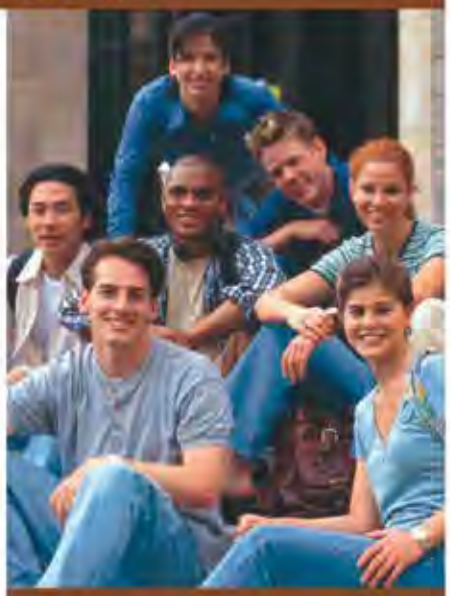

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One hundred years of service

What would the nine analytical chemists who founded the American Oil Chemists' Society (AOCS) have thought if they suddenly appeared at the 100th AOCS Annual Meeting & Expo (AM&E) in Orlando, Florida, USA, May 3–6, 2009?

They probably would have marveled over how much—and how little—has changed in 100 years. After, that is, they were able to focus on something other than the wonders of gas chromatography, mass spectroscopy, and other high-tech analytical equipment available on the Expo floor. When they noticed the importance in today's world of palm and soy oils, David Wesson, in particular, would have wondered what happened to King Cotton; Wesson established the first private US laboratory for analysis of cottonseed products in 1887.

The original nine would have found changes in the organization itself to be remarkable. The sheer size and diversity of the Society would have astounded them, with thousands of members from 90 countries organized in 12 divisions and seven sections ranging from agricultural microscopy to surfactants and detergents. Another source of amazement: the size of the AM&E, with almost 500 oral presentations, close to 230 posters (up from 169 in 2008), 95 exhibitors, and 1,495 registrants from 53 countries.

The growth and reach of AOCS' technical services would be a cause for their pride, too: The first methods published in 1925 fit comfortably into a busy oil analyst's back pocket. The sixth edition, which will be available soon, is close to 10 centimeters thick and is heavy enough to cause a shelf to buckle.

What hasn't changed? Many of the methods developed at the beginning of AOCS' history, when it was a small, regional organization, are still in use in trade, only now at the global level. Methods from 1925—including those for establishing the refractive index and saponification value of oils—are among the recommended methods of analysis and sampling listed in the Codex Alimentarius Commission's *Standard 234–1999 (2007)*.

Another constant is that AOCS members continue to be driving forces in their many fields of endeavor. They belong to AOCS because they know, as keynote speaker Daniel Burrus pointed out, that knowledge increases in value when it is shared.

The founders would have felt right at home at the 2009 AM&E because the sharing of knowledge remains the focus of all AOCS gatherings. Another unvarying truth: Members like to socialize—often with a drink in hand—at AOCS meetings. David Wesson once noted that although meeting attendees would be "very circumspect about their operations in formal sessions," they would gather in a cocktail lounge at the end of the day, where they tended to "speak freely." The informal sharing helped move the industry along, Wesson suggested . . . and it still does. Some things don't change, and we are richer as a result.

The following pages detail some of the knowledge shared at the 100th AOCS Annual Meeting & Expo. Here's to the next 100 years of AOCS!

information

Did you miss the celebration in Orlando but want to see a photographic record of the festivities? Visit www.aocs.org/100 to view and order photographs or 100th anniversary merchandise. In addition, some sessions—including the keynote address—were videotaped. Those files will be available on the AOCS website soon.

hfdialog

Subject: „Oilseed processing"

Daniel Burrus delivers AOCS keynote address

Catherine Watkins

"When I think of what you have done, you all ought to get awards," keynote speaker Daniel Burrus said as he surveyed the assembled annual meeting attendees at the Tuesday morning business and awards breakfast on May 5, 2009.

Burrus, a noted futurist and business strategist (see sidebar), marveled at how the reach of AOCS "goes around the world." Calling AOCS "an important organization," he joked that as a former teacher of biology and physics, he would have had trouble deciding which annual meeting sessions to attend had he been an AOCS member.

For the next 45 minutes, Burrus unveiled his strategies for seeing and facing the future, all of which rely on managing change instead of being controlled by it. He began by advising his listeners to move away from a problem-solving mode of action on the job. "Your problem is seldom the problem," he said, adding that problems are like onions, with many layers to remove until the real culprit presents itself.

In an age of uncertainty, relationships (in the business sense, although the truism would hold in the personal sphere as well) are increasingly important. "You can't cut yourself [your organization] to growth," he stressed.

Hindsight has only one mode: lament. Rather than focusing on the past, Burrus suggested focusing on what he calls "the visible future" to create and sustain a competitive advantage. The idea is to move beyond uncertainty and develop plans based on what truly can be known.

Burrus defined two types of trends: soft and hard. Soft trends *might* continue to their logical conclusion, whereas hard trends *will* continue to a foreseeable end point. He used Elvis impersonators, to the crowd's delight, to illustrate soft trends. "Immediately after Elvis' death, an increasing number of impersonators emerged. If you extended that trend over time, it could be argued that within 20 years, one in three North Americans would be an Elvis impersonator."

Hard trends often encompass demographics and technology, including the fact that Baby Boomers the world over will, in 10 years, hold roughly 80% of the wealth in industrialized nations and will be shifting that wealth into more conservative retirement funds. The power of hard trends, Burrus suggested, is the degree of certitude associated with them.

Keynote speaker Daniel Burrus addresses attendees at the Business Meeting and Awards Recognition Breakfast of the 100th AOCS Annual Meeting & Expo in Orlando, Florida, USA. Courtesy Dan Higgins.

Take technology trends: "Technology trends in the future will be driven by a perfect storm of ramped-up processing power, bandwidth, and storage," he asserted, citing Moore's law as the basis for hard "technotrends." Roughly stated, Moore's law (named for Intel co-founder Gordon Moore) holds that computer processing power increases exponentially, doubling roughly every two years. "This means that automation systems, robotics, computer systems, and cell phones will soon have supercomputer capabilities," Burrus said. ("Today's cell phones would have cost millions of dollars several decades ago.") The speed of advancement also means we have shifted from a world of incremental change to one of transformation.

"Processing power, bandwidth, and storage influence and will continue to influence everything," Burrus said, adding that the transformative power of the "perfect storm" will alter marketing, communication, and collaboration. Other technology-driven hard trends he pointed to included:

- Networking;
- Dematerialization (making things smaller, such as medical tools that have shrunk from the size of a steamer trunk to that of a cigarette pack);
- Virtualization (which allows for a much faster speed-to-market for new products);
- Product intelligence (embedding chips in products);

- Interactivity (supercomputers in everyday items such as phones);
- Mobility;
- Globalization (from selling overseas to staff based overseas);
- Convergence (for example, the overlap seen now among food, feed, and fuel).

Burrus had practical advice for his audience, noting that there currently are four generations in the workforce. "Are you combining talents by combining the generations on work teams?" he asked. "We need each other. When I grew up a toaster was just a toaster," he noted, ruing the fact that 21st-century toasters need manuals—or a member of a younger generation—to explain them.

He also pointed to hard trends that will specifically affect AOCS and its members, including:

- The rise of the global middle class—"Here's a real revolution: One billion people will move up into the middle class in coming years," Burrus noted, which will demand increased agricultural yields and a reduction of inputs.
- Web 2.0 for business/academia—Organizations will benefit from setting up internal social utilities like Facebook and Twitter, and creating their own interactive Wikis (a page or collection of web pages designed to enable anyone who accesses them to contribute or modify content).

Who is Daniel Burrus?

Keynote speaker Daniel Burrus is the founder of five companies and a consultant to a list of Fortune 500 companies such as GE, IBM, Oracle, Microsoft, DuPont, ExxonMobil, and Sara Lee.

Long considered one of the world's leading technology forecasters and business strategists—the *New York Times* once called him one of the top three "business gurus" in the world—he currently is the CEO of Burrus Research Associates Inc. in Hartland, Wisconsin, USA. There are few better at predicting technology trends: In 1984, he predicted that scientists would sequence the human genome and proclaimed that pocket-sized telephones would be available by the mid-1990s.

Burrus is the best-selling author of *Technotrends: How to Use Technology to Go Beyond Your Competition*, which—although written in 1993—remains topical. More to the point, though, as an audience of several hundred experienced at the 100th AOCS Annual Meeting & Expo, Burrus is a dynamic keynote speaker much lauded for his insight and delivery. His primary message is that technological, social, and business forces are converging to create enormous, untapped opportunities.

- Increasing government regulation—"It will not be long before governments will require companies to record and save all phone conversations since the phone, like e-mail, is more frequently being sent over the Internet," Burrus counseled.
- Rising need for just-in-time training—The trend is to move from informing via a one-way flow of information to communicating via a two-way flow.

Burrus also gave advice on how to see the visible future. "Think both/and instead of either/or," he advised. The future will involve both wireless and wired technology; it will be both paperless and papered (direct mail vs. e-mail), and both high- and low-tech.

In closing, Burrus advised keeping the focus on what really matters, which is family and friends. "In the end, I want a widely diversified portfolio of memories," he said.

"I look around this room and I see high-performance people juggling the maximum number of balls both on and off the job. We all know someone will toss you another ball. Rather than drop them all, because there is a finite limit to the number of balls that can be juggled, your job is to decide which ball is the least relevant. Make that decision, and then drop that ball."

Catherine Watkins is associate editor of inform. *She can be reached at cwatkins@aocs.org.*

2009 Supelco/Nicholas Pelick–AOCS Research Award

Thomas A. Foglia, recipient of the 2009 Supelco/Nicholas Pelick–AOCS Research Award, presented his award lecture on Tuesday, May 5, during the 100th AOCS Annual Meeting & Expo in Orlando, Florida, USA. The lecture was entitled "Processing of Fats and Oils into Value-Added Products." Foglia, a past president of AOCS, spent 39 years as a researcher at the Eastern Regional Research Center (ERRC; Wyndmoor, Pennsylvania, USA). (ERRC is a unit of the US Department of Agriculture's Agricultural Research Service.) Foglia retired in 2008 but continues as an emeritus researcher at ERRC.

The first part of Foglia's presentation focused on the application of selected lipases for the harvesting of industrially or nutritionally important fatty acids from common fats and oils. He began by demonstrating how he and his collaborators developed protocols for determining the selectivity, if any, of a given lipase using lipids of known stereochemical composition.

Len Sidisky of Supelco, Inc. (left) congratulates Thomas A. Foglia, recipient of the 2009 Supelco/Nicholas Pelick–AOCS Research Award. The award was presented during the Business Meeting and Awards Recognition Breakfast at the 100th AOCS Annual Meeting & Expo on Tuesday, May 5.

"In general, lipases can express a preference for or against a particular fatty acid, express a 1,3-positional selectivity for a triacylglycerol, or have little or no selectivity," he noted. For example, 1,3-selective lipases such as the lipase from *Rhizomucor meihei* can be used to isolate important fatty acids such as erucic and ricinoleic acid from rapeseed and castor oil, respectively.

A second area that capitalizes on the selectivity of lipases from organisms such as *R. meihei* and/or *Carica papaya*, which are food use-approved lipases, is the modification of the physical and/or nutritional properties of natural fats and oils. Topics covered included the alteration of the physical and/or thermal properties of solid fats such as tallow to produce fats suitable for baking or shortening applications; the production of mixed short- and long-chain structured triacylglycerols intended for use as low-calorie confectionery fats; and mixed medium- and long-chain triacylglycerols from chicken fat intended as nutritional supplements.

The second part of the presentation covered the use of lipases for the production of biodiesel fuels as an alternative to the alkali-catalyzed transesterification of oils/fats, which presently is the commonly used method of producing biodiesel. The use of lipases to produce biodiesel is well documented in the literature, Foglia said. Advantages cited for using this approach are that the lipases not only transesterify the oil/fat glycerides to esters but also esterify the free fatty acids (FFA) present and improve glycerol recovery.

"The disadvantages of lipases, however, are their cost and the long reaction times required for high conversions of the oil/fat to biodiesel," Foglia said. "Immobilized lipases can be used more cost effectively in a continuous bioreactor to remove the FFA content of a feedstock such as restaurant grease to an acceptable level for subsequent alkali-catalyzed transesterification of the grease to biodiesel." This approach allows for repeated reuse of the lipase as well as shortened reaction times, and facilitates glycerol recovery, all of which improve the economics of this approach to manufacturing biodiesel, Foglia said.

In the final section of Foglia's presentation, he reviewed the fermentation work that his colleagues continue to conduct at ERRC. The work focuses on the fermentation of fats, oils, and their co-products into biopolymers and biosurfactants.

The biopolymers presently being studied at ERRC are polyhydroxyalkanoates (PHA), a family of biopolyesters composed of a β-hydroxy acid repeat unit containing a β-alkyl substituent.

"There are two classes of PHA polymers: namely, short-chain PHA, where the R group is methyl or ethyl; and medium chain-length PHA, where the R group varies from C_4 to C_{11}. The latter class of PHA may contain unsaturation," Foglia noted.

When grown on a fat or oil substrate, medium chain-length PHA are synthesized as intracellular storage lipids. Substrates used

for the microbial production of PHA include both vegetable oils and animal fats, with typical PHA production ranging from 1 to 2.5 g/L. Intended uses for medium-chain PHA, which are elastomeric in nature, include such applications as adhesives, elastomers, and coatings.

Research in the biosurfactants arena currently centers on the production of sophorolipids and rhamnolipids, both of which fall into the general class of surface-active glycolipids. Unlike PHA, sophorolipids are secreted as extracellular glycolipids, which facilitates their harvesting, and are produced in yields ranging from 20 to 100 g/L. The range of substrates that can be used for their production is broader than for PHA. Substrates used by the ERRC team include fatty acids, fats and oils, and co-product streams such as unrefined glycerol from biodiesel production and soy molasses from soybean refining.

A major drawback to the use of rhamnolipids as biosurfactants is that the organism used in their biosynthesis, *Pseudomonas aeruginosa*, is pathogenic, Foglia said. Accordingly, the ERRC researchers are looking at potential nonpathogenic bacteria for their synthesis.

The Supelco/Nicholas Pelick–AOCS Research Award is sponsored by Supelco, Inc., a division of Sigma-Aldrich of Bellefonte, Pennsylvania, USA, and Nicholas Pelick, a longtime member and past president of AOCS. The award recognizes outstanding original research in fats, oils, lipid chemistry, or biochemistry. It is presented in the form of a plaque and $10,000 honorarium. For more information about the award, visit www.aocs.org/member/awards/award.cfm?awd=research. ■

Foglia also wins USB-IOP award

It has been a good year for former AOCS President Thomas A. Foglia. In addition to receiving the 2009 Supelco/Nicholas Pelick–AOCS Research Award, Foglia also received the Industrial Uses of Soybean Oil Award at the 100th AOCS Annual Meeting & Expo. That award is sponsored by the United Soybean Board (USB) and is offered through the AOCS Industrial Oil Products (IOP) Division. The award recognizes outstanding research into new industrial applications or uses for soybean oil and consists of a $3,000 honorarium and a commemorative plaque.

In his award address during the luncheon meeting of the IOP Division, Foglia focused on three areas of his present research interests: biodiesel production using immobilized catalysts and second-use lipid feedstocks; the development of process models for biodiesel production; and the preparation of branched-chain fatty acids from unsaturated fatty acids using a novel solid acid catalyst at high temperature and pressure. All three ongoing projects have been conducted in collaboration with Helen Ngo and Michael Haas at the USDA (US Department of Agriculture)-ARS (Agricultural Research Service) Eastern Regional Research Center in Wyndmoor, Pennsylvania, USA.

The rise and fall of surfactants lore

Editor's note: The following article is based on the address given by Michael F. Cox, the 2009 Samuel Rosen Memorial Award winner, at the 100th AOCS Annual Meeting & Expo, held in Orlando, Florida, USA, May 3–6.

Michael F. Cox

Significant changes have occurred in the surfactants industry in the past 30 years, both in terms of what we consider to be important and in the paradigms that we operate under. The following discussion highlights my view of the significant changes that have occurred and is based entirely on my experience, recollection, and opinion.

Since I do not have a lot of space, I am going to focus on two key topics: surfactants as a business and paradigms in the surfactants industry.

SURFACTANTS AS A BUSINESS

You might ask yourself why an old research and development guy would delve into the business side of surfactants. The answer is that technical development and business development are (or should be) symbiotic; both aim to achieve the vision for the business. To a young scientist, it may seem more like the meeting of the *Titanic* (his or her technical project) and an iceberg (the business), but this should not often be the case when business and technical efforts are aligned. During the past 30 years, the surfactant business, and therefore the technical focus, has changed significantly. The two most significant changes that have occurred deal with who the key players are and who has had the greatest influence over the industry (in other words, who has been the "800-pound gorilla" in the surfactants playpen).

In the 1980s, surfactants were considered a great way to extend the oil business "downstream" to capture the rich returns that downstream derivatives could provide. This more or less began to reverse itself in the late 1980s as oil vs. derivative margins changed and oil companies concluded that they needed to focus on their core business of producing crude oil derivatives. This resulted in surfactants-based assets being sold off and in a reduction of new assets being built. Although I worked for the same company for 26+ years, my résumé looks as if I jumped ship on a regular basis. I started with Conoco in its chemicals division in 1981; Conoco was then purchased by DuPont, which sold the Conoco Chemicals division to form Vista Chemical Co., which later went public and was then purchased by RWE, who combined it with other purchased assets to form CONDEA, which was later sold to Sasol. This is the reason the governing board of the Surfactants & Detergents Division of AOCS has put considerable effort into developing a company name/asset roadmap, so that our younger scientists can better understand the history of our industry.

As those with experience will tell you, there is usually some entity in the industry that has significant influence over the industry at any given time. I refer to this entity as the "800-pound gorilla in the surfactants playpen." In the early 1980s, the well-integrated, large-volume surfactant producers had significant power (they were well positioned in that supply was tight and margins were good).

Milton Rosen (left) congratulates Michael F. Cox, the 2009 Samuel Rosen Memorial Award winner. The award honors Rosen's father, who worked as an industrial chemist on the formulation of printing inks for more than 40 years. Courtesy of Brian Sansoni/SDA (The Soap and Detergent Association).

A good illustration of this is the 1985 AOCS meeting in Philadelphia. A surfactant manufacturer had organized a session focusing on a new surfactant it was promoting and had invited a number of companies evaluating the new surfactant to give presentations at the AOCS meeting on their experience with it. One of these companies informed the session chair (an employee of the surfactant manufacturer) that the data were not positive but they felt

obligated to share the data and experience with the industry rather than cancel their presentation. My recollection is that just prior to the session, the session chair reorganized the session so that the offending paper was given last (at the end of the day). Furthermore, the session chair gave both an introduction and a rebuttal to the offending paper, something I have never seen occur since. My point is not to point fingers here (both companies involved felt they were doing the right thing) but to illustrate that during this period of time, the large surfactant manufacturers had clout, and clearly were 800-pound gorillas.

In the 1990s, the big gorilla was Wal-Mart, because of the sheer volume of product it moved through its plethora of stores. Wal-Mart's buying power had significant influence on pricing (as well as packaging, etc.), which initiated and/or exacerbated the pressure that the industry faced in the late 1990s and early 2000s to reduce costs and improve production efficiency.

In the 2000s, we saw a change in terms of what gave the gorilla its power. In the 1980s and 1990s, I think the ability to impact supply and demand (margin and sales) gave the gorilla its power, but in the 2000s, knowledge took over. Detergent manufacturers learned how to manage the gorillas of the 1980s and 1990s, and those that understood and planned for unexpected variations in supply became the 800-pound gorilla in the 2000s. If we have learned anything in the last decade, our ability to predict feedstock costs (and resultant surfactants costs) is comparable to our ability to predict the stock market. Detergent manufacturers that understood what could happen, and prepared for it, were logically better positioned to thrive in the market. As a technical person, I am gratified that power in our industry now comes from knowledge.

Although I think the gorilla of the 2000s (knowledge) will thrive in the next decade, I think we will also see the emergence of another gorilla from the surfactant manufacturers' side. Enhanced oil recovery (EOR) is becoming a reality, and the volume of surfactant that will be consumed in this market is significant (comparable, potentially, to the detergents market). You can argue that EOR has been talked about for decades and that oil prices have come back down, but the bottom line is that nobody thinks that, in the long-term, the price of oil is going anywhere but up. In addition, EOR technology has become more effective and technically driven, making EOR less speculative in nature. It is my opinion that surfactant manufacturers that align themselves to service this emerging market, while staying a force in the detergents market, will take on "gorilla" stature.

PARADIGMS THAT HAVE BEEN SHATTERED

Paradigms shape our industry, and an examination of how paradigms have changed over time gives us an idea of where we are and where we are headed. When I started in the surfactants industry in 1981, I was taught that linearity and acceptability went hand-in-hand, and that surfactants with nonlinear hydrocarbon backbones were inferior. Shell put the first serious crack in this paradigm by successfully teaching the industry that alcohol and alcohol derivatives with some methyl-branching (and with both even and odd carbon-number chain lengths) were not only acceptable but performed more or less identically to their oleochemical or Ziegler-based counterparts. This paradigm was more completely shattered by Procter & Gamble's research and development of selectively branched surfactants, which basically demonstrated to the industry that limited branching can provide enhanced surfactant properties without negatively impacting environmental acceptability.

When I started as a surfactants chemist, the fundamental understanding of surfactants was left to the academicians. Industry scientists focused on the application of surfactants and not on basic surfactant properties. AOCS meetings had "academic" sessions and they had "industrial" sessions. I am glad to say that I think this segregation has largely been eliminated. Although academia still orients itself toward fundamentals and the commercial industry toward applications, they share a common appreciation that both orientations require an understanding of the other. I think we have academia to thank for this. Professors Milton Rosen, John Scamehorn, and others have worked hard to make sure their research had practical utility to the industry, and they have effectively educated the industry on the importance of understanding the fundamental chemistry of surfactants. This is why we now have technical sessions where both academicians and industrial chemists participate, both in the seats and at the podium. Another good example of this blending of academia and industry is illustrated by the Samuel Rosen Memorial Award: this award is sponsored by Professor Milton Rosen of the City University of New York (USA), an academician, for significant accomplishments in the application of the principles of surfactant chemistry in industry. Thank you, Dr. Rosen.

The last paradigm that I think has been firmly shattered is this: feedstock consumption, availability, and costs (and the stock market) can be reliably predicted!

THE PARADIGM THAT JUST WILL NOT GO AWAY

One way of thinking that I wish would just go away is the "my product is greener than yours" mentality. If we have learned anything in the last 30 years, it is that making unsubstantiated environmental claims so as to market products only results in the industry having to put tons of money into unneeded product defense instead of into research that moves the industry forward. For example, the word "green" is often inappropriately used and is seldom adequately defined in our industry, which unfortunately means that it will eventually be discarded (except by fashion designers and landscapers) and replaced by a new word that some in the industry can then spin-doctor into oblivion. Meeting acceptable human health and environmental standards is the responsibility of the industry as a whole. The giants in our industry understand this. I think it is the smaller "want-to-be giants" that sometimes use their limited understanding of an issue (for example, 1,4-dioxane in ethoxylates) as an opportunity to market their products; this only causes confusion and hinders efforts being made in the industry through organizations such as The Soap and Detergent Association to apply good science and reason to real issues. The bottom line is this: Knowledge, good science, and common sense are critical when dealing with these issues. If you do have these tools, please do not pick a fight in order to advance your agenda.

PARADIGM OF THE FUTURE?

I believe that success in the surfactants industry in the next decade will require two things: knowledge and flexibility. Feedstock availability and costs will continue to vary (perhaps unpredictably) and the influence of EOR will begin to impact surfactant availability. Although the parent hydrocarbons used to make surfactants for EOR are largely different from those used to make surfactants for the detergents industry, harvesting new hydrocarbon feedstocks

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Bailey Award presented to Albert J. Dijkstra

Albert J. Dijkstra, winner of the 2009 Alton E. Bailey Award, presented his award address—"Interesterification Revisited"—at the dinner meeting of the Edible Applications Technology Division on May 4, during the 100th AOCS Annual Meeting & Expo at Rosen Shingle Creek in Orlando, Florida, USA.

Dijkstra received his Ph.D. in gas kinetics in 1965 from Leiden University in the Netherlands. From 1966 to 1975, he served as a researcher, as the chief chemist in polymer plants, and as a new project leader at the European head office of ICI. ("ICI doesn't exist anymore. But I do," Dijkstra said, to appreciative laughter.) Following ICI, he was research and development director of the Vandemoortele Group in Belgium from 1978 to 1997. Since 1997, Dijkstra has been his own boss, "doing what I enjoy doing as a scientific consultant, inventor, author, editor, and even translator/annotator (Chevreul), without having to justify the time spent on scientific problems with uncertain return on effort, not wasting time on writing grant proposals or commuting, and taking time to think," he said.

In his address, Dijkstra pointed out that Alton E. Bailey applied for two patents dealing with interesterification in the late 1930s when he was working for the Cudahy Packing Co. "They were not granted, so we don't know what they contain," Dijkstra noted.

Dijkstra's own work on interesterification resulted, in 2004, in his proposal of the enolate mechanism for base-catalyzed interesterification (developed "during sleepless nights"). Next came the question of what to do with this development. He asked colleagues for comment but received "hardly any," because most colleagues deemed the proposal outside their field of expertise. So Dijkstra submitted a manuscript, which was rejected, but the submission of an oral presentation for the 2004 EuroFedLipid Congress in Edinburgh was accepted. "During the discussion after the presentation, László Poppe, a theoretical chemist from Budapest, suggested some experiments to provide support for my mechanism," Dijkstra said. (It turns out Poppe was only at the Congress because he accompanied his wife, Katalin Recseg.)

Dijkstra and Poppe wrote and submitted a new, joint manuscript, which was again rejected by the reviewers, although in the end it was published as a "hypothesis paper" (*European Journal of Lipid Science and Technology 107*:912–921, 2005). The enolate mechanism assumes that the reaction of a base (such as sodium methanolate) with the oil will eventually lead to the abstraction of an α-hydrogen from a fatty acid moiety, and that the enolate anion thus formed acts as the catalytic intermediate.

"This enolate can re-abstract a proton from the hydroxyl group of a partial glyceride, whereupon the resulting alcoholate attacks the carbonyl group," Dijkstra, Poppe, and their colleagues write in the 2005 paper. "This leads to a new ester and a new glycerolate anion that then regenerates a new enolate anion. If the enolate anion reacts with methanol, this will lead to the formation of a fatty acid methyl ester and a glycerolate anion that again regenerates an enolate anion. Reaction with water leads to catalyst inactivation by converting the enolate anion to an unreactive fatty acid moiety (free fatty acid or soap) and a partial glyceride.

"Thermal inactivation of the enolate intermediate is assumed to be through the formation of catalytically inactive β-keto esters. The accelerating role of acetone is explained by assuming this compound . . . act[s] as a highly mobile hydrogen transfer agent that facilitates the reaction between the glycerolate anion and the α-hydrogen atoms in fatty acid moieties. The above assumptions are independently supported by the observation that the addition of acetone-d_6 to an interesterifying reaction mixture leads to the almost quantitative incorporation of deuterium into the α-position of fatty acid moieties. Theoretical calculations on the enolate-alcohol system at PM3 level are also in agreement with the enolate mechanism," they conclude.

Among his take-home messages, Dijkstra urged his audience not to believe everything they read, or that people tell them. Question established truths, he urged, because they can be myths. After all, "they may have originated as suggestions and then started to lead a life of their own." Be sure to define research problems as concisely as possible, because "then you are already halfway to the answer." Think before attempting experimental verification, he suggested, because "thinking is cheap—you do it in bed or while driving to work—and laboratory work is expensive, especially when unnecessary." Above all, however, "enjoy. Chemistry is fun. Or at least it should be, and I hope to have shown that it can be."

The Alton E. Bailey Award has been presented by the North Central Section (now the North Central Chapter of the USA Section) since 1959. It is given for outstanding improvements in edible oil processing technology and significant contributions to scientific literature. The Archer Daniels Midland Co. and Kraft Foods sponsored the 2009 Bailey Award.

For more information about the award, or to nominate someone for the 2010 award, visit www.aocs.org/member/awards/award.cfm?awd=bailey. ■

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Short Courses

New Tools for Surfactant and Polymer Characterization

Stacie Hecht

The "New Tools for Surfactant and Polymer Characterization Short Course" was held on May 3, 2009, at the 100th AOCS Annual Meeting & Expo. Thirty-three participants from seven countries attended the full-day short course. The participants represented a variety of sectors, including consumer products companies, chemical suppliers, and consulting firms. The course included a background seminar on surfactants, a series of talks on new characterization tools, and demonstrations of the latest equipment by manufacturers and distributors. Jeffrey Scheibel from The Procter & Gamble Co. (P&G; Cincinnati, Ohio, USA) presented the overview seminar on the evolution of anionic surfactant technology. Scheibel discussed the evolution of both natural and synthetic surfactants commonly used in consumer products over the past 75 years. He also previewed some of the new feedstocks being evaluated to produce more effective and sustainable surfactants.

This session also highlighted the latest instrumentation for characterizing the surfactant and polymer composition of mixtures and formulations, and for determining basic physical properties such as surface tension, oil/water interfacial tension, critical micelle concentration, and solubility. James Chamberlain, of Kruss USA (Matthews, North Carolina), gave an interactive presentation on state-of-the-art systems to measure surface tension and contact angles. Chamberlain had a Drop Shape Analysis System for automated contact angle measurements and a K100 Tensiometer for surface tension measurements onsite, which gave participants an opportunity to supplement the lectures with demonstrations of the course material.

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Hot Topics

Historical Perspectives on the Chemistry of Oils and Fats

George Willhite

Historical looks at the oleochemical industry, vegetable-oil diesel fuels, AOCS publications, and AOCS presidential trivia were provided in a Hot Topic session entitled Historical Perspectives on the Chemistry of Oils and Fats.

Gary List covered development of the US oleochemical industry. List is with the US Department of Agriculture's National Center for Agricultural Utilization Research (USDA's NCAUR; Peoria, Illinois, USA). List focused on the contributions of the "little giant" of the oleochemical industry, 5-foot, 2-inch Ralph Potts. Potts pioneered fractional distillation of industrial fatty acids at Armour & Co. Ernst Twitchell had patented a process for splitting fatty acids in 1898. Potts' work came about four decades later.

Jim Kenar, also of USDA's NCAUR, reviewed the history of AOCS publishing activities. In the early 1900s, specialized scholarly groups began to organize, with AOCS being among dozens that formed that year in the United States and elsewhere. After publishing its meeting proceedings in a special section of the *Cotton Oil Press* for several years, AOCS began its own quarterly publication, which eventually became a monthly. That journal was handled by private publishers for some time before AOCS decided to take full control of its publication and launched *Oil & Soap* in 1932. The title was subsequently changed to the *Journal of the American Oil Chemists' Society (JAOCS)*. An increasing interest in biochemistry and health effects of dietary fat led to creation of *Lipids* in 1966. In 1990 AOCS began publishing *INFORM*, and the *Journal of Surfactants and Detergents* in 1998.

In addition to its journals, AOCS has published more than 300 hardcover monographs, proceedings, and reports, and has released approximately two dozen electronic publications in CD/DVD format.

Gerhard Knothe, also from USDA NCAUR, moderated the session and spoke on the history of vegetable oil-based fuels. Rudolf Diesel's engine exhibited at the 1900 Paris global exposition could run using vegetable oils as fuel. Several petroleum-importing nations became enthusiastic, with a biofuel organization sprouting in France, a journal appearing in the Belgian Congo, and in 1947 a report on the potential use of such fuels appearing at a meeting of the American Society of Mechanical Engineers in the United States. While the original idea was the use of straight vegetable oils as fuels, in more recent times blends of oleo- and petro-original ingredients have been used in biofuels for diesel engines.

David Wesson's venture into bicycle manufacturing from 1895 to 1900, Frank Smalley's service as a US Army chemist/nurse in the Philippines during the Spanish-American War, and Felix Paquin's initial desire to become an engineer were part of a talk by AOCS Centennial Historian George Willhite.

Contact AOCS Centennial Historian George Willhite at georgewillhite@aol.com

Frank Smalley, pictured here, was one of a number of historical figures covered in the Historical Perspectives on the Chemistry of Oils and Fats Hot Topic session held Tuesday, May 5, 2009, in Orlando, Florida, USA.

Sustainability as the Foundation for the Future in Fats and Oils

Catherine Watkins

"Businesses can do well by doing good," Gerrit van Duijn of Unilever noted during the Hot Topic session on sustainability at the 100th AOCS Annual Meeting & Expo in Orlando, Florida, USA. That sentiment was echoed by many of the presenters at the symposium.

Kenneth A. Strassner began the session by offering a definition of sustainability as "a business approach to create long-term shareholder value by embracing opportunities and managing risks deriving from economic, environmental, and social developments." Strassner is vice president of Global Environment, Safety, Regulatory, and Scientific Affairs for Kimberly-Clark, the global health and hygiene company based in Dallas, Texas, USA.

"Good decisions for the environment and society are good decisions for business," Strassner continued, as he made the case for corporate sustainability efforts. Sustainability programs further risk management by eliminating waste and cutting costs, he said. They also serve to focus innovation by "giving a lens for product development and finding new markets." Added benefits include increasing employee morale and helping companies to attract and retain talent, Strassner said.

"It may be controversial," he warned, "but I do not believe there will be a cap and trade bill or agreement out of Copenhagen." (The Kyoto Protocol—an international agreement reached in 1997 in Kyoto, Japan, to address the problems of climate change—expires in December 2012, and the Copenhagen conference scheduled for December 2009 is slated to set up a climate change regime for the period after 2012.) "Instead, I believe there will be a framework agreement to work on certain issues."

Van Duijn explained how his multinational corporation has approached corporate responsibility since the company's program began in 1995. The company tracks 11 indicators, he said, including water and pesticide use, biodiversity, and animal and social welfare. Unilever also is working with groups that certify the sustainability of vegetable oils, including the Roundtable on Sustainable Palm Oil and the Round Table on Responsible Soy Association. The company has also developed a sustainable supply chain for rapeseed oil with the University of Halle (Germany) and the UFOP (Union for the Promotion of Oil and Protein Plants) in Berlin. Unilever is continuing to develop principles and criteria for creating a sustainable supply of sunflower oil, van Duijn noted.

"There is strong evidence now to support the claim that sustainable development efforts have a positive impact on share price, and the evidence is growing," Monica Hale said. Hale is sustainability director, engineering and infrastructure, for Science Applications International Corp. in McLean, Virginia, USA.

Companies need to integrate their sustainability policies into both operating and capital programs, she stressed. They also need to take baseline measurements as they begin their efforts. "Some companies are following the ISO 14000 standards but not spending the money for certification," she noted.

The question-and-answer period following the presentations brought forth practical advice from the presenters. Kimberly-Clark's Strassner explained his company's planning process in detail. The director of each of the company's businesses developed a detailed sustainability plan as if it were a standard business plan, outlining the competitive advantage of each recommendation. Each plan then went through several levels of review, ending with the top 10 managers of the global corporation and the Kimberly-Clark Board of Directors.

"Sustainability is as important [to a business] as product innovation and financial return," Strassner said.

The Kimberly-Clark planning process, which began in early 2007, took most of a year, he said. The company is implementing the plans in 2009 and is now beginning to develop five-year sustainability plans. "There is no substitute for involving managers and using standard business tools," he stressed.

In the end, though, as symposium co-chair Erich Dumelin pointed out, "Sustainability can only work if everyone does it."

Also speaking were Ben Zeehandelaar of the Round Table on Responsible Soy Association in Buenos Aires, and Rosidah Radzian of the Malaysian Palm Oil Board in Washington, DC, USA. The two summed up the sustainability and certification efforts both groups are undertaking.

The organizers of the session were Michael J. Boyer of Agribusiness and Water Technology, Inc., Cummings, Georgia, USA; Brian Yeh, SAIC, Oakland, California, USA; and Erich Dumelin of Industrial Oils in Zurich, Switzerland.

Catherine Watkins is inform *associate editor.*

Fatty Acids in Body Weight Regulation and Obesity

Kasey Heintz

Promotion of a healthy weight may be yet another reason to choose your fats wisely. It's less about cutting fat and more about replacing the types of fats you eat with healthful ones (MUFA [monounsaturated fatty acids] and PUFA [polyunsaturated fatty acids]) when it comes to chronic disease, and evidence is showing that this may also be true when it comes to weight regulation and obesity.

This was one of the major themes in "Fatty Acids in Body Weight Regulation and Obesity," a Hot Topic Session organized by Patricia Kearney, president and chief executive officer (CEO) of PMK Associates, Inc. (Alexandria, Virginia, USA), who also chaired the event with Mary LaGuardia, Omega-9 Oils Market manager for Dow AgroSciences (Naperville, Illinois, USA). The session presented a "seed to

Presentations in the final portion of the course considered high-throughput instrumentation and modeling and simulation techniques. Ken Price, from P&G, gave a presentation that captured new tools, including high-throughput systems, for characterizing surfactants and polymers in solution. Many of these tools give insights into cleaning and sudsing properties of surfactant and polymer systems. Michael Doyle of Accelrys (San Diego, California, USA) presented new approaches to modeling and simulation of polymers in solution. Doyle shared work on mesoscale and quantitative structure-property relationships (QSPR) models for polymer systems, which can be used in conjunction with characterization tools to better understand polymer systems.

Stacie Hecht, section head—Global Chemical Technologies, The Procter & Gamble Co., can be reached via email at hecht.se@pg.com.

Lipid Oxidation and Antioxidants

Edwin Frankel

This short course, organized by Edwin Frankel, University of California-Davis (USA), continues a long tradition of offering basic and practical instructions from leaders in the field to assist participants in understanding (i) the major factors that affect the stability of oil-bearing foods and (ii) how antioxidants can be used to minimize the effects of lipid oxidation and increase the stability of these foods as a basis for the development of healthful products.

The stimulating lectures presented at this short course elicited many questions and resultant discussions on the wide variety of multidisciplinary topics affecting food and health, as offered by a very competent faculty. Unfortunately, this year our short course attracted only about half as many students as last year, presumably owing to the current depressed economy. The highly qualified faculty included three academic professors—Bruce German, University of California-Davis; Eric Decker, University

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table" discussion regarding recent research on fats and oils and their role in weight regulation, obesity, and health.

Kathy McManus, director of the Department of Nutrition at Brigham and Women's Hospital (Boston, Massachusetts, USA), a teaching affiliate of Harvard Medical School, presented new data supporting the notion that you do not have to cut dietary fat to lose weight. The "Pounds Lost" weight loss trial, published in the *New England Journal of Medicine* in February 2009, was the largest, multicenter human weight loss trial to study the effects of four calorie-controlled, healthful diets ranging in macronutrient intake. The goals for the lowest- and highest-fat diets were 20% and 40% of calories from fat. Interestingly, for all four diets, at two years, participants had all naturally drifted to eating moderate levels of fat (27–35%). "Successful diets can emphasize a large range of macronutrient intakes that include higher fat, while promoting weight loss," concluded McManus.

Keep in mind, however, that the type of fat we eat has an impact on health, as Penny Kris-Etherton of Pennsylvania State University (State College, USA) pointed out in her discussion, "Fatty Acid Implications for Disease Prevention and Health Promotion." Although average intakes meet the US fat recommendations, 50% of the population is consuming too much total fat, with about 75% consuming too much saturated fat and 75% also consuming too much *trans* fat. Kris-Etherton summarized considerable evidence showing that unsaturated fats should replace saturated fat and *trans* fat in the diet and that this can have substantial influence in reducing chronic disease risk, while improving insulin sensitivity and attaining health benefits.

To highlight this, Kris-Etherton discussed a recent major review of about 600 studies that looked at associations between diet or dietary factors and coronary heart disease (CHD). The study clearly indicates that there is a strong association between CHD and monounsaturated fatty acids as a dietary component as well as when part of a dietary pattern, such as was the case with the "Mediterranean" diet. Of note, Kris-Etherton provided an example showing that it is possible to decrease total and saturated fat, and increase unsaturated fats within current recommendations so as to derive a health benefit.

Diet Component (% of kcal)	NFCS 1977-78	CSFII 1989-91	NHANES 2005-06	Summary of Change
Total Fat	40.1	34.4	33.6	6.5 ↓
Sat Fat	–	12.3	11.4	0.7 ↓
PUFA	–	6.6	7.0	0.4 ↑
MUFA	–	12.7	12.3	0.4 ↓
Energy	1854	1839	2157	298 ↑

FIG. 1. *Calories have increased over the past 20 years, whereas energy from total fat has decreased. Abbreviations: NFCS, Nationwide Food Consumption Survey; CSFII, Continuing Survey of Food Intake by Individuals; NHANES, National Health and Nutrition Examination Survey; Sat Fat, saturated fat; PUFA, polyunsaturated fatty acids; MUFA, monounsaturated fatty acids. Energy is given in units of kcal.*

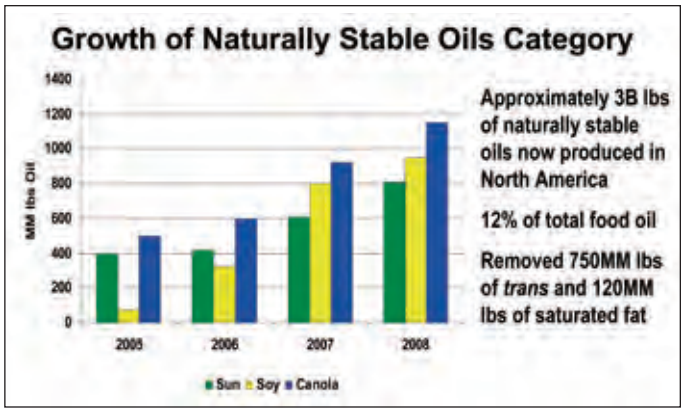

FIG. 2. *As naturally stable oils have become more available,* trans *and saturated fat have been removed from the food supply.*

Science is indicating that we may also want to emphasize the type of fat consumed when it comes to body weight regulation and promotion of weight loss, which was the focus discussed by Peter Jones, director of the Richardson Centre for Functional Foods and Nutraceuticals (Winnipeg, Manitoba, Canada). Among the reports summarized were studies published on conjugated linoleic acid (CLA), medium-chain triglycerides (MCT), and diacylglycerol (DAG) oils as well as on more conventional fats and oils, including saturates, omega-3, omega-6, and omega-9 fatty acids.

"Not all fats are created equally in their capacity to be oxidized, and the structure of the fatty acid may influence this," noted Jones. Enhanced oxidation may exist for CLA, MCT, and DAG; and oleic acid may be favored as an energy substrate compared with other fats. In fact, monounsaturated fat diets appear to up-regulate energy expenditure because of enhanced metabolism of monounsaturated fats, but new research is showing that another part to the story may be related to their effect on satiety.

It can be important to consider how fats and oils impact overall metabolism and longer-term energy balance and body weight control. Although increased fat intakes have sometimes taken the blame for the US obesity epidemic, Patricia Kearney shared that, as calorie intakes have increased over 20 years, the percentage of energy from fat has declined (shown in Fig. 1). Kearney showed that although the US Food and Drug Administration does not officially recognize the definition of functional foods, nor is it standardized across countries, fatty acids are falling into this category of a "food component that provides health benefits beyond basic nutrition" as the research emerges.

David Dzisiak, commercial leader, oils for Dow AgroSciences (Indianapolis, Indiana, USA), discussed oilseed innovations that have delivered healthy new solutions through breeding and technology. "There has been substantial growth of naturally stable oils in the past four years that has led to the reduction of approximately 750 million pounds of *trans* fat and 120 million pounds of saturated during this time in North America (shown in Fig. 2)."

The demand for canola oil for food use has increased the most, such that it is now the second-largest oil used in the United States. According to Informa Economics data, it has increased by 800 million pounds (360 million kilograms) for the 2008/09 crop year versus 2005, whereas soy oil use in food is declining (–1,600 million pounds). One outcome of this is the plan to ramp up annual canola oil production significantly by 2012. Another is the move to continue creating novel oils with functional properties that will provide more healthful solutions.

Kasey Heintz, manager of Nutrition Programs for PMK Associates, Inc., can be reached via email at kheintz@pmkassociates.com.

Increased Oleic Soybean Oil for Food Product Formulation

Steve Poole

At the 100th AOCS Annual Meeting & Expo, the United Soybean Board (USB; St. Louis, Missouri, USA) presented "Increased Oleic Soybean Oil for Food Product Formulation." The Hot Topic session featured a distinguished panel of experts at the forefront of enhanced soybean oil research, development, and commercialization.

Leading the session, Robert Reeves, public affairs director of QUALISOY™ (St. Louis, Missouri), presented an overview of food applications using increased oleic soybean. Increased oleic soybean oil can be effective as a deep-frying medium for products such as fried potatoes, breaded seafood and poultry products, and snack foods. These oils may also be used in combination with processed oils and as an ingredient in cookies, nutrition bars, cakes, and other bakery products. QUALISOY works in collaboration with the soybean community to improve the quality traits of soybeans in order to increase their competitiveness in the market.

Utah State University's Michael Lefevre addressed enhanced trait soybean oils and their implications for human health. Lefevre presented research conducted by the International Life Sciences Institute's Lipids Committee that investigated dietary impacts of emerging oils with varying fatty acid profiles. Among his conclusions, near-complete replacement of *trans* fat with alternatives, such as higher oleic oils and higher stearic acid fats, would conservatively lead to an estimated reduction in 20-year cardiovascular disease risk of 2.5% in average users and 7.0% in the highest users (based on changes in total and HDL [high-density lipoprotein] cholesterol), and could be up to 11% in average users and 29% in the highest users.

Gary List, retired lead scientist from the US Department of Agriculture's National Center for Agricultural Utilization Research (USDA's NCAUR) laboratory in Peoria, Illinois, USA, with 44 years as a fats and oils chemist, "understands the attraction of high-oleic soybean oils to food manufacturers." List explained that increased oleic soybean oils are particularly useful for snack foods and frying applications where extended shelf life and/or exposure to high temperature are prime considerations in the selection of oils. For food products such as baked snack crackers, salty snacks, tortilla chips, cookies, muffins, and biscuits, increased oleic oils offer a solution with zero grams of *trans* fat and lowered saturated fatty acid content. List currently serves as a consultant to the edible oil industry, USB, and QUALISOY.

Next, Pamela J. White, professor of food science and human nutrition development at Iowa State University (Ames, USA), presented research on the oxidation of edible oils and their chemical and sensory changes, as well as genetic variations of fatty acid composition in corn and soybeans. White's research measured the overall frying stability and flavor quality of six oil treatments, indicated by the percentage of oleic acid (OA): 79%, 65%, 51%, 37%, and 21.5% (control). The findings indicate superior frying performance of soybean oil varieties with increased levels of oleic acid.

Lastly, as a research manager with Pioneer Hi-Bred (Johnston, Iowa), a DuPont company, with over 25 years experience in the field of agricultural biotechnology, Susan Knowlton shared industry news about the 2009 commercial introduction of high-oleic soybean oil. With improved functionality, high-oleic soybean oil offers oxidatively stable oil that improves the shelf life of baked goods and other products requiring high heat during

of Massachusetts (Amherst, USA), and Edwin Frankel, University of California-Davis—one government scientist, Kathleen Warner, from the Agricultural Research Service, US Department of Agriculture (Peoria, Illinois); and two industrial scientists, Seong-Jae Yoo, Martek Bioscience Corp. (Columbia, Maryland, USA), and Norman Cloud, Kemin Nutriscience Inc. (Des Moines, Iowa, USA).

Edwin Frankel lectured on the chemistry of free radical lipid oxidation and methods to determine and control oxidation, oxidative stability, and antioxidants. He discussed the multiplicity and complexity of factors influencing oxidative stability and quality of food lipids and antioxidants, recommended testing protocols for food lipid antioxidants, and discussed how oxidative deterioration ultimately affects the flavor and nutritional quality of end products.

Bruce German discussed the biological and nutritional aspects of lipid oxidation and antioxidants, and their complex roles and consequences in cellular damage. The nutritional issues included essential nutrient adequacy and oxidative signaling of polyunsaturated fatty acids (PUFA). He concluded that, "Biology uses oxidation very professionally. It is oxidation that is devastating to life."

Eric Decker talked on the oxidative stability of food emulsions; the role of emulsifiers, metal catalysts, and peroxide contaminants; and how to improve oxidative stability with metal chelators and antioxidants. Factors influencing the oxidative stability of oil-in-water emulsions include droplet interface characteristics, physical location of pro-oxidants, and physical properties of lipids.

Edwin Frankel summarized many research problems in multiphase food emulsions that need further research: how to optimize antioxidant formulations, how to test the activity of oxidized antioxidants and to regenerate activity of oxidized antioxidants; how to test fish/fish meal for oxidation; and how to evaluate the pro-oxidant and antioxidant activities of chlorophylls.

Kathleen Warner discussed factors in choosing *trans*-free frying oils, including cost, availability, stability, functionality, flavor, and nutrition. To eliminate or decrease *trans* fatty acid isomers, she recommended using naturally stable oils or

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processing. When compared with many other edible oils, high-oleic soybean oil has a heart-healthy profile, provides an excellent source of monounsaturated fats, and contains about 20% less saturates than conventional soybean oil. Knowlton addressed product development timelines for high-oleic soybean oil, with limited quantities of the oil available in 2009/2010 for commercial testing.

If you missed the session, you can still collect information on enhanced trait soybean oils from USB's Soy Connection website. Go to: www.soyconnection.com/soybean_oil/plan_your_oils_future.php.

Steve Poole, director of Human Health & Nutrition Communications for the United Soybean Board, can be reached at info@soyconnection.com.

Saturated Fats and Health: Facts and Feelings

Koenraad Duhem and Richard Feinman

Presenting to an overflow audience, five speakers discussed current scientific insights about the physiological relevance of dietary saturated fat, among other macronutrients, in the context of a healthy diet. Two speakers challenged the "bad guy" status of saturated fatty acids (SFA), suggesting there are no unequivocal facts to support the negative feelings regarding dietary SFA.

Is Saturated Fat Consumption a Major Dietary Risk Factor for CHD—What Is the Evidence?

D. Mozaffarian, Harvard University, School of Public Health, Department of Epidemiology, USA.

Dariush Mozaffarian described evidence from ecological studies that contributed to our knowledge of life-style risk factors for heart disease, among them poor diet, inactivity, and smoking. Ecological studies, however, show biases. Randomized clinical trials (RCT) and prospective cohort studies (PCS) are needed to overcome those inherent study limitations. Recently performed RCT and PCS show that lower fat intake increases the risk of stroke and that replacing SFA by monounsaturated fats or carbohydrates has a detrimental effect on health. Mozaffarian concluded that listings of risk factors for heart disease should not be limited to dietary SFA and blood cholesterol levels. He recommends a focus on the following "essential" dietary habits, including regular consumption of: (i) seafood (for omega-3 fatty acids), (ii) whole grains, (iii) fruits and vegetables, (iv) polyunsaturated fatty acids, and (v) nuts and seeds. Mozaffarian also counseled: (i) reduced salt consumption, (ii) reduced portion sizes, (iii) rare consumption of sweetened beverages, and (iv) no consumption of artificial *trans* fats.

High-Carbohydrate Versus High-Saturated Fat Diets and Health: "You are not what you eat, but what your body does with it"

J. Volek, University of Connecticut, Neag School of Education, USA.

For years, Jeff Volek has studied macronutrient impacts on aspects of metabolic syndrome, with an emphasis on the effects of carbohydrate-restricted diets. The reduction of fat intake and the concomitant increase of carbohydrate intake among the US population have led to higher obesity and incidence of cardiovascular disease.

Volek presented data that showed low-carbohydrate diets improved many biomarkers such as blood glucose, insulin, triglycerides, and high-density lipoprotein cholesterol in persons with metabolic syndrome. His research shows that carbohydrate restriction decreases the level of *de novo* lipogenesis—resulting in lower blood levels of SFA—suggesting that carbohydrate, not dietary SFA, may be the culprit.

Three speakers brought additional evidence for the need to reconsider the role of dietary SFA.

The Impact of Dairy on Health

P. Elwood, Cardiff University, Department of Epidemiology, UK.

Peter Elwood presented a systematic review of milk and dairy product consumption and the risk of ischeamic heart disease, stroke,

diabetes, and cancer. Among prospective cohort studies representing more than half a million people, milk drinking was, for example, associated with an approximately 15–20% reduced risk of ischemic heart disease and stroke. Dairy consumption also reduced the risk for colorectal and bladder cancer by approximately 20%. Randomized clinical trials to evaluate definitively the effect of dairy consumption on the risk of cardiovascular disease have not been carried out owing to the size required for such trials. Collectively, the data suggest a survival advantage associated with milk and dairy consumption in Western societies. Most of the studies were done when low-fat dairy products were not yet widely available. Insufficient data are available to determine whether low-fat milk consumption would result in a different (lower or higher) survival advantage compared with whole milk.

Does Current Scientific Data Warrant Aggressive Lowering of Saturated Fat in Our Diets?
B. German, University of California-Davis, USA.

Bruce German's talk included a discussion of the evolution of the milkfat gene, which is the most highly conserved gene among mammals, suggesting an essential role for milk and its constituents in the diet. He further commented on new metabolic research uncovering the influence of SFA on cellular co-activator functions. This talk laid the groundwork for the consideration that SFA are not toxic but, rather, have some specific roles in metabolism.

The Role of Saturated Fatty Acids in Our Body Is Strongly Linked to Their Chain Length. Each Saturated Fatty Acid Has Its Own Merits.
P. Legrand, Agrocampus-INRA, France.

Philippe Legrand highlighted new research on cellular functions of individual SFA. In particular, pathways have been discovered by which myristic acid (14:0) is attached to proteins and may be responsible for specific activation or regulatory actions.

Because SFA are endogenously produced, they should be taken into account when studying defined roles for dietary saturated fat, Legrand suggested. Revealing different biochemical functions by short-, medium-, and long-chain SFA suggests that they should be further individually defined rather than grouped as one class.

An electronic voting system at the beginning and end of the session showed a shift in audience response to seven questions about saturated fat.

The lecture files of the hot topic presentations are available at www.aocs.org/meetings/annual_mtg/index.cfm?page=am09_ht_saturated.htm. A theme contribution, including a review and original papers from the speakers, will be will be submitted for publication in *Lipids*.

Koenraad Duhem, CNIEL (Centre national interprofessionel de l'Economie laitière; Paris, France) can be reached at KDUHEM@CNIEL.com. Richard Feinman, State University of New York Downstate Medical Center (USA), can be reached at feinman@me.com.

Rapid and Informed Decision Making with Emerging Sensing and Information Technology

Marguerite Torrey

The rapid changes that are occurring worldwide in data and information technology offer prospects of dealing constructively with problems on a scale not imagined before. Sensing and information technology ("cyberinfrastructure") will be an integral part of these solutions, but most scientists have an incomplete understanding of how this technology can be used and to what kinds of problems they can be applied.

This Hot Topic, presented by Brian Kucic, vice president of business development for R Systems NA Inc. (Champaign, Illinois, USA), and Barbara Minsker, associate provost fellow at the University of Illinois at Urbana-Champaign (UIUC), used examples from their own experience to demonstrate the potential for emerging sensing and information technology. Their experience is directly tied to the National Center for Supercomputing Applications (NCSA) at UIUC, where the most powerful supercomputer in the world for open scientific research is scheduled to come online in 2011. (As an illustration of the power of this computer, called Blue Waters, the electricity use on the UIUC campus is projected to increase 30% once the computer is fully functional.) Performance projections indicate that Blue Waters will sustain 1 petaflops (1×10^{15} **fl**oating point **op**erations per **s**econd).

Kucic discussed the benefits of high-performance computing (HPC: the use of supercomputers and computer clusters to solve advanced computation problems) for industrial problems, using as an example the recent evaluation of a centrifugal pump design by the Cornell Pump Co. (Portland, Oregon, USA). Design engineers were able to perform a series of transient simulations to develop a complete performance curve, finishing the evaluation in only 2 hours with HPC, down from 200 hours without; result, a reduction in product development time. HPC should also reduce the number of pump castings needed for physical testing. Formerly, the Cornell design team needed 300 iterations, at 1.5 iterations per hour, to evaluate a single design. Combining the HPC resources of Blue Ridge Numerics, Inc. (Charlottesville, Virginia, USA) and R Systems, 300 iterations can now be completed in 2 hours: result, increased productivity, reduced costs, higher quality, faster time to market, and a competitive advantage.

Minsker directed her comments to very complex large-scale problems for which sensing, data integration and modeling, and HPC are needed. As an introductory example, she asked the audience to consider a watershed study encompassing detection devices such as agricultural sensor arrays, groundwater telemetry recording the height of the water table, forest sensor arrays, a rain gauge network, water quality sensors, stream samplers collecting data at selected depths, snowpack sensors, cameras set to record water flow in the stream emptying the watershed, aircraft and satellite monitoring, and on, and on. Data from these detection devices are collected in different

modified composition oils higher in oleic acid and lower in linolenic acid, expeller-pressed oils, blending oils, antioxidants, and antifoam agents.

Seong-Jae Yoo reviewed a multitude of standard and advanced methods to evaluate oxidative and flavor stability of algae and fish oils rich in omega-3 PUFA. His lecture included sensory and volatile analyses.

Norman Cloud lectured on the multifunctional role of antioxidants in animal total nutrition: preventing rancidity, adding nutritional enhancers, and improving palatability. He reviewed regulations and safety of synthetic and natural antioxidants, and the increasing complexity resulting from the inclusion of high PUFA content ingredients having unique health properties. Palatability aspects include negative effects of oxidation. Rancidity from oxidation products that reduce consumption by animals can be effectively controlled by antioxidants.

Edwin Frankel, Department of Food Science and Technology, University of California-Davis, can be reached via email at enfrankel@ucdavis.edu.

formats at many spatial and temporal scales and need to be integrated to be able to make real-time decisions.

With such a massive amount of collected data, there must be a framework for fusing them into usable natural and human systems. Data must be integrated, which may involve interpolation and fusion processes, so that they can be fed into a preliminary model. This can involve integrating data from different agencies (e.g., in the case of the watershed study, US Geological Survey, state monitoring agencies) and tools and models created in different frameworks (e.g., Java, Matlab, ArcGIS, Fortran, C#). An interactive executive dashboard is created that presents the resulting information in easy-to-read fashion for sharing on an intranet or the web.

Minsker presented other examples of large-scale problems that are especially well suited for real-time cyberinfrastructure, such as the modeling of water flow (and flooding) through the storm sewers of Chicago, and the status of hypoxia (depletion of dissolved oxygen) in Corpus Christi Bay, Texas.

The capabilities of cyberinfrastructure are so great that the NCSA at UIUC is searching for big problems for which it can be of service. What about, "How does agricultural runoff in the US Midwest contribute to fish kills in the Gulf of Mexico, into which the Mississippi River drains? Where are additional sampling sites needed? Can multi-year trends be identified?" Or, "How does flooding along the Mississippi River influence barge shipments of grain to the port of New Orleans?" Large questions in metabolomics and lipidomics are already being investigated by pharmaceutical companies using this technology.

Persons wishing further information about cyberinfrastructure are encouraged to visit the NCSA website (www.ncsa.uiuc.edu) or contact Barbara Minsker (minsker@illinois.edu).

inform *Technical Projects Editor Marguerite Torrey can be reached at mtorrey@aocs.org.*

AOCS Technical Services update

Catherine Watkins and Gina Clapper

From its inception, AOCS has focused on providing technical support to industry and academia. Each year at the AOCS Annual Meeting & Expo (AM&E), a number of committees meet and move that work forward. Following are notes from the committee meetings held May 3–6 at the AM&E in Orlando, Florida, USA.

TECHNICAL STEERING COMMITTEE (TSC)

Meeting chair: Keith Grime, JKG Consulting, Liberty Township, Ohio, USA

The TSC is charged with ensuring "an effective program of technical activities and services that meet the needs of the Society." As such, it oversees the work of the all of the committees mentioned below.

Grime began the TSC meeting at the 2009 AM&E by complimenting the consistency of AOCS Technical Services' performance. He noted that programs are growing and continue to be financially stable. Because Grime recently was elected vice president of the AOCS Governing Board, however, Len Sidisky was installed as the 2009 chair of TSC. The committee then proceeded to hear reports about the work of the following committees.

LABORATORY PROFICIENCY PROGRAM (LPP) COMMITTEE

Chair: John Hancock, Federation of Oils, Seeds, and Fats Associations International (FOSFA), London, UK

"Things are good for the LPP," said committee chair John Hancock, adding that increasing requirements for auditing and accreditation are likewise increasing the need for the Laboratory Proficiency Program.

AOCS plans to apply for accreditation of the LPP program from the International Laboratory Accreditation Cooperative. Accreditation may increase the cost to AOCS of administering the program if homogeneity data are required before the dispatch of samples to participants.

The committee agreed that precision data from AOCS methods should determine how values are reported. In the meantime, the proposed changes to the number of significant figures on LPP reporting tickets for the nutritional labeling and marine oil fatty acid profile series (changing some entries from one to two decimal places) will be carried out.

The online data entry/results retrieval system for LPP will be updated over the next several months by Results Direct (www.resultsdirect.com). Work will

upgrade the visual presentation, create more user-friendly functions, and upgrade the statistical program for analyzing the proficiency data. Final implementation has been set for January 2010, with the hope that the process is completed in time for the October 2009 results submission period.

UNIFORM METHODS COMMITTEE

Chair: Mike Kennedy, Cargill, Minneapolis, Minnesota, USA

The publication of the 6th edition of the *Official Methods and Recommended Practices of the AOCS* was cause for a celebratory luncheon held in appreciation of its associate editors and contributors. A few individual methods were passed around the table so committee members could see the new format (each method has the AOCS logo, the column formatting is now one column instead of two, and tables and graphs have been moved to the end of the method).

Next, the various subcommittee chairpersons presented their reports.

Mycotoxins. Chair: James Falk, US Department of Agriculture (USDA), Washington, DC, USA

Falk suggested adding in-shell pistachio nuts to the scope of AOCS Official Method Ab 7-91 based on the findings of USDA proficiency check sample results. Falk will provide the revised table to AOCS for publication. Further, he suggested performing an international collaborative study to approve major and validated modifications to AOCS Official Method Ab 7-91 for testing aflatoxins in shelled almonds. Falk was to provide AOCS with the collaborative study protocol by July 1, 2009.

Chromatography. New Co-chairs: Sneh Bhandari, Silliker, Chicago Heights, Illinois, USA; Steve Hansen, Cargill, Minneapolis, Minnesota, USA; and Tiffanie West, Bunge, Bradley, Illinois, USA

It has been suggested that AOCS move away from listing chromatography column dimensions and transition to listing performance specifications in the methods to keep them relevant. The committee will determine which specifications should be set. Performance criteria will be included in all future methods. Current methods will also be reviewed to note performance criteria.

Other projects include:

- AOCS has determined that the current method for determining polar compounds by liquid chromatography (LC) is not sufficient. New methodologies will be solicited for consideration.
- AOCS Method Ce 1j-07 is ready for collaborative study and samples are being sourced. Because the method is the primary procedure used when one does not know the origin of the material, the title will now reference extracted fats.
- A single-step and two-step direct methylation method is ready for collaborative study as Ce 1k-09. The alkaline-only and the acid-alkaline direct methylation procedures will be collaboratively studied concurrently with the new "general" method for chromatography. The same samples are to be used for Ce 1j-07 and Ce 1k-09.
- The packed column methods will be reviewed and updated. Tiffanie West and Len Sidisky will work together to update the methods for butyric acid, triglycerides, and fatty amines. AOCS' Richard Cantrill and Mike Kennedy are updating Ce 1-62.

Physical Methods. Magdi Mossoba has finished his collaborative study on "Negative Second Derivative Infrared Spectroscopic Method for Rapid (5 min) Determination of Total Isolated *trans* Fat"). Other projects include:

- Preliminary work on the solid fat content–dry block project is complete; future work will improve the insulation on the dry block and a side-by-side study between dry block and water bath will be performed.
- The Physical Methods Committee agreed to review the new free fatty acid (FFA) method presented by Jeff Tompkins of Metrohm USA.

Rapid and Nondestructive Technologies. New chair: Alan Kook, NMR Consulting, Austin, Texas, USA

The guidelines for evaluating primary methods to secondary techniques were distributed for a vote in June 2009. Kook also presented low-field NMR (nuclear magnetic resonance) data obtained from used frying oil. Test samples should be shared between this collaborative study and any other polar compound study.

Seed and Meal. Chair: Veronique Barthet, Canadian Grain Commission, Winnipeg, Manitoba, Canada

Veronique Barthet is working on methods for the measurement of chlorophyll in oil. She will draft a single method for crude and refined oils and will then distribute it to industry for comment before submitting it to AOCS as a new method in September 2009. The subcommittee also voted that AOCS should adopt the International Organization for Standardization (ISO) method for pheophytins/pyropheophytins.

Report from Technical Services Director Richard Cantrill. Cantrill reported that ISO is still at the forefront of the department's international activities. New activities in the last year include the first plenary meeting of the ISO/Technical Committee (TC) 34/ Subcommittee (SC) 16 (Molecular Biomarker Analysis) and the first plenary meeting of ISO/TC 28/SC 7 (Biofuels). In addition, AOCS has formed a new Expert Panel for Olive Oil that will focus on methodology.

"The rapidly developing US olive oil industry has prompted AOCS to convene an Olive Oil Expert Panel," Cantrill explained. "As the USDA is in the final stage of the approval of the United States Standards for Grades of Olive Oil and Olive Pomace Oil, it was thought timely to bring together a number of US and international experts to discuss approaches to solving the problems of authenticity and quality that are central to the trade and consumption of this highly valued vegetable oil." Participants in the inaugural teleconference included representatives of the California Olive Oil Council, North American Olive Oil Association, USDA, FOSFA International, ISO/TC 34/SC 11, Australian Olive Association, University of California-Davis, and AOCS. Discussions revolved around sample collection from both US-grown and imported sources, the use of methods of analysis to detect fraud, and the development and maintenance of critical expertise in the United States, Cantrill said.

Other research and development activities undertaken by AOCS Technical Services include the initiation of two new LPP series. The first new series is an analytical proficiency test series for the nutritional fish oils industry, organized in

collaboration with the Global Organization for EPA and DHA (eicosapentaenoic and docosahexaenoic acids). The second new series is for biodiesel feedstock quality assessment. In addition, AOCS Technical Services continues to work with several life sciences companies on certified reference material.

UNITED SOYBEAN BOARD (USB)/AOCS SOYBEAN QUALITY TRAITS (SQT) PROGRAM COMMITTEE

Chair: Amy Johnson, AOCS, Urbana, Illinois, USA

The meeting began with an overview of SQT projects, including the Analytical Standards Program (ASP), the NIR (near-infrared) applicability study, and methods development. ASP is a proficiency testing program with three series: whole soybean wet chemistry, whole soybean NIR spectroscopy, and soybean meal NIR. Currently, there are 53 participants.

During 2007 and 2008, commercially available whole soybean samples were collected for the NIR applicability study from Monsanto Co., Pioneer Hi-Bred International, Inc., and Iowa State University at harvest. After wet chemistry analysis, samples were made available to participants, primarily NIR equipment manufacturers, for scanning purposes. NIR results were statistically compared with wet chemistry, as well as across all NIR platforms.

The SQT Program also is investigating the development of a faster amino acid method (the current gold standard is three-plus hours/sample method), a phytate method, and a sugar method in soybeans. Other projects include development of a virtual soybean breeding line library for centralizing information about breeding lines, maturity groups, seed composition, and yield levels. The online library will allow breeders to search for varieties with specific agronomic characteristics.

BIODIESEL EXPERT PANEL

Chair: Gina Clapper, AOCS, Urbana, Illinois, USA

AOCS is involved in the activities of the ISO/TC 28/SC 7—ISO/TC 34/SC 11 joint Working Group. Chairperson Gina Clapper reported that the first plenary meeting of ISO/TC 28/SC 7 Biofuels was held January 29–30, 2009, in Rio de Janeiro.

TABLE 1. *National Biodiesel Board fiscal year 2010 technical priorities*[a]

Priority	Technical topic area	Priority	Technical topic area
1	Life cycle/GHG and indirect land use technologies	10	Lower-cost production
2	Biodiesel quality enforcement	11	Tank, piping, dispenser approvals
3	2007/2010 engine and after treatment	12	Water separator impacts
4	Feedstock development (3–8 years)	13	Emissions data—NOx
5	Impact of minor components (8+ years)	14	Feedstock development
6	Biodiesel stability	15	Issues with ULSD
7	New, faster, better test methods	16	Biodiesel in the pipeline
8	Lubricating oil effects with biodiesel	17	Biodiesel distribution—need data
9	Biodiesel standards—B100 and blends		

[a] Abbreviations: GHG: greenhouse gas; NOx: nitrous oxide; ULSD: ultra-low sulfur diesel.

The committee also heard progress reports on a variety of activities being undertaken by ASTM International and the National Biodiesel Board (NBB). These included the approval of B5 (5% biodiesel and 95% petroleum diesel) in on/off road diesel (ASTM D 975) and cold soak filtration test efforts. NBB Technical Director Steve Howell also presented NBB's priorities for fiscal year 2010 (see Table 1).

The group also discussed sterol glucosides, noting that AOCS will work with Steve Hansen (Cargill, USA); Jordan Thaeler (NBB), and additional volunteers to develop a manuscript for publication that reviews all current published methods for sterol glucosides analysis in biodiesel. Other work discussed included the Cognis Quality Trait Analysis (QTA™) round robin study. This collaborative study of 10 samples (two blind duplicate samples and eight unique samples) was conducted in 2008. The results have been analyzed both by the AOAC (Association of Analytical Communities)-IUPAC (International Union of Pure and Applied Chemistry) Harmonized Protocol and by the ASTM D6708 program. The results were to be distributed in May 2009 to the Rapid and Nondestructive Technologies Subcommittee of the AOCS Uniform Methods Committee.

Other business discussed included the new Biodiesel Feedstock Quality series within the AOCS LPP. In addition, AOCS announced that it will put together an *ad hoc* group of oleochemical scientists to examine methodologies for monoglycerides analysis.

For further information about any of the activities of AOCS Technical Services, or to receive a complete list of current ISO work items, please send an e-mail to Paul Dayton at ISO@aocs.org.

Catherine Watkins is associate editor of inform *and can be reached at cwatkins@aocs.org. Gina Clapper is an AOCS technical specialist and can be reached at ginac@aocs.org.*

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AOCS greatly appreciates the generous contributions from the following organizations. Without their assistance, the celebration of the AOCS' 100th Anniversary and the success of the 100th Annual Meeting & Expo would not have been possible.

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AOCS

Purifine® PLC: Industrial application in oil degumming and refining

Editor's note: This article is based on a presentation given Wednesday, May 6, in the Processing Exhibitor Session at the 100th AOCS Annual Meeting & Expo.

Tim Hitchman

Plant oils, such as soybean, rapeseed, sunflower, and corn oils, are an important global source of nutrition. They are also widely used as feedstocks for biodiesel production. Crude oil extracted from oilseeds is refined to remove impurities that adversely impact oil stability, color, and flavor. However, each refining step to separate neutral oil triacylglycerols (TAG) and diacylglycerols (DAG) from impurities results in a loss of oil yield proportional to the amount of impurities present. Phospholipids are a major class of impurities removed in conventional processes by oil degumming, at significant cost to oil yield. Phospholipids must be removed because they cause oil darkening (or browning) during the subsequent bleaching, hydrogenating, and deodorizing steps of refining. In addition, phospholipids reduce oxidative stability of the refined oil and inhibit the performance of chemical catalysts used in oil hydrogenation and biodiesel production. Phospholipid quantities and type are determined by oilseed growth, storage, and handling condi-

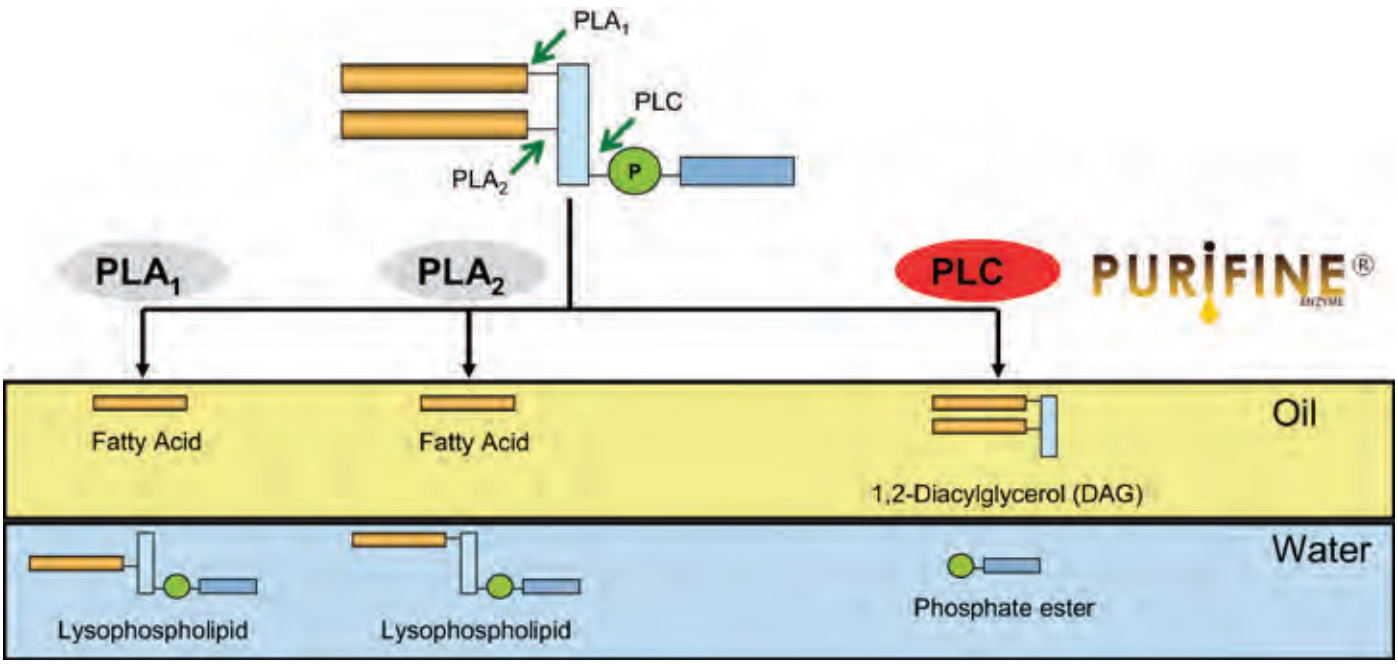

FIG. 1. *Structure of phospholipids and reactions catalyzed by phospholipase enzymes. Phospholipids comprise diacylglycerol coupled to a phosphate ester. All phospholipase enzymes act to break phospholipids into water-soluble and oil-soluble fragments. In the case of phospholipase A (PLA) enzymes, these are a lysophospholipid and a fatty acid, respectively. PLA[1] and PLA[2] enzymes differ by the position of the fatty acid removed from the phospholipid. A phospholipase C (PLC), such as Purifine® enzyme, has a different mode of action in that it removes the water-soluble phosphate ester from the phospholipid, leaving intact diacylglycerol oil.*

tions, as well as oil extraction method, but they may represent up to 3% by weight of crude oil.

In traditional oil refining, phospholipid removal is accomplished by the addition of water to crude oil. The phospholipids comprise DAG coupled to a polar phosphate ester (Fig. 1). Addition of water to the oil causes hydration of the phosphate esters, bringing the phospholipids to the oil-water interface (Fig. 2A). The hydrated phospholipids drag neutral oil with them, resulting in formation of an emulsion or gum, containing water, phospholipids, and entrained neutral oil. This viscous gum is separated from bulk oil by centrifugation, and the process is termed water degumming. Ease of phospholipid removal by hydration (i.e., emulsifying potency) is determined by the type of phosphate ester present. Phosphatidylcholine (PC) is by far the most hydratable phospholipid, and therefore the strongest emulsifier. This very property makes lecithin, the PC-rich by-product of water degumming, a useful emulsifier in numerous food applications. In water degumming, however, the strong emulsifying properties of PC cause the greatest oil-yield loss owing to entrainment of oil. Further yield losses arise during centrifugation because clean separation of oil (light phase) from gum (heavy phase) necessitates the sacrifice of oil close to the phase boundary. Residual phospholipids in the water-degummed oil cause additional yield losses in later refining steps, such as removal of free fatty acids, again owing to formation of an emulsion. Thus, in traditional oil refining, a major cause of yield loss is formation of emulsion owing to the presence of intact phospholipids, and the extent of yield loss is proportional to the amount of phospholipids present.

Enzymatic degumming, already available on an industrial scale, is an alternative to water degumming that addresses the yield-loss issue. Unlike chemical catalysts, enzymes are highly specific and act only on target molecules, leaving similar molecules untouched. For instance, phospholipase enzymes, such as Purifine® PLC (phospholipase C), specifically react with the phospholipid impurities in oil, leaving the bulk oil untouched. Phospholipases break phospholipids into water-soluble and oil-soluble fragments, thereby reducing their ability to form an emulsion. Less

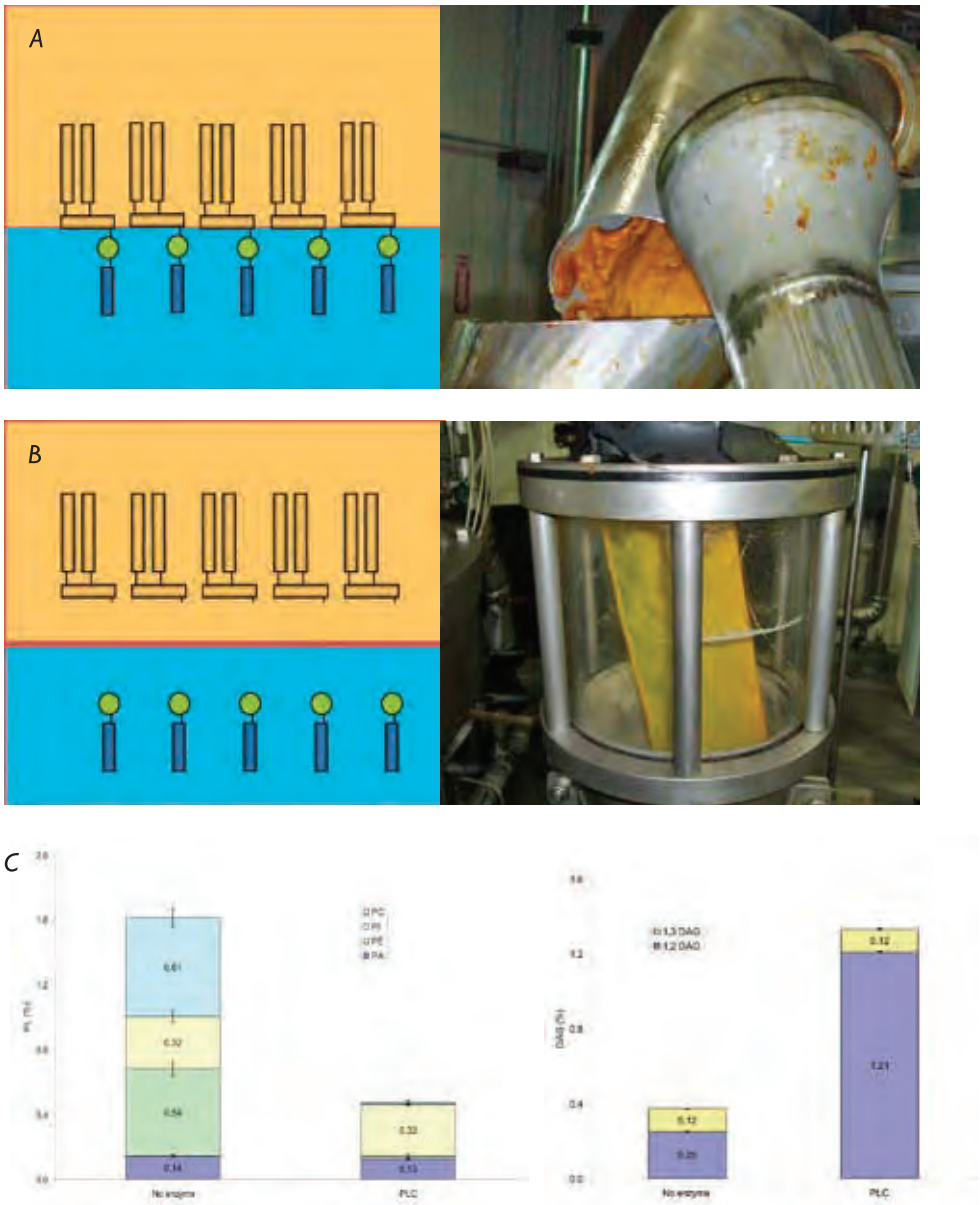

FIG. 2. *Comparison of heavy phases from water-degumming and enzymatic degumming and monitoring the reaction. (A) Phospholipids are emulsifiers and in the presence of water will sit at the oil water interface, trapping oil in the process (left panel). The gum of water, phospholipid, and oil is removed in a centrifuge and is viscous and difficult to handle as it exits the separator (right panel). (B) The action of a degumming enzyme like Purifine® PLC on phospholipids breaks the emulsion (left panel), reducing the amount of entrained oil; the resultant heavy phase is free-flowing as it exits the centrifuge (right panel). The change in gum viscosity with addition of enzyme to a water-degumming process allows easy visualization of a successful enzyme reaction by plant operators. (C) Accurate confirmation of enzyme performance can be attained using analytical techniques. NMR (nuclear magnetic resonance; left panel) enables the phospholipids in the oil to be quantified in crude oil before (-E) and after (+E) enzyme action. HPLC (high-performance liquid chromatography; right panel) can be used to measure the increase in DAG levels in crude oil (-E) after enzyme action (+E). Abbreviations: PL, phospholipid; PLC, phospholipase C; DAG, diacylglycerol; PC, phosphatidylcholine; PI, phosphoinositol; PE, phosphatidylethanolamine; PA, phosphatidic acid. Photographs provided by Bunge North America and used with their permission.*

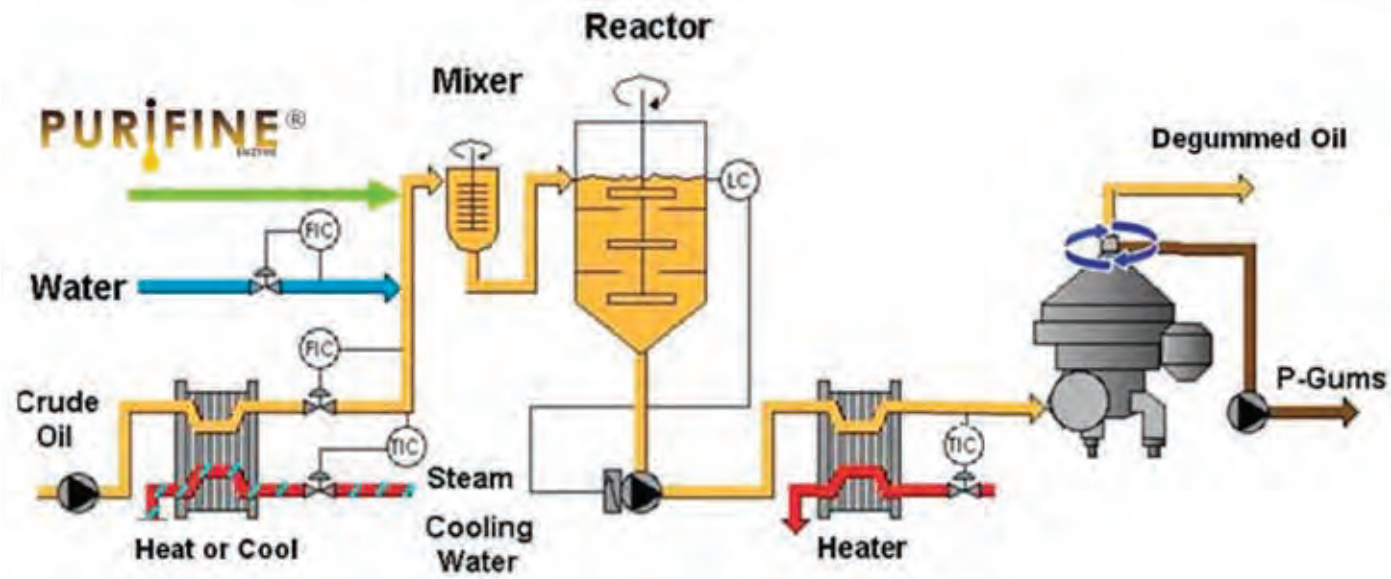

FIG. 3. *Process schematic for implementation of Purifine® enzymatic degumming. Schematic by Alfa Laval; used with permission.*

emulsion formation means less yield loss due to entrained oil, and lower gum content enables cleaner separation of oil and heavy phases, with further reduction in yield loss. Several commercially available degumming enzymes are available, most of which have a common mode of action. Phospholipase A (PLA) enzymes remove fatty acids from the phospholipid, forming lysophospholipids that are poor emulsifiers in the low-water environment of oil processing. Degumming with PLA enzymes results in a significant reduction in yield loss due to the reduction in entrained oil. However, the fatty acids produced remain in the degummed oil and, for both edible oil and biodiesel production, have to be removed in later refining steps (usually) by conversion to soapstock, resulting in formation of an emulsion and loss of oil yield.

Purifine enzyme is a novel product from Verenium Corp. (San Diego, California, USA) that was developed specifically for oil degumming and validated at industrial scale. This PLC is differentiated from other degumming enzymes because it converts phospholipids into DAG and a water-soluble phosphate-bearing ester fragment. Unlike PLA, PLC does not produce any additional free fatty acids (Fig. 1). Purifine PLC acts on the two major phospholipids in oils, phosphatidylcholine (PC) and phosphatidylethanolamine (PE). Due to conversion of PC, the strongest emulsifier of the four phospholipids found in crude oil, reduction in entrained oil yield loss by degumming with Purifine PLC is close to equivalent to the yield loss reduction obtained with PLA enzymes. The DAG produced by Purifine degumming, however, is a bonus oil yield that is retained throughout the refining process. The increase in DAG content caused by degumming with Purifine enzyme lies within the natural variation of DAG levels in oils (which may reach 10%; Yasukawa and Katsuragi, 2004), and has no impact on oil performance indicators, such as smoke point. In fact, an oil product containing greater than 80% DAG is sold in the United States for general use. Together, the DAG bonus yield and reduction in oil loss obtained during Purifine PLC degumming result in approximately twice the yield gain achieved with PLA degumming enzymes, without increasing the fatty acid content of the oil.

Enzymatic degumming using Purifine PLC can easily be integrated into most existing plant designs. The basic equipment required to carry out the process is an ultra-high shear mixer and a reaction tank (Fig. 3). The mixer is required to create sufficient area of interface between the oil and water to enable complete reaction of phospholipids with minimal enzyme dosage and minimum reaction time. In fact, creation of a fine emulsion allows the Purifine enzyme to react rapidly with the emulsifiers and break down the emulsion in less than 2 hours. This technology is a paradigm shift from traditional oil refining, which is designed to minimize the occurrence of emulsions and the associated yield losses. The enzyme process can optimized by controlling oil temperature, water dose, and enzyme dose. The result is a robust and uniform process where the enzyme is simply allowed to do its work, without adjusting process parameters according to the quality of the incoming oil.

Verenium has developed sophisticated analytical techniques that accurately measure conversion of phospholipids into DAG and that can be applied to optimize the process. In the plant, easy visualization of success boosts operator confidence. As the enzyme is dosed in, the heavy phase exiting the separator is seen to change visibly from gelatinous water gums that are difficult to pump to free-flowing "phosphoro gums." Despite the change in heavy-phase properties, the phosphoro can still be added to the oilseed-derived meal, with possible advantages such as reduced dilution of meal protein content, or reduced energy

*inform*ation

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input to dry the meal. Degummed oil that results from use of Purifine PLC typically contains less phosphorus than the same oil degummed using just water, which can result in savings in usage of water, chemicals, and processing aids as it is refined to edible oil or biodiesel. The increased oil yield and reduced overall refining costs resulting from Purifine PLC degumming can translate into significantly improved operating margins for the oilseed processor.

To date, there are relatively few plants operating enzymatic degumming despite the availability of PLA enzymes for nearly 20 years (De Maria *et al.,* 2007). Recent economic conditions have made squeezing additional value from existing investments a high priority to the oil processing industry, particularly biodiesel producers. To facilitate adoption of Purifine PLC degumming, Verenium has qualified Alfa Laval, an engineering services company, to provide comprehensive engineering packages for existing and greenfield plants. Alfa Laval has proven technology and know-how in the oil refining industry and can offer customers the security of performance guarantees.

Oilseed processors also need a clear understanding of the economic benefits to make the decision to proceed with a new technology such as enzymatic degumming with Purifine PLC. The first step is accurately estimating yield gain benefits compared with the current process based on phosphorus levels in the crude oil. For instance, in crude soybean oil containing 800 ppm elemental phosphorus, the intact phospholipids typically account for 1.76 wt%. Purifine PLC reacts with the two most prevalent phospholipids, PC and PE, generally 70% of the total (i.e., 1.23 wt% of oil). The mass of DAG produced is about 80% of the mass of phospholipids converted due to removal of the phosphate ester portion, and so the attainable DAG yield is (0.8 × 1.23) equal to 0.99 wt% of oil processed. Efficient water degumming of this oil may result in neutral oil losses of approximately 0.88 wt% of oil processed. Purifine enzyme action on PC, the strongest emulsifier, leads to an overall reduction in mass of gums and recovery of most of this yield loss. Thus, for a typical soybean oil of this type, a total yield increase of 1.87% may be attained using Purifine degumming to replace water degumming. Actual gains will vary depending on the efficiency of the pre-existing process, quality of the crude oil, and whether other equipment is configured to allow full capture of the additional yield. For instance, in an industrial implementation of Purifine PLC degumming of soybean oil containing 720 ppm elemental phosphorus, a net DAG yield of 0.8% by weight was measured in the degummed oil, representing 90% combined reaction and yield recovery efficiency (data obtained at Bunge facility; used with permission).

In an evermore difficult global economic climate, it is increasingly important that essential commodities are produced in a highly efficient manner. Purifine PLC offers a way to improve yields and overall economics of edible oil and biodiesel production that is likely to play an important role in the future of oil refining.

Tim Hitchman, Purifine product manager for Verenium Corp. (San Diego, California, USA), can be reached via email at Tim.Hitchman@verenium.com.

Wastewater evaporation in oil refineries

Editor's note: This article is based on a presentation given Wednesday, May 6, in the Processing Exhibitor Session at the 100th AOCS Annual Meeting & Expo.

William Younggreen and John Piazza

In today's environmental and economic climate, a heightened awareness exists regarding the sustainability of our industrial processes. Companies and individuals alike now focus on best practices to reduce, reuse, and recycle our natural resources as a regular part of doing business. Water, in particular, is one of our greatest assets, and making the most of it is an important environmental and economic business decision.

Water comes in contact directly with the oil during a number of processes used within the typical refinery. For example, water is used:

- to remove phosphatides in the degumming process;
- to dilute the caustic in the chemical refining process;
- to further reduce unwanted constituents such as soaps, gums, and metal ions in the water-washing step.

Water is also consumed in other, less-direct applications, including:

- barometric condensing water in deodorization vacuum systems;
- boiler feed water;
- cooling tower make-up water;
- minor cooling applications using fresh water;
- centrifuge service water.

FIG. 1. *Photograph of a multi-effect evaporation plant.*

An average 1,000 metric tons per day (TPD) vegetable oil refinery can consume as much as 75,000 cubic meters of fresh water annually.

Two of the streams discussed earlier, wash water and barometric condensing water, offer nearly ideal conditions for water recovery using evaporation. Both of these applications give an oil-water effluent that is greater than 97% water with only a small amount of organics such as neutral oil, free fatty acids, soaps, light ends, and phosphatides.

By using steam to evaporate the water, it is possible to concentrate the organics to a much higher level—up to greater than 45% fats, oils, and greases (FOGs)—while recovering the vapors as condensate for reuse in the process. By returning this water to the production process, the refinery can significantly reduce its use of fresh water.

Evaporation systems have been used in various industries for many years. The designs may vary to some degree but, in general, consist of heat exchangers to evaporate the water; cyclonic separators to separate the liquid and vapor phases; and a source of vacuum and a heat exchanger to condense the vapors for reuse. Some systems utilize either a thermal vapor compressor or a mechanical vapor compressor for added efficiency. In general, the greater the number of stages, the higher the capital cost but the lower the operating cost (Table 1).

By utilizing plate heat exchangers, the physical size of the entire plant can be substantially smaller owing to the heightened efficiency of the technology. The plate evaporators and condensers are specially designed to handle large vapor volume flows under vacuum conditions (Fig. 1).

The typical evaporation system has two inputs: the oil-water mixture and steam. It also has two outputs: condensate and concentrated FOGs. For example, if a vegetable oil refinery produces 7,500 kilograms per hour (kg/h) of an oil-water mixture, a three-effect evaporation system with thermo vapor recompression can be designed to use 1,465 kg/h of steam to evaporate 7,485 kg/h of water and concentrate the effluent to 45% total solids, recovering 8,950 kg/h of hot water (a combination of the recovered water from the feed and steam used to drive the process) for reuse in the refining process (Fig. 2).

TABLE 1. *Steam usage per unit of water evaporated for several plant configurations*

Number of effects	kg steam/kg water
1-effect, without TVR[a]	~ 1.0
1-effect with TVR	~ 0.50
2-effect with TVR	~ 0.33
3-effect with TVR	~ 0.25

[a] Thermo vapor recompression

By recovering water, several routine costs can be eliminated, including those costs associated with procuring additional fresh water, heating the water to the desired temperature, and treating the effluent.

By avoiding water procurement costs—which typically range from $0.50 to $1.00 per 1,000 kg— significant savings can be realized. In the foregoing example, if one assumes a cost of $0.87/1,000 kg, the annual **value** of the recovered water is **$64,000**.

By avoiding the cost to heat the fresh water from 15°C to 75°C, more savings can result. In the previous example, a **savings** of approximately **$220,000** could accrue. This figure naturally depends on the value of steam within a particular plant.

And, by avoiding the costs associated with treating the effluent, even more savings can occur. These costs can vary dramatically depending upon the plant's capability to pre-treat the effluent and the local municipality's ability to process the effluent. In fact, typical costs can range from $2.50/1,000 kg to $13/1,000 kg. The preceding real-world example would result in annual **savings** of approximately **$522,000**.

It should be noted that the system also produces 14 kg/h concentrated FOGs, which can be sold as a calorie source for animal feed, similar to acid oil. By assuming a value of $0.22/kg, this could result in

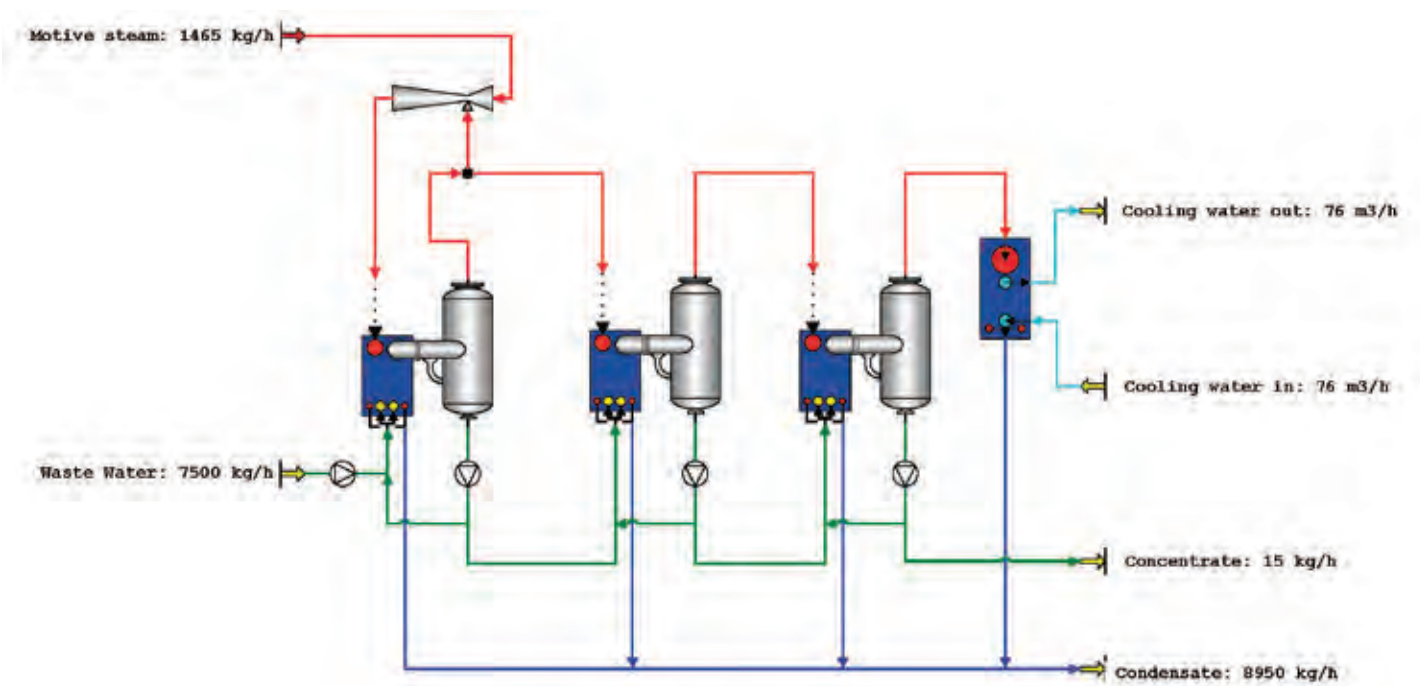


FIG. 2. *Mass balance of a 3-effect wastewater evaporation system.*

a new **revenue stream** of **$25,000** annually. Alternatively, the concentrate can be mixed with the soapstock or gum stream from the existing plant.

Naturally, there are some additional costs associated with the wastewater evaporation system: steam, electricity, and cooling tower water. The above example utilizes 1,465 kg/h of steam. If a steam cost of $5.45/1,000 kg is assumed, the annual **cost** would be **$320,000**.

In addition, the system uses several pumps such as for feed, circulation, condensate, and concentrate, as well as a vacuum pump, all of which consume electricity. For a system as described above, the rate of consumption would be 30 kWh (kilowatt-hour). Based on a typical cost of $0.04/kWh, the annual additional operational **costs** would be **$10,000**.

Finally, the system uses a plate heat exchanger as a final stage to condense all of the vapors. The system uses cooling tower water as the heat sink at an annual **cost** of **$90,000**.

From our example, the operational economics that can be realized can be calculated by summarizing the numbers in boldface in the preceding paragraphs as $411,000/year.

The budgetary price for this complete system is $675,000. This includes the following equipment:

- 3 plate evaporators
- 1 plate condenser
- 3 cyclonic separators
- A high efficiency thermal vapor recompressor
- Pumps
- Instruments
- Controls and engineering
- Piping and cabling
- Stands and platforms for the equipment

Other than certain relatively minor placement and piping interconnection installation costs, there are no other additional charges. By using the figures from our example, one can see that the return on investment occurs in approximately 20 months.

While evaporation technology is well proven in many applications and installations throughout the world, the economic feasibility of a wastewater evaporation system depends greatly on a site's specific costs. By looking at a site's specific operating expenses, the speed with which payback on the investment could occur may be demonstrated.

William Younggreen graduated from Iowa State University (Ames, USA) in 2000 with a B.S. in Chemical Engineering. He has worked with Alfa Laval for eight years in various positions and is currently regional business manager for North America in the Vegetable Oil Technology market unit. He works out of Alfa Laval's Copenhagen office.

John Piazza graduated from the University of Illinois (Urbana-Champaign, USA) in 1987 with a B.S. in Chemical Engineering. He has worked for Alfa Laval for eight years and is currently sales manager for the Vegetable Oil Technology market unit in the USA. Visit www.alfalaval.us for more information.

New this year, The Lab (powered by the AOCS Foundation) offered participants opportunities to attend mini-sessions on the various electronic products and services offered by AOCS. Social networking, SpringerLink, eLearning, and Manuscript Central were some of the topics covered.

As a convenience, the Abstract Search and Build Your Itinerary Stations were provided by the AOCS Foundation so that participants could search presentation abstracts and build their schedule for the meeting.

AOCS Section and Division Councils meet

Each year at the AOCS Annual Meeting & Expo, the AOCS Section and Division Councils gather to plan activities for the coming year.

The AOCS Section Council met on May 6, 2009, to plan for the coming year. Seated (l. to r.) are: Ching Hou, Hak-Ryul Kim, Vic Huang, Kazuo Miyashita, Karl Heinz Wagner, and Charlotte Jacobsen. Standing (l. to r.) are: Roberto Berbesi, Hector Autino, Amy Richards, Carlos Molina, Tom Richar, Erich Dumelin (chairperson), and Erica Siegrist.

The AOCS Section Council met on May 6, 2009. Topics for discussion included the new Section Guidelines, which went into effect January 1, 2009, as well as general budgeting and planning issues. Following this discussion, each Section reported its news.

Vic Huang noted that the Asian Section, which was founded two years ago, held its first board meeting in 2008 during the International Society of Biocatalysis and Biotechnology (ISBB) meeting in Taiwan (see *inform 20*:271, 2009). The Section will also meet jointly with ISBB in 2009 in Taiwan, in 2010 in Korea, and in 2011 in Japan. Huang also said the Section plans to expand its membership to include professionals from Malaysia, Indonesia, and China.

Amy Richards of the Australasian Section reported that the Section will sponsor a Lipid Oxidation and Antioxidants Short Course immediately prior to the Australian Oilseeds Federation/International Society for Fat Research Congress in September 2009 in Sydney. She also reported the Section was working with AOCS staff to organize the 19th International Symposium on Plant Lipids in Cairns, Australia, July 11–16, 2010. Additionally, the Section has been considering organizing a short course focused on margarines and spreads. The Section will elect new officers during its meeting in Sydney in September.

Charlotte Jacobsen of the European Section noted that the Section jointly organized a phospholipids seminar in October 2008 with the Øresund Food Network (see *inform 20*:57, 2009). Held in Copenhagen, the focus of the seminar was nutrition, application, and technology. She also reported that the Section leadership has been in discussion with EuroFedLipid on future collaboration between the two groups. Currently, the Section is considering organizing a smaller meeting in 2010 or 2011 focused on lipid oxidation. A larger meeting, similar to a world conference, is being considered for 2012. The suggested focus of this larger meeting would be investigation into future foods.

Hector Autino of the Latin American Section began his report by showing a video that showcased plans for the upcoming 13th Latin American Congress on Fats and Oils, November 1–6, 2009, in Rosario, Argentina. Autino also noted that membership grew to 160 members during the 2009–2010 program year. Other plans include a short course on palm oil organized in cooperation with Fedepalma on September 21, 2009, immediately prior to the start of Fedepalma's XVI International Oil Palm Conference in Cartagena, Colombia. The Section also is working with ASAGA (Asociación Argentina de Grasas y Aceites) to make its magazine available to Section members, as well as producing its own monthly newsletter. (For an interview with Hector Autino, see *inform 20*:260–261 and *inform 20*:283–284.)

The USA Section, which is in the process of formation, includes members from the last two remaining US Sections—the Northeast and North Central Sections. Co-chair Tom Richar reported that the Section held its first meeting during the 2009 Annual Meeting & Expo. The Section leadership is considering organizing a program prior to the AOCS 2010 annual meeting in Phoenix, Arizona. The first order of business will be to survey the current membership and seek suggested topics for future workshops.

The Indian and Canadian Sections did not make formal reports at the meeting.

AOCS DIVISION COUNCIL

The AOCS Division Council met on May 3, 2009. Chairperson Max Norris led the meeting, which followed meetings by the individual division boards.

The Council traditionally discusses issues affecting all divisions. This year, topics included nominations and elections, 2009 Division sponsorship funds, a protocol for interacting on behalf of AOCS with related associations, and a new "proven practices" program.

The goal of the program is to establish criteria and procedures that identify specific

CONTINUED ON PAGE 488

From Paquin to Purtle: This handshake between Dick Baldwin (right) and Ian Purtle represents the full 100 years of AOCS' existence. Baldwin, who joined the Society in 1944, was president of AOCS in 1961. He met AOCS' first president, Felix Paquin, at the AOCS Annual Meeting in Atlanta in 1950. Purtle was installed as AOCS president at the 2009 Annual Meeting & Expo in Orlando, Florida, USA.

The handshake also represents the growth and longevity of AOCS member company Cargill (Minneapolis, Minnesota, USA). Baldwin retired from Cargill in 1983 as vice president and secretary of the Long-Range Planning Committee of Cargill's Board of Directors. Purtle currently serves as vice president and director of Cargill's Process Solutions Technology Development Center. Courtesy of Dan Higgins

Forty intrepid golfers pose on the hot and humid morning of Sunday, May 3, at the start of a four-hour Texas shamble-style tournament. The heat eventually exceeded 90°F (32°C), but all involved were pleased that AOCS brought back the tournament for one final appearance in celebration of the Society's 100th anniversary. Competitors included Gentry Ideus, 16, son of Gary Ideus, the newly installed chairperson of the Agricultural Microscopy Division.

Calling the experience "extraordinary," first-time-ever golfer Jianshe Chen of the University of Leeds particularly enjoyed the "golden sunshine, which we would not normally have in England." Chen thinks he may play golf again, noting that "sitting in an office thinking and writing all the time is no good."

Common interest groups meet

It is perhaps fitting that AOCS' two common interest groups reflect fats and oils research at both ends of the spectrum, from students to educators. Both common interest groups met at the 100th AOCS Annual Meeting & Expo (AM&E) in May 2009.

The Student Common Interest Group has two new co-chairs in addition to Brent Sorensen (Max Planck Institute for Chemical Ecology, Jena, Germany), who has served as co-chair for several years; new to the effort are Wajira Asanga Manamperi (Iowa State University, Ames, USA) and Bita Farhang (University of Guelph, Ontario, Canada).

More than 20 mentors participated in the mentoring session, during which several mentors sit at each table, allowing students to table hop and talk to as many mentors as possible. This year the students were also treated to many heartfelt expressions of gratitude toward AOCS by the mentors. "No single thing is as good for a career as volunteering in AOCS. By doing that, you short-circuit yourself directly to where the action is," said Michael Haas, former AOCS president and researcher at the US Department of Agriculture (USDA)-Agricultural Research Service's Eastern Regional Research Center in Wyndmoor, Pennsylvania.

Steve Hill, secretary of the AOCS Governing Board, drew laughter when he said he was "still finishing up some papers from graduate school," which was followed by former AOCS President Casimir Akoh's joking suggestion that he was just finishing his post-doc. (Akoh received the 2009 Biotechnology Division Lifetime Achievement Award at the meeting.)

Ideas for the future suggested at the meeting included organizing a separate poster competition for students as well as a quiz competition. Students wishing to work on either project or to learn more about the Student Common Interest Group should contact Brent Sorensen at BSoerensen@ice.mpg.de.

EDUCATORS GROUP

The first meeting of the Professional Educators' Common Interest Group was held in May 2008 and resulted in the goal of promoting lipid education and teaching by developing web-based resources for public access. The past year saw the introduction of a web portal that allows educators to post course syllabus, text book, and course materials (www.aocs.org/member/profed/). Andrew Proctor (University of Arkansas, Fayetteville, USA) and Randy Weselake (University of Alberta, Edmonton, Canada) have been co-chairpersons of the group since its inception.

Participants in the 2009 meeting reviewed the group's original objectives of collecting and sharing syllabi for lipids courses, asking educators to share publically available educational resources, and developing a database of lipid and food science programs at universities around the world. Such a listing already is available at www.aocs.org/member/student/uniprog.cfm; a link to it will be provided on the professional educators' web portal.

The group also discussed a number of possible new programs. They include:

- Writing a USDA education grant for the development of a lipid education course (online textbook, ring binder of notes, etc.);

CONTINUED ON PAGE 488

In its 14th year, the AOCS Foundation-Student Common Interest Group Silent Auction offered a wide range of items including photography, hand-crafted items, electronics, collectibles, and analytical equipment. Coordinated by the AOCS Foundation and run by student volunteers, this year's Auction had 114 items up for bid and raised $3,800 to support AOCS Student Programs such as the Honored Student Award and fellowships.

Award Recipients '09

What follows is a sampling of the award winners from this year's Annual Meeting & Expo (AM&E). Look for our continuing coverage of AM&E Award Addresses throughout the year. Images are courtesy Dan Higgins unless otherwise noted.

AOCS President Ian Purtle (left) presents George U. Liepa with the 2009 AOCS Award of Merit at the 100th AOCS Annual Meeting & Expo in Orlando, Florida, USA. The Award of Merit is presented for productive service to the AOCS. Leadership in technical, administrative, or special committees and activities; outstanding service that has advanced the Society's prestige, standing, or interests; and services not otherwise specifically recognized are considered. For more on Liepa and the award, see inform *20:389 (2009).*

2009–2010 AOCS President Ian Purtle (left) joins 2008–2009 AOCS President Casimir Akoh (third from right) in congratulating the 2009 AOCS Fellows, from left, Kathleen Warner, Robert Moreau, Philip Bollheimer, and John Cherry. Not pictured is AOCS Fellow Ragnar Ohlson. Veteran AOCS members whose achievements in science entitle them to exceptionally important recognition or who have rendered unusually important service to the Society or to the profession are eligible for the honor of being named a Fellow. For more on this year's Fellows, see inform *20:389 (2009).*

Ching Hou, left, and Thomas McKeon, right, congratulate the 2009 recipient of the Biotechnology Division Lifetime Achievement Award, Casimir Akoh. The Biotechnology Division Lifetime Achievement Award was developed to honor lifetime outstanding performance and meritorious contributions to an area of interest to the Biotechnology Division of the AOCS. The award is sponsored by Novozymes A/S. Image courtesy Marguerite Torrey.

AOCS President Casimir Akoh (left) presents Ken Stark with the AOCS Young Scientist Research Award. The Award was established to annually recognize a young scientist who has made a significant and substantial research contribution in one of the areas represented by the Divisions of the AOCS. The award is sponsored by V.K.S. Shukla and the International Food Science Centre A/S in Denmark.

AOCS President Casimir Akoh (right) presents the AOCS Corporate Achievement Award to Bunge Oils representative Roger L. Daniels, director of research and development and new business development for the company. Bunge Oils was recognized for creative and innovative research and development, leading to the introduction of more healthful food oils in the marketplace. Bunge's Nutra Blanche/Nutra Frye and Donut Fry are results of Bunge Oils' commitment to reduce and eliminate trans *fatty acids in shortening oils without altering their taste and functionality.*

Joe Endres (left) poses with 2009 Stephen S. Chang Award winner Nissim Garti. The Stephen S. Chang Award was established by AOCS Past President Stephen S. Chang and his wife, Lucy D. Chang, to annually recognize a scientist, technologist, or engineer who has made distinguished and significant accomplishments in basic research, either by one major breakthrough or by an accumulation of publications. This person's creative efforts must have been utilized by industries for the improvement or development of food products related to lipids.

Rick Della Porta (right) presents Jiann-Tsyh (Ken) Lin with the 2009 Herbert J. Dutton Award. The Herbert J. Dutton Award, sponsored by the Analytical Division, is presented to a scientist who has made significant contributions to the analysis of fats and oils or for work that has resulted in major advances in the understanding of processes utilized in the fats and oils industry. Image courtesy Marguerite Torrey.

AOCS President Ian Purtle (left) poses with the Thomas H. Smouse Memorial Fellowship winner, Thrandur Helgason. The Archer Daniels Midland Foundation, AOCS, the AOCS Foundation, and the family and friends of Dr. Smouse established a fellowship program designed to encourage and support outstanding graduate research in a field of study consistent with the areas of interest of the AOCS.

2009–2010 AOCS President Ian Purtle (left) joins 2008–2009 AOCS President Casimir Akoh in presenting the Peter and Clare Kalustian Award to its 2009 recipient, Jose Gerde (middle). The Peter and Clare Kalustian Award recognizes the outstanding merit and performance of an Honored Student who will present a paper at the Annual Meeting. The award is supported by the Kalustian estate.

The 2009 AOCS Honored Students, from left, were (front row) Bernhard Seifried, Jose Gerde, Rivka Efrat, Thaddao Waraho, Young-Hee Cho; (middle row) Bena-Marie Lue; (back row) Chibuike Udenigwe, Eroen Vereecken, Thrandur Helgason, and Megan Tippetts. Here they pose with 2009–2010 AOCS President Ian Purtle (middle row) and 2008–2009 AOCS President Casimir Akoh (back row). Not pictured are Idit Amar-Yuli and C. Eric Hodgman.

Sustainable use of glycerine honored

Three researchers from Pittsburg State University in Kansas, USA, are the recipients of the 2009 Glycerine Innovation Award, which is given annually by the Industrial Oil Products Division of the American Oil Chemists' Society.

AOCS members Zoran Petrovic, Ivan Javni, and Mihail Ionescu were honored at the 100th AOCS Annual Meeting & Expo for their research, which developed a new family of glycerine-based polyols suitable for use in rigid polyurethane foams. The meeting was held May 3–6, in Orlando, Florida, USA.

Polyol foams are used in thermal insulation for the refrigeration and construction industries, packaging, transportation, adhesives, sealants, and coatings. The total volume of polyols used annually for these applications is measured in the millions of metric tons.

"We are urethane specialists," Petrovic explained, "and our soy-based polyols are being commercialized by Cargill as BiOH polyols." The patent application on glycerine-based polyols has been filed, he noted, which is the first step leading to commercialization. Several companies are interested in the glycerine-based polyols, which are in most cases 100% biobased and are always more than 80% biobased, according to Petrovic.

Pricing has to be determined by taking into account both raw material and processing costs, he noted. "The price will be determined primarily by the price of crude glycerin. We hope to be competitive with petro-polyols," Petrovic said.

The market for rigid foams manufactured from all feedstocks was 3.4 million metric tons (MMT) in 2005, according to IAL Consultants of London. Polyols comprise approximately 40–50% of the market for rigid foams, Petrovic said, or about 1.5 MMT per year. IAL projected the global market for rigid foams at approximately 4.4 MMT in 2010, which is unlikely to be reached, given the recession.

The National Biodiesel Board's Steve Howell (left) and The Soap and Detergent Association's Kathleen Stanton present the 2009 Glycerine Innovation Award to Ivan Javni, Zoran Petrovic, and Mihail Ionescu of Pittsburg State University (Kansas, USA). Courtesy of Brian Sansoni/SDA.

The award is sponsored by The Soap and Detergent Association (SDA; Washington, DC, USA) and the National Biodiesel Board (NBB; Jefferson City, Missouri, USA). It recognizes outstanding achievement for research into new applications for glycerine, with particular emphasis on commercial viability.

The deadline for nominations for the 2010 award is November 1, 2009. For details, visit AOCS' website at www.aocs.org/member/awards/award.cfm?awd=glycerine.

Sungwhan Oh: 2009 Hans Kaunitz Award winner

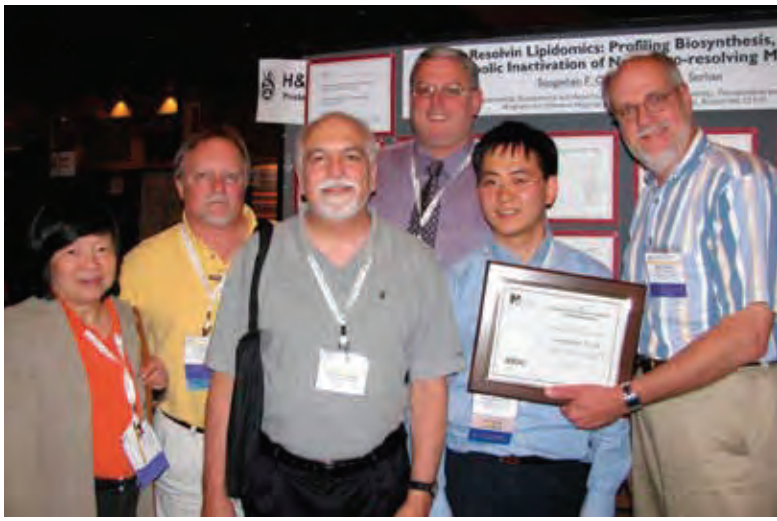
Tom Richar

Annually, the Northeast Chapter of AOCS' USA Section presents its Hans Kaunitz Award. The 2009 Hans Kaunitz Award consists of a $1,000 honorarium with certificate, plus $500 toward travel expenses to the 100th AOCS Annual Meeting & Expo (AM&E), held this year in Orlando, Florida, USA. Individuals applying must be graduate students at any institute of higher learning within the geographical boundaries of the United States and be actively performing research toward a master's or doctoral degree. Additionally, the candidate must be in good academic standing, be involved in research dealing with fats, oils, protein co-products, and/or surfactants, and be interested in the areas of science and technology fostered by AOCS.

The recipient of this year's Hans Kaunitz Award is Sungwhan Oh, who recently received his Ph.D. from Harvard Medical School in Cambridge, Massachusetts, USA. As an undergraduate, Oh studied chemistry at Seoul National University in the Republic of Korea. While studying there, he realized that using well-developed chemical methodologies to observe and understand biological processes could provide breakthrough discoveries in the biosciences. Upon graduation, he applied to biological/medical science Ph.D. programs in the United States and felt extremely lucky to be admitted to Harvard Medical School.

The list of awards and honors Oh has received includes being named an Honor Scholar by the Samsung Scholarship Foundation and a Gold Medalist in the 31st International Chemistry Olympiad. He also received a research grant for Outstanding Undergraduates from the Korea Science and Engineering Foundation and a scholarship for Distinguished Undergraduates from the Korea Foundation for Advanced Studies.

At this year's AM&E, Oh highlighted his research in a poster presentation entitled, "E-series Resolvin Lipidomics: Profiling Biosynthesis, Functions, and Metabolic Inactivation of Novel Active Lipid Mediators." The beneficial effects of omega-3 fish oils to many chronic inflammatory diseases such as cardiovascular disease and stroke have been widely accepted by researchers and the public, but their *in vivo* mechanisms in health and diseases have remained unknown. Charles Serhan, Oh's Ph.D. advisor, is a pioneer in this field and has identified new, very potent molecules called resolvins.



Pictured (left to right) are AOCS Northeast Chapter members: Catherine Chen, Len Sidisky, George Piazza, Rick Ashby, Sungwhan Oh (Hans Kaunitz Award winner), and Tom Richar (presenting the award).

Resolvins are a family of anti-inflammatory and pro-resolving mediators derived from eicosapentaenoic acid and docosahexaenoic acid. They provide a potential molecular-level explanation for some of the beneficial effects described for essential omega-3 fatty acids. Resolvins' biosynthesis, anti-inflammatory, and pro-resolving actions, and inactivation, in both human and animal models have been the focus of Oh's most recent research, which has been conducted at the Center for Experimental Therapeutics and Reperfusion Injury, Brigham and Women's Hospital (Boston, Massachusetts), and the Department of Biological Chemistry and Molecular Pharmacology, Harvard Medical School.

As for his future plans, Oh wants to finish his current research and publish it, then go on to postdoctoral training in the Boston area.

Tom Richar is co-chair of AOCS' USA Section and is a research scientist with Kraft Foods in East Hanover, New Jersey, USA. He can be reached at Tom.Richar@kraft.com.

New books debut

The AOCS Bookstore—always a busy place during the AOCS Annual Meeting & Expo—carried a full range of new books this year from AOCS Press. New offerings, by subject area, included:

Biodiesel
The Biodiesel Handbook, 2nd Edition; Gerhard Knothe, Jürgen Krahl, and Jon Van Gerpen, editors.

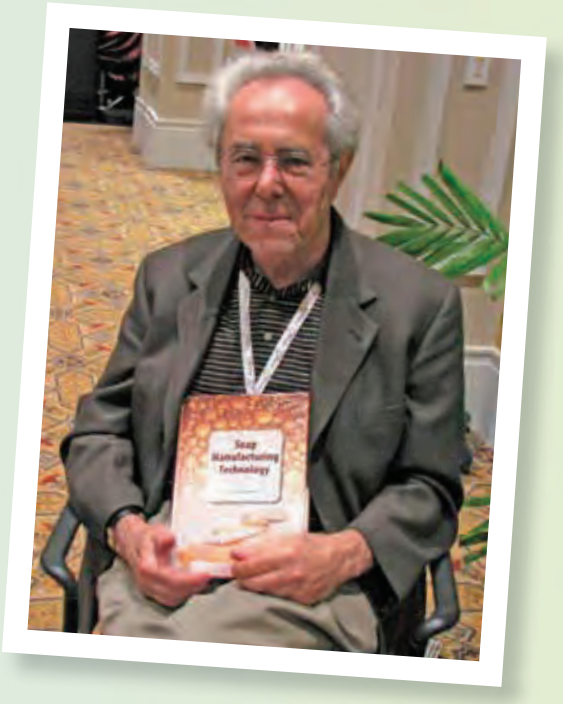
Health, nutrition, and biochemistry
Fatty Acids in Health Promotion and Disease Causation, Ronald R. Watson, editor; *Focus on Obesity CD-ROM,* Patricia Kearney, editor; *Gourmet and Health-Promoting Specialty Oils,* AOCS Monograph Series on Oilseeds, Volume 3, Robert Moreau and Afaf Kamal-Eldin, editors; *Tocotrienols: Vitamin E Beyond Tocopherols,* Ronald R. Watson and Victor R. Preedy, editors.

Methods and analysis
Official Methods and Recommended Practices of the AOCS, 6th Edition, David Firestone, editor; *Official Methods for the Determination of* Trans *Fat, 2nd Edition,* Magdi Mossoba and John Kramer.

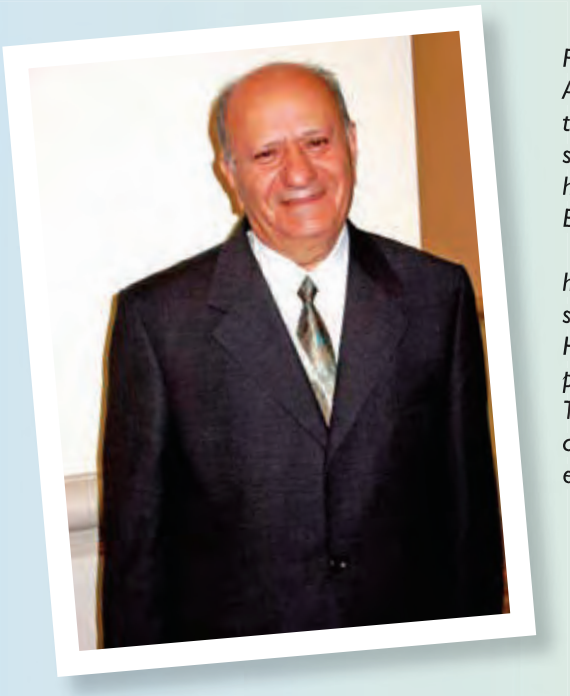
Processing
Bleaching and Purifying Fats and Oils: Theory and Practice, 2nd Edition, Gary List, editor.

Surfactants, detergents, and oleochemicals
Biobased Surfactants and Detergents: Synthesis, Properties, and Applications, Douglas Hayes, Dai Kitamoto, Daniel Solaiman, and Richard Ashby, editors; *Soap Manufacturing Technology,* Luis Spitz, editor.

For more information or to order online, visit www.aocs.org/store.



Long-time AOCS member and author Luis Spitz takes a break from attending sessions to sign books in the AOCS Bookstore at the 100th AOCS Annual Meeting & Expo in Orlando, Florida, USA. A number of new books—including Spitz's Soap Manufacturing Technology*—debuted at the meeting.*



Firouz Madadnoee has undertaken the long trip from Iran to the AOCS Annual Meeting & Expo (AM&E) many times. His first trip to the United States was in 1965 when he came to work at Anderson & Clayton & Co. in Sherman, Texas. His memories of AOCS, however, date back to 1967, when he came to work with Manny Eijadi at the Drew Chemical Corp. in Boonton, New Jersey.

Among his many accomplishments, Madadnoee reports that he introduced palm oil into Iran in 1984. (Palm currently constitutes about one-third of the edible oils used in Iran, he says.) His presentation at this year's AM&E detailed his work—as vice president of research and development and product planning at Tehran's Kesht Va Sanat Shomal and Mahidasht Kermanshah—creating zero- fat liquid oils, vegetable ghee, margarines, shortening, and puff pastry shortening and margarine.

Each year the AOCS and its component groups present awards to recognize accomplishments by individuals in the realm of fats, oil, and related materials.

CALL FOR NO

A. Richard Baldwin Distinguished Service

This is the Society's highest service award. It recognizes long-term, distinguished service to the AOCS in positions of significant responsibility.

Nature of the Award: $2,000, a travel-and-expense allowance, and a plaque provided by Cargill.

Deadline: November 1

AOCS Award of Merit

This award recognizes productive service to the AOCS: leadership in committee activities; service that has advanced the Society's prestige, standing, or interests; and, service not otherwise specifically recognized.

Nature of the Award: A plaque.

Deadline: November 1

AOCS Fellow

The status of Fellow is awarded to members of the AOCS whose achievements in science entitle them to exceptionally important recognition or to those who have rendered unusually important service to the Society or to the profession.

Nature of the Award: Fellow membership status and a plaque.

Deadline: December 1

AOCS Young Scientist Research Award

This award recognizes a young scientist who has made a significant and substantial research contribution in one of the areas represented by the Divisions of the AOCS.

Nature of the Award: $1,000 honorarium, a plaque, and a travel-and-expense allowance provided by the International Food Science Center A/S.

Deadline: November 1

Corporate Achievement Award

This award recognizes industry achievement for an outstanding process, product, or contribution that has made the greatest impact on its industry segment.

Nature of the Award: A plaque.

Deadline: November 1

Supelco/Nicholas Pelick-AOCS Research Award

This award recognizes outstanding original research of fats, oils, lipid chemistry, or biochemistry. The recipient must have published the research results in high-quality technical papers regarding fats, oils, lipid chemistry, or biochemistry.

Nature of the Award: $10,000 honorarium, a travel-and-expense allowance, and a plaque. The award is sponsored by Supelco, a subsidiary of Sigma Aldrich Corp, and Nicholas Pelick, past president of AOCS.

Deadline: November 1

Stephen S. Chang Award

This award recognizes a scientist, technologist, or engineer whose distinguished accomplishments in basic research have been used by industries for the improvement or development of products related to lipids.

Nature of the Award: An honorarium and a jade galloping horse, symbolizing the award, provided by the Stephen and Lucy Chang endowed fund.

Deadline: October 15

The Schroepfer Medal

Originated by colleagues of George Schroepfer, this award recognizes a scientist who has made significant and distinguished advances in the steroid field. The work may represent a single major achievement or an accumulation of data.

Nature of the Award: An honorarium and a medal.

Deadline: October 15

SDA/NBB Glycerine Innovation Award

The Industrial Oil Products Division of the AOCS initiated this award to recognize outstanding achievement for research in new applications for glycerine with particular emphasis on commercial viability.

Nature of the Award: $5,000 honorarium and a plaque provided by The Soap and Detergent Association and the National Biodiesel Board.

Deadline: November 1

Biotechnology Division Lifetime Achievement Award

The Biotechnology Division of the AOCS initiated this award to recognize an individual who has made significant and meritorious lifetime achievements in areas of interest to the Biotechnology Division.

Nature of the Award: $3,500 honorarium and a plaque.

Deadline: November 1

USB Industrial Uses of Soybean Oil Award

The Industrial Oil Products Division of the AOCS initiated this award to recognize outstanding research into new idustrial applications or uses for soybean oil.

Nature of the Award: $3,000 honorarium and a plaque provided by the United Soybean Board.

Deadline: November 1

CALL FOR NOMINATIONS

Each award has its own specific and unique nomination requirements. For award consideration, it is essential that all paperwork be complete and received at AOCS by the nomination deadline. Self-nominations are welcomed and encouraged. Please refer to the AOCS awards website for the nomination requirements and submission deadlines.

ELECTRONIC SUBMISSIONS ONLY!

AOCS is accepting nomination material only by electronic communication. Window based programs (WORD) and PDF material emailed to AOCS must include the award name and candidate name in the email subject line. For complete information and entry details on all awards, please visit the AOCS Awards Program website **www.aocs.org/member/awards**.

OMINATIONS

Award recipients range from longtime AOCS members who have spent years in their specialties to graduate students who are just beginning their careers.

Samuel Rosen Memorial Award

Milton Rosen and the Surfactants and Detergents Division of the AOCS initiated this award to recognize a surfactant chemist for significant advancement or application of surfactant chemistry principles.

Nature of the Award: $2,000 honorarium and a plaque provided by the endowed fund.

Deadline: November 1

Food Structure & Functionality Division Lifetime Achievement Award

The Food Structure & Functionality Division of the AOCS initiated this award to honor outstanding lifetime performance and meritorious contributions to an area of interest to the Food Structure & Functionality Division.

Nature of the Award: $1,500 travel-and expense allowance and a crystal plaque.

Deadline: November 1

Herbert J. Dutton Award

The Analytical Division of the AOCS initiated this award to recognize an individual who has made significant contributions to the analysis of fats and oils and related products or whose work has resulted in major advances in the understanding of processes utilized in the fats and oils industry.

Nature of the Award: $1,000 honorarium and a plaque.

Deadline: November 1

Timothy L. Mounts Award

The Edible Applications Technology Division of the AOCS initiated this award to recognize research relating to the science and technology of edible oils or derivatives in food products, which may be basic or applied in nature.

Nature of the Award: $500 honorarium and a plaque provided by Bunge North America.

Deadline: November 1

Alton E. Bailey Award

This award is supported by the North Central Chapter of the USA Section and recognizes research and/or service in the fields of fats and oils and related disciplines.

Nature of the Award: An honorarium and a plaque. The award recipient must present an award lecture at the Section's meeting, or the Society's Annual Meeting.

Deadline: November 1

Thomas H. Smouse Fellowship Award

This award was established by the Archer Daniels Midland Foundation and the family and friends of Thomas H. Smouse. The purpose of this graduate fellowship is to encourage and support outstanding research by recognizing a graduate student pursuing an M.S. and/or Ph.D. degree in a field of study consistent with the areas of interest of the AOCS.

Nature of the Award: The Fellowship level is up to $15,000 ($10,000 Fellowship, $5,000 for travel and research expenditures related to the student's graduate program).

Deadline: February 1

Ralph H. Potts Memorial Fellowship

This award recognizes a graduate student working in the field of chemistry of fats and oils and their derivatives. Qualifying research will involve fatty acids and their derivatives, such as long-chain alcohols, amines, and other nitrogen compounds.

Nature of the Award: $2,000 honorarium, a plaque, and travel-and-expense allowance. The award is supported by AkzoNobel, Inc.

Deadline: October 15

Honored Student Award

This award recognizes graduate students in any area of fats and lipids. To receive the award, a candidate must remain a registered graduate student and must not have received a graduate degree or have begun career employment prior to the Society's Annual Meeting.

Nature of the Award: Travel-and-expense allowance to attend and present a lecture at the Society's Annual Meeting.

Deadline: October 15

Kalustian and Manuchehr Eijadi Awards

Each award recognizes outstanding merit and performance of one Honored Student award recipient and includes an honorarium of $1,000.

Hans Kaunitz Award

This award is supported by the Northeast Chapter of the USA Section and encourages studies in the sciences relating to fats, oils, and detergent technology. This award is open to graduate students within the geographical boundaries of the Northeast Chapter of the USA Section.

Nature of the Award: Travel-and-expense allowance to attend and present at the Society's Annual Meeting, and a certificate.

Deadline: February 1

AOCS Division Awards for Students

These awards recognize students at any institution of higher learning, who are studying and doing research towards an advanced degree in fats, oils, proteins, lipids, surfactants, detergents, and related materials.

The following student awards are currently being offered by these AOCS Divisions:

- Analytical Division Student Award
- Biotechnology Student Excellence Award
- Edible Applications Technology Division Student Award
- Health and Nutrition Division Student Excellence Award
- Industrial Oil Products Division Student Award
- Processing Division Student Excellence Award
- Surfactants and Detergents Division Student Travel Award

Nature of the Award: Awards can consist of up to $500 to help defray travel and lodging costs to attend the Society's Annual Meeting to give a technical presentation.

Deadline: Varies from October 15 to January 15

The award recipient must agree to attend the AOCS Annual Meeting & Expo and present an award address. The AOCS Annual Meeting & Expo will be held in Phoenix, Arizona, USA from May 16–19, 2010.

AOCS Awards contact

Email: awards@aocs.org • **Web:** www.aocs.org/member/awards

The rise and fall of surfactants lore, *cont. from p. 454*

from existing sources, and the need to convert these new feedstocks to surfactants using conventional derivatization technologies (sulfonation, ethoxylation, etc.), will certainly impact surfactants' supply and demand to the detergents industry. Surfactant manufacturers that understand this, and align themselves to take advantage of this, will be more successful than those that do not. Detergent producers that understand this, and prepare for this, will be more successful than those that do not.

I want to thank Milton Rosen for sponsoring the Samuel Rosen Memorial Award, the selection committee, and AOCS for the honor of receiving this year's Rosen Award, and for the opportunity to present my thoughts on "The Rise and Fall of Surfactants Lore."

Michael F. Cox retired after 26+ years in the surfactants industry and is now a consultant based in Georgetown, Texas, USA. He can be reached at MichaelFCox@suddenlink.net.

AOCS Section and Division Councils meet, *cont. from p. 477*

Division procedures and activities as "best practices." Such activities would then be reviewed and incorporated (as appropriate or desired) by AOCS Divisions. The goal is to help Division leadership be as effective as possible, without having to reinvent programs each time leadership changes.

Criteria identified by the *Ad Hoc* Proven Practices Committee as being critical are that proven practices be sustainable, replicable, and measurable. The next step is for AOCS staff to develop a web-based form to capture ideas of potential proven practices that can then be considered for dissemination.

The *Ad Hoc* Proven Practices Committee members include Max Norris (chairperson); Peter Huth (Health and Nutrition Division); Fred Eller (Analytical Division); Ken Doll (Industrial Oil Products Division); Mike Snow (Processing Division); and Jeffry Newman, Donna Elbon, and Barbara Semeraro of AOCS.

For more information about AOCS Divisions or Sections, contact Barbara Semeraro, AOCS member services manager (barbs@aocs.org).

Common interest groups meet, *cont. from p. 479*

- Creating online short courses for educators;
- Continuing to enhance the group's website with a list of textbooks, reference sites, and reference books;
- Developing a forum for posting questions/queries and comments as part of the AOCS Connect online network;
- Offering effective teaching practices (examinations, tests, lectures) for new faculty.

Proctor also called for the development of a leadership team to oversee the group's activities for the next year. Nurhan Dunford (Oklahoma State University, Stillwater, USA), Rich Hartel (University of Wisconsin, Madison, USA), Randy Weselake, and Eric Decker (University of Massachusetts, Amherst, USA) expressed interest before the meeting. Tong Wang (Iowa State University, Ames, USA), Clifford Hall (North Dakota State University, Fargo, USA), Shamim Momin (Institute of Chemical Technology, Mumbai, India), Carlos Torres (Universidad Autónoma de Madrid, Spain), Robert Mullen (Case Western Reserve University, Cleveland, Ohio, USA), and Deland Myers (North Dakota State University) expressed interest during the meeting.

For more information about the Professional Educators Common Interest Group, contact Andy Proctor at AProctor@uark.edu.

The continuing collaboration between AOCS and the Japan Oil Chemists' Society (JOCS) was made manifest by a ceremonial gift given by JOCS on the occasion of AOCS' 100th anniversary. Admiring the gift (left to right) are Ian Purtle, 2009–2010 AOCS president; Jean Wills, AOCS executive vice president; Casimir Akoh, 2008–2009 AOCS president; and JOCS' new president, Hiroyiki Shimasaki. JOCS also has a new secretary general, Akira Kiyomiya, who took over from Yoshio Ohta, who retired in March 2009.

"The longstanding relationship between AOCS and JOCS has been one of the most productive in AOCS' history. I am grateful for the friendships and deep respect that exist between members and staff of the two groups," said Jean Wills. Courtesy of Dan Higgins.