

# *inform*

AOCS\*

International News on Fats, Oils,  
and Related Materials

## **101st AOCS Annual Meeting & Expo**

**Highlights from  
Phoenix, including:**

**Award Addresses**

**Hot Topic coverage**

**Division & Section updates**



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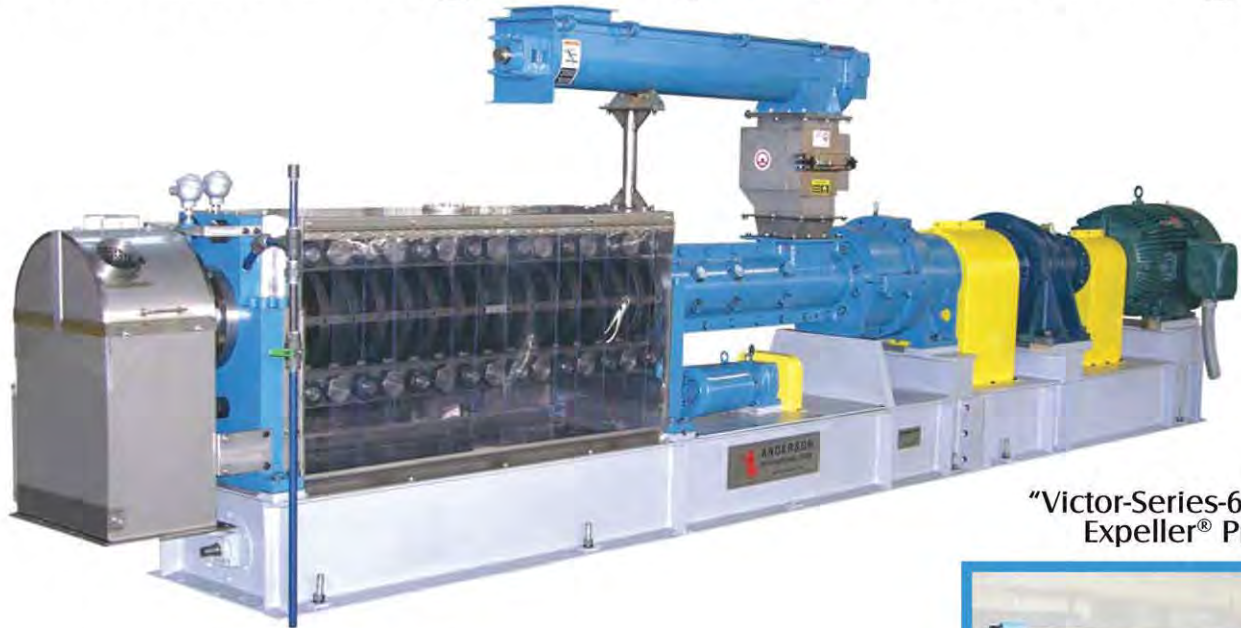
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### Alfa Laval

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[www.alfalaval.com](http://www.alfalaval.com)



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#### 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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# Calendar

**Bold type:** new listingFor details on these and other upcoming meetings, visit [www.aocs.org/meetings](http://www.aocs.org/meetings).

## August

August 1–6, 2010. 19th World Congress of Soil Science, Brisbane, Australia. Information: [www.19WCSS.org.au](http://www.19WCSS.org.au).

August 2–6, 2010. Curso Avanzado sobre Crushing de Semillas Oleaginosas (Advanced Course on Oil Seed Crushing), Rosario, Argentina. Information: email: [gabrielapage@asaga.org.ag](mailto:gabrielapage@asaga.org.ag) or [asaga@asaga.org.ar](mailto:asaga@asaga.org.ar).

**August 11–13, 2010. International Symposium on Renewable Feedstock for Biofuel and Bio-based Products—The Roles of Fiber Crops: Kenaf, Jute, Hemp, Flax, and Allied, Austin, Texas, USA. Information: [http://ccgconsultinginc.com/2010sym\\_general.aspx](http://ccgconsultinginc.com/2010sym_general.aspx).**

August 21–24, 2010. Lipids, Inflammation, and Stress Reactions in Atherosclerosis: Mechanisms, Imaging, and Therapy, Kern Aspen Lipid Conference, Aspen, Colorado, USA. Information: [www.kernconference.org](http://www.kernconference.org).

August 22–26, 2010. 240th American Chemical Society Autumn Meeting, Boston, Massachusetts, USA. Information: [www.acs.org](http://www.acs.org).

August 22–26, 2010. 15th World Congress of Food Science and Technology, Cape Town International Convention Centre,

Cape Town, South Africa. Information: [www.iufost2010.org.za](http://www.iufost2010.org.za).

**August 22–27, 2010. 12th Annual Practical Short Course on Food Extrusion: Cereals, Protein & Other Ingredients, College Station, Texas, USA. Information: [mnriaz@tamu.edu](mailto:mnriaz@tamu.edu); <http://foodprotein.tamu.edu/extrusion>.**

August 26–27, 2010. Soy Innovation Africa, The Westin Grand, Cape Town, South Africa. Information: [www.iufost2010.org.za/SoyInnovationAfrica.asp](http://www.iufost2010.org.za/SoyInnovationAfrica.asp); <http://events.soyatech.com/conferences/SIA2010.htm>.

August 31–September 2, 2010. Farm Progress Show, Boone, Iowa, USA. Information: [www.FarmProgressShow.com](http://www.FarmProgressShow.com).

## September

September 1–3, 2010. JAIMA/JSIA [Japan Analytical Instruments Manufacturers' Association/Japan Federation of Scientific Instrument Associations] Expo: 2010, Makuhari Messe, Japan. Information: [www.jaimasis.jp](http://www.jaimasis.jp).

September 7–11, 2010. 51st International Conference on the Bioscience of Lipids, Bilbao, Spain. Information: [www.icbl.unibe.ch](http://www.icbl.unibe.ch).

September 8–11, 2010. 8th Encuentro de Gerentes de la Industria de Grasas y Aceites Alimentarios (Meeting for Managers of the Edible Fats and Oils Industry), Mendoza, Argentina. Information: email: [gabrielapage@asaga.org.ag](mailto:gabrielapage@asaga.org.ag) or [asaga@asaga.org.ar](mailto:asaga@asaga.org.ar).

September 13–14, 2010. FAME Summit and Exhibition, InterContinental Hotel, Berlin, Germany. Information: <http://greenworld-conferences.com>.

**September 13–15, 2010. International Biomass Valorisation Congress [rescheduled from April 20–22],**

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## AOCS Meeting Watch



October 4–7,  
2010. 7th  
World  
Conference  
on Detergents:

New Strategies in  
a Dynamic Global Economy,  
Montreux Music & Con-  
vention Centre, Montreux,  
Switzerland. Information:  
[www.aocs.org/meetings/  
montreux](http://www.aocs.org/meetings/montreux).



October  
16–19, 2010.  
9th Interna-  
tional Sym-  
posium on  
the Role of Soy in Health  
Promotion and Chronic  
Disease Prevention and  
Treatment, Capital Hilton,  
Washington, DC, USA.  
Information: [www.Soy-  
Symposium.org](http://www.Soy-Symposium.org).



May 1–4,  
2011. 102nd  
AOCS Annual  
Meeting and  
Expo, Duke  
Energy Convention Center,  
Cincinnati, Ohio. Informa-  
tion: phone: +1-217-359-  
2344; fax: +1-217-351-8091;  
email: [meetings@aocs.org](mailto:meetings@aocs.org);  
<http://AnnualMeeting.aocs.org>.

For in-depth details on these and other upcoming meetings,  
visit [www.aocs.org/meetings](http://www.aocs.org/meetings).

**Regardz Zilveren Toren Amsterdam, Netherlands. Information: [www.bio-mass-valorisation.com](http://www.bio-mass-valorisation.com).**

**September 14–18, 2010. 14th International Biotechnology Symposium and Exhibition, Palacongressi, Rimini, Italy. Information: email: [ibs2010@adreacongreg.it](mailto:ibs2010@adreacongreg.it); [www.adriacongreg.it](http://www.adriacongreg.it).**

September 21–23, 2010. Analytica China 2010, Shanghai New International Expo Centre, Shanghai, People's Republic of China. Information: [www.analyticachina.com](http://www.analyticachina.com).

September 26–29, 2010. 124th Annual AOAC Annual Meeting & Exposition, Loews Royal Pacific at Universal Orlando, Orlando, Florida, USA. Information: [www.aoac.org/meetings/124th\\_annual\\_mtg/  
main\\_2.htm](http://www.aoac.org/meetings/124th_annual_mtg/main_2.htm).

September 28–29, 2010. Bioenergy International CANADA Expo & Conference, The Coast Plaza and Conference Centre, Calgary, Canada. Information: [www.bio-fuelsinternationalexpo.com/canada/index.html](http://www.bio-fuelsinternationalexpo.com/canada/index.html).

**September 28–29, 2010. NEREC [North European Renewable Energy Conference] 2010, Oslo, Norway. Information: [www.messe.no/en/ntf/  
Projects/NEREC/](http://www.messe.no/en/ntf/Projects/NEREC/).**

September 28–30, 2010. 2010 Algal Biomass Summit, JW Marriott Desert Ridge Resort, Phoenix, Arizona, USA. Information: [www.algalbiomass.org/  
events](http://www.algalbiomass.org/events).

## October

October 3–6, 2010. GERLI (Groupe d'Étude et de Recherche en Lipidomique), 7th Lipidomics Congress: Lipids in all states, Club Bellambra, Anglet Biarritz, France. Information: [www.cbmn.u-bor-  
deaux.fr/GERLI/index.php?tab=1](http://www.cbmn.u-bordeaux.fr/GERLI/index.php?tab=1).

October 3–7, 2010. Practical-Short Course on Processing and Products of Vegetable Oil/Biodiesel, Food Protein Research & Development Center, Texas A&M University, College Station, Texas, USA. Information: [http://foodprotein.tamu.edu/fatsoils/  
scvegoil.php](http://foodprotein.tamu.edu/fatsoils/scvegoil.php).

October 4–6, 2010. 5th Soya & Oilseed Summit/Global Soybean & Grain Transport, Hyatt Regency Minneapolis, Minnesota, USA. Information: [http://  
events.soyatech.com/conferences/  
GSGTSOS2010.htm](http://events.soyatech.com/conferences/GSGTSOS2010.htm).



**October 4–7, 2010. 7th World Conference on Detergents: New Strategies in a Dynamic Global Economy, Montreux Music & Convention Centre,**

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**Montreux, Switzerland. Information:** [www.aocs.org/meetings/montreux](http://www.aocs.org/meetings/montreux).

October 13–14, 2010. American Fats & Oils Association Annual Meeting, Grand Hyatt Hotel, New York City, New York, USA. Information: [www.afoaonline.org/events.html](http://www.afoaonline.org/events.html).



**October 16–19, 2010. 9th International Symposium on the Role of Soy in Health Promotion and Chronic Disease Prevention and Treatment, Capital Hilton, Washington, DC, USA. Information:** [www.SoySymposium.org](http://www.SoySymposium.org).

October 17–21, 2010. Federation of Analytical Chemistry and Spectroscopy Societies Annual Conference, Raleigh Convention Center, Raleigh, North Carolina, USA. Information: <http://facss.org/facss/index.php>.

October 18–20, 2010. Sustainable Cosmetics Summit, Paris, France. Information: [www.sustainablecosmeticssummit.com](http://www.sustainablecosmeticssummit.com).

October 20, 2010. Cosmetic Technology Transfer Conference, Woodbridge Hilton, Woodbridge, New Jersey, USA. Information: email: [steve@stephen-herman.com](mailto:steve@stephen-herman.com); [www.nyscc.org/cttc.html](http://www.nyscc.org/cttc.html).

October 20–22, 2010. OFI Asia 2010, incorporating OFIC 2010 (Oils & Fats International Congress 2010), Kuala Lumpur Convention Centre, Kuala Lumpur, Malaysia. Information: [www.oil-sandfatsinternational.com/publication.asp?pubid=28&nav=3&exid=160](http://www.oil-sandfatsinternational.com/publication.asp?pubid=28&nav=3&exid=160).

October 21, 2010. Jornada de Actualización de Mantenimiento en la Industria Aceitera (Sustainability in the Oil Industry), Holiday Inn Hotel, Rosario, Argentina. Information: email: [gabrielapage@asaga.org.ar](mailto:gabrielapage@asaga.org.ar) or [www.asaga.org.ar](http://www.asaga.org.ar).

October 22, 2010. Jornada de Actualización de Calidad en la Industria Aceitera (Achieving Quality in the Oil Industry), Holiday Inn Hotel, Rosario, Argentina.

Information: email: [gabrielapage@asaga.org.ar](mailto:gabrielapage@asaga.org.ar) or [www.asaga.org.ar](http://www.asaga.org.ar).

October 24–27, 2010. American Association of Cereal Chemists, Savannah International Trade & Convention Center, Savannah, Georgia, USA. Information: <http://meeting.aaccnet.org/reghotel/Registration.cfm>.

October 27–29, 2010. North American Industrial Coating Show, Indianapolis Convention Center, Indianapolis, Indiana, USA. Information: [www.nace.org](http://www.nace.org) or [www.powdercoating.org](http://www.powdercoating.org).

October 27–29, 2010. DIREC 2010 (Delhi International Renewable Energy Conference), Expo Centre & Mart, Greater Noida (National Capital Region of Delhi, India). Information: [www.direc2010.gov.in](http://www.direc2010.gov.in).

October 31–November 4, 2010. ASA-CSSA-SSSA (American Society of Agronomy-Crop Science Society of America-Soil Science Society of America) 2010 International Annual Meetings, Long Beach, California, USA. Information: <https://www.acsmeetings.org>.

## November

November 7–11, 2010. 30th Practical Short Course on Vegetable Oil Extraction, College Station, Texas, USA. Information: <http://foodprotein.tamu.edu/extraction-protein/scvegoil.php>.

November 10–12, 2010. 45th Southeastern Regional Lipid Conference 2010, High Hampton Inn & Country Club, Cashiers, North Carolina, USA. Information: [www.musc.edu/BCMB/serlc](http://www.musc.edu/BCMB/serlc).

**November 11, 2010. 15th Soy Symposium: Adapting to New Market Forces, L'Enfant Plaza Hotel, Washington, DC, USA. Information:** [www.soyfoods.org/2010-soy-symposium](http://www.soyfoods.org/2010-soy-symposium).

November 16–18, 2010. Health Ingredients Europe, Madrid, Spain. Information: <http://hieurope.ingredientsnetwork.com>.

November 16–18, 2010. Food Ingredients Europe, London, United Kingdom. Information: [www.fi-events.com](http://www.fi-events.com).

November 21–24, 2010. 8th Euro Fed Lipid Congress, Munich, Germany. Information: email: [info@eurofedlipid.org](mailto:info@eurofedlipid.org); [www.eurofedlipid.org/meetings.munich](http://www.eurofedlipid.org/meetings.munich).

**November 29–December 1, 2010. 7th Annual Canadian Renewable Fuels Summit, Hilton Lac-Leamy Hotel, Gatineau, Québec, Canada. Information:** [www.crfs2010.com](http://www.crfs2010.com).

## December

**December 10–11, 2010. Functional Foods for Heart Health: Continuum Between Science and Commercialization, Winnipeg, Canada. Information:** [www.bioactivesworld.com/winnipeg.html](http://www.bioactivesworld.com/winnipeg.html).

December 16–17, 2010. HPCI [Home and Personal Care Ingredients] Congress, Mumbai, India. Information: [www.hpci-congress.com](http://www.hpci-congress.com).

## 2011

**February 6–9, 2011. National Biodiesel Board Conference & Expo, Phoenix Convention Center and Venues, Phoenix, Arizona, USA. Information:** [www.biodiesel.org](http://www.biodiesel.org).

**February 20–22, 2011. 16th National Ethanol Conference, JW Marriott Desert Ridge, Phoenix, Arizona, USA. Information:** [www.ethanol-rfa.org](http://www.ethanol-rfa.org) or [www.nationalethanolconference.com](http://www.nationalethanolconference.com).

**February 26–March 1, 2011. GEAPS [Grain Elevator and Processing Society] Exchange, Portland, Oregon, USA. Information:** [www.geaps.com/exchange/index.cfm](http://www.geaps.com/exchange/index.cfm).

**March 13–18, 2011. Pittcon 2011, Georgia World Congress Center, Atlanta, Georgia, USA. Information:** [www.pittcon.org/about](http://www.pittcon.org/about). ■





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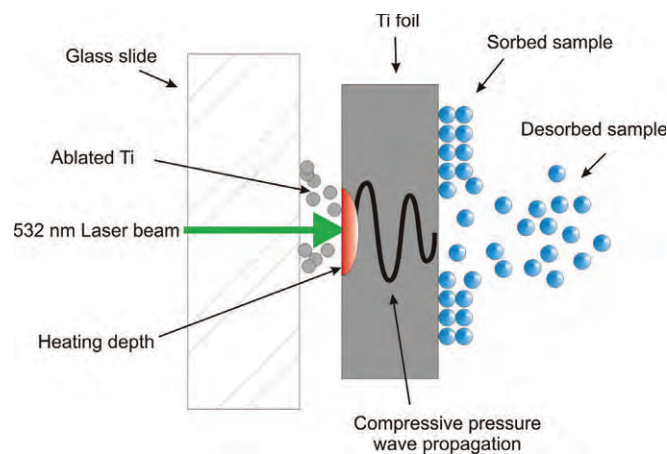
# Laser-induced acoustic desorption/chemical ionization mass spectrometry for lipid analysis

Zhicheng Jin and Hilkka I. Kenttämäa

Lipidomics is defined as the systematic study of lipid molecules and their function in biological systems. Mass spectrometry has played an important role in the analysis of lipids, although they are a challenging group of analytes owing to their structural diversity and lack of volatility. The mass spectrometric analysis of nonpolar lipids, which include triacylglycerols, cholesterol, fat-soluble vitamins, and hydrocarbons, has been particularly problematic because of their thermal lability and lack of easily ionizable functional groups.

Most current mass spectrometric methods used for lipid analysis have serious limitations. For example, electron ionization (EI) produces extensive fragmentation. Electrospray ionization (ESI) and matrix-assisted laser desorption/ionization (MALDI) are soft evaporation/ionization methods (generate low-energy protonated molecules with minor fragmentation), but both are selective for polar compounds. In addition, MALDI matrix causes interference at lower masses. Atmospheric pressure chemical ionization (APCI) causes more fragmentation and is less sensitive than ESI. Indeed, derivatization is often used to increase the volatility and/or ionization efficiency of lipids, or to allow chromatographic separation. However, derivatization is time-consuming and can be a source of inaccuracy in quantitative analysis. These issues have inspired the search for new mass spectrometric methods for the characterization of lipids.

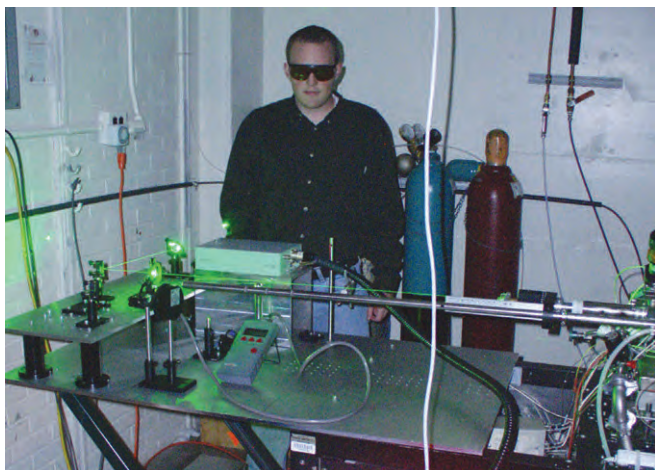
In chemical ionization (CI), analyte molecules vaporized into the mass spectrometer are ionized by reactions with gaseous reagent ions. This method allows control over the selectivity of ionization and the degree of fragmentation via a proper selection of the reagent ion. Until recently, this method could be used only for analytes that could be evaporated by heating into a CI source of a mass spectrometer. However, laser-induced acoustic desorption (LIAD) was recently demonstrated to allow the evaporation of all types of nonvolatile and thermally labile compounds as neutral molecules into the gas phase. This method differs from most other laser desorption methods, such as MALDI, in that the



**FIG. 1.** Laser-induced acoustic desorption (LIAD) setup used in this study.

laser light does not have direct contact with the analyte (Fig. 1). Hence, ions are not formed and fragmentation does not occur upon LIAD. Since no matrix is used, interference derived from matrix molecules is not present in the low mass range, as it is in MALDI. The desorption and ionization processes are uncoupled in LIAD experiments, which allows each process to be optimized independently. The desorbed neutral molecules can be ionized by using a variety of methods, including CI.

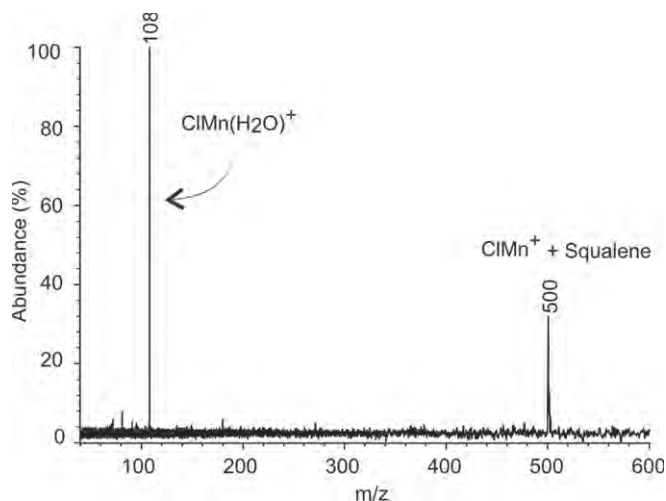
Our laboratory recently evaluated LIAD/CI for the analysis of nonpolar lipids in a dual-cell Fourier-transform ion cyclotron resonance (FT-ICR) mass spectrometer by using the CI reagent ion  $\text{ClMn}(\text{H}_2\text{O})^+$ , which is known to ionize saturated hydrocarbons without fragmentation. The ionization reaction involves the replacement of the water ligand with the analyte. Lipid samples were first deposited onto thin titanium foils. The foils were placed on a stainless steel probe. The probe was inserted into the high-vacuum chamber of the FT-ICR mass spectrometer. LIAD was performed by irradiating the backside of the foil with high-intensity laser pulses (Nd:YAG laser, 532 nm, 3 ns pulse width, 10 Hz). Laser pulses can be delivered onto the backside of the foil by using either an optical fiber (fiber probe, used in this study) or reflecting mirrors (high power probe, Fig. 2). The high-power probe offers higher desorption efficiency for analytes with larger molecular weights, for example, asphaltenes. The laser pulse generates a laser-induced shock wave that propagates through the foil and evaporates neutral molecules into the mass spectrometer. The



**FIG. 2.** Ryan C. Shea is aligning the high power probe, which is installed on the Fourier-transform ion cyclotron resonance (FT-ICR) mass spectrometer. The desorption axis should be in alignment with the center of the ICR cell.

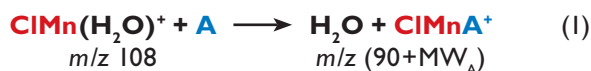
desorbed neutral lipid molecules are then allowed to react with the  $\text{CIMn}(\text{H}_2\text{O})^+$  ions generated by CI of a precursor,  $\text{CIMn}(\text{CO})_5^+$ , in the presence of water vapor.

Five nonpolar lipids and five steroids were analyzed by using LIAD/CI in an FT-ICR, and the results were compared to those obtained using ESI and APCI in a linear quadrupole ion trap mass spectrometer. All analytes were successfully evaporated into the gas phase by using LIAD. The five nonpolar lipids—cholesterol,  $5\alpha$ -cholestane, cholesta-3,5-diene, squalene,



**FIG. 3.** LIAD/chemical ionization mass spectrum (15 laser shots) of squalene (MW 410) obtained by using a fiber LIAD probe. For abbreviation see Figure 1.

and  $\beta$ -carotene—were found to react with  $\text{CIMn}(\text{H}_2\text{O})^+$  by the expected replacement of the water molecule (see Eq. 1). Further fragmentation did not occur. A typical mass spectrum of a nonpolar lipid, squalene, is shown in Fig. 3. In sharp contrast, ESI and APCI do not ionize saturated hydrocarbons such as  $5\alpha$ -cholestane. Further, they produce extensive fragmentation for cholesterol. The unsaturated hydrocarbon lipids squalene,  $\beta$ -carotene, and cholesta-3,5-diene were ionized by APCI, but not ESI.



Upon LIAD/CI, the steroids studied—androsterone, dehydroepiandrosterone (DHEA), estradiol, estriol, and estrone—for the most part produced the expected water replacement product (adduct- $\text{H}_2\text{O}$ ) although minor fragment ions were also observed. With the exception of estrone, ESI and APCI produced much more extensive fragmentation for the steroids than LIAD/ $\text{CIMn}(\text{H}_2\text{O})^+$ . Androsterone and DHEA formed stable protonated molecules when using ESI, but not APCI. These results suggest that the proton transfer reactions in the APCI source are more exothermic than in the ESI source.

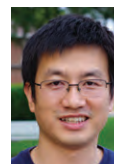
This study demonstrated that LIAD/CI carried out with the reagent ion  $\text{CIMn}(\text{H}_2\text{O})^+$  can be used to desorb and ionize various types of lipids without substantial fragmentation. This method is capable of ionizing saturated hydrocarbon lipids, such as  $5\alpha$ -cholestane, which is not possible for ESI or APCI. Hence, LIAD/CI mass spectrometry provides a powerful method for the characterization of underivatized lipids.

## information

### FOR FURTHER READING:

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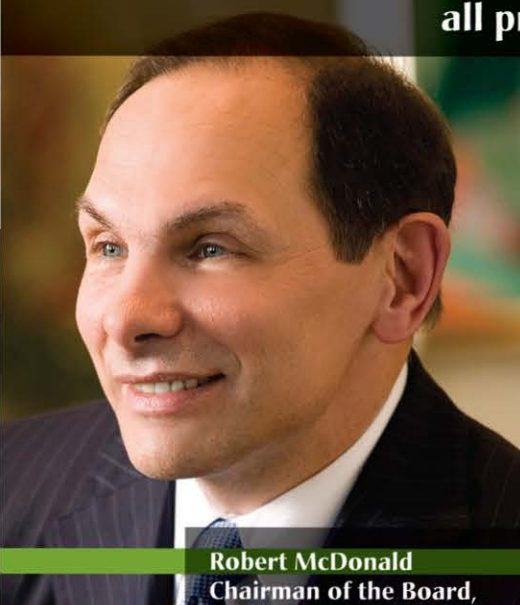
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# Montreux 2010

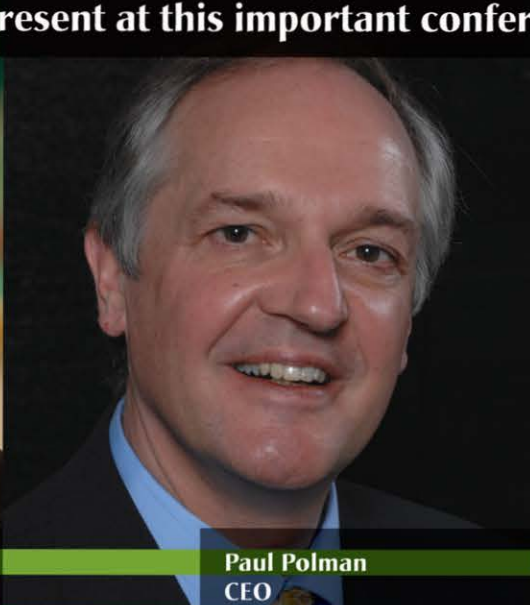
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## Briefs

Monsanto Co. (St. Louis, Missouri, USA) announced in mid-May that its Vistive Gold high-oleic soybean oil had received Generally Recognized as Safe (GRAS) status from the US Food and Drug Administration.

■ ■ ■

Ben-Gurion University of the Negev (Israel) researchers have isolated a microalgal strain that is capable of accumulating up to 15% (of dry weight) of the polyunsaturated fatty acid known as DGLA (dihomo- $\gamma$ -linolenic acid). The new strain, IKG-1, is a freshwater microalga that the researchers believe is the only known plant source of DGLA. DGLA is an omega-6 fatty acid whose metabolites include anti-inflammatory eicosanoids. DGLA has been shown to accumulate readily in humans in direct proportion to  $\gamma$ -linolenic acid intake.

■ ■ ■

Just months after the soybean genome was sequenced, Jianxin Ma and co-workers at Purdue University (West Lafayette, Indiana, USA) have discovered a long-sought gene that controls the plant's main stem growth and could lead to the creation of new types of soybean plants that will allow producers to incorporate desired characteristics into their local varieties. The study appeared in the *Proceedings of the National Academy of Sciences* (doi: 10.1073/pnas.1000088107).

■ ■ ■

The US Environmental Protection Agency (EPA) is making it easier to find chemical information online. EPA is releasing a database, called ToxRefDB, that allows scientists and the interested public to search and download thousands of toxicity testing results on hundreds of chemicals. ToxRefDB captures 30 years and \$2 billion of testing results and is available at <http://actor.epa.gov/toxrefdb>. ■

# News & Noteworthy



Laboratory automation equipment manufacturer Innolabtec GmbH had the most creative Expo booth setup at the 101st AOCs Annual Meeting & Expo in Phoenix. Managing Director Siegfried Brandtner (left) and Mirco Hansen found themselves without their exhibit, which was held up by US Customs. (A frustrating Catch-22 ensued when Brandtner was told that he could not sign the form Customs needed there in Phoenix. Rather, it had to be signed in Europe.) A quick trip to a local retailer followed, and they set up a wading pool with water toys that stopped Expo visitors in their tracks. A wading pool, however, is a far cry from the company's new Peltier Dry Bath "Inno-P-Block" and autosampler for solid fat content measurement.

The AOCs Expo provides opportunities for annual meeting attendees to conduct business and to network. It also allows curious journalists to find out what is on the minds of those in the many fats and oils industries. Unfortunately, we could not meet with all 80 exhibitors because of time constraints. So if you have news to report, please email it to inform Associate Editor Catherine Watkins ([cwatkins@aocs.org](mailto:cwatkins@aocs.org)).

## News from the Expo floor

Sustainability, the recession, and challenges to the biodiesel industry were three major topics raised by a number of exhibitors at the 101st AOCs Annual Meeting & Expo in Phoenix, Arizona, USA, May 16–19, 2010.

Desmet Ballestra North America Inc.'s Jim Willits summed up his view of the

industry succinctly: "Trans is down and biodiesel will come back in some form," he said.

Barbara Stefl of Cognis Corp.'s Quality Trait Analysis (QTA) business unit reported that QTA has begun a new collaborative study, in tandem with AOCs, on mono-, di-, and triglycerides, as well as other properties, in biodiesel. "The Renewable Fuel Standard in the United States will drive demand, so we want to be ready with new analysis



capabilities that will meet the needs of the industry,” she said. The company is also expanding in the area of nutraceutical analysis, introducing a “whole line” of new nutraceutical analysis capabilities, including for fish oil, vitamins, and essential oils.

POS Pilot Plant Corp. was celebrating the end of its first fiscal year as a self-sufficient not-for-profit operating in the black. In the next booth, Jim Pauley, senior process engineer, Process Separations, for LCI Corp., had the economy on his mind. LCI, which sells capital equipment for the lecithin, glycerin, biodiesel, and omega-3 fatty acid industries, has seen business upticks in Africa, South America, and the Far East. Business in North America, however, has been flat.

## GREEN TREND

Many exhibitors talked about the focus on all things “green” by either their companies or their customers—or both.

For example, Rudy Nijburg, Market Manager Detergents for Purac (a CSM company and lactic acid producer), discussed

differences between the European and US approaches to dealing with biocide registration. “The United States is being more pragmatic than Europe, with its Biocide Directive. Put another way, the US is working from the bottom up, while Europe is working from the top down,” he said. Nijburg also noted that 10 years ago, Europe was at the forefront of the “green trend.” Now, he feels that the United States is taking the lead.

A spokesperson for enzyme manufacturer Novozymes said that the use of enzymes in detergents is on the upswing—augmenting and even partially replacing surfactants. The company is focusing on improved stain removal and whiteness with its Mannaway enzyme. (Visitors to the Novozymes exhibit received a handy stain remover pen—always helpful when one is on the road.) Hugo Gonzalez of Genencor (a division of Danisco) agreed that the focus on sustainability has increased interest in the use of enzymes as a means to reduce surfactant concentrations in products.

Bruce Patsey, vice president & general manager, Global Specialty Products Group, Oil-Dri Corp. of America, shared his insights on the trend toward “natural” products. “The increase in palm oil

## Acquisitions/mergers

**Perrigo Co.** (Allegan, Michigan, USA) said in May 2010 that it had completed the acquisition of **PBM Holdings Inc.**, the world’s largest manufacturer of infant formula for store-brand markets. PBM (Gordonsville, Virginia, USA) manufactures and distributes over-the-counter infant formula and baby foods sold by retailers and pharmacies in the Canada, China, Mexico, and the United States.

## Commodities

### CANOLA/RAPESEED OIL

**Weaver Popcorn Co., Inc.** has introduced the first microwave popcorn made with canola oil to the US market. The company, which is based in Indianapolis, Indiana, said it is using Dow AgroSciences’ high-oleic canola oil.



Iredell County, North Carolina, USA, is new to growing canola, but the crop may have a future in the area, according to the *Mooreville Tribune* newspaper. Farmer Phil McLain of McLain Farms has gotten phone calls about his 1,200 acres (about 500 hectares) of canola, which is more than four times the amount of winter canola he planted in 2009. Since his processing facility, which crushes canola for oil, created a market for the crop, the thought is that more North Carolina farmers will adopt canola as an alternative to wheat.

### FISH OIL

The People’s Republic of China has approved fish oil and fish oil powder as Novel Food Ingredients for all food and beverage categories and for all ages, children through to seniors, according to FoodProcessing.com. Supplier **Ocean Nutrition Canada Ltd.** said in a news release that it “anticipates that the Chinese

market will quickly follow the lead of both North America and Europe, where omega-3 fortified food and beverage new product [introductions] are showing excellent growth.”

### OLIVE OIL

Production of olive oil in Chile is projected to triple as of 2015, increasing from 12,000 to 45,000 metric tons (MT), according to Juan Pablo Barrios, president of the **Asociación de Productores de Aceite de Oliva**. Exports, which were 2,000 MT in 2010, would rise to around 20,000 MT by 2015. “A total of \$50 million is being invested in the Chilean olive oil segment, led by Angelini, Alfonso Swett, and Clemente Eblen,” said a report in the *El Diario* newspaper.

### PALM OIL

Palm oil-derived tocopherols with tocotrienols (T3) and  $\alpha$ -tocopherol as the principal components have been given GRAS (Generally Recognized as Safe) status by the US Food and Drug Administration (FDA). They are cleared for use as ingredients in a wide variety of products, including margarine and spreads, chocolate, meatless products, and frozen dairy desserts and mixes. T3 is a mixture of  $\alpha$ -,  $\beta$ -,  $\gamma$ -, and  $\delta$ -tocotrienol.

## New ventures

Algal DHA manufacturer **Martek Biosciences Corp.** of Columbia, Maryland, USA, announced in May 2010 that it has signed a five-year agreement with leading Chinese dairy, **Mengniu Dairy Co. Ltd.**, for the use of Martek’s life’sDHA (docosahexaenoic acid) in Mengniu-brand UHT (ultra-high-temperature) milk and potentially other foods. In China, Mengniu is the leader of the rapidly growing dairy products market. Milk comprises approximately 60% of the Chinese dairy category, of which Mengniu has a leading share of 35%, Martek said. ■

*Liquids to Value*

production has increased the demand for natural clay," he noted. Patsey also said that Oil-Dri recently hired 2007 AOCS Honored Student Vishal Jain to expand the company's research and technical support capabilities. Jain is working on procedure and method development, oil oxidation, and scale-up work—among other projects—Patsey said.

Customers' increased interest in energy savings was a topic raised by a number of exhibitors. GEA Westfalia Separator, has found that the desire to save energy has increased noticeably in Asia, "especially China," according to Steen Lassen, deputy division manager, Food & Dairy Division. Farah Salaria, vice president product development for Solex Thermal Science, agreed: "Energy efficiency is driving the market for us." Solex markets technology for drying grains and oilseeds.

Larry Forrester, general manager and vice president international marketing for Tramco, Inc., which manufactures conveyor systems, echoed the importance of Asia to new business prospects. Similarly, Chemithon Corp., which develops sulfonation technologies, reported that its methyl ester sulfonate (MES) plant in Guangzhou, China, will be completed in late 2010. The plant will have a capacity of 50,000 metric tons/year, said Michael Shea, regional manager/Asia Pacific & Europe. "Chemithon has been ahead of the green curve, starting in the early '90s when we developed our first MES technologies," he noted. "The Guangzhou plant will be very similar to our Houston [Texas, USA] facility that has been in constant operation since mid-2002 making MES products for most parts of the US for private-label products for Costco, Wal-Mart, Safeway, Sun, and many others."

## NEW PRODUCTS

Among the new products introduced at the meeting were "natural" antioxidants such as Danisco's GUARDIAN™ Green Tea Extract for margarine and spreads. The market for processed foods carrying "no preservatives" claims reached \$13 billion in 2009, according to the Mintel market research firm. (Thanks for that statistic go to Bruce Johansing, global technical sales manager of Kalsec. He also pointed to Kalsec's Herbalox® Seasoning and Duralox® blends of natural antioxidants as fitting in with the trend toward naturally based products.)

Andrew Evans, category manager, Nutrition, at ingredients manufacturer Nealanders International Inc. also spoke about wellness trends in the food industry. "The trend covers three categories: 'better for you' products such as no-*trans* items; clean label ("natural," organic, or synthetics-free) items; and fortified foods," he said.

Other product introductions included a benchtop NMR/MRI (nuclear magnetic resonance/magnetic resonance imaging) unit from NIUMAG Corp, as well as a method of direct thermometric titration of sodium in foodstuffs announced by Metrohm USA Inc.

Wacker Chemical Corp. introduced two new products. The first—Silfoam® SP 150—is a cost-effective defoamer for high-efficiency detergents. The second is an aqueous-based stain repellent for use on fabrics, leather, or wood.

AkzoNobel announced the availability of a number of new, sustainable products. They included Dissolvine® GL, a replacement for phosphates, EDTA, and NTA in autodish detergents; Berol® PBX active oxygen stain remover; Berol® HD heavy-duty degreaser; and the Alcoguard® H 5240 hybrid bio-polymer technology. The latter



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has been nominated for pollution prevention recognition by the US Environmental Protection Agency, a company spokesperson said.

When asked if his company had any new products to announce, William Gambel of Caravan Ingredients instead talked about his company's first year as an exhibitor at the AOCS Annual Meeting & Expo.

"I am very impressed with the level of scientific talent that attends this meeting," he said.

We couldn't have said it better ourselves.

## US olive oil industry conducts survey

"The US olive oil industry is undergoing expansion on an impressive scale," according to the California Olive Oil Council (COOC).

How impressive? COOC estimates that an additional 5,000 acres of olive trees will be planted each year from 2010 through 2030. Further statistics about the industry will be available by the end of the third quarter of 2010, when COOC issues the results of a survey funded by the Technical Assistance for Specialty Crops program of the Foreign Agricultural Services branch of the US Department of Agriculture (USDA).

A total of 100 olive oil samples were collected from all producing areas within the United States as well as the Mexicali region of Mexico, COOC reports. The aim is to have a better understanding of the profile of olive oil produced in North America.



Local artist, Gary Kelley (left), and NABL director, Lou Honary (right), unveil an original painting commissioned for the new National Ag-Based Lubricants Center during the grand opening ceremony at TechWorks, Friday, May 14, 2010, in Waterloo, Iowa, USA. NABL is the first tenant to set up shop in two six-story buildings, formerly owned by John Deere. The Center's new address is 360 Westfield Ave., Tech I, Waterloo, IA 50701. Courtesy of Molly Wade, University of Northern Iowa.

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The project included the use of four laboratories: AgbioLab, the USDA-Agricultural Marketing Services lab in Blakely, Georgia; SGS Labs in Louisiana and the Wagga Wagga laboratory in Australia. When the first survey is completed, COOC plans to apply for a second technical grant to continue the work.

COOC credits Bruce Golino, chair of the COOC Standards Committee, for overseeing the project.

## Final piece in phytate puzzle discovered?

A team of scientists in Spain and the United Kingdom have identified what they say is the “final piece in the jigsaw of how phytate is produced in plants.”

Published online in the *Proceedings of the National Academy of Sciences* (10.1073/pnas.0912979107), the breakthrough discovery by the Consejo Superior de Investigaciones Científicas (CSIC) in Madrid and the University of East Anglia (UEA) has implications for agribusiness, the environment, and human health.

Phytate is a naturally-occurring phosphate deposit that accumulates in the seeds, beans, and tubers of many crops. The researchers have identified for the first time how the enzyme that produces phytate works, by solving the molecular structure of the protein IP5 2-kinase.

Because many animals are unable to digest the phytate present in their feed, the phytate phosphorus is transferred to the soil in manure, leading to the pollution of waterways. As a result, the animal feed industry currently adds the enzyme phytase to feed, which allows animals to absorb the phosphorus complexed within phytate. This is a costly process, and so the industry needs to identify low-phytate varieties of crops such as maize, rice, wheat, barley, and soybean.

“This is a hugely exciting discovery as scientists have been searching for this final piece in this jigsaw for so long, and because phytate has such a wide-ranging impact in agriculture, the environment, and human health,” said co-author Charles Brearley, of UEA’s School of Biological Sciences, who collaborated in this work with Beatriz González of CSIC’s Instituto de Química-Física Rocasolano.

Victor Raboy, a crop geneticist at the US Department of Agriculture, commented: “Understanding this unique aspect of inositol phosphate chemistry has broad significance not only for plant biology and agriculture but also for nonplant eukaryotic cellular metabolism and signal transduction.

“For example, it will also enhance our understanding of how yeast, slime molds, and fruit flies function, and potentially could have future importance in understanding human disease and in designing therapies.”

## FDA seeks comment

The US Food and Drug Administration (FDA) wants comments and information from the public and “other interested parties” about front-of-package nutrition labeling and on shelf tags in retail stores. The comment deadline is July 28, 2010.

The agency wants to understand how to enhance the usefulness to consumers of point-of-purchase nutrition information. This includes information on the main display panel of food products, called “front-of-pack” labeling, as well as information on shelf tags in retail stores.

The FDA is seeking to learn more about:

- The extent to which consumers notice, use, and understand nutrition symbols on front-of-pack labeling of food packages or on shelf tags in retail stores;
- Research that assesses and compares the effectiveness of particular approaches to front-of-pack labeling;
- Graphic design, marketing, and advertising data and information that can help develop better point-of-purchase nutrition information; and
- How point-of-purchase information may affect decisions by food manufacturers to reformulate products.

“The front-of-pack nutrition labeling effort aims to increase the number of consumers who readily notice, understand, and use point-of-purchase information to make good nutritional choices for themselves and their families,” FDA said.

Comments may be sent to <http://www.regulations.gov> by entering Docket No. FDA-2010-N-0210. Written comments also may be sent to the Division of Dockets Management (HFA-305) Food and Drug Administration, 5630 Fishers Lane, Room 1061, Rockville, Maryland 20852. ■

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#### Current Status of the Biodiesel Industry

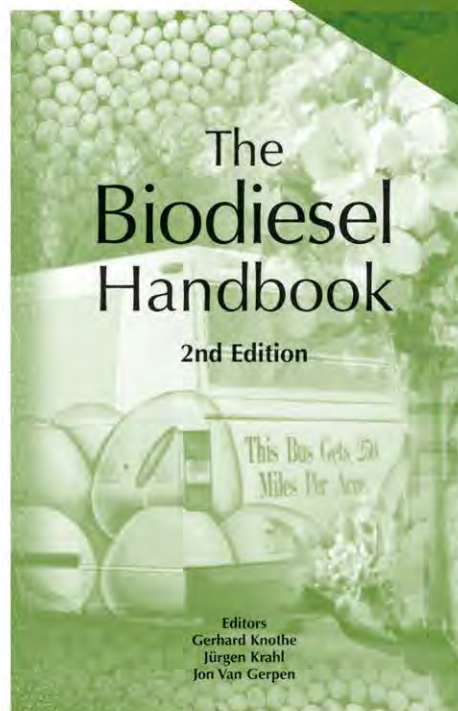
- Biodiesel in the United States
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## Briefs

The city of Albuquerque (New Mexico, USA) has decided not to continue to use E85 gasoline (85% ethanol + 15% petroleum-based gasoline) for municipal vehicles. It claims fuel-pump failures on police cars, warranty problems, and increased costs of fuel necessitate the change. The city plans to continue using biodiesel, albeit at a B5 level (5% biodiesel + 95% petrodiesel) instead of the B20 it had been using.

■ ■ ■

The following web sites are sources of information on jatropha as a feedstock for biofuel: (i) [www.jatropha-hq.com](http://www.jatropha-hq.com) presents information on business and science; (ii) [www.jatropha-alliance.org](http://www.jatropha-alliance.org) is a platform for the jatropha industry; and (iii) <http://www.wn.com/jatropha> presents information regarding jatropha in both text and video formats.

■ ■ ■

Manitoba Hydro, in partnership with Natural Resources Canada's National Renewable Diesel Demonstration Initiative, is supporting a C\$340,000 project that will demonstrate the use of biodiesel blends (5%) and their long-term storage under extreme cold weather conditions in electric generators in a northern Manitoba community. The project is a follow-up to an initial test conducted by Manitoba Hydro in which 173,000 liters of 5% biodiesel were shipped to Brochet, Manitoba, in January 2008; stored for more than a year; and then burned successfully in the winter of 2008/2009.

■ ■ ■

Lufthansa German Airlines announced in mid-May that it too plans to incorporate biofuel into traditional jet fuel on commercial flights (KLM, Continental Airlines, Virgin Air, and Japan Airlines have already tested biofuels). A schedule will likely be decided by the end of 2010, and the goal is to add biofuel by 2012. Reuters news service quoted Wolfgang Mayrhumer, chief executive officer of Lufthansa, as saying that Lufthansa had no plans to run individual test flights at this point. Instead, the

CONTINUED ON NEXT PAGE

# Biofuels News



## GENERAL

### Creation of a synthetic genome

Scientists announced the development of the first cell controlled by a synthetic genome ([www.eurekalert.org/pub\\_releases/2010-05/aaft-su051710.php](http://www.eurekalert.org/pub_releases/2010-05/aaft-su051710.php)) on May 20 in a paper published online by the journal *Science* ([www.sciencemag.org/cgi/content/abstract/science.1190719](http://www.sciencemag.org/cgi/content/abstract/science.1190719)).

The list of 24 authors for this paper includes J. Craig Venter, known for his studies characterizing the human genome and presently head of Synthetic Genomics Inc. (SGI; La Jolla, California, USA) and the J. Craig Venter Institute (JCVI).

The authors term their creation a "synthetic cell," although only its genome is synthetic. According to Venter, in the EurekAlert release, "This is the first synthetic cell that's been made, and we call it synthetic because the cell is totally derived from a synthetic chromosome, made with four bottles of chemicals on a chemical synthesizer, starting with information in a computer."

Venter also said, "This becomes a very powerful tool for trying to design what we want biology to do." EurekAlert indicated researchers are planning to design algae that can capture carbon dioxide and make new hydrocarbons that could go into refineries. Other possibilities include making new chemicals or food ingredients and cleaning up water.

Commentary on the development of the "synthetic cell" has been widespread in both the scientific and popular literature, ranging from questions regarding whether this publication describes the creation of "new life" (*Nature* 465:422, 2010); whether this is only a new way to re-engineer organisms (*Nature* 465:424, 2010); the importance of the cell as the basic construct of life ([www.nytimes.com/2010/06/01/science/01angi.html](http://www.nytimes.com/2010/06/01/science/01angi.html)); issues of ethics and security posed by synthetic biology (*Nature* 465:397, 2010); and the safety of the biotechnology industry and questions of federal regulation (Biotechnology Industry Organization: [www.bio.org/news/pressreleases/newsitem.asp?id=2010\\_0520\\_01](http://www.bio.org/news/pressreleases/newsitem.asp?id=2010_0520_01)).

SGI and oil giant ExxonMobil entered a five-year, \$600 million research and development agreement on July 14, 2009, for the



carrier plans to introduce biofuel on several routes and monitor data collected over a longer period of time.

■ ■ ■

Valero Energy Corp. (San Antonio, Texas, USA) and Algenol Biofuels Inc. (Bonita Springs, Florida, USA) jointly announced in May that they would work together on the commercial-scale production of fuels derived from algae. Algenol has developed processes to make ethanol from algae growing in seawater in the presence of carbon dioxide. If this collaboration is successful, it has the potential of resulting in commercial-scale algae-based facilities and off-take arrangements with a global reach. Valero also is invested in Solix Biofuels (Fort Collins, Colorado, USA), which is developing technology to extract oil from algae to make bio-crude and, after refinement, fuels.

■ ■ ■

In April, T. Boone Pickens, oil and gas executive and financier, testified before the US House Committee on Ways & Means urging the passage of legislation to reduce US dependence on foreign oil. He said, in part, "In January 2010 our trade deficit for the month was \$37.3 billion; \$27.5 billion of that was money we sent overseas to import oil." He added, "Two-thirds of our foreign oil is used as a transportation fuel."

■ ■ ■

Following the withdrawal (*inform* 20:348, 2010) of the European Biodiesel Board and the European Bioethanol Fuel Association (eBIO) from the Switzerland-based Roundtable on Sustainable Biofuels (RSB), more than 50 organizations expressed their continued support of the RSB. Among the supporters were the Sustainable Aviation Fuel Users Group, the National Soybean Board, the National Wildlife Federation, Shell International Petroleum, Neste Oil, and WWF International.

■ ■ ■

LL Biofuels Namibia, an Israeli-owned biofuels venture, has signed a 20-year lease with the Caprivi Regional Council, in the Caprivi Strip of Namibia, and the Namibia Development Corporation to plant jatropha on 300,000 hectares of land. LL Biofuels Namibia has already

creation of next-generation biofuels from algae (*inform* 20:577, 2009).

## Philippines works on biofuels plans

The Philippine Department of Energy (DOE) has released plans to increase the national blend for biodiesel to 20%. Implementation is supposed to take place this year, although exact details have not been made public yet. By 2015, the proposed blend will rise to 10%; by 2020, to 15%; and to 20%, by 2025.

Incorporation of ethanol into fuel at a 10% level is supposed to start in 2011, rising to 15% by 2015, and 20% by 2020.

The DOE acknowledges there are still weak spots in establishing policies to move adoption of higher blends of biofuels. These include the lack of infrastructure and uncertain sources of feedstocks for the mandated domestic production of ethanol; the need for a critical mass of vehicles that can use the higher blends; and the development of standards for the proposed higher blends.

## ALGAE

Sci.Dev.Net.com reported on May 7 that Gerhard Knothe, a recognized expert in the field of biofuels with the US Department of Agriculture's Agricultural Research Service (Peoria, Illinois, USA), is presenting his misgivings about fuels being developed from algae in a chapter entitled "Production and Properties of Biodiesel from Algal Oils." The book in which it will appear, entitled *Algae for Biofuels and Energy*, will be published by Springer.

Knothe told Sci.Dev.Net that "many, if not most" of the biodiesel fuels derived from algae have "significant problems" with cold-

flow properties. They also tend to degrade more easily than other biofuels because they contain relatively high amounts of saturated and polyunsaturated fatty acids.

Genetic engineering of algae, however, may yield oils with more useful properties, according to Knothe.

## OriginOil and MBD Energy Ltd. sign MoU

Australia-based MBD Energy Ltd. and OriginOil, Inc. (Los Angeles, California, USA) signed a memorandum of understanding on May 11 for algae feeding and extraction systems. OriginOil will supply MBD Energy with its fracturing and extraction systems, to be integrated into MBD's algal carbon capture and storage process to enhance algae growth and perform oil extraction.

Information from OriginOil indicated that MBD Energy is its first customer.

Three of Australia's largest coal-fired power generators have committed to building test facilities adjacent to their power stations using MBD's proprietary growth system. Smokestack CO<sub>2</sub> emissions will be captured and used to grow oil-rich algae in solar reactors.

In the initial phase, OriginOil will equip MBD Energy's research and development facility at James Cook University (Townsville, Queensland, Australia), where testing will take place.

Each of the three current MBD power station projects has the potential to generate 80-hectare commercial plants, each capable of producing 11 million liters of oil for plastics and transport fuel, and 25,000 metric tons of (drought-proof) animal feed annually.



## Algal by-products as fish food

The US National Marine Fisheries Service awarded a \$243,000 Saltonstall-Kennedy grant to Kona Blue Water Farms Inc., located on Hawaii Island, to research alternative protein sources for aquaculture feeds. The project will examine substitutes for fish meal in the company's farm-raised Hawaiian yellowtail (*Seriola rivoliana*).

The protein sources to be investigated include microalgae by-products from biofuels production; single-cell protein made from food processing water; and a fish protein filtered from the wastewater of fish processing plants.

The marine fish hatchery and aquaculture operation will substitute protein sources at different ratios into Hawaiian yellowtail diets, then compare growth rates, food conversion ratios, and product quality to that of fish fed a standard commercial diet.

Research is expected to begin in July 2010.

## ETHANOL

### Risks associated with a short corn crop

The National Pork Producers Council (NPPC; Washington, DC, USA) testified before the National Research Council in early May regarding the financial risks associated with a short corn crop. The NPPC suggested that the ethanol industry should share more of this risk with livestock farmers, instead of forcing them to bear almost the entire risk of rationing if there is a short corn crop owing to bad weather and/or a high demand for biofuels.

The first hint of a short corn crop in 2008 sent corn prices soaring and forced rationing of the corn supply. As a result, pork producers suffered major losses, and many small- and medium-sized pork producers left the business.

The NPPC asked for federal policies

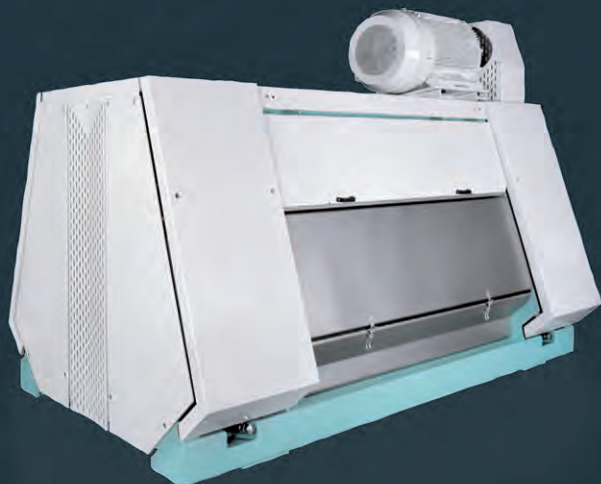
planted 400 different varieties of jatropha on 15 hectares of the Katima Farm to determine which varieties of jatropha offer the highest diesel yield, and which will thrive in the Caprivi region's conditions. If all goes according to plan, LL Biofuels expects biodiesel production to begin in 2011.

■■■

New Generation Biofuels Holdings, Inc. (Columbia, Maryland, USA) has filed a patent application for an emulsified biofuel incorporating glycerin (US Patent Application 20100037513, February 18, 2010). The biofuel contains (i) a continuous phase comprising about 50–95 wt% of at least one liquid oil of vegetable or animal origin or mixtures thereof; (ii) a water-containing dispersed phase comprising about 1–50 wt% water; (iii) about 1–25 wt% of hydroxyl-containing organic compound selected from the group consisting of mono-, di-, tri-, and polyhydric alcohols; and (iv) about 0.05–10 wt% of at least one emulsifier. ■

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that address how to share such risk equitably among all grain users. It also asked that the tariff on imported ethanol and tax credits for blending ethanol into gasoline be allowed to expire.

## Ceres and Novozymes to customize plants for biofuels

Energy crop company Ceres (Thousand Oaks, California, USA) and enzyme provider Novozymes (Franklinton, North Carolina, USA) have entered a research collaboration to co-develop customized plant varieties and enzyme cocktails for the production of cellulosic biofuel. The joint goal is to produce more effective enzymes and higher-quality energy crops, leading to greater fuel yields and lower capital and operating costs.

Ceres and Novozymes will initially work to determine the best enzyme combinations for biorefining Ceres' commercial switchgrass seed products. The partners

will also begin similar evaluations of sweet sorghum.

A 2009 report prepared by Sandia National Laboratory and General Motors R&D & Strategic Planning ([www.sandia.gov/news/publications/white-papers/index.html](http://www.sandia.gov/news/publications/white-papers/index.html)) concluded that 75 billion gallons of cellulosic ethanol could be produced annually in the United States by 2030.

## US automakers seek to delay increase in ethanol percentage

The US Environmental Protection Agency (EPA) was expected to issue by mid-year a ruling to permit oil companies to increase the amount of ethanol in automotive fuel to 15%, up from the present 10%, to meet federal mandates for renewable fuels.

*The New York Times* said that C. Coleman Jones, biofuel implementation manager at General Motors, speaking on behalf of the Alliance of Automobile

Manufacturers (AAM), indicated that half of the engines tested so far with the higher ethanol blend have had problems. According to the AAM, more ethanol content makes engines run too hot, destroys catalytic converters, and damages engine cylinders.

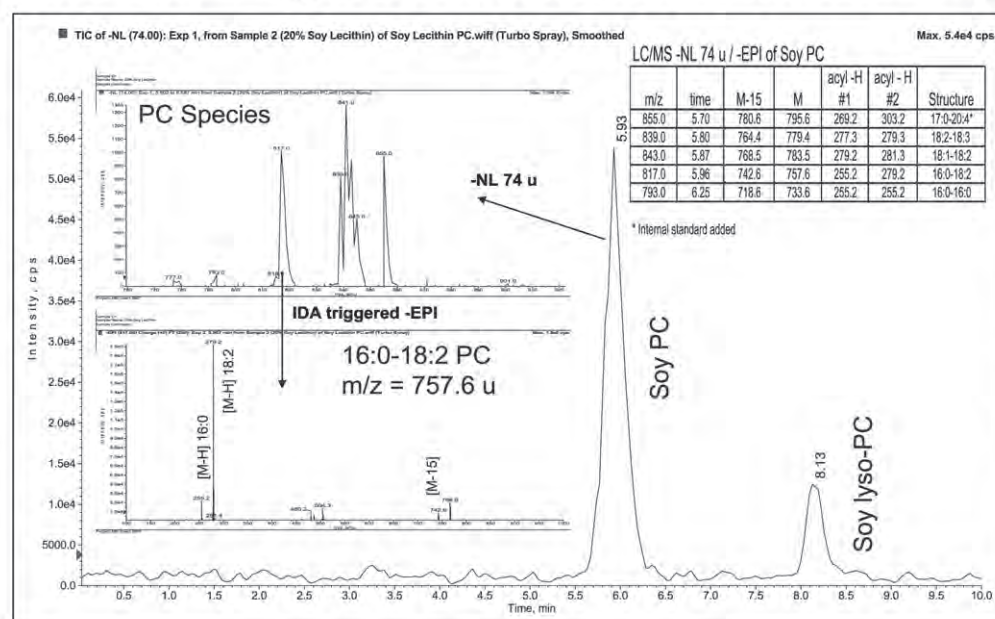
The ethanol industry contends that implementation of the ruling is essential in lowering US dependence on imported oil and that most cars are unaffected by 15% ethanol.

A complicating factor is that ethanol production for fuel in the United States has increased enough that ethanol producers have hit a "wall." New markets must be found or else an excess supply of ethanol will drive down the price of ethanol.

## Cellulosic ethanol plant to be constructed in China

Denmark-based Novozymes, an enzyme manufacturer; COFCO, a grain, oil, and

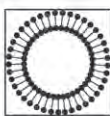
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foodstuffs import and export group in China; and the Chinese oil refiner Sinopec signed a memorandum of understanding at the end of May covering the next steps toward commercialization of cellulosic biofuel in China. As part of the agreement, COFCO and Sinopec will build a cellulosic ethanol demonstration plant for which Novozymes will supply the enzymes.

The new plant will be the largest demonstration facility converting agricultural waste into biofuel in China. Feedstock initially will be corn stover. The plant is scheduled to come online in the third quarter of 2011 and should produce 3 million gallons (11 million liters) of ethanol per year.

A 2009 study by Novozymes and McKinsey showed that by converting agricultural residues into fuel ethanol, China can reduce its gasoline consumption by 31 million tons in 2020, thereby reducing its dependence on imported petroleum by 10% and creating 6 million direct jobs.

By 2020, the number of cars in China is expected to exceed 200 million, up from 130 million today, leading to substantial growth in the demand for vehicle fuels.

## BIODIESEL

### EU directive could disqualify palm oil as feedstock

Neste Oil, headquartered in Espoo, Finland, plans to start production of biodiesel in the fourth quarter of 2010 at the \$1 billion plant it is constructing in Singapore. The plant is already over 90% completed, according to *The Business Times* of Singapore. However, concerns are surfacing that the palm oil feedstock slated for use in the plant will not be acceptable in Europe.

The European Union (EU) directive requires that biofuels entering the EU market must result in greenhouse gas (GHG) savings of at least 35%; this savings level will increase to 50% by 2017. Furthermore, the fuels cannot be derived from cleared forest or wetlands. However, the EU computed a GHG savings of 15% for palm oil, which would block entry of biodiesel produced from Malaysian and Indonesian palm oil into the EU market.

Neste wants its Malaysian palm oil supplier to investigate accusations that it has illegally cleared forest on Borneo to acquire

palm oil, and it now is planning its own enquiries into Malaysia's IOI Corp. after recent reports of IOI bulldozing large tracts of land in the Indonesian part of Borneo to expand its plantings.

Neste has not stated publicly how much palm oil it is buying from Malaysia or Indonesia for its Singapore plant, although it indicated earlier it planned to buy from these two countries. It also plans to process animal fat from Europe and Australia at the Singapore site into renewable diesel.

When completed, Neste Oil's renewable diesel plant in Singapore will be the world's largest, with a capacity of 800,000 metric tons per year.

### Potential for biodiesel from sewage sludge

According to a review article by David M. Kargbo (US Environmental Protection Agency Region III, Philadelphia, Pennsylvania, USA) appearing in *Energy & Fuels* (24:2791–2794, 2010), existing technology

can produce biodiesel fuel from municipal sewage sludge that is within a few cents a gallon of being competitive with conventional diesel refined from petroleum.

US wastewater treatment facilities produce 7 million dry metric tons of sewage sludge annually, and the amount is expected to increase in the future. Significant concentrations of lipids in sludge are derived from their direct adsorption onto the solid material, including triglycerides, diglycerides, monoglycerides, phospholipids, and free fatty acids. In addition, the cell membranes of microorganisms used in the treatment process are composed primarily of phospholipids.

According to the review, "up to 36.8 wt% of the dry sludge is comprised of fatty acids and steroids. With the fatty acids from sludge predominantly in the range of C10 to C18, these are excellent for the production of biodiesel."

Major challenges include how best to collect the different lipid fractions and achieve maximal extraction, choice of solvents for the transesterification reaction, soap formation and product separation.

CONTINUED ON PAGE 464

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## Briefs

The US Department of Agriculture (USDA) has moved to eliminate use of algal DHA (docosahexaenoic acid) and ARA (arachidonic acid) in organic baby formula and organic milk. USDA is not challenging the safety of the additives. Instead, it says the administration of President George W. Bush did not follow proper procedures when it listed the fatty acids as allowable non-organic ingredients.

"The USDA plans to issue a draft guidance later this year that would give food makers a grace period to reformulate their lines. The public will have 60 days to comment, after which the USDA will issue a final decision," an article in *The Wall Street Journal* notes.

■ ■ ■

A low-carbohydrate, ketogenic diet or orlistat therapy combined with a low-fat diet led to similar beneficial effects on weight, serum lipids, and glycemic parameters, say US researchers. Over 48 weeks, 146 study participants (mean age 52 years) with overweight or obesity were treated with either a low-carbohydrate, ketogenic diet (initially, 20 g of carbohydrate daily) or with the over-the-counter weight-loss drug orlistat (120 mg oral dose given three times daily) in combination with a low-fat diet (30% energy from fat, 500–1,000 kcal deficit per day). The primary outcome measures were body weight, blood pressure, fasting serum lipid concentrations, and glycemic parameters.

According to lead author William S. Yancy Jr. (Veterans Affairs and Duke University Medical Centers, Durham, NC), mean weight loss was substantial but similar for the two groups: 11.4 kg for the low-carbohydrate, ketogenic diet group and 9.6 kg for the group treated with orlistat and a low-fat diet. Both treatment strategies improved certain risk factors, such as levels of cholesterol or glucose, and were well-tolerated. Patients on a low-carbohydrate diet, however, showed greater improvement of systolic and diastolic blood pressure compared with the orlistat therapy group. ■

# Health & Nutrition

Courtesy of Michael Bernstein, American Chemical Society



## "Green exercise" boosts well-being

A confession: The following question has nothing to do with fats and oils. Nonetheless, it is of interest to those concerned with nutrition and health.

And now for the question: How much "green exercise" produces the greatest improvement in mood and sense of personal well-being? A study in *Environmental Science & Technology* (doi: 10.1021/es101129n) finds that just five minutes of exercise in a park, on a nature trail, or other green space will benefit mental health.

Jules Pretty and Jo Barton of the UK's University of Essex explain in the study that green exercise is physical activity in the presence of nature. Abundant scientific evidence shows that activity in natural areas decreases the risk of mental illness and improves the sense of well-being. Until now, however, nobody knew how much time people had to spend in green spaces to get those and other benefits.

"For the first time in the scientific literature, we have been able to show dose-response relationships for the positive

effects of nature on human mental health," Pretty said.

From an analysis of 1,252 people (of different ages, genders, and mental health status) drawn from 10 existing studies in the United Kingdom, the authors were able to show that activity in the presence of nature led to mental and physical health improvements.

They analyzed activities such as walking, gardening, cycling, fishing, boating, horse-riding, and farming. The greatest health changes occurred in the young and the mentally ill, although people of all ages and social groups benefited. All natural environments were beneficial including parks in urban settings. Green areas with water added something extra. A blue and green environment seems even better for health, Pretty noted.

From a health policy perspective, the largest positive effect on self-esteem came from a five-minute dose.

"We know from the literature that short-term mental health improvements are protective of long-term health benefits," Pretty said. "So we believe that there would be a large potential benefit to individuals, society, and to the costs of the health service if all



groups of people were to self-medicate more with green exercise,” added Barton.

A challenge for policy makers is that policy recommendations on physical activity are easily stated but rarely adopted widely as public policy, Pretty noted, adding that the economic benefits could be substantial.

Policies that suggest active living point to the need for changes to physical, social, and natural environments, and are more likely to be effective if physical activity becomes an inevitable part of life rather than a matter of daily choice.

## New flaxseed review

A new review paper explores the role of flaxseed as an antioxidant that may protect against cancer and diabetes. The new research appears in *Comprehensive Reviews in Food Science and Food Safety* (9:261–269, 2010).

“Flaxseed has been the focus of increased interest in the field of diet and disease research due to the potential health benefits associated with some of its biologically active components,” according to researchers from the School of Food Science and Technology at Jiangnan University in China, who conducted the review. Their article evaluated current research on flaxseed, its role as a functional food, and any potential benefits it may have against diabetes and certain cancers.

Flax is rich in  $\alpha$ -linolenic acid (ALA), an essential omega-3 fatty acid, and phytochemicals such as lignans. Lignans are found in many cereals and grains, with the highest amounts occurring in flaxseed. Researchers from Canada, England, and China found the following:

Flaxseed lignans might play a role in cancer prevention—specifically in breast, prostate, colon, and skin cancers;

Soluble fiber and other components of flaxseed fractions could potentially affect insulin secretion and maintenance of steady blood sugar.

Lead author Alhassane Touré of the Institute Polytechnic in Guinea states that flaxseed contains natural antioxidants with potential health benefits but more studies need to be conducted to assess any over-dose effects.

## Vitamin E and liver disease

Vitamin E has been shown effective in treating nonalcoholic steatohepatitis (NASH), an obesity-associated chronic liver disease that can lead to cirrhosis, liver cancer, and death. NASH also is related to or a part of type 2 diabetes, lipid disorders, and cardiovascular disease.

The often asymptomatic condition affects 2–5% of the population, although an additional 10–20% of the population has fat in their livers but no inflammation or liver damage, a condition called “fatty liver” that is a precursor to NASH. There is no established treatment.

The government-funded multicenter study was organized by the Nonalcoholic Steatohepatitis Clinical Research Network of the National Institute of Diabetes and Digestive and Kidney Diseases, and is the largest ever placebo-controlled randomized trial of treatment for NASH. Results were published in the *New England Journal of Medicine* (362:1675–1685, 2010).

Beginning in the late 1990s, study of vitamin E for NASH was pioneered in pilot trials by Joel Lavine, now a faculty member at the Department of Pediatrics at Columbia University College of Physicians and Surgeons and chief of gastroenterology, hepatology, and nutrition at New York-Presbyterian/Morgan Stanley Children’s Hospital. Researchers followed patients at nine centers, including the University of California, San Diego, where Lavine was previously on faculty.

“There is an increasing prevalence of nonalcoholic steatohepatitis in this country, something that is directly related to the obesity epidemic,” said Lavine, co-chair of the Network’s steering committee and a coauthor of the study. “The good news is that this study showed that cheap and readily available vitamin E can help many of those with the condition. We also looked at the drug pioglitazone, which showed some benefits, although not as dramatic as with vitamin E.”

Lavine cautions that there are risks with any therapy, even vitamin E, and all treatment should be done under medical supervision. “Individuals who are overweight or have a family history of liver disease should ask their doctor to be tested for the condition. In addition, physicians should be aware

that liver enzyme levels considered normal are actually elevated. Healthy levels are <30 U/L for a man and <20 for a woman.”

In the Pioglitazone or Vitamin E for NASH Study (PIVENS), investigators randomly assigned 247 nondiabetic adults with biopsy-confirmed NASH to receive vitamin E, pioglitazone, or placebo. Vitamin E functions as an antioxidant whereas pioglitazone improves the sensitivity of cells to insulin, a hormone that controls both sugar and fat metabolism.

After 96 weeks of treatment, vitamin E improved all features of NASH with the exception of the amount of scar tissue in the liver; 43% of those treated with vitamin E met the primary end point of the trial, which was a composite of the scores for several features of NASH indicative of disease activity, compared with only 19% of those who received a placebo. Pioglitazone also improved many features of NASH and met the primary end point in 34% of individuals who received it but fell short of statistical significance. Pioglitazone treatment led to an average weight gain of 10 pounds (4.5 kg) over the 96-week duration of this study. Liver enzyme tests, which are commonly used to assess liver injury, also improved in those who received either pioglitazone or vitamin E. However, upon stopping the medications, the liver enzymes worsened again, suggesting the need for long-term treatment.

The study was conducted in those with NASH who did not have diabetes, and the benefits of either drug for those with NASH who also have diabetes remain unknown. Also, the study lasted for only two years, and the potential long-term benefits and risks of taking vitamin E or pioglitazone in these doses are uncertain.

Lead author of the study and the other NASH Clinical Research Network co-chair is Arun Sanyal, professor of medicine and chairman of the Division of Gastroenterology at Virginia Commonwealth University in Richmond.

## DHA and memory

The Memory Improvement with Docosahexaenoic acid (DHA) Study (MIDAS) published online in early May in *Alzheimer’s & Dementia: The Journal of the Alzheimer’s Association* showed that algal DHA improved memory function in healthy aging

adults, providing a benefit roughly equivalent to having the learning and memory skills of someone three years younger.

MIDAS is the first large, randomized, and placebo-controlled study demonstrating the benefits of algal DHA in maintaining and improving brain health in older adults. The goal of MIDAS was to evaluate the effects of algal DHA on cognitive outcomes in healthy elderly people with a mild memory complaint, according to algal DHA maker Martek Biosciences (Columbia, Maryland, USA), which funded the study.

MIDAS found that healthy persons with memory complaints who took 900 mg algal DHA capsules for six months had almost double the reduction in errors on a test that measures learning and memory performance vs. those who took a placebo, a benefit roughly equivalent to having the learning and memory skills of someone three years younger. The DHA was well tolerated, and subjects taking the DHA also experienced a lower heart rate, providing a significant cardiovascular benefit.

The study population included 485 people 55 years and older at 19 US sites who were considered to have age-related cognitive decline. Age-related cognitive decline is defined as decline in cognitive functioning consequent to the aging process that is within normal limits given a person's age. For example, individuals may report problems remembering names or appointments or may experience difficulty solving complex problems.

The primary end point was a cognitive test of memory and learning called the CANTAB Paired Associate Learning (PAL). CANTAB PAL is an assessment of visual memory and new learning, and is a useful tool for assessing patients with age-related memory loss.

## The natural history of soy allergy

Approximately 0.4% of children are affected by allergy to soy, and it is believed that the majority of children with soy allergy develop tolerance in early childhood.

Researchers at Johns Hopkins University School of Medicine in Baltimore, Maryland, USA, sought to describe the natural history of soy allergy and identify predictors of oral tolerance/outgrowing soy allergy. Records of patients with a soy allergy were reviewed and data were collected including soy allergy-related symptoms, history of other food allergies and atopic diseases, soy-specific IgE (immunoglobulin E) levels, peanut-specific IgE levels, and food challenge results.

The study found that approximately 50% of children with soy allergy outgrew their allergy by the age of seven years. Absolute soy IgE levels were useful predictors of outgrowing soy allergy. The work appeared in the *Journal of Allergy and Clinical Immunology* (125:683–686, 2010). ■

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“Supplies of oleic fatty acids are tightening as the material is being used to make dispersants—a key product that BP is using to break up a massive oil spill in the Gulf of Mexico,” buyers and sellers told ICIS News in mid-May. Fatty acid producers include Procter & Gamble, Vantage Oleochemical, Emery Oleochemicals, and Dial, the ICIS report noted.

■ ■ ■

Siltech Corp. has acquired Rhodia’s manufacturing facility in Mississauga, Ontario, Canada. Siltech will continue to manufacture Rhodia’s products under a long-term contract. Novecare products produced at the facility are used in shampoos, detergents, soaps, paints, lubricants, and hard-surface cleaners.

■ ■ ■

A team of scientists in the United Kingdom and the Netherlands are reporting evidence that soil microbes have become progressively more resistant to antibiotics over the last 60 years. This trend continues despite more stringent rules on use of antibiotics in medicine and agriculture, and improved sewage treatment technology that broadly improves water quality in surrounding environments. The report appears in *Environmental Science and Technology* (44:580–587, 2010).

■ ■ ■

The Estée Lauder Companies Inc. announced in mid-May that it was acquiring Smashbox Beauty Cosmetics, Inc., a privately held, photo studio-inspired prestige cosmetics company based in Los Angeles, California, USA. The acquisition was expected to close in July 2010.

■ ■ ■

The National Association of Chemical Distributors (NACD) told ICIS News in May that it hopes to create a global standard for its program to improve health, safety, and other areas. The NACD said it plans to set a single standard for the US, Canada, Brazil and Mexico before the end of the year.

“We want to gain greater recognition for Responsible Distribution

# Surfactants, Detergents, & Personal Care News



Rich Sedlak (left), senior vice president, technical and international affairs for the American Cleaning Institute, congratulates Michael Incorvia, who accepted the ACI Distinguished Paper Award on behalf of himself and his coauthors during the 101st AOCS Annual Meeting & Expo.

## ACI Distinguished Paper Award

Aroma chemicals are used to enhance a variety of cleaning, fabric, and personal care products. Researchers are now making strides in understanding how to formulate products that clean, condition, and deliver fragrance more effectively.

A team of researchers from Cornell University (Ithaca, New York, USA) and International Flavors & Fragrances Inc. (IFF; New York, USA) received the American Cleaning Institute (formerly The Soap and Detergent Association) Distinguished Paper Award for the most outstanding research article published in 2009 in the *Journal of Surfactants & Detergents (JSD)*.

The honorees include S. Kay Obendorf, Haiqing Liu, and Kuitian Tan of Cornell; Timothy Young of IFF; Michael Incorvia,

formerly of IFF (now of Sheridan Ross PC); and Michael Leonard, formerly of IFF.

Their paper, “Adsorption of Aroma Chemicals on Cotton Fabric in Different Aqueous Environments,” provides insight into why certain water-based surfactant products interact differently with different fabrics and the materials contained within the product formulation, explains researcher Michael Incorvia.

IFF’s Timothy Young says the findings of this research will aid perfume and surfactant formulators to develop products that not only clean and condition more effectively but also deliver fragrance more effectively.

The ACI Distinguished Paper Award was presented during the annual luncheon of AOCS’ Surfactants and Detergents Division, which is responsible for selecting the annual award recipient. AOCS Press and Springer Science + Business Media publish *JSD*.

CONTINUED ON NEXT PAGE



globally so suppliers like Shell, Dow, and BASF, who deal with distributors in different countries, will know they are working with partners that follow top environmental, health and safety practices,” NACD’s Chris Jahn said in an interview with ICIS.

■■■

Germany’s Cognis has introduced its Disponil NG series of alkylphenol ethoxylate-free, volatile organic compound-free surfactants. According to Cognis, the surfactants offer several benefits in the emulsion polymerization process as well as in end users’ applications, such as being gel-free, showing fast foam decay, and having low pour points.

■■■



Bar soap accounted for 58% of the Russian market for bath and shower products by volume in 2009 (versus 59% in 2008), liquid soap for 16.2% (15.6%), bath foam for 5.6% (6.1%), shower gel for 20% (19.1%), and multipurpose products for 0.2% (0.2%)—all according to market research firm ACNielsen. In addition, the Russian bar soap market outpaced the liquid soap market about four times by volume.

■■■

BASF is investing \$1.4 billion in new capacity at its Nanjing, China, site, to raise ethylene capacity from 600,000 to 740,000 metric tons/year and build 10 new plants downstream. New products will include 2-propylheptanol, nonionic surfactants, amines, and super-absorbent polymers, according to ICIS News ■

## P&G introduces sustainability scorecard

The Procter & Gamble Co. (Cincinnati, Ohio, USA) has introduced a sustainability scorecard and rating process to measure the environmental performance of its key suppliers. The new scorecard will assess P&G suppliers’ environmental footprint by measuring energy use, water use, waste disposal, and greenhouse gas emissions on a year-to-year basis.

The company says the scorecard will be “open code” for use by any organization to help determine common supply chain evaluation processes across all industries.

The scorecard is similar to Wal-Mart’s sustainability index in that it asks questions about the sustainable practices of its suppliers including climate change action, greenhouse gas reduction targets, and renewable energy use, among other measures. P&G has been directly affected by Wal-Mart’s efforts—by one measure, made back in 2007, meeting Wal-Mart’s sustainability goals has cost P&G hundreds of millions of dollars (see <http://tinyurl.com/33zv7j>).

Just as Wal-Mart’s scorecard has had a large effect on its suppliers, P&G says its rating system has the ability to encourage environmental improvement across its global network of suppliers—which represents approximately 75,000 businesses and \$42 billion in spending each year.

P&G says its scorecard is the culmination of 18 months’ work, which included input from a supplier sustainability board made up of more than 20 leading supplier representatives from P&G’s global supply chain. The scorecard relies on protocols from the World Resources Institute, the World Business Council for Sustainable Development, and the Carbon Disclosure Project to, according to P&G, minimize redundant efforts. “Our suppliers wanted a tool that was flexible yet grounded in existing measurement standards,” said Rick Hughes, P&G global purchasing officer.

The scorecard is specifically designed to focus on, and encourage, year-on-year improvement—regardless of a supplier’s total size or the current stage of its sustainability program. A timeline for roll-out beyond P&G’s key suppliers will be determined down the road.

Suppliers will have a full year to prepare to report their data before the rating can adversely affect their supplier rating with P&G. In the future, P&G will use the scorecard to determine each supplier’s sustainability rating as part of P&G’s annual supplier performance measurement process—which also is similar to Wal-Mart’s system.

The scorecard is available at <http://tinyurl.com/2w57qbl>.

## “Green” household cleaning market expands

With more consumers interested in adopting a “green” lifestyle, the marketplace for socially responsible, sustainable, ethical, and eco-friendly products is primed for innovation after holding its own during the recession, according to “Green” Household Cleaning Products in the US: Bathroom Cleaners, Laundry Care and Dish Detergents and Household Cleaners by market research publisher Packaged Facts.

Retail sales of green cleaners in 2009 totaled \$557 million in the United States—split between \$339 million from green household cleaning products and \$218 million from green laundry products—to account for 3% of the total household and laundry cleaner retail market. Packaged Facts estimates retail sales of green cleaners grew 229% between 2005 and 2009, more than doubling their footprint in dollar terms and more than tripling their share of the total household cleaner market.

“Emotional-, therapeutic- and sensory-influenced benefits such as family safety, health and wellness, aromatherapy, style and design, and environmental concerns have emerged as important drivers in the segment,” says Don Montuori, publisher of Packaged Facts. “As green marketers better connect their products to these aspects of consumer preference the market will continue to make a transition from niche to mainstream and ultimately approach \$2 billion in sales by 2014 based on our expectations.”

Packaged Facts’ proprietary online green clean consumer usage survey conducted in February 2009 and February 2010 reveals that the green household cleaners market is capitalizing to some extent on



several opportunities for growth including increased visibility through the media, expanded distribution and retail channels by eco-specific green marketers, and the introduction of mass-marketer brand extensions.

As of February 2010, 42% of adult consumers reported having used a natural, organic, or ecologically friendly household cleaning/laundry product within the previous 12 months compared to 38% of respondents revealed in the February 2009 survey. The 42% usage rate for green household cleaners translates to 48 million households. When weighed against the market's \$557 million in sales, the amount spent on green cleaners equates to almost \$12 per customer household.

For more information on the report, visit <http://tinyurl.com/28pmfxw>.

## Croda sells Emmerich site

Croda International Plc announced in May 2010 that it had agreed to sell its Emmerich oleochemicals manufacturing site and associated business in Germany to KLK Emmerich GmbH, a subsidiary of the KLK Group (Kuala Lumpur Kepong Bhd.), for 60.5 million euros (about \$76.8 million). The Emmerich site produces fatty acids and glycerine, most of which have been sold into Croda's Industrial Specialties market.

"The disposal largely completes Croda's restructuring program to reposition

its oleochemical operations following the acquisition of Uniqema in 2006," *Chemical Week* magazine noted.

Completion of the sale was contingent on German antitrust clearance and approval by the Malaysian Central Bank.

## Emery Oleochemicals to expand

ICIS Chemical Business reported in early May 2010 that Malaysia's Emery Oleochemicals has begun a five-year expansion plan, "relying on a time-tested strategy of combining advantaged feedstock with specialty products."

Emery is a joint venture (JV) between Malaysia's Sime Darby and PTT Chemical International, the investment unit of Thailand's largest petrochemical producer, PTT Chemical.

The ICIS article points to Emery's strategy of "combining advantaged feedstock with downstream production" as a familiar one in petrochemicals, "and one that other oleochemical producers may adopt."

As part of its strategy, Emery will increase fatty acid production capacity from its current 600,000 metric tons (MT)/year to well over 900,000 MT/year, the ICIS article noted.

In other news about oleochemicals, four Indonesian producers of crude palm oil (CPO) are planning to spend about \$1.5 billion to build oleochemical factories, an official of the Industry Ministry told Asia Pulse newswire in May. Wilmar Indonesia, PT Permata Hijau, PT Musimas, and PT Astra Agro Lestari plan to build their factories in industrial clusters, Upstream Chemical Industry Director Alexander Barus said.

Foreign investors from Taiwan and South Korea have also indicated interest in investing in the downstream sector of the palm oil industry. Barus said the government plans to build industrial clusters for the downstream sector of the palm oil industry in Maloy in East Kalimantan, Dumai and Kuala Enong in Riau, and Semangke in Medan, North Sumatra.

Oleochemicals that will be manufactured at the sites include polyethoxylated derivatives, oxygenated fatty acid esters, and fatty acid amides.

## New APE-free surfactants introduced

Air Products (Lehigh Valley, Pennsylvania, USA) has introduced two new surfactants for the architectural coatings market that are alkylphenol ethoxylate (APE)-free and specially targeted for zero-VOC (volatile organic compound) coating formulations.

Carbowet 13-40 is a VOC- and APE-free alternative to 30-40 mole ethoxylate surfactants for use in waterborne coatings, inks, and adhesives. It provides substrate wetting, pigment wetting and stabilization, and emulsification in a variety of applications and polymer systems, according to Air Products.

EnviroGem 2010 is a solvent- and APE-free surfactant that contributes no VOC to zero-VOC coating formulations and provides substrate wetting and pigment wetting in architectural coatings. ■

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# People News/ Inside AOCS

## Obendorf recognized by AATCC, ACI

The American Association of Textile Chemists and Colorists (AATCC) honored AOCS member **S. Kay Obendorf**, professor of fiber science and apparel design in Cornell University's College of Human Ecology, with the Olney Medal for outstanding achievements in the field of textile chemistry May 19 at the AATCC's International Conference in Atlanta, Georgia, USA.



"Her scholarly work provided critical advances in textile chemistry and fiber science and contributed toward a better understanding of the surface chemistry of fibers and films and their performance," said AATCC's announcement. "She made outstanding contributions in the areas of pesticide protective clothing, fiber morphology, detergency and functional textiles."

The announcement also noted, "She did groundbreaking work in the area of the underlying chemistry of soils and their interactions with fibers that furthered the basic understanding of the methods and processes of fabric care—because of Kay Obendorf's work, your clothes get cleaner and resist stains better today than they did before her discoveries."

Obendorf has also investigated how textile fibers absorb and retain odor. AATCC said, "Because of Obendorf's work, your clothes may smell fresher, for longer."

At the AOCS Annual Meeting & Expo held May 16–19 in Phoenix, Arizona, USA, the American Cleaning Institute (ACI; formerly called the Soap and Detergent Association) presented its Distinguished Paper Award to Obendorf and her co-workers for the best technical paper appearing in the *Journal of Surfactants and Detergents* in 2009.

## New hires at Sapphire Energy

Sapphire Energy (San Diego, California, USA), one of a number of biofuel companies trying to turn algae oil into commercially viable fuel, appointed **James Lambright**, former head of the US Export-Import Bank and former chief investment officer of the Treasury Department's Troubled Asset Relief Program (TARP), to serve as the company's chief financial officer in March. His role will be to increase the company's access to all finance markets.



On April 15 **Dan Sajkowski** joined Sapphire as senior director, downstream technology. He comes to Sapphire after 24 years with BP (Amoco). According to company president **Cynthia J. Warner**, "Having [Sajkowski's] level of expertise in oil refining is critical as we move closer to commercializing our algae-based green crude. Because our green crude can be refined into drop-in replacement liquid transportation fuels, we take full advantage of the existing oil infrastructure, from refining through distribution," which Warner pointed out as Sajkowski's area of strength for the company.



## New VP with Solazyme

In May, Solazyme, Inc. hired **Adriano Galvez** as senior vice president (VP) of manufacturing and process development. He will be responsible for scale-up and commercialization for the South San Francisco

(California, USA) company, including optimization of processes in the company's three product areas: fuels and chemicals, nutritionals, and health sciences.

Solazyme is perhaps best known for its role in fuels and chemicals, but it also supplies algal oils to the food, nutritionals, and health sciences markets. Galvez will use his technical background in chemical and biomass processing to oversee major manufacturing projects for Solazyme. Galvez has a background in cellulosic ethanol biotechnologies.

## Cerrotti joins Oxford Instruments

The new product marketing manager for Oxford Instruments Magnetic Resonance (Tubney Woods, Oxfordshire, UK) is **John Paul Cerrotti**. The company announcement said



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|  | Flash Point               |
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| Analytical@dallasgrp.com                           |                           |

Cerrotti will work with existing and prospective users to develop new applications, capabilities, and instrumentation that will solve important analytical problems.

Cerrotti "will be working in a range of industries, including food and beverage, polymer, personal care, pharmaceutical, chemical, materials, and oil and gas," said **Jeff Jefferson**, general manager. Oxford Instruments provides a line of low-field nuclear magnetic resonance spectrometers.

## French Oil Mill names new director, marketing coordinator

The stockholders of the French Oil Mill Machinery Company (FOMMCO; Piqua, Ohio, USA) elected **Dane A. Belden** to serve on the company's board of directors in February, thus increasing the number of French Oil directors to eight. Belden has many years of privately held company management experience in the industrial environment, producing both capital and consumer goods. He most recently served

as president and chief operating officer of the Peerless Group (Sidney, Ohio), a bakery equipment provider.

French also recently announced the appointment of **Taylor "Tayte" French Lutz** as the company's marketing coordinator. Lutz will be responsible for market analysis, brand management, and all marketing campaigns at French Oil. She is the fourth generation of the French family to be employed by FOMMCO.

Lutz comes to French Oil with eight years of experience in marketing, business analysis, sales, and buying in the fashion industry. She also worked at French Oil for several summers, while in school.



*Four generations of the French family: Taylor French Lutz and her father, Daniel P. French, are flanked by portraits of Alfred W. French, Jr. (left) and company founder Alfred W. French (on the right).*

## OBITUARY

### DAVID WAYNE SHOCKLEY

David W. Shockley, of Bartlett, Tennessee, USA, died on August 26, 2009, at the age of 55. Shockley had been a member of AOCS since 1991.

Shockley attended Freed-Hardeman University (Henderson, Tennessee) and received an associate's degree. He was employed by Kraft Food Ingredients and its subsequent embodiments, including ACH Food Companies, where he was manager of technologies.

He is survived by Judy, his wife of 35 years, and his children Phillip and Christie.

## AOCS Methods Electronic Access

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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

## 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 horse, provided by the Stephen and Lucy Chang endowed fund.

**Deadline:** October 15 

## 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 



## ACI/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 American Cleaning Institute 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 industrial 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 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.



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 and 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 

## Ralph Holman Lifetime Achievement Award

The Health and Nutrition Division established the award to annually recognize an individual who has made significant contributions to the Division's field of interest, or whose work has resulted in major advances in health and nutrition.

*Nature of the Award:* \$500 honorarium and a signed print.

*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 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 USA Section.

*Nature of the Award:* \$1000 honorarium, travel-and-expense allowance, 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 \$100 to \$500 and a certificate.


*Deadline:* Varies from October 15 to January 15 

## Alton E. Bailey Award

This award is supported by 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.

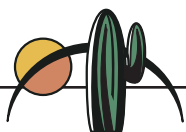
*Deadline:* November 1 

 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 Cincinnati, Ohio, USA from May 1-4, 2011.

## AOCS Awards contact

Email: [awards@aoocs.org](mailto:awards@aoocs.org) • Web: [www.aoocs.org/member/awards](http://www.aoocs.org/member/awards)





# 101st AOCS Annual Meeting & Expo

The numbers illustrate the vitality of AOCS in its 101st year: More than 1,600 registrants from 49 countries attended the AOCS Annual Meeting & Expo in Phoenix, Arizona, USA, May 16–19, 2010.

For the first time, AOCS provided a live webcast of the Annual Business Meeting and keynote address. Visitors to the newly updated [www.aocs.org](http://www.aocs.org) on Tuesday, May 18, heard Rick Theiler of The Dial Corp. address sustainability innovation in the chemicals and consumer product goods (CPG) industries.

Theiler, who is senior vice president, Research and Development, noted that sustainability “is not an end point but rather a journey.” The chemical materials industry is the second-most intensive greenhouse gas contributor, he said. Freshwater reserves continue to shrink, which adds to the dilemma faced by the CPG industries.

“We are champions of global consumerism,” Theiler said, “and we are positively impacting the rise in affluence globally. On the other hand, we are leading contributors to overall environmental impact.”

If developing markets in Asia and Latin America achieve the levels of consumption of developed countries, natural resource consumption will exceed the earth’s bio-capability by 2040. (Currently, consumer spending accounts for up to 60% of the gross domestic product in the United States and Western Europe, Theiler said.)

He also detailed the approach of Dial’s parent company—Henkel—to sustainability. Henkel sets five-year goals in five focal areas:



*Outgoing AOCS President Ian Purtle, keynote speaker Rick Theiler, and incoming President J. Keith Grime pose after the Annual Business Meeting.*

energy and climate, water and wastewater, safety and health, materials and waste, and social progress. The company also conducts life cycle analyses of all products, beginning with raw materials and continuing through use and disposal.

“The actual use of products has the biggest impact on the environment,” Theiler noted.

For example, in the United States alone, consumers use up to 17 billion gallons (more than 64 billion liters) of water per year just washing their hands. Use of a pre-foaming hand wash can reduce water consumption by up to 40%, which can save up to 6 billion gallons of water per year.

Led by Arizona State University and the University of Arkansas, a new organization known as the Sustainability Consortium has been formed to develop sustainability measurement and reporting standards for consumer products. Industrial partners from four different sectors are involved in the effort. The sectors include the personal and home care, consumer electronics, food and agriculture, and residential lighting industries.

“In the end, we are all stakeholders for insuring a sustainable global value chain,” Theiler emphasized.











# Seven receive high honors from AOCS

"If you ask me the secret to getting an award like the Award of Merit, here it is: Be a volunteer," said Keshun Liu as he accepted the award at the 101st AOCS Annual Meeting & Expo (AM&E) in Phoenix, Arizona, USA. Liu is a research chemist with the Agricultural Research Service of the US Department of Agriculture.

Liu has been a tireless volunteer since he joined AOCS in 1992. His service to the Protein and Co-Products Division includes stints as chairperson, vice-chairperson, secretary/treasurer, and member-at-large. He has written or edited several AOCS Press books, one of which has been translated into Chinese. In addition, he has served as a contributing editor for *inform* and as a reviewer for the *Journal of the American Oil Chemists' Society* (JAOCS).

Liu's leadership extends to technical program development. He has organized or co-organized at least 18 symposia and delivered more than 35 presentations at the AOCS AM&E and AOCS-sponsored conferences. He has furthered AOCS' international reach through his work organizing the 2002 China & International Soy Conference and Exhibition in Beijing, China, and has promoted closer ties between AOCS and Chinese researchers through the Chinese Cereals and Oils Society.



2010 AOCS Award of Merit recipient Keshun Liu (US Department of Agriculture, Agricultural Research Service). He is pictured with outgoing AOCS President Ian Purtle (left) and incoming AOCS President J. Keith Grime.

The Award of Merit is presented annually for productive service to 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 information, see <http://tinyurl.com/AwardofMerit>.

## 2010 AOCS FELLOWS HONORED

Also honored at the 101st AOCS AM&E were six new AOCS Fellows: Albert J. Dijkstra, Levente L. Diosady, Walter E. Farr, Apostolos K. Kiritsakis, Dharma R. Kodali, and Edmund W. Lusas.

The distinction of "Fellow" is given to "veteran AOCS members whose achievements in science entitle them to exceptional recognition or who have rendered unusually important service to the Society or to the profession," according to the AOCS Bylaws. A candidate must have been an AOCS Member for a minimum of 15 years.

For more information, see <http://tinyurl.com/AOCSFellows>.

**Albert J. Dijkstra** was recognized for his innovative theories and accomplishments in the oilseed processing industry. He has made valuable contributions to many areas of processing, including degumming, bleaching, blending, countercurrent processes, fractionation, and hydrogenation. Although he is officially retired (to the proverbial south of France), he continues to be active in the field of edible oils and fats as an author, editor, inventor, and scientific consultant.



Dijkstra has been an active member of AOCS for more than 20 years. He wrote the chapters dealing with oil refining and modification processes and was co-editor of the third edition of *The Lipid Handbook* from CRC Press. In addition, he translated the classic *Recherches Chimiques sur les Corps Gras d'Origine Animale* by M.E. Chevreul.

Dijkstra has also received the 2009 Chevreul Medal from the Association Française pour l'Étude des Corps Gras (AFECG; French Association for the Study of Fat Substances), the 2009 AOCS Alton E. Bailey Award, the 1997 AOCS Stephen S. Chang Award, and the 2002 European Lipid Technology Award from the European Federation for the Science and Technology of Lipids (Euro Fed Lipid).

**Levente L. Diosady** is a professor at the University of Toronto in Ontario, Canada. He has been recognized internationally in the areas of food processing and nutraceuticals. His research has had a major impact in Africa and Asia through the Canadian International Development Agency and the United Nations Children's Fund (UNICEF), where



**"If you ask me the secret to getting  
an award like the Award of Merit,  
here it is: Be a volunteer."**

his pioneering work on fortification of salt with iron significantly reduced anemia in children. As a food engineer, his research has contributed significantly to oilseed processing, catalytic hydrogenation, and meat curing, as well as the extraction of proteins by membranes.

Diosady has been an AOCS member for 30 years and is a founding member of the Canadian Section of the AOCS (CAOCS), for which he has served as chairperson. He co-established the CAOCS scholarship fund, and has organized and chaired sessions at several AOCS meetings.

Diosady has received the Engineering Medal for Research and Development (2003; Professional Engineers of Ontario), the W.J. Eva Award of the Canadian Institute of Food Science and Technology (2007), and was elected to the Canadian Academy of Engineering (2008).

**Walter E. Farr** is president of The Farr Group of Companies in Memphis, Tennessee, USA. He has contributed to the oil extraction, refining, and biodiesel industries through technology development. His Farr Process improves yields and quality while reducing energy requirements, air emissions, and water discharge. In addition, his high-solubility soybean meals with reduced lysine supplementation requirements have become the standard for professionally supervised poultry and swine producers. Beginning in the 1980s and continuing to the present, Farr has helped to develop the Oil Refining and Processing Short Course at Texas A&M University, in cooperation with Ed Lusas and Les Watkins.



He has been a member for over 35 years and has made numerous presentations at AOCS events, as well as lecturing at short courses and acting as a session chairperson. He is a past president of the Mid-South Section of the AOCS and was a founder of the AOCS Processing Division.

Farr received the AOCS Processing Division's Lifetime Achievement Award in 2004. He also serves as a contributing editor for *inform*.

**Apostolos K. Kiritsakis** is a professor at the Alexander Technological Education Institution in Thessaloniki, Greece, and is a world-renowned researcher on olives and olive oils. He has researched olive oil quality, chemistry, adulteration, and nutritional and health effects of olives and olive oil. Kiritsakis also has made significant contributions to the Greek and foreign olive industry by applying Hazard Analysis Critical Control Points to olive processing factories and through the development of traceability systems.



Kiritsakis has been an AOCS member for almost 35 years and has participated in a number of AOCS AM&E, joint AOCS meetings,

and short courses. He served as an associate editor and reviewer for *JAOCS*, and as an author of *Olive Oil* (AOCS Press).

**Dharma R. Kodali** is managing director of Global Agritech Inc. in Minneapolis, Minnesota, USA. As an innovative and hands-on researcher, he has contributed significantly to fats and oils research and utilization. His work has focused on the development of value-added products from agricultural raw materials for industrial and food uses, from concept to commercialization.



Kodali has been an AOCS member for over 25 years and was a founding member of the Industrial Oil Products Division, acting as chairperson from 2002–2004. He has served on the Books and Special Publications Committee, as an associate editor of *JAOCS*, and as a speaker and session organizer for several short courses and annual meetings.

Kodali has also received the Industrial Innovation Award from the American Chemical Society (2002) and the AOCS Timothy L. Mounts Award (2003).

**Edmund W. Lusas**, who is retired, had a distinguished career as a professor, an administrator, an inventor, and as a consultant to the food industry in the areas of fats and oils and protein technology.



He reorganized the Food Protein Research & Development Center (FPRDC) at Texas A&M University and expanded it by adding the Fats and Oils Program and Facilities and the Extrusion Program. Under his leadership, the FPRDC became a leading center of excellence in oilseed processing in the United States.

Lusas has been an AOCS member for over 30 years. In 1982, he was the organizing chairperson for the Proteins and Co-Products Section, becoming its first chairperson the following year. He has organized numerous short courses, annual meeting sessions, and was a member of the organizing committee for several AOCS world conferences. He was an associate editor for *JAOCS* and served on the AOCS Governing Board in 1988–1989.

Lusas has also received the AOCS Award of Merit (1996), the Meritorious Service Award from the Proteins and Co-Products Section (1985), and the Archer Daniels Midland Best Paper Award (1987).







# Dietary n-3 and n-6 fatty acids compete for accumulation in tissues as 20- and 22-carbon highly unsaturated fatty acids (HUFA)

**Bill Lands**

*The following article is based on the address given by Bill Lands, the 2010 Ralph Holman Lifetime Achievement Award winner. His address was given at the 101st AOCS Annual Meeting & Expo, held in Phoenix, Arizona, USA, May 16–19.*

The vitamin-like essential fatty acids were conceived in 1929 (as I also was). Over the years, knowledge of 18-carbon omega-3 (n-3) and omega-6 (n-6) polyunsaturated fatty acids (PUFA) grew to include details of their metabolism to 20- and 22-carbon highly unsaturated fatty acids (HUFA) and selective accumulation of HUFA at the 2-position of membrane phospholipids. HUFA are released when various stimuli activate cellular phospholipases, and the released HUFA form potent eicosanoid hormones that have receptors on nearly every cell in the human body. Thus, these vitamin-like nutrients and their derived hormones affect a wide range of physiological and pathological events.

Excessive n-6 hormone actions cause more severe atherosclerosis, arthritis, asthma, bone loss, cancer growth, heart attacks, immune-inflammatory events, length of hospital stays, plus major depression, suicide, classroom disruptions, and unproductive workplace behaviors. An important difference between the n-3 and n-6 types of hormone is that n-6 actions tend to be more vigorous and intense than those of n-3. Primary prevention of excessive activation of many hormone receptors will likely prevent many severe chronic immune-inflammatory diseases that every year cause more than a trillion dollars of loss in the United States. Clearly, the longer we keep people healthy, the less health care treatments need to be paid and the less personal and corporate financial loss occurs.

The proportion of n-6 hormone precursors in tissue HUFA strongly correlates with cardiovascular mortality rates in several



Lowering the proportion of n-6 in HUFA from the 78% now common to 50% will likely lower the CHD mortality rate by more than half.

populations (Lands, 2003). People with more than 50% n-6 in HUFA have an n-3 deficit and a greater risk of death from heart attacks. The HUFA-associated risk for heart attacks per 100,000 people was estimated to be near  $[3 \times (\% \text{ n-6 in HUFA}) - 75]$ . Overall evidence supports a hypothesis that lowering the proportion of n-6 in HUFA from the 78% now common to 50% will likely lower the CHD (coronary heart disease) mortality rate by more than half, preventing over 800,000 clinical CHD events and 200,000 deaths annually in the United States. For large, self-insured corporations paying a substantial part of employee health care costs, a shift from 78% to 50% may prevent annual losses of \$100 million per 100,000 employees. Health-related absenteeism and presenteeism may cause corporate

losses severalfold greater than medical and pharmacy costs. Thus, employees who eat more n-3 and less n-6 to shift from 78% to 50% n-6 in their HUFA may lower corporate health-related annual losses by \$500 million per 100,000 employees. Any corporation combining HUFA assay status with records of overall health costs will obtain useful internal evidence of corporate benefits in motivating food choices that lower the current n-3 HUFA deficit.

Food choices that prevent a dietary imbalance of n-3 and n-6 nutrients prevent accumulating n-3 HUFA deficits with their excessive proportions of n-6 hormone precursors in tissue HUFA. The enzymes that convert dietary PUFA into tissue HUFA seem fairly diffident about details of the n-3 and n-6 chemical structure, indiscriminately treating them mostly in accord with their relative abundance. As a result, the relative dietary abundance determines the proportions accumulated in tissue HUFA. Neglect in acknowledging quantitative competitive interactions of linoleic acid (18:2n-6) and linolenic acid (18:3n-3) maintains the imprecise belief that the 18-carbon n-3 acid is inherently less able to form HUFA. Investigators reluctant to study dietary conditions beyond those that maintain n-3 deficits continue to misinterpret the nearly equal competitive elongation and desaturation of n-3 and n-6 acids.

Quantitative comparisons of accumulated tissue HUFA derived from the 18-carbon dietary essential fatty acids were first detailed in 1963 by Mohrhauer and Holman and confirmed later in my lab in 1990 and 1992. The observations led to describing an empirical quantitative relationship (<http://efaeducation.nih.gov/sig/hufacalc.html>) that estimates the competitive hyperbolic influence of dietary essential fatty acids on the proportion of n-6 in accumulated

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HUFA of tissues. A simple calculator using the equation estimates likely outcomes from various dietary combinations (<http://efaeducation.nih.gov/sig/dietbalance.html>). The empirical equation was also combined with the US Department of Agriculture's Nutrient

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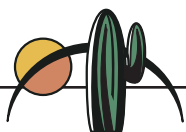
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# Degumming revisited

Albert J. Dijkstra

The following article is based on the address given by Albert J. Dijkstra, the 2010 Timothy L. Mounts Award winner. His address was given at the 101st AOCS Annual Meeting & Expo, held in Phoenix, Arizona, USA, May 16–19.

In 1992, during the AOCS World Conference in Budapest (Dijkstra, 1993), I launched the enzymatic degumming process EnzyMax<sup>®</sup> on behalf of Lurgi, the company that had developed this process. I reported that I had measured low residual phosphorus and iron contents in the enzymatically degummed oil samples Lurgi had given me. So I could not but conclude that the oil would yield good quality oil on physical refining and that the EnzyMax process would therefore compete with my own acid refining process TOP (Dijkstra and Van Opstal, 1989). However, by repeating in this presentation what Lurgi had told me, I also misled the audience by stating that the citrate buffer was added to the oil as such, whereas in actual practice, a concentrated citric acid solution was added first and a dilute caustic soda solution was added quite some time later. In 1998, when presenting a paper on degumming at the AOCS Annual Meeting & Expo in Chicago, Illinois, I rectified this statement by describing the EnzyMax process as an “acid refining process in disguise.”

Since that time, the porcine phospholipase (PLA2) used in the original EnzyMax process has been replaced by microbial enzymes such as the phospholipase A1 (PLA1) enzymes Lecitase<sup>®</sup> Novo and Ultra (Novozymes, Bagsvaerd, Denmark) and the PLA2 enzyme Rohalase<sup>®</sup>

The use of PLC as a degumming agent can increase the oil yield, especially for high-phosphatide oils such as soybean oil that has not yet been water-degummed.

MPL (AB Enzymes, Darmstadt, Germany), and additional microbial enzymes have been developed. One of these is Purifine<sup>®</sup>, a phospholipase C (PLC; Verenum Corp., Cambridge, Massachusetts, USA). As indicated in Figure 1, it catalyzes the hydrolysis of the phosphate/glyceryl bond in phosphatidylcholine (PC) and phosphatidylethanolamine (PE), the major phosphatides in most vegetable oils. This hydrolysis yields diglycerides and phosphate esters of choline and ethanolamine, respectively. These diglycerides are not removed during subsequent refining processes, and since the phosphate esters do not retain any triglyceride oil, the use of PLC as a degumming agent can increase the oil yield, especially for high-phosphatide oils such as soybean oil that has not yet been water-degummed. For these oils, the yield increase amounts to 1% of oil for every 500 ppm of phosphorus present in the crude oil. Purifine PLC does not catalyze the hydrolysis of other phosphatides than PC and PE, so it is not capable of providing an oil that is so low in residual phosphorus and iron that it can be physically refined.

Another enzyme that is used in degumming is LysoMax<sup>®</sup>, a lipid acyl transferase with PLA2 activity (LAT; Danisco AS, Copenhagen,

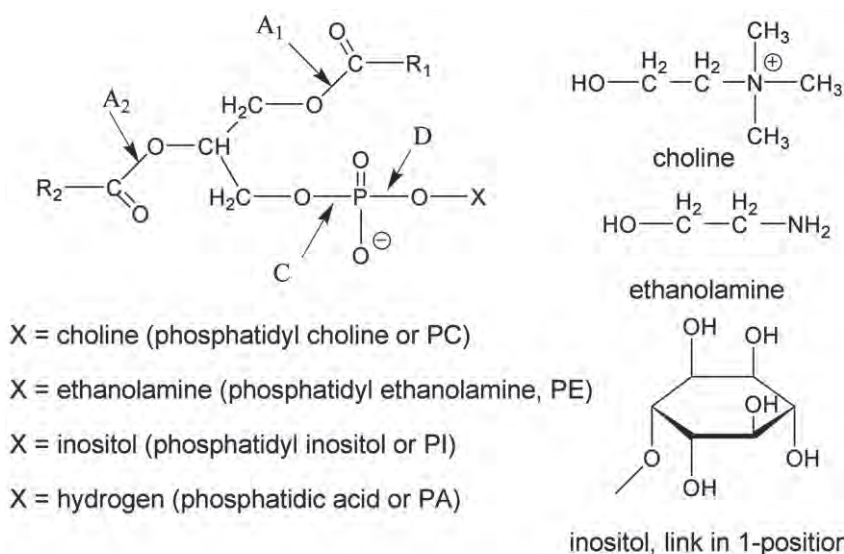


FIG. 1. Chemical structure of various phosphatides.



Albert Dijkstra (left) receives the 2010 Timothy L. Mounts Award from Edible Applications Technology Division Chair Dilip Nakhasi (right) of Bunge Oils Inc.

Denmark). It can abstract a fatty acid moiety from a phosphatide and transfer this to a free sterol or stanol present in the oil and convert this into a fatty acid ester. If no free sterols are present, the enzyme causes free fatty acids to be formed. Its specificity is not limited to PC and PE so that, given time, all phosphatides present in the aqueous enzyme solution end up as lysophosphatides just as when the PLA1 enzyme is used. These lysophosphatides retain less oil than the original phosphatides, so their use in degumming also leads to an oil yield improvement: Hydrolysis reduces the dry gum weight by about 35% and on a dry weight basis, the lysophosphatide gums retain only some 15 weight % of oil as opposed to the non-hydrolyzed gums, which retain 30–35 weight % of oil. In the case of the LAT enzyme, this yield is even further increased because the fatty acids that are attached to sterols are retained and the free sterol loss during deodorization is reduced.

When comparing the porcine PLA2 with the new microbial PLA1 (Lecitase® Novo), Clausen (2001) described the standard Novozymes laboratory degumming procedure that forms the basis of all their presentations, publications, and patent applications. It comprises a 30-minute pre-treatment of the oil with dilute (2.2% w/w) aqueous citric acid, followed by the addition of the amount of caustic soda necessary to reach the pH aimed for. Then the enzyme is added and the experiment is continued for 6 hours. During the entire experiment the oil (0.6 L) is circulated over the reaction vessel at a rate of 1.1 L per minute by a Silverson in-line mixer. This mixer maintains a certain degree of dispersion of the aqueous phase in the oil and thus permits the reactions taking place at the oil/water interface to continue. Consequently, these laboratory experiments show a slow but steady decrease in residual phosphorus content of the oil.

In this respect, the laboratory conditions differ fundamentally from what can be realized on an industrial scale. There, a reaction vessel can be filled with a fine dispersion by using a suitable high-shear in-line mixer, but once this dispersion has entered the vessel, the agitator in this vessel cannot maintain this dispersion. It

coalesces and the rate of reaction at the interface decreases. For an acid refining process such as TOP, this coalescence does not matter since the reaction aimed for, the decomposition of the non-hydratable phosphatides (NHP), is very fast (less than 1 minute), but for the much slower enzyme-catalyzed NHP decomposition, this coalescence is fatal: It stops.

So, contrary to what is commonly taken for granted, industrial enzymatic degumming processes using PLA or LAT and aiming at complete NHP removal achieve this by treating the oil with a strong solution of citric acid that is subsequently neutralized to arrive at the right pH for the enzyme. They are in fact “acid refining processes in disguise.” All the enzyme does is hydrolyze the phosphatides that are already in the aqueous phase so that they retain less oil. This raises the question: Would it not be easier to treat the gums rather than the oil with one or more enzymes and effectuate the gain in oil yield in a separate and much smaller unit? This treatment can be a low-temperature enzymatic or chemical treatment (Kellens and De Greyt, 2010), or it can be a high-temperature hydrolysis that does not require any catalyst (Naudet *et al.*, 1954).

What degumming process should be used where? An oil mill selling partially degummed oil ( $P < 200$  ppm) could do a number of things. It could continue to degum its crude oil with water and sell water-degummed oil. The gums could then be mixed with the meal or treated in such a way that the oil yield improves or the fatty acid moieties are recouped. It could also treat its crude oil with an aqueous solution of PLC at a temperature at which this enzyme does not yet lose its activity, raise the temperature to reduce the oil viscosity, and isolate the degummed oil in a centrifugal separator. Because

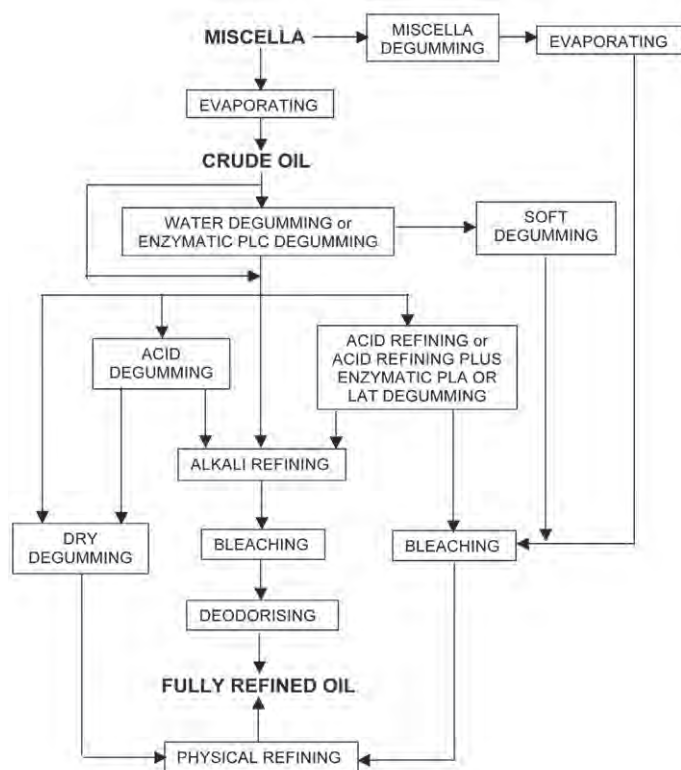
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**FIG. 2.** Flow diagram representing the various refining routes. Abbreviations: LAT, lipid acyl transferase; PLA, phospholipase A; PLC, phospholipase C.

these processes are carried out at the same stage, they have been put in the same box in Figure 2.

Figure 2 also shows a box that refers to a membrane degumming process as applied to the miscella resulting from the extraction process. Such processes have been disclosed in several patents and have been the subject of industrial trials, but since these suffered from serious membrane fouling, the membrane degumming process is not being used industrially.

The dry degumming process has been represented on the left side of Figure 2. The use of this process permits a two-step refining process consisting of the dry degumming step, which also serves to bleach the oil, and the physical refining step. The dry degumming process can be profitably applied to low-phosphatide oils such as palm oil, lauric oils such as coconut oil, palm kernel oil, and animal fats such as edible tallow and lard. For high-phosphatide oils such as most vegetable oils, the amount of bleaching earth required would be so high as to make the process uneconomic. As I mentioned during my presentation, I think that the dry degumming process could profit from further investigation and development. One possibility might involve the partial neutralization of the degumming acid prior to the bleaching earth addition such as disclosed by Nock (1995) for oils containing more phosphatides than the oils now being dry-degummed.

Figure 2 also includes the acid degumming process, but as mentioned before (Dijkstra, 1993), this process does not ensure sufficiently complete removal of phosphatides so it has to be followed by an alkali refining process or a dry degumming process. Accordingly, the acid degumming process can be considered as obsolete.

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# Thought processes leading to discovery

**Ammanuel Mehreteab**

*The following article is based on the address given by Ammanuel Mehreteab, the 2010 Samuel Rosen Memorial Award winner. His address was given at the 101st AOCS Annual Meeting & Expo, held in Phoenix, Arizona, USA, May 16–19.*

As the 2010 recipient of the Samuel Rosen Memorial Award, I was asked to present at the luncheon of the Surfactants & Detergents Division of the American Oil Chemists' Society. I was faced with the challenge of choosing a subject that would be relevant to my audience, yet not too scientific. I decided to discuss the topic of "thought processes" and how they lead to discoveries that may be of interest.

I asked myself several questions: What does the mind go through when solving a problem? Is there a structured way of thinking about problem solving? Can we identify and verbalize this structure so that it can be shared? Can creativity be learned?

All of us have had creative moments. If we can retrace our steps and identify what the effective thought processes are, we can then transfer them from a subconscious level to a more conscious activity that can be repeated and may also be transferred to others. I decided to retrace my own steps and reflect on my experience and experiments when developing soluble cationic-anionic surfactants in order to try to articulate my thought processes along the way. The more I reflected on how I did things, the more I discovered, on a conscious level, how I thought and learned about some of my thought processes. Although verbalizing these thought processes seems to be a challenge, I would like to share some of these thoughts. Chances are that similar thought processes are common to many of us.

## PRECONDITIONS FOR TAKING ACTION

Three major preconditions or steps must be met before starting the rigorous thought process that leads to creativity or innovation. These preconditions include (i) a need to be met or a challenge to overcome, (ii) a desire to take action, and (iii) a decision to take action. Since these steps have to be met to start an action, it is important to know what motivates us to go through each step. As in the proverb "Necessity is the mother of invention," need is the integral starting point. And the perceived importance of the need will lead to the desire and decision to take action. Therefore, concentrating on the benefits of meeting the need, rather than on the difficulty of



*The 2010 Samuel Rosen Memorial Award winner Ammanuel Mehreteab, pictured here third from left. Also pictured are, from left, previous Rosen Award winners Paul Berger, Lee Matheson, and Upali Weerasooriya.*

achieving it, would be an incentive to drive us into taking action. However, does taking action and working hard guarantee success? Or does the approach and method of taking action make a difference? The thought processes undertaken during problem solving and the design and performance of experiments are the crucial final steps leading to creativity and innovation.

## APPROACH TO PROBLEM SOLVING—MAKING FULL USE OF "INTERNAL LIBRARY"

I have found it helpful to first identify the problems to meet a need: Break complex problems into more manageable pieces; and then formulate each problem into basic questions whose answers help solve the problem. The basic questions are How and the five Ws, that is, Who, What, When, Where, and Why. The intention is that answering the questions will help solve the problems, and solving the problems will help meet the need. Answering the basic questions then gives guidance toward meeting the needs when working backward. But where do we find answers to the basic questions?

The normal practice is to look into the readily accessible internal and external sources—that is, our own expertise, available literature, and other experts—to see if similar questions have already been answered. However, when the solution is not available because nobody else has addressed it before, we tend to give up. This is unfortunate because we are failing to fully use our "internal library" (IL), which consists of all our accumulated knowledge and experience. Our expertise, which is a tiny amount of knowledge directly related to the topic of interest, is embedded within the vast IL. Yet,





widely scanning through our entire IL; looking for information, however remotely related to the topic of interest; and processing it would give us a clue that would steer us in the right direction.

When accessing our IL, the type and amount of information we get will depend on part of our IL we target, which in turn depends on how we ask. I ask specific questions that target my expertise in the area of interest. If my expertise is insufficient to give a complete answer, then I ask general questions and scan through the rest of my IL for any related information, however remote it may be. I then analyze the information for any clues that will steer me in the right direction. I follow this iterative process of asking, scanning through my IL, and processing the information for an answer and work backward until the problem is solved.

## CONCEPTUAL DEVELOPMENT OF “PSEUDONONIONIC” SURFACTANT COMPLEX

Let me now give an example of a need I had identified and decided to investigate. The need was to find a surfactant system that is more effective than those commercially available. I started the process of asking, scanning through, and analyzing. The critical questions were: How are surfactants characterized? And how is this related to their structure?

In scanning through my IL, the hydrophilic-lipophilic balance (HLB) method came to mind. HLB is a guide to the emulsifying properties of surfactants. One of the methods of calculating HLB characterizes surfactants by determining the relative size of their hydrophilic portion compared to their lipophilic (hydrophobic) portion. It indicates the appropriateness of a surfactant for preparing an oil-in-water or a water-in-oil emulsion. I then analyzed the application limits of the HLB method as a guide. The same HLB can represent two different molecules (one short and another long) as long as they share a similar relative ratio of their hydrophilic and hydrophobic parts (a potential flaw to the indiscriminant use of HLB).

However, from experience we know that a surfactant with a longer hydrocarbon chain and a correspondingly larger hydrophilic group is more effective than a smaller molecule with the same HLB. Toying with this limitation—and observing that larger molecules of the same HLB perform better—gives the clue that a larger size is one of the characteristics to fulfill. What is important at this stage is not the level of accuracy of the information, interpretation, or analysis; rather, it is the internal gathering of all the scattered possibly relevant information that could help in the process to find clues, that is, a larger molecule would perform better.

Unable to find a larger molecule in the easily accessible part of my IL, I asked myself: Why not make a larger molecule from smaller molecules, for example, by interacting commercially available

anionic and cationic surfactants? But anionic and cationic surfactants are incompatible; they form insoluble complexes. So my solution brought another problem—the problem of insolubility.

To solve the new problem, I went through the process of asking, scanning through the IL, and analyzing the information for an answer or a clue. For example, why are the individual anionic and cationic surfactants soluble but their combination is insoluble? The answer is that the charges that are responsible for the solubility of the ionic surfactants are lost when the surfactants neutralize each other to form the complex. The answer gives some clue for a solution, but not enough.

To tap further into the not-so-closely related but vast part of my IL, I asked a general question: What common substances are soluble in water and why? Immediately, table salt and sugar come to mind. Why are they soluble? Salt because it dissociates into ionic components, like ionic surfactants, and sugar because it has many hydrophilic (OH) groups. This process of asking, scanning through the IL, and analyzing the information gave a clue to the solution: an anionic-cationic surfactant complex with additional polar groups would be soluble. If either or both of the anionic and the cationic surfactants have large enough hydrophilic groups in addition to their charged head, the resulting complex should be water soluble, like nonionic surfactants. A very exciting solution! This exciting solution came with a small problem though: If the resulting solution is clear, how would we know that the anionic and cationic surfactants have interacted? Untested ideas are merely hypotheses and need to be proven experimentally. However, a physical experiment should be preceded by a “thought experiment” in order to be carried out efficiently.

## PROVING THE FORMATION OF A SOLUBLE CATIONIC-ANIONIC SURFACTANT COMPLEX

*Thought experiment.* Before I perform an actual experiment, which by the way should focus on answering one question and only one question, I go through a thought experiment that meets three steps: (i) think of an experiment that would unequivocally prove the hypothesis, (ii) mentally identify all the possible outcomes of the experiment, and (iii) clearly interpret what each possible outcome means before the experiment is performed. The interpretation then will be free of any personal bias on what the results *should* infer. This interpretation should be one that unbiased others would agree to. Applying this process to prove unequivocally whether the complex exists, I resorted back to scanning for a relevant experiment. The ideas of weak acid dissociation and Le Châtelier’s Principle from first-year chemistry courses came to mind. Using the previously discussed steps, I designed a thought experiment:

Prepare an aqueous solution of an acidic anionic surfactant with a partially dissociable proton ( $\text{AH} \rightarrow \text{A}^- + \text{H}^+$ ). Add to it a neutral aqueous cationic surfactant solution. The pH of the resulting solution could go up or down. When an acidic solution is diluted, one expects the pH to go up. However, if the pH goes down, it is an unusual phenomenon. The only way it can occur is if the cationic ion ( $\text{C}^+$ ) interacts with the anionic ion ( $\text{A}^- + \text{C}^+ \rightarrow \text{AC}$ ); then more of the AH will dissociate (Le Châtelier’s Principle), making the already acidic solution more acidic. If this happens it would be an unequivocal proof that an AC complex has formed. In fact, this is what happened experimentally.

*Physical experiment—A. pH profile of A/C solutions (for detailed results, see Mehreteab, 1992).* When an already acidic alkyl phosphate ester (APE) surfactant solution was titrated with a neutral

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tetradecyltrimethyl ammonium bromide (TTAB) cationic surfactant solution, the pH decreased, indicating that the replacement of the proton associated with APE by TTAB resulted in the formation of APE/TTAB complex. As more of the aqueous cationic solution was added to the already acid solution, it became more acidic. When all the anionic surfactant was complexed, further addition of the cationic solution resulted in a pH increase owing to dilution. We now had a new surfactant system.

*B. Cloud point phenomena—additional proof.* When one claims to find something new, one has to be critical and skeptical and look for additional proof. Since the APE/TTAB complex has ethylene oxide (EO) groups, it must behave like other ethoxylated nonionic surfactants. Ethoxylated nonionic surfactants are less soluble (become cloudy) at high temperature. The temperature at which their solution turns cloudy is referred to as cloud point temperature (CPT). We found that solutions of APE/TTAB exhibit cloud point phenomena with a minimum CPT near the 1:1 mole ratio. A cloud point phenomenon exhibited only by the complexes, and not by the surfactant components, is another indication that a pseudo-nonionic complex is formed.

## HAS THE NEED BEEN MET?

Yes, the cat-anionic complex exhibited surfactant behavior, such as the cloud point phenomena of a nonionic surfactant. But how effective is it as a surfactant system? Surface tension results showed that

a pseudo-nonionic complex has a lower critical micelle concentration and a lower attainable surface tension, indicating that it is more efficient and effective than either of its ionic surfactant components. Interfacial tension results also showed that the complex has lower interfacial tension than its component surfactants, implying that it is a better emulsifier. And finally, the detergency efficacy (in removing oily soil from fabric) of the anionic-cationic surfactant complex was far superior to either of its ionic surfactant components. All these results indicate that we have developed a very effective surfactant system.

## EXPANDING THE STUDY

Another potential source or opportunity for creativity is attentiveness to details and thoroughness in a study. It takes less effort to explore an area while you are there than having to return to it at a later time. Any experiment requires a lot of preparation to carry it out. It is far easier to extend an experiment to several related experiments than to start from scratch each time.

After meeting the initial need of finding an effective surfactant system, the work was expanded to other areas such as phase properties and rheology. Cloud point temperature was measured for several systems of cat-anionic solutions as a function of chain length and as a function of EO groups. All solutions exhibited CPT minima at the 1:1 anionic/cationic surfactant mole ratio. The CPT decreased

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# Johnson receives Alton E. Bailey Award

"With few exceptions, the Alton E. Bailey Award has gone to senior scientists with an average age over 60," said USA Section Co-chair Tom Richar in his introduction of the 2010 award winner.

"That fits," laughed award recipient Lawrence A. Johnson. Richar also noted that nearly half of the Bailey awardees have been presidents of AOCS; Johnson served as AOCS president in 2004–2005. A majority of the award recipients have been awarded other major honors from AOCS; Johnson received the A. Richard Baldwin Award for Distinguished Service in 2008.

Because he is director of both the Center for Crops Utilization Research and the BioCentury Research Farm at Iowa State University in Ames, Iowa, USA, it was not surprising that his award address was titled "The Bioeconomy: A Revolution in American Agriculture."

"The bioeconomy is the way society will obtain vital sources of carbon and energy and in the process dramatically reduce our dependence on imported petroleum," he noted. Agriculture will make this transformation possible by providing biorenewable resources to produce biofuels and biobased products, he said. The motivations for a bioeconomy include excess agricultural production, global climate change, reduced reliance on foreign cartels for energy, rural development needs worldwide, and high petroleum prices.

"We are in the midst of the greatest changes in agriculture since mechanization and hybrid corn. In fact, we are in the midst of a revolution," Johnson said.

## TEN KEY MESSAGES

Johnson's 10 key messages follow:

1. Science and engineering will make grain-based and cellulosic ethanol more cost effective. Although ethanol has a positive (30%) renewable fuel-to-fossil energy gain, "we can do better," he noted.
2. US food has been and still is inexpensive. Media scare messages over price increases for food often are factually incorrect. For example, Johnson showed that in 1947, food expenditures constituted 23.5% of disposable income in the United States; in 2007, that figure was 9.8%.
3. Biotechnology will increase crop yields and enable easier processing. Biotechnology may also improve biodiesel by designing soybeans that produce ready-made biodiesel and biolubricants with enhanced performance.
4. Farmers deserve a larger share of food and fuel dollars. "Farmers have received \$2–3 per bushel for the last 50 years," he said. "No other commodity has remained the same price for that long. Is it rational that the farmer's portion of a \$3.50 box of corn flakes amounts to 13 cents?"



Lawrence A. Johnson (right) receives the 2010 Alton E. Bailey Award from Bob Johnson of the USA Section during the 101st AOCS Annual Meeting & Expo.

5. Corn grain alone cannot meet the US biofuels mandate—cellulosic ethanol will be needed. The US Department of Energy calculated that the total cellulosic biomass potential in the United States is in excess of 1.3 billion short tons (about 21 exajoules), which could supply 21% of US energy demand, or 66% of US transportation fuel.
6. It is not just about ethanol, it is about biorefineries. Johnson defines "biorefinery" as "a cluster of biobased industries producing chemicals, fuels, power, products, and materials." Such complexes are able to shift production among products depending on market prices to maximize profits, he said.
7. Do not be wedded to today's ethanol and biodiesel—there may be better biofuels. "Ethanol is not the ideal fuel due to low energy density and tendency to absorb water," he noted. "Many other renewable fuels are on the drawing board."
8. Biofuels provide feedstock for value-added industrial chemicals and biobased products. "Anything you can make from petroleum, you can make from crops—it's just a matter of economics," Johnson noted. "We need to think about biorefineries the same way the petroleum industry thinks about oil refineries and develop higher-value co-products such as industrial chemicals. A vast chemicals industry has developed alongside oil refineries."
9. Livestock production must be integrated with biorefineries to enhance food and fuel supplies. "It is inevitable that some

CONTINUED ON PAGE 463

# Cedric Shackleton receives Schroepfer Medal

Cedric H.L. Shackleton of the University of Birmingham (UK) and Children's Hospital Oakland Research Institute (California, USA) received the 2010 Schroepfer Medal on May 17 at the 101st AOCs Annual Meeting & Expo in Phoenix, Arizona, USA.

Shackleton has made a number of original contributions to steroid analytical methodology. His detailed analyses of steroid profiles have led to the discovery of new clinical syndromes and have advanced the understanding of several diseases found to be linked to defects in steroid biosynthesis and metabolism.

In his award presentation, Shackleton gave a brief historical overview of the discoveries of enzyme deficiencies in the biosynthetic pathway of cholesterol and various steroid hormones and how these mutations in these enzymes cause distinct human clinical disorders. Currently, there are about six known clinical disorders in the pathway leading to cholesterol and 15 additional disorders in the pathway going from cholesterol to steroid hormones and metabolites.

In general, persons with an inability to synthesize cholesterol experience much more severe symptoms than persons who have disorders in the biosynthetic pathway from cholesterol to steroid hormones. Shackleton described how the late George Schroepfer's pioneering research contributed to our understanding of the Smith-Lemli-Opitz syndrome, a cholesterol deficiency disorder caused by a mutation of the enzyme 7-dehydrocholesterol reductase, the last enzymatic step in the cholesterol biosynthetic pathway. Treatment has classically been through heavy cholesterol supplementation (often in the form of eggs), but Shackleton showed promising data on the use of gene therapy by his research group for increasing cholesterol synthesis in a mouse model of the disorder. This may lead to a new therapy for human patients.

One of Shackleton's major contributions has been the use of mass spectrometry and other analytical tools to identify the unique lipid metabolomes (the patterns or fingerprints of sterols and steroids in the urine or blood) of persons that suffer from disorders in cholesterol and steroid biosynthesis. His pioneering work with such techniques goes back to the 1960s. These valuable analytical tools have proven to be fundamental to the accurate prenatal and postnatal diagnosis of these disorders.

The Schroepfer Medal recognizes significant and distinguished accomplishments in the steroid field, which is defined to encompass sterols and other natural and synthetic compounds incorporating the tetracyclic gonane ring system. The Schroepfer Medal is presented every two years at the AOCs Annual Meeting & Expo. The award, which consists of a \$5,000 honorarium and a medal, was established to honor the memory of George J. Schroepfer Jr., a leader in the sterol and lipid field for more than 40 years. ■



Cedric H.L. Shackleton (middle) with Past President Ian Purtle (left) and 2010–2011 President J. Keith Grime (right).

## HUMAN DISORDERS OF STEROL (POST SQUALENE) AND STEROID BIOSYNTHESIS AND METABOLISM

1. Desmosterolosis sterol  $\Delta^{24}$ -reductase. DHCR24
2. Antley-Bixler syndrome, CYP51 attenuated. P450 Oxidoreductase (#10) suspected
3. Greenberg skeletal dysplasia.  $\Delta^4$ -reductase
4. CHILD syndrome, 4-demethylase. NSDHL
5. CDPX2 syndrome  $\Delta^7$ - $\Delta^8$  isomerase
6. Lathosterolosis 5-desaturase. SC5DL
7. SLOS, 7-dehydrosterolreductase. DHCR7
8. StAR transport protein/cholesterol side-chain cleavage (CYP11A1)
9. 17-Hydroxylase/ 17/20 desmolase. CYP17A1
10. P450 Oxidoreductase
11. 3 $\beta$ -Hydroxysteroid dehydrogenase. HSD3B2
12. 21-Hydroxylase. CYP21A1
13. 11 $\beta$ -Hydroxylase. CYP11B1
14. Aldosterone synthase. CYP11B2
15. Cortisone reductase deficiency. HSD11B2 attenuated. Caused by H6PD mutations
16. Apparent mineralocorticoid excess syndrome. HSD11B2
17. 17 $\beta$ -Hydroxysteroid dehydrogenase. HSD17B3
18. Aromatase. CYP19A1
19. 5 $\alpha$ -Reductase. SRD5A2
20. 5 $\beta$ -Reductase. AKRD1
21. Sulfokinase. SULT2A1 attenuated. Caused by PAPSS2 mutations
22. Steroid sulfatase. STS



101st AOCS Annual Meeting & Expo



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# Hot Topics

## Food Safety Management Systems

**Gina Clapper**

Consumer confidence in food safety and regulatory agencies is waning as a consequence of recent food recalls. AOCS, as administrator of the US Technical Advisory Group (TAG) to—and liaison member of—ISO/TC 34, has been tangentially involved with the concept of Food Safety Management Systems for the last six years. Several documents were prepared by Working Groups of TC 34 (Food Products) and are now housed in the subcommittee dedicated to Food Safety Management Systems (ISO/TC 34/SC 17). More companies are looking to differentiate their products through food safety- and quality management-system audits throughout their supply chains. With this in mind, the Food Safety Management Systems Hot Topic was organized by Gina Clapper, AOCS Technical Services, for the 101st AOCS Annual Meeting & Expo.

The session covered food safety management concepts from the farm to bulk grain to food/ingredient manufacturers to information on AOCS' role in the ISO process. The first presentation was prepared by Mark Ames, AQS Management Systems (Minneapolis, Minnesota, USA), but was given by Clapper due to Ames' unavoidable absence. Food safety and quality are not "new" concepts. The Romans practiced and wrote food safety into law to protect their citizens. Eli Whitney used preventive management practices to manufacture products in the early 1800s. By the late 1800s, preventive management for controlling product and process outcomes had been well established and documented. The first fully developed, documented, and deployed Quality Management System was published by the US government in 1942 to support the mass production needs of World War II. The concepts in this document eventually evolved into ISO 9001 (in 1987).

The second part of the presentation introduced the audience to the recently published ISO 22006:2009: The application of ISO 9001:2008 in Crop Production. This standard was initiated by farmers and puts in place preventive practices and instills a preventive attitude throughout the organization; improves internal communication; causes organizations to "work together"; and allows organizations to communicate to potential customers their readiness to provide products and services. To make it work for your farm you need to:

- Understand your business and all the processes within your business
- Put your management system into your business and put it to work to achieve benefits
- Ensure your employees understand the benefits and their role

- Ensure that top management understands the inherent benefits and the need for their active participation
- Foster an environment in which people at all levels understand their roles and responsibilities

Organizations should be driven by their own objectives—not ISO. ISO is simply a list of preventive actions that can accommodate any business situation.

John G. Surak, of Surak and Associates (Clemson, South Carolina, USA), spoke on the Global Food Safety Initiative (GFSI) and ISO 22000 certification systems. GFSI, formed in 2000 by the CIES—the Food Business Forum, emerged to address the needs of the retail food industry in Europe. Over the years, it has evolved from being a European organization to an international one. The GFSI mission is to facilitate convergence of food safety standards; improve cost efficiency of the FSMS process; and provide an international platform for networking. The idea is that once a company is certified by GFSI, the certification will be accepted everywhere.

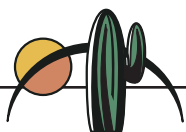
GFSI does not approve or develop food safety standards; approve or develop certification schemes; or make policy for retailers, producers, manufacturers, or accreditation bodies. However, GFSI does benchmark FSMS certification schemes (GFSI Guidance issue 5) and determine whether or not the certification scheme meets the GFSI requirements.

One such scheme that does meet GFSI requirements is the combination of ISO 22000 and ISO 22002-1. ISO 22000 is Food Safety Management Systems—Requirements for any organization in the food chain; and pre-ISO 22002-1 Prerequisite programmes for food safety—Part: 1 Food manufacturing. The FSMS involves a continuous improvement cycle of Plan, Do, Check, Act (repeat) that includes validation, verification, and monitoring.

Is it possible to trace a truckload of corn back to a particular field? The answer is yes, if the truckload of corn was delivered to Farmers Cooperative Co., Odebolt Facility, Iowa, USA. Charles Hurburgh, Iowa State University (Ames), worked with this Cooperative to help it become the first ISO 9001:2000 certified grain elevator in the United States. Hurburgh spoke to the audience about this experience. Bulk handlers have found that improving traceability (even if it can never be perfect) is a critical part of the cost efficiency process that accompanies organized quality management systems such as ISO 9000/22000. Grain elevators are not designed for tracking small lots; traceability is a matter of statistics, odds, and management changes that narrow the inventory control even if they never can be perfect. Tracking bulk grain is a matter of where the product cannot be, not where it is. Simple accounting and information technology processes can make large differences, especially if they are accompanied by physical operations changes—which generally reduce costs and improve quality to the user at the same time tracking is improved.

Traceability offers the opportunity to:





- Respond to security threats
- Respond to food safety problems
- Document chain-of-custody
- Document production practices (e.g., organic)
- Meet consumer desires or social preferences
- Provide safety/quality assurance or uniformity
- Protect integrity of brand name; control risk
- Authenticate claims (e.g., regional foods)
- Comply with regulations
- Improve logistics and reduce production costs
- Organize a uniform response to unusual conditions
- Measure carbon footprint

Hurburgh was also an active member of the former Traceability Working Group, which developed ISO 22005:2007: Traceability in the feed and food chain—General principles and basic requirements for system design and implementation.

The session ended with a brief overview of AOCS' involvement with ISO and ISO procedures given by AOCS Technical Director Richard Cantrill. The scope of TC 34 is standardization in the field of human and animal foodstuffs, as well as animal and vegetable propagation materials, in particular, terminology, sampling, methods of testing and analysis, product specifications, and requirements for packaging, storage, and transportation. There are 15 active subcommittees (SC) of TC 34: SC 2, Oleaginous seeds and fruits; SC 3, Fruit and vegetable products; SC 4, Cereals and pulses; SC 5, Milk and milk products; SC 6, Meat, poultry, fish, eggs, and their products; SC 7, Spices and condiments; SC 8, Tea; SC 9, Microbiology; SC 10, Animal feeding stuffs; SC 11, Animal and vegetable fats and oils; SC 12, Sensory analysis; SC 14, Fresh, dry and dried fruits and vegetables; SC 15, Coffee; SC 16, Molecular biomarker analysis; and SC 17, Food safety management. For more information, visit <http://tinyurl.com/MethodsDevelopment>.

*AOCS Technical Specialist Gina Clapper can be contacted via email at [ginacl@aocs.org](mailto:ginacl@aocs.org).*

## High-Protein Diets and Weight Management

**Marguerite Torrey**

Nicolas Deak and Charles Schasteen, both of Solae LLC, USA, introduced this symposium with these statistics: More than a billion people in the world now are overweight, and of these 300 million are obese—but there are also a billion undernourished people.

This symposium was organized around two premises: Obesity has become a worldwide epidemic and is increasing rapidly, and numerous human studies have shown that protein is more satiating than fat or carbohydrate and promotes weight loss.

"Plant-based Diets—Weight Management and Health" was the topic of Cyril Kendall, University of Toronto, Canada. He briefly reviewed metabolic syndrome; dietary changes that have occurred in the last 50 years, especially in western and westernized societies; and cholesterol's influence on human health.

Kendall pointed out that human physiology is designed for a high-fiber diet. His work has contributed to showing that a statin-

More than a billion people in the world  
now are overweight, and of these  
300 million are obese—but there are  
also a billion undernourished people.

like reduction in low density lipoprotein (LDL) cholesterol can be achieved by consuming what he termed a "simian diet." Such a diet requires consumption of 5.5 kg of fruits and vegetables daily, which in turn requires almost non-stop eating to be able to eat all of it. The consumption of such a high quantity of fiber also requires considerable adaptation by the digestive tract for persons not accustomed to that amount of fiber.

Kendall and co-workers are currently studying what they term an "eco-Atkins diet," which is a low-calorie, low-carbohydrate diet high in plant-based proteins (see *Arch. Int. Med.* 169:1046–1054, 2009). Vegetable-based fats substitute for animal-based fats. The researchers found this diet is more effective at producing weight loss than conventional low-fat diets containing animal products and can lead to a 10% reduction in LDL cholesterol.

Stijn Soenen of the University of Maastricht, the Netherlands, presented his work on "Protein Intake and Targets of Weight Management." He presented a hierarchy of satiety: Protein is more satiating than carbohydrates, which are more satiating than fats. Different proteins produce different levels of satiety. Protein-induced satiety varies with different amounts of the same protein as well as the same amounts of different proteins.

"Essential Amino Acid Supplementation to Maintain or Improve Muscle Mass and Function in Sports, Rehabilitation, and Aging" formed the basis of the talk by Blake Rasmussen (University of Texas Medical Branch, Galveston, USA). Muscle wasting can be a consequence of injury, surgery, cancer, and AIDS. It also can be related to aging (sarcopenia); lean body mass starts to fall after 40 years of age, and especially after 70.

Rasmussen's work has explored the general question of how synthesis of muscle mass is regulated by protein intake. He and his co-workers have used <sup>3</sup>H- or <sup>13</sup>C-labeled phenylalanine to follow the effects of the consumption of protein and carbohydrate following exercise on muscle synthesis, and its relation to insulin sensitivity. One conclusion they have reached is that if there is enough protein/leucine in the diet an older person can achieve adequate muscle protein synthesis. Also, consumption of essential amino acids after exercise can augment muscle synthesis.

Mark Cope of Solae LLC described the "Role of High-Quality Soy Protein in Weight Management and Sports Nutrition." According to Cope, soy protein preserves lean body mass during weight loss induced by energy restriction, as well as during weight maintenance. Soy is also comparable to other proteins in inducing satiety, he contended, and there is a greater satiating effect with greater intake of soy proteins. In combination with whey and casein, soy protein may give added benefit to sports nutrition enthusiasts.

*inform Technical Projects Editor Marguerite Torrey can be reached via email at [mtorrey@aocs.org](mailto:mtorrey@aocs.org).*

## Challenges and Opportunities in Lipids and Oil/Fats Education and Curriculum Development

Catherine Watkins

The guiding lights behind AOCS' Professional Educators' Common Interest Group—Andy Proctor of the University of Arkansas and Randy Weselake of the University of Alberta—put together a hot topic that looked at lipids education from all angles.

Rich Hartel of the University of Wisconsin-Madison began with a professor's perspective. After reviewing Bloom's Taxonomy of Learning Domains, Hartel discussed the 4Mat method of learning (see [www.aboutlearning.com](http://www.aboutlearning.com)). This method offers a way to reach all types of learners. The first step is to begin with an experience that addresses why a topic is important. (If the topic were lipid oxidation, for example, then the experience could be the smell of rancid peanuts.) The next mode of learning is conceptual; with the lipid oxidation example, students would learn about reaction steps. The third step is to apply knowledge through a practical example. Again, using lipid oxidation, students would discuss methods for preventing oxidation. Finally, students must create something new using their newly won knowledge.

Hartel also discussed the possibility of certifying programs dealing with fats and oils education, much as the Institute of Food Technologists does for food technology courses. The University of Wisconsin-Madison has developed a sequenced and coordinated food science curriculum based on learning outcomes developed by all the instructors, he noted.

The presentation that received the most reaction from the audience was Crystal Snyder's discussion of the topic from a student's perspective. Snyder, who manages Weselake's laboratory at the University of Alberta, announced that she has no plans to work on a Ph.D. (She successfully defended her M.Sc. in March 2010.) Further, she suggested that lipid educators discuss opportunities for lipid scientists with "only" an M.Sc. Such opportunities include science writing, library science, intellectual property management, funding work, policy development, and project management. In short, Snyder believes it is time to change attitudes toward the M.Sc. degree and "restore its value."

Steve Hill, AOCS Governing Board secretary and director of cheese and dairy research and development for Kraft Foods Inc., brought his industry perspective to bear on the topic of lipid education. He detailed what he looks for when scouting for new employees. His criteria include demonstrated leadership, academic achievement, practical experience, and specific skills or talents.

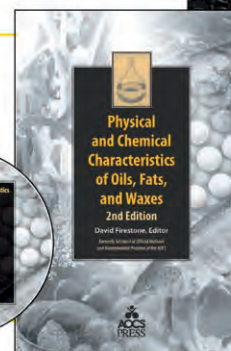
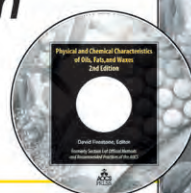
"Unlike the stock market, a student's past performance is a predictor of future success," he noted.

Hill also called for lipid educators to provide linkage with industry by creating integrated curricula where coursework is built

CONTINUED ON PAGE 463

## Physical and Chemical Characteristics of Oils, Fats, and Waxes, 2nd Edition

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# Lipid Oxidation and Health Short Course: From Chemistry to Nutrition

**Ed Frankel**

This short course, organized by Edwin Frankel, University of California, Davis (USA), continues a long tradition of offering basic and practical instruction from leaders in the field to assist participants to understand and discuss the major factors that affect the stability of oil-bearing foods and how antioxidants can be used to minimize the effects of lipid oxidation and increase their stability as a basis for development of healthful products. This year the scope of the short course included an update on the biological and health aspects of lipid oxidation and antioxidants, including Genomics and Oxidation risks and protection, Bioavailability, and Safety management.

Ed Frankel reviewed different mechanisms of oxidation and how decomposition products affect the quality and sensory properties of lipid-containing foods. He discussed problems with high-temperature stability tests, antioxidants in foods and biology, and the confusing literature on the methods used to evaluate antioxidants. He concluded that the large effort expended in testing new and natural antioxidants emphasizes the urgent need to improve test methods and their standardization and to increase our knowledge of *in vivo* activities of natural antioxidants in humans.

Bruce German (University of California, Davis, USA) reviewed stresses on, consequences of, and responses to oxidation in biological systems. Lipid oxidation is involved in various chronic degenerative and inflammatory diseases, is the reason why saturated fats raise blood cholesterol, takes part in gene transcription, and is a factor in the role prostaglandins have in activating endogenous protection systems. His second more general lecture dealt with the global delivery of health through food, why exercise is so good, and how cells react to energy needs. He concluded that future success may depend on personalized protection against oxidative damage.

Kathleen Warner (consultant, Peoria, Illinois, USA) discussed the problems of using polyunsaturated vegetable oils in place of hydrogenated fats. Compositions have been modified to increase oleic acid and decrease polyunsaturated fatty acid content, especially linolenic acid, in soybean and canola oils. To improve the stability of frying oils, she recommended the use of other options such as expeller-pressed low-linolenate oils and combination of these oils with other conventional vegetable oils.

Fabiola Dionisi (Nestlé Research Center, Lausanne, Switzerland) discussed global concepts of quality and safety management. She followed the journey of lipids from raw materials to their fate in the human body, emphasized the need to establish several control points for each manufacturing line, and considered safety aspects including rapid tests for lipid oxidation and antioxidants. In her second lecture, she discussed bioavailability of lipids and phytonutrients and looked at the importance of their health effects. During absorption many phytonutrients are converted into metabolites that may be responsible for their biological effects. Oxidized lipids may increase the risks of atherosclerosis and cardiovascular disease.

Eric Decker (University of Massachusetts, Amherst, USA) lectured on many factors that influence lipid oxidation in foods,

**Demands are expected to continue to rise, including global grain demands in corn (76%), wheat (40%), soybeans (125%), cotton (28%), and rice (102%).**

including environmental aspects, the presence of antioxidants, and physical and structural properties. He discussed structural design of emulsions to decrease lipid-prooxidant interactions, oxidative stability of  $\omega$ -3 fatty acid delivery systems, concepts of nanolamination, encapsulation, spray-dried powders, nanoemulsions, and liposomes.

Norman Cloud (Kemin Nutrisurance Inc., Des Moines, Iowa, USA) considered practical applications of antioxidants in feed and food and the impact of antioxidants on diet. He provided examples of primary and secondary antioxidant actions, considered the health problems of ethoxyquin, and enumerated the many natural antioxidants—including rosemary, green tea, and pomegranate—that can be used in place of synthetic antioxidants and their applications in various diets.

Tom Tiffany (ADM Food Oils, Decatur, Illinois) reviewed the use of chemical and enzymatic interesterification to replace *trans*-containing hydrogenated fats, palm oil-based shortening and margarine. He presented data on the oxidative stability of high- and mid-oleic soybean oils, low-linolenic canola and soybean oils, and blends with palm olein/canola and palm olein/soybean oils. He compared the effects of synthetic antioxidants (TBHQ, BHT, BHA) with those of rosemary extracts and mixed tocopherols on the oxidative stability index of new sun oil. Suitable blends of palm olein, canola, corn, and soybean oils for frying were evaluated by the anisidine test, which showed that TBHQ was a superior antioxidant to BHT and BHA.

Richard Wilkes (Monsanto Co., St. Louis, Missouri, USA) presented some of agriculture's challenges in biotechnology and breeding, as well as consumer trends. He also considered industrial development pipelines for  $\gamma$ -linoleic acid (Arcadia), high oleic- and low linolenic-soybean oils (Pioneer/Dupont), low-saturates/high-oleic soybeans (Monsanto), stearidonic acid  $\omega$ -3-enriched soybeans (Monsanto), and EPA/DHA (eicosapentaenoic acid/docosahexaenoic acid)-enriched crop plants (Australia) and canola (Lipgene/BASF). He summarized some of the future crop technologies that will be used to address global food security, the environmental footprint of these crops, demands for healthier diets, and the need for biofuels. Demands for these crops are expected to continue to rise, including global grain demands in corn (76%), wheat (40%), soybeans (125%), cotton (28%), and rice (102%). Paths to biotechnology and breeding include determining the right trait, commercializing a breeding approach, and modifying crop genetics. ■

# A visit to Arizona's only olive mill



Bruce Golino and Jim Falk pose by the Queen Creek Olive Mill menu board and deli case. Both are members of the AOCS Olive Oil Expert Panel.

Arizona's only olive mill is hot—in all senses of the word, with temperatures often reaching 100°F (almost 38°C) by May 1. And as a tour destination less than an hour from downtown Phoenix, the mill does a booming business.

Queen Creek Olive Mill in Queen Creek, Arizona, USA, provided a special tour for members of the AOCS Olive Oil Expert Panel on Sunday, May 16, 2010, before the start of the Annual Meeting & Expo in Phoenix. Queen Creek's president, Perry Rea, led the tour and also generously donated breakfast from the mill's retail food outlet to tour attendees. All items were made with olive oil, including the waffles topped with fresh fruit. ("Those waffles were the lightest I've ever had," said one participant.)

For more than a decade, Rea has experimented with different olive (*Olea europaea*) varieties, searching for those that grow best in the Arizona desert. Queen City's olive grove currently is home to more than 16 different varieties, with Frantoio, Grapolo, Pendolino, Maurino, Moraiola, Coratina, Taggiasca, and Mission as the primary varieties.

The trees are drip-irrigated and the olives are processed mechanically using a

two-stage process. A hammer mill grinds the olives, crushing the pits, seeds, and flesh into a coarse paste. The paste is then blended very slowly for up to 40 minutes in a large mixer with spiral blades. This malaxation process allows the smaller droplets of oil released by the milling process to aggregate and be more easily separated.

Next, a centrifugal decanter spins the olive paste, separating the heavier flesh, pits, and most of the water from the oil. Finally, the oil is transferred to an oxygen-free stainless steel storage decanter with a conical bottom, where the oil and water separate.

Queen Creek sells 95% of the oil it produces in its retail store and at local markets. Some oil goes into bath and body products; some is used in flavored oils. The mill's retail store also sells stuffed olives (produced elsewhere) and tapenades.

"My primary business is agro-tourism," said Rea, because of the educational tours that are conducted every half hour on the hour during the business day. The mill is a popular stop for tourists as well as locals.

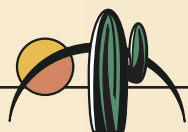
One visitor asked if the success of Rea's operation has interested other Arizona farmers in growing olives.

"Once they hear it takes three to four years until the first crop, they're done," Rea laughed.



Courtesy of Ben Johnson.





# Student CIG meets



*All participants received a free book from AOCS.*

Close to 40 students attended the annual Student Common Interest Group (SCIG) business meeting luncheon on Wednesday, May 19, during the 101st AOCS Annual Meeting & Expo in Phoenix, Arizona, USA. The luncheon was sponsored by Kraft Foods, Inc.

There, students discussed new ideas for SCIG activities and met with about 20 mentors from industry, government, and academia.

For more information about joining the SCIG, email Barbara Semeraro at [barbs@aoacs.org](mailto:barbs@aoacs.org).



*Edmund Daniel Co, an M.Sc. candidate from the Department of Food Science at the University of Guelph in Ontario, Canada, was happy with the free book he selected.*



*Gerard Dumancas (left) poses real-life questions to mentor Neil Widlak of Archer Daniels Midland Co. Dumancas received several awards at the meeting, including the USA Section's Hans Kaunitz Award, an Analytical Division student award, and designation as an AOCS 2010 Honored Student. Dumancas is working on a doctorate at Oklahoma State University.*

# A Message from the AOCS Foundation...

## Taking your AOCS into its next 100 years

**Amy Lydic**

If you attended the 101st AOCS Annual Meeting & Expo (AM&E) in Phoenix, Arizona, USA, in May, the first thing you probably noticed upon entering the Expo Hall was the delicious smell of popcorn. I'm just kidding of course; the AOCS Foundation really hopes you noticed the new [www.aocs.org](http://www.aocs.org), the LAB, and the Abstract Search/Itinerary Builder Stations.

All of the funds that the Foundation has to devote to new products and services come through the ongoing generosity of our members, companies, and constituents—in other words, you! It has been, and continues to be, the goal of the Foundation to provide funding to enhance your experience with AOCS.

One of the biggest accomplishments for AOCS and the Foundation to date, and one that directly benefits you, is the successful launch of the newly redesigned [www.aocs.org](http://www.aocs.org). If you haven't already, spend some time on [www.aocs.org](http://www.aocs.org). With all the new resources that have been added, you will be glad you did.

In conjunction with this year's AM&E, the Foundation also provided funding for future products to be developed from the Hot Topic Sessions, as well as a live webcast of the Annual Business Meeting and keynote speech. Even if you were unable to attend the AM&E, you can still benefit from the exchange of information that took place there. For example, the Annual Business Meeting and keynote speaker webcast is still available at: <http://tinyurl.com/2010Webcast>.

The AOCS Foundation also kicked off its new funding focus—the Influencing Innovation Campaign—with an outdoor party on Sunday night. Chairman of the Foundation Board Michael Boyer spoke to the attendees about the need for gifts to continue the Foundation's role of providing funding for the development of new products and services to benefit our global community.

Finally, the Foundation unveiled a new website of its own: [www.aocsfoundation.org](http://www.aocsfoundation.org).

It has been a very busy year already, and with all these wonderful things in process, it is time to ask if you have given to the Foundation. The Foundation will be the driver for all that AOCS becomes in the future, because it is the driver behind all that is new and innovative. It will allow you the opportunity to contribute to the advancement of your profession. So, your gift is really an investment that will be used to shape the future of AOCS for the next 100 years.

Many flexible giving opportunities—from onetime gifts to pledges to planned gifts—are available, allowing you to choose what best fits your current giving plan. The Foundation is grateful for gifts of every amount to continue to fund innovation.

Please don't delay. Make your investment now and be a part of it!

## AOCS FOUNDATION Influencing Innovation



### Projects Recently Funded by the Foundation

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|---|----------------------|
| Redesign of <a href="http://www.aocs.org">www.aocs.org</a>  | \$100,000            |
| Live Webcast of Annual Business Meeting and Keynote Speaker                                       | \$5,000              |
| Recording and product production of 2010 Hot Topic Sessions                                       | \$9,000              |
| Resources at the Annual Meeting each year:<br>Create your Itinerary<br>Abstract Search<br>The LAB | \$34,000             |
| eLearning Series  | \$34,000             |
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AOCS Foundation Development Manager Amy Lydic can be reached via email at [amyl@aocs.org](mailto:amyl@aocs.org).

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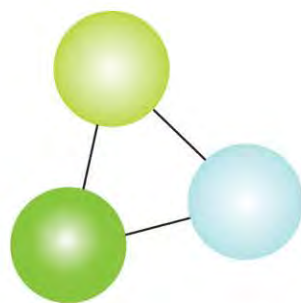
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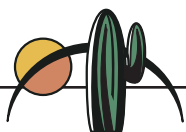
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# Division and Section Councils meet

**Mary Belding**

Sunday, May 16, 2010, was a busy day for the three executive steering committee members of AOCS's 12 divisions. On Sunday morning—prior to the afternoon individual division leadership and Division Council meetings at the 101st Annual Meeting & Expo (AM&E)—the chairs, vice chairs, and secretary-treasurers of each division had an opportunity to meet with others holding the same office to learn more about the responsibilities of their positions and to discuss concerns and ask questions of mutual interest.

On Sunday afternoon, Chairperson Max Norris led the Division Council meeting, which was attended by 23 division representatives, 2 division visitors, 10 Governing Board members, and 5 staff members. AOCS Executive Vice President Jean Hinton announced that the Division Council chair will no longer serve on the Board; the AOCS secretary will now assume this responsibility. Web Strategy Manager Amy Lopez gave a brief presentation on the newly designed AOCS website and the new Division pages. Plans are under way to provide an online repository of Division resources to help the executive steering committees administer their Division's programs and activities.

This year is the first time that every Division has held elections for the three executive steering committee positions. This new process allows members to become involved without committing to a lengthy term; however, a person can be re-elected and serve in the same position for up to three consecutive years.

Nurhan Dunford of the Processing Division was elected Division Council chair by written ballot.

Deland Myers, chair of the Education and Meetings Steering Committee, spoke to the Council about some new features that are planned related to the Annual Meeting, including the videotaping of short courses and hot topics; the webstreaming of the keynote presentation at the Tuesday morning business meeting/breakfast; and a renewed focus on eLearning. Myers also talked about the *ad hoc* committee that is charged with studying the job functions of Division members and explained that while there is a great deal of overlap in functions, it can be difficult for people who are not familiar with AOCS Divisions to determine which Divisions are involved with various topics. AOCS incoming President Keith Grime spoke briefly about how AOCS is a "society of capabilities and expertise," and he said that the *ad hoc* committee is seeking ways to allow members the ability to access capability siloed by common interests, not just by Division names.

The AOCS Section Council meeting took place on Wednesday, May 19, led by Governing Board member Erich Dumelin. In attendance were Ignace Debruyne (European Section); Roberto Berbesi, Hector Autino, and Erica Siegrist (Latin American Section); and several AOCS staff members. Web Strategy Manager Amy Lopez gave a brief presentation on the newly designed AOCS website and

the new Section pages and described the new listservs that will provide membership discussion forums.

Debruyne gave an update of the European Section's recent activities, including the awarding of two student travel grants for the AM&E; the new Section leadership team; plans to work with the Phospholipid Division on a short course in 2011; efforts to become a member of Euro Fed Lipid (EFL); and the need to survey both Section members and AOCS members in Europe to determine future Section activities. Debruyne also reported that the Section recently held a workshop in Scandinavia.

Outgoing Latin American Section President Hector Autino presented details about the November 2009 Latin American Congress in Rosario, Argentina; and incoming Section President Roberto Berbesi spoke about plans for the 2011 Latin American Congress in Cartagena, Colombia. Berbesi said that the Section hopes to increase member benefits and produce a newsletter in both Spanish and English.

The election of a new Section Council chair did not take place owing to the low turnout at this meeting.

For more information about AOCS Divisions or Sections, contact Mary Belding at [mbelding@aocs.org](mailto:mbelding@aocs.org). ■



# Award Recipients '10

What follows is a sampling of the award winners from this year's Annual Meeting & Expo (AM&E). Look for our detailed coverage of AM&E Award winners both elsewhere in this issue and throughout the year.



William W. Christie, center, is presented with the 2010 Supelco/Nicholas Pelick Research Award during the AOCs Annual Business Meeting, Tuesday, May 18, in Phoenix, Arizona, USA. He is pictured with, at left, AOCs Past President Nicholas Pelick and, at right, Leonard Sidisky of Supelco, Inc. The award—given to honor significant original contributions in fats and oils research—is sponsored by Pelick and Supelco, Inc., a subsidiary of Sigma-Aldrich Corp.



David Julian McClements, right, received the 2010 Stephen S. Chang Award. The award recognizes 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, and was established by AOCs Past President Stephen S. Chang and his wife, Lucy D. Chang. Chang Award Trustee Steven Hill, left, presented McClements with the award.



Edgar J. Acosta, center, was the 2010 recipient of 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 AOCs. This year, the award was sponsored by the International Food Science Centre A/S in Denmark. He is joined in the photo by outgoing AOCs President Ian Purtle, left, and incoming AOCs President J. Keith Grime, right.





Andrew Proctor, right, receives the 2010 Herbert J. Dutton Award from Analytical Division Chairperson Rick Della Porta. The award 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.



Linh Do, center, was the 2010 recipient of the Ralph H. Potts Memorial Fellowship Award. The award, sponsored by AkzoNobel, commemorates the career of Ralph H. Potts, a pioneer in the development of industrial fatty acids and their derivatives. Do is joined in the photo by outgoing AOCS President Ian Purtle, left, and incoming AOCS President J. Keith Grime, right.

Yu Zhang, center, received the 2010 Manuchehr (Manny) Eijadi Award. The award recognizes the outstanding merit and performance of an AOCS Honored Student. The award is supported by donations in honor of Manuchehr (Manny) Eijadi, a distinguished and active member of the AOCS. Zhang is joined in the photo by outgoing AOCS President Ian Purtle, left, and incoming AOCS President J. Keith Grime, right.



## Benecke receives USB Industrial Uses of Soybean Oil Award

Herman Benecke of Battelle (Columbus, Ohio, USA) received the 2010 USB Industrial Uses of Soybean Oil Award at the 101st AOCs Annual Meeting & Expo in Phoenix, Arizona, USA.

Benecke, who specializes in the conversion of soybean oil and meal into various industrial products, received the award on May 17 at the luncheon meeting of the Industrial Oil Products Division. The award is sponsored by the United Soybean Board (USB).

Since joining Battelle in 1980, Benecke has been awarded 14 patents, many of which deal with the use of soybean and other vegetable oils to formulate products varying from flexible and rigid foams to more environmentally friendly plasticizers for the manufacture of polyvinyl chloride flexible tubing, children's toys, vinyl flooring, and other products.

"This award is really for my Battelle team that has pioneered so many of these discoveries," Benecke said.

Benecke directed research teams that were recognized by *R&D Magazine* for discoveries that made the magazine's annual list of the 100 top scientific discoveries in 2002 and 2007 for the development of biobased plasticizers and biobased polyols, respectively. He was a member of the research team that made *R&D Magazine*'s 2003 list for biobased deinkable toners. The team also received a Presidential Green Chemistry Challenge Award in 2008 for deinkable toners. In 1999, Benecke received Battelle's Inventor of the Year Award, as well as the President's Award.

Benecke, a research leader in Advanced Materials Applications, continues to improve the synthesis of biobased polyols used to prepare flexible and rigid foams. He also currently directs Battelle's research programs to develop soybean oil-based lubricants and hydraulic fluids and to use soybean meal to manufacture hydrogels.

Before moving to oil-based chemistry, Benecke specialized in the synthesis of drugs and analytical reagents and in the design



Leland Orr (left) presents Herman Benecke (right) of Battelle with the 2010 USB Industrial Uses of Soybean Oil Award. Orr is a commercialization manager with the United Soybean Board (USB), which sponsors the award.

and improvement of industrial chemical processes. One example is the development of an efficient process to convert lactic acid to the key intermediate used to prepare polylactic acid, a leading biobased and versatile polyester.

Benecke earned a B.S. degree in chemistry from the University of Florida and a Ph.D. in organic chemistry from the University of Cincinnati. He also worked as a post-doctoral researcher at Ohio State University.



Jennifer E. Lambert, center, was the 2010 recipient of the Peter and Clare Kalustian Award. The award recognizes the outstanding merit and performance of an AOCs Honored Student. The award is supported by the Kalustian estate. Lambert is joined in the photo by outgoing AOCs President Ian Purtle, left, and incoming AOCs President J. Keith Grime, right.





The 2010 AOCS Honored Students were, from left, Amir Malaki Nik, University of Guelph, Canada; Yu Zhang, the University of Pennsylvania, USA; Vera Van Hoed, Ghent University, Belgium; Gerard G. Dumancas, Oklahoma State University, USA; Jennifer E. Lambert, University of Alberta, Canada; and Debjani Mitra, Iowa State University, USA. Recipients not pictured: Carlos E. Astete, Louisiana State University, USA; Qin Liu, University of Alberta, Canada; and Ying Zhong, Memorial University of Newfoundland, Canada.



## ACI/NBB Glycerine Innovation Award

*Escherichia coli*—*E. coli* for short—is often identified as a bacterium that contributes to foodborne illness. But research led by a Rice University scientist has discovered ways to use a safe, nonpathogenic *E. coli* to convert glycerine into high-value fuels and chemicals.

Ramon Gonzalez, William W. Akers Assistant Professor in the Departments of Chemical and Biomolecular Engineering and Bioengineering at Rice University in Houston, Texas, USA, received the 2010 Glycerine Innovation Award on Monday, May 17, during the 101st AOCS Annual Meeting & Expo in Phoenix, Arizona, USA. The award is sponsored annually by the American Cleaning Institute (ACI; formerly The Soap and Detergent Association) and the National Biodiesel Board (NBB).

Gonzalez and his team of researchers identified the metabolic processes and conditions that allow a known strain of *E. coli* to convert glycerine into ethanol. Glycerine is the major by-product of biodiesel production.

Gonzalez says scientists previously believed that the only organisms that could ferment glycerol were those capable of producing a chemical called 1,3-propanediol (1,3-PD). But neither the bacterium *E. coli* nor the yeast *Saccharomyces*—the two workhorse organisms of biotechnology—were able to produce 1,3-PDO.

But the Rice researchers discovered pathways and mechanisms that mediate glycerol fermentation in *E. coli*. That enabled their efforts to develop new technologies for converting glycerol into high-value chemicals. In essence, they designed strains of *E. coli* that could produce a range of products from biofuels, ethanol, hydrogen, and organic acids.

As an example, Gonzalez's team created a new version of the bacterium that produces up to 100 times more succinate, a high-demand chemical feedstock that is used to make everything from noncorrosive airport de-icers and nontoxic solvents to plastics, drugs, and food additives. Most succinate today comes from



Kathy Stanton (left) and Steve Howell (right) present the 2010 Glycerine Innovation Award to Ramon Gonzalez (middle) of Rice University. Stanton is associate director, Scientific Affairs, for the American Cleaning Institute (ACI). Howell is technical director of the National Biodiesel Board (NBB). ACI and NBB sponsor the award.

nonrenewable fossil fuels. The new Rice technologies are being licensed commercially so they can be brought to market.

The ACI/NBB Glycerine Innovation Award recognizes outstanding achievement for research into new applications for glycerine, with particular emphasis on commercial viability. The award, which includes a plaque and a \$5,000 honorarium, was presented by the AOCS Industrial Oil Products Division during the AOCS Annual Meeting in Phoenix, Arizona, USA.

For more information on the honored research, contact Gonzalez at +1 713-348-4893 or [ramon.gonzalez@rice.edu](mailto:ramon.gonzalez@rice.edu).

## Dumancas receives 2010 Kaunitz Award

**Tom Richar**

Annually, the Northeast Chapter of the USA section of AOCS presents its Hans Kaunitz Award. This year, the 2010 Hans Kaunitz Award consisted of a \$1000 honorarium with certificate, plus \$500 toward travel expenses to the 101st AOCS Meeting & Expo held in Phoenix, Arizona, 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 was Gerard Dumancas. Dumancas received his B.S. in chemistry at the University of the Philippines in 2005; his thesis for that degree was titled "*n*-Hexane Extractable Material in Iloilo River Sediments." This research involved the Soxhlet extraction of oils and grease in a river's sediment and characterization of the aldehydes and ketones therein by Fourier transform-infrared spectroscopy. That same year, he won the 2005 International Eco-Minds Pathfinder Award in Asia-Pacific for his research plan involving the utilization of cottonseed oil wastes as diesel replacement fuel. He joined AOCS and the Analytical Division in 2007. In 2009, he won AOCS' Analytical Division Student Award for Excellence in Analytical Chemistry Research. In May 2010, Dumancas was awarded the 2010 AOCS Honored Student Award for outstanding research, academics, and leadership involvement. Over the past several years, Dumancas has won numerous awards, has received countless accolades, published several papers, and helped write several book chapters.

At this year's AOCS Annual Meeting and Expo, he gave two talks. His Hans Kaunitz award address was entitled "Chemometric Algorithms for the Direct Determination of Lipids in Human Serum." His second talk was "Effect of Wavelet Daubechies Denoising on K-Matrix Chemometric Algorithm for the Direct Determination of Lipids in Synthetic Mixtures and Human Serum." In this talk, he discussed a patented reagent system that



*Pictured (left to right) are Tom Richar (co-leader AOCS' USA section), Gerard Dumancas (the 2010 Hans Kaunitz Award winner), and George Piazza (Northeast Chapter of the USA Section)*

had previously been developed in his advisor's laboratory. This system is selective to the  $-\text{CH}=\text{CH}-\text{CH}_2-$  functional group and can simultaneously quantify the seven most abundant lipids in human serum (cholesterol, linoleic acid, linolenic acid, arachidonic acid, eicosapentaenoic acid, docosahexaenoic acid, and conjugated linoleic acid) using an ultraviolet-visible detector. Deconvolution of the lipids was done by K-matrix chemometric algorithm using a full factorial design of  $n = 128$  training sets and D-optimal design of  $n = 16$  validation sets, all in synthetic mixtures in chloroform solutions. By using Wavelet Daubechies (db) family, Dumancas applied several threshold denoising parameters to the K-matrix algorithm to remove fluctuations of noise that would interfere with the analysis.

Dumancas' research advisor at Oklahoma State University (Stillwater, USA) is Neil Purdie. Dumancas plans to graduate in the summer of 2012 with a Ph.D. in chemistry. His future plans include finding a postdoctoral fellowship in the areas of chemometrics and proteomics and then obtaining a job in a community college as an instructor or as an assistant professor.







Visitors to the AOCS Press Bookstore played Plinko, a game of chance, to win prizes or an additional discount on purchases. Here, Dean E. Roberts of Bruker Optics Inc. takes his chances.

Monsanto Co. set up its CAML (Crop Analytics Mobile Laboratory) on the Expo floor during the 101st AOCS Annual Meeting & Expo in Phoenix, Arizona, USA, May 16–19, 2010. The company also teamed up with AOCS before the meeting to bring the CAML to high school students at Phoenix Central High School. This event was officially a part of The International Year of Chemistry (ICY 2011), which is a celebration sanctioned by the United Nations and the International Union of Pure and Applied Chemistry. Read the August issue of *inform* for more on ICY 2011 and the CAML's trip to Phoenix.



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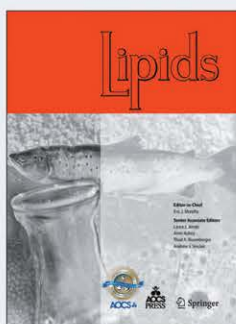


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# Extracts & Distillates

## The comparative efficacy of plant sterols and stanols on serum lipids: A systematic review and meta-analysis

Talati, R., *et al.*, *J. Am. Diet. Assoc.* 110:719–726, 2010.

Plant sterols and stanols are plant steroids with a similar chemical structure and cellular function to human cholesterol, and are recommended as dietary modifiers of serum lipids. Plant sterols have a higher degree of absorption than plant stanols, suggesting differential efficacy between the two. A meta-analysis of randomized controlled trials was performed to summarize direct comparisons between the effect of plant sterols vs. plant stanols on serum lipid levels in healthy patients and patients with hypercholesterolemia. A systematic literature search of MEDLINE, EMBASE, Cochrane CENTRAL, and the Natural Medicines Comprehensive Database was conducted from January 1950 through January 2009. Trials were included in the analysis if they were randomized controlled trials evaluating the effect of plant sterols vs. plant stanols in healthy patients or patients with hypercholesterolemia who reported efficacy data on total, low-density lipoprotein, and high-density lipoprotein cholesterol or triglycerides. The weighted mean difference (WMD) of the change from baseline (in mg/dL) with 95% confidence interval was calculated as the difference between the means in the plant sterol and plant stanol groups using a random-effects model. Fourteen studies ( $n = 531$  patients) met the inclusion criteria. Upon meta-analysis, the results showed that there is no statistically or clinically significant difference between plant sterols and plant stanols in their abilities to modify total cholesterol (WMD  $-1.11$  mg/dL [ $-0.0286$  mmol/L], 95% confidence interval [CI]  $-4.12$  to  $1.90$ ,  $P = 0.47$ ), low-density lipoprotein cholesterol (WMD  $-0.35$  mg/dL [ $-0.0091$  mmol/L], 95% CI  $-2.98$  to  $2.28$ ,  $P = 0.79$ ), high-density lipoprotein cholesterol (WMD  $-0.28$  mg/dL [ $-0.00073$  mmol/L],

95% CI  $-1.18$  to  $0.62$ ,  $P = 0.54$ ), or triglycerides (WMD  $-1.80$  mg/dL [ $-0.0203$  mmol/L], 95% CI  $-6.80$  to  $3.21$ ,  $P = 0.48$ ). Plant sterols and plant stanols do not have statistically or clinically relevant differing effects on total cholesterol, low-density lipoprotein cholesterol, high-density lipoprotein cholesterol, or triglyceride levels. The selection of plant sterols vs. plant stanols should then be based on potential differences in safety parameters and further study is required to elucidate such differences.

## Role of very-long-chain fatty acids in plant development, when chain length does matter

Bach, L., and J.D. Faure, *Comptes Rend. Biol.* 333:361–370, 2010.

Very long chain fatty acids (VLCFA) are essential components for eukaryotes. They are elongated by the elongase complex in the endoplasmic reticulum and are incorporated into four major lipid pools (triacylglycerols, waxes, phospholipids, complex sphingolipids). Functional analysis of several components of the elongase complex demonstrated the essential role of VLCFA in plants, invertebrates, and vertebrates. Although VLCFA changes in the triacylglycerol pool have no consequence for plant development, modifications of the nature and levels of VLCFA in waxes, phospholipids, and complex sphingolipids have, collectively, profound effects on embryo, leaf, root, and flower development. VLCFA levels in epicuticular waxes are critical for the regulation of epidermal fusions during organogenesis. VLCFA phospholipids and sphingolipids are involved in membrane structure and dynamics regulating cell size but also division and differentiation. This review summarizes the recent findings in plants but also in other organisms, highlighting the importance of very long acyl chain length during development.

## Effects of plant sterols and stanols beyond low-density lipoprotein cholesterol lowering

Derdemezis, C.S., *et al.*, *J. Cardiovasc. Pharmacol. Therapeut.* 15:120–134, 2010.

Consumption of foods and supplements enriched with plant sterols/stanols (PS) may help reduce low-density lipoprotein cholesterol (LDL-C) levels. In this review, we consider the effects of PS beyond LDL-C

lowering. Plant sterols/stanols exert beneficial effects on other lipid variables, such as apolipoprotein (apo) B/apoAI ratio and, in some studies, high-density lipoprotein cholesterol (HDL-C) and triglycerides (TG). Plant sterols/stanols may also affect inflammatory markers and coagulation parameters, as well as platelet and endothelial function. Evidence also exists about a beneficial effect on oxidative stress, but this does not seem to be of greater degree than that expected from the LDL-C lowering. Many of these effects have been demonstrated *in vitro* and animal models. Some *in vitro* effects cannot be seen *in vivo* or in humans at usual doses. The epidemiological studies that evaluated the association of plasma PS concentration with cardiovascular disease (CVD) risk do not provide a definitive answer. Long-term randomized placebo-controlled studies are required to clarify the effects of supplementation with PS on CVD risk and progression of atherosclerosis.

## Stereospecific analysis of triacylglycerols as a useful means to evaluate genuineness of pumpkin seed oils: Lesson from virgin olive oil analyses

Butinar, B., *J. Agric. Food Chem.* 58:5227–5234, 2010.

In Slovenia two superb vegetable oils with high added nutritional value are produced: “Ekstrašdevi kočolj no olje Slovenske Istre (extra virgin olive oil from Slovene Istria)” and “Stajersko prekmursko bučno olje (pumpkin seed oil from Slovenia).” Their quality and genuineness must be monitored, as adulteration can easily be undertaken. Olive oil genuineness determination experiences can show how analyses following an experience data-driven decision tree gathering several chemical determinations [fatty acids, (*E*)-isomers of fatty acids, sterol and tocopherol determinations] may be helpful in assessing the pumpkin seed oil from Slovenia genuineness. In the present work a set of high-performance liquid chromatography triacylglycerol determinations was performed, based on the nine main triacylglycerols (LLLn, LLL, PLL, LOO, PLO, OOO, POO, SPL, and SLS, where L = linoleic, Ln = linolenic, P = palmitic, O = oleic, and S = stearic) on a limited number of different pumpkin seed oils from northeastern Slovenia. The performed determinations

showed that stereospecific analyses of triacylglycerols together with other chemical determinations can be useful in building a protocol for the evaluation of the genuineness of pumpkin seed oil from Slovenia.

## Functional properties of select edible oilseed proteins

Sharma, G.M., *et al.*, *J. Agric. Food Chem.* 58:5457–5464, 2010.

Borate saline buffer (0.1 M, pH 8.45) solubilized proteins from almond, Brazil nut, cashew nut, hazelnut, macadamia, pine nut, pistachio, Spanish peanut, Virginia peanut, and soybean seeds were prepared from the corresponding defatted flour. The yield ranged from 10.6% (macadamia) to 27.4% (almond). The protein content, on a dry weight basis, of the lyophilized preparations ranged from 69.23% (pine nut) to 94.80% (soybean). Isolated proteins from Brazil nut had the lightest and hazelnut the darkest color. Isolated proteins exhibited good solubility in aqueous media. Foaming capacity (<40% overrun) and stability (<1 h) of the isolated proteins were poor to fair. Almond proteins had the highest viscosity among the tested proteins. Oil-holding capacity of the isolated proteins ranged from 2.8 (macadamia) to 7 (soybean) g of oil/g of protein. Least gelation concentrations (% w/v) for almond, Brazil nut, cashew, hazelnut, macadamia, pine nut, pistachio, Spanish peanut, Virginia peanut, and soybean were, respectively, 6, 8, 8, 12, 20, 12, 10, 14, 14, and 16.

## Soybean tocopherol concentrations are affected by crop management

Seguin, P., *et al.*, *J. Agric. Food Chem.* 58:5495–5501, 2010.

Soybeans are an important source of tocopherols, which have health-beneficial properties. Previous studies have demonstrated that environmental factors may affect soybean tocopherol concentrations; the impact of specific crop management strategies, however, remains poorly understood. Experiments were conducted for 2 years at three sites in Québec to determine the impact on soybean tocopherol concentrations of seeding rate, row spacing, seeding date, cultivar, and P and K fertilization. Total and  $\alpha$ -,  $\gamma$ -, and  $\delta$ -tocopherol concentrations were determined by high-performance liquid

chromatography. Overall,  $\alpha$ -tocopherol was the most responsive to the factors evaluated; the response of other tocopherols was often lower or inconsistent across environments. The seeding rate affected  $\alpha$ -tocopherol concentrations in three out of five environments; seeding at a rate of 40 seeds  $m^{-2}$  resulted in 4% higher concentrations than seeding at a higher rate. Wide row spacing (more than 36 cm) resulted, in two out of five environments, in 6% higher  $\alpha$ -tocopherol concentrations as compared to narrower row spacing. The seeding date had a greater impact; mid- to late-May seeding across four environments resulted in 45% greater  $\alpha$ -tocopherol concentrations than seeding at later dates. Phosphorus and K fertilization had a negligible impact on tocopherol concentrations. Across experiments, large differences were observed between environments; plants grown in northern environments consistently had lower concentrations of  $\alpha$ - and  $\gamma$ -tocopherols but higher concentrations of  $\delta$ -tocopherol. Differences between cultivars were also consistent, ranging between 10 and 30%, depending on the tocopherol. Results demonstrate that soybean tocopherol concentrations are affected by crop management and thus suggest that specific recommended agronomic practices may need to be established for the production of soybeans for the functional food market.

## Regulating survival and development in the retina: Key roles for simple sphingolipids

Rotstein, N.P., *et al.*, *J. Lipid Res.* 51:1247–1262, 2010.

Many sphingolipids have key functions in the regulation of crucial cellular processes. Ceramide (Cer) and sphingosine (Sph) induce growth arrest and cell death in multiple situations of cellular stress. On the contrary, sphingosine-1-phosphate (S1P), the product of Sph phosphorylation, promotes proliferation, differentiation, and survival in different cell systems. This review summarizes the roles of these simple sphingolipids in different tissues and then analyzes their possible functions in the retina. Alterations in proliferation, neovascularization, differentiation, and cell death are critical in major retina diseases, and collective evidence points to a role for sphingolipids in these processes. Ceramide induces inflammation and apoptosis in endothelial and retinal pigmented epithelium cells, leading

to several retinopathies. Sphingosine-1-phosphate can prevent this death but also promotes cell proliferation that might lead to neovascularization and fibrosis. Recent data support Cer and Sph as crucial mediators in the induction of photoreceptor apoptosis in diverse models of oxidative damage and neurodegeneration and suggest that regulating their metabolism can prevent this death. New evidence proposes a central role for S1P controlling photoreceptor survival and differentiation. Finally, this review discusses the ability of trophic factors to regulate sphingolipid metabolism and transactivate S1P signaling pathways to control survival and development in retina photoreceptors.

## Glycerophospholipid and triacylglycerol distribution in corn kernels (*Zea mays* L.)

Harrabi, S., *et al.*, *J. Cereal Sci.*, 51:1–6, 2010

The distribution of various molecular species of triacylglycerols (TAG) and phospholipids among three corn kernel parts was determined by liquid chromatography/electrospray ionization-mass spectroscopy. A comparison between three corn kernel parts demonstrated that there was a significant ( $P < 0.05$ ) difference in their contents of various glycerophospholipid classes. Phosphatidylcholine was the most abundant class in germ and pericarp fractions (51.4–70.6% of the total glycerophospholipids), followed by phosphatidylinositol (11.3–25.1%) and phosphatidylethanolamine (8.4–12.6%). In contrast, phosphatidylethanolamine was found to be the most abundant class in the endosperm fraction (41.4–48.5%), followed by phosphatidylcholine (30.2–33.4%) and phosphatidylinositol (13.2–14.4%). Various molecular species were detected in each class of glycerophospholipid, and their levels were significantly ( $P < 0.05$ ) different among three corn kernel fractions. The major molecular species of triacylglycerol detected in three corn parts were OLL, OOL, LLL, POL, PLL, OOO, and POO, where L represents linoleic acid, O, oleic acid, and P, palmitic acid. The TAG composition was significantly different among three corn kernel fractions. In *Astro* germ fraction, LLL (27.2%) was detected as the dominant TAG molecular species, followed by OLL (21.9%) and PLL (13.4%); however, in *Astro* endosperm fraction, OLL

CONTINUED ON NEXT PAGE



(21.5%) was the major form followed by PLL (18.6%) and LLL (13.5%).

## Biolubricants: Raw materials, chemical modifications and environmental benefits

Salimon, J., *et al.*, *Eur. J. Lipid Sci. Technol.* 112:519–530, 2010.

The depletion of the world's crude oil reserve, increasing crude oil prices, and issues related to conservation have brought about renewed interest in the use of bio-based materials. Emphasis on the development of renewable, biodegradable, and environmentally friendly industrial fluids, such as lubricants, has resulted in the widespread use of natural oils and fats for nonedible purposes. In this study, we have reviewed the available literature and recently published data related to bio-based raw materials and the chemical modifications of raw materials. Additionally, we have analyzed the impacts and benefits of the use of bio-based raw materials as functional fluids or biolubricants. The term biolubricants applies to all lubricants that are both rapidly biodegradable and non-toxic to humans and other living organisms, especially in aquatic environments. Biodegradability provides an indication of the persistence of the substance in the environment and is the yardstick for assessing the eco-friendliness of substances. Scientists are discovering economical and safe ways to improve the properties of biolubricants, such as increasing their poor oxidative stability and decreasing high pour points. "Green" biolubricants must be used for all applications where there is an environmental risk.

## Granulation of sludge under different loads of a glycerol fraction from biodiesel production

Cydzik-Kwiatkowska, A., *et al.*, *Eur. J. Lipid Sci. Technol.* 112:609–613, 2010.

The aim of the research was to evaluate the possibility of using the crude glycerol fraction from biodiesel manufacturing processes for granular sludge production. The experiment was carried out simultaneously in four sequencing batch reactors (SBR) at different carbon loads:  $0.2 \pm 0.08$ ,  $0.6 \pm 0.16$ ,  $1.1 \pm 0.27$ , and  $1.3 \pm 0.35$  g COD/g TSS per cycle (COD, chemical oxygen

## AOCS Journals



### Journal of the American Oil Chemists' Society (June)

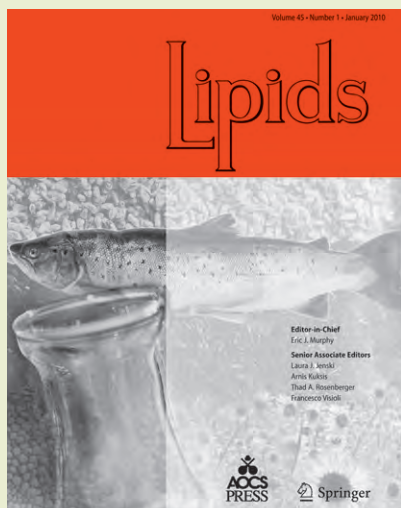
- Application of FTIR spectroscopy for the determination of virgin coconut oil in binary mixtures with olive oil and palm oil, Rohman, A., Y.B. Che Man, A. Ismail, and P. Hashim
- Application of headspace solid-phase microextraction and gas chromatography for the analysis of furfural in crude palm oil, Loi, C.C., H.C. Boo, A.S. Mohamed, and A.A. Ariffin
- Synthesis, characterization and free radical scavenging properties of rosmarinic acid fatty esters, Lecomte, J., L.J.L. Giraldo, M. Laguerre, B. Baréa, and P. Villeneuve
- Detection of corn oil in adulterated sesame oil by chromatography and carbon isotope analysis, Seo, H.-Y., J. Ha, D.-B. Shin, S.-L. Shim, K.-M. No, K.-S. Kim, K.-B. Lee, and S.-B. Han
- Characterization of Aegean olive oils by their minor compounds, Ilyasoglu, H., B. Ozcelik, V. Van Hoed, and R. Verhe
- Chemical composition and oxidative stability of selected plant oils, Szerk, A., M. Roszko, E. Sosińska, D. Derewiaka, and P.P. Lewicki
- Physicochemical properties of lipase-catalyzed interesterified fat containing  $\alpha$ -linolenic acid, Shin, J.-A., C.C. Akoh, and K.-T. Lee
- Biocatalytic properties of lipase from

walnut seed (*Juglans regia* L.), Yeşiloğlu, Y., and B. Demirkan

- Characteristics and composition of watermelon seed oil and solvent extraction parameters effects, Baboli, Z.M., and A.A.S. Kordi
- Competitive binding of off-flavor compounds with soy protein and  $\beta$ -cyclodextrin in a ternary system: A model study, Arora, A., and S. Damodaran
- Synthesis and characterization of the intrinsic properties of milkweed polyhydroxy fatty acids, Harry-O'kuru, R.E., A. Mohamed, S.H. Gordon, J. Xu, and B.K. Sharma
- Comparative evaluation of physicochemical properties of jatropha seed oil from Malaysia, Indonesia and Thailand, Emil, A., Z. Yaakob, M.N. Satheesh Kumar, J.M. Jahim, and J. Salimon
- Quality of biodiesel prepared from phorbol ester extracted *Jatropha curcas* oil, Devappa, R.K., J. Maes, H.P.S. Makkar, W. De Greyt, and K. Becker
- Effect of the previous storage of ripe olives on the oil composition of fruits, López-López, A., F. Rodríguez-Gómez, A. Cortés-Delgado, P. García-García, and A. Garrido-Fernández

### Lipids (June)

- Intracellular lipid droplets contain dynamic pools of sphingomyelin: ADRP binds phospholipids with high affinity, McIntosh, A.L., S.M. Storey, and B.P. Atshaves
- $\beta_3$ -Adrenergic signaling acutely down regulates adipose triglyceride lipase in brown adipocytes, Deulius, J.A., L.-F. Liu, M.A. Belury, J.S. Rim, S. Shin, and K. Lee
- Influence of simvastatin on apoB-100 secretion in non-obese subjects with mild hypercholesterolemia, Berthold, H.K., J. Mertens, J. Birnbaum, S. Brämwig, T. Sudhop, P.H.R. Barrett, K. von Bergmann, and I. Gouni-Berthold
- Medium- and long-chain triacylglycerols reduce body fat and blood triacylglycerols in hypertriacylglycerolemic, overweight but not obese, Chinese individuals, Zhang, Y., Y. Liu, J. Wang, R. Zhang, H. Jing, X. Yu, Y. Zhang, Q.



Xu, J. Zhang, Z. Zheng, N. Nosaka, C. Arai, M. Kasai, T. Aoyama, J. Wu, and C. Xue

- APOA1/A5 variants and haplotypes as a risk factor for obesity and better lipid profiles in a Brazilian elderly cohort, Chen, E.S., T.K. Furuya, D.R. Mazzotti, V.K. Ota, M.S. Cendoroglo, L.R. Ramos, L.Q. Araujo, R.R. Burbano, and M. de Arruda Cardoso Smith
- Identification and characterization of  $\Delta 12$ ,  $\Delta 6$ , and  $\Delta 5$  desaturases from the green microalga *Parietochloris incise*, Iskandarov, U., I. Khozin-Goldberg, and Z. Cohen
- Effect of conjugated linoleic acid on *Cyprinus carpio* var. Jian regarding growth, immunity, and disease resistance to *Aeromonas hydrophila*, Jiang, J., M.-j. Zhao, F. Lin, L. Yang, and X.-q. Zhou
- Characteristics of the fatty acid composition of a deep-sea vent gastropod, *Ifremeria nautilei*, Saito, H., and J. Hashimoto
- Sitosterol thermo-oxidative degradation leads to the formation of dimers, trimers and oligomers: A study using combined size exclusion chromatography/mass spectrometry, Rudzinska, M., R. Przybylski, Y.Y. Zhao, and J.M. Curtis
- Near-infrared spectroscopy and partial least-squares regression for determination of arachidonic acid in powdered oil, Yang, M., S. Nie, J. Li, M. Xie, H. Xiong, Z. Deng, W. Zheng, L. Li, and X. Zhang

demand; TSS, total suspended solids). Granulation did not occur in the reactor with the lowest organic carbon load. In the remaining reactors small granules began to appear after 25 cycles of reactor operation. In all reactors the efficiency of carbon removal remained at *ca.* 80%. The highest granular sludge production per cycle was  $0.31 \pm 0.28$  g TSS/L; it was obtained at an organic load of  $1.1 \pm 0.27$  g COD/g TSS per cycle. Most of the introduced COD was removed in the reactors during the first 5 h of aeration; the COD removal rate was correlated with the organic load and varied from 123.12 to 472.76 mg COD per liter and hour. With the increasing production of biodiesel fuel a problem arises with the utilization of glycerol that is a by-product of the process. By-product glycerol fraction from small agricultural installations is usually contaminated. Its composition varies depending on parameters of the transesterification process, and it is unprofitable to purify it. In the present research we investigated one possible way of dealing with the by-product. The glycerol fraction was successfully used as a carbon source for the production of aerobic granular sludge. The granules obtained can be used as a seed sludge in granule-based reactors, or can be co-fired with coal or directly combusted. Since aerobic granular sludge is one of the most promising technologies investigated during the last few years it appears to possess high utility.

### Chemistry of extra virgin olive oil: adulteration, oxidative stability, and antioxidants

Frankel, E.N., *J. Agric. Food Chem.* 58:5991–6006, 2010.

Much analytical work has been published on the chemistry of extra virgin olive oil (EVOO) as a basis for the detection and quantitative analyses of the type and amount of adulteration with cheaper vegetable oils and deodorized olive oils. The analysis and authentication of EVOO represent very challenging analytical chemical problems. A significant amount of literature on EVOO adulteration has depended on sophisticated statistical approaches that require analyses of large numbers of samples. More effort is needed to exploit reliable chemical and instrumental methods that may not require so much statistical interpretation. Large assortments of methods have been used to determine lipid oxidation and oxidative

stability and to evaluate the activity of the complex mixtures of phenolic antioxidants found in EVOO. More reliable chemical methods are required in this field to obviate excessive dependence on rapid antiradical methods that provide no information on the protective properties of antioxidants. The extensive literature on olive oil sensory tests, using many descriptors varying in different countries, should be supplemented by more precise gas chromatographic analyses of volatile compounds influencing the odor and flavors of EVOO.

### Dietary cholesterol, blood cholesterol and cardiovascular disease

Stanley, J., *Lipid Technol.* 22:110–112, 2010.

Cholesterol is an essential cellular nutrient, and homeostatic mechanisms exist to balance rates of cholesterol production and utilization and minimize effects of dietary cholesterol on blood cholesterol and hence cardiovascular disease risk. In non-diabetic populations, there is little evidence from epidemiological studies for associations between dietary cholesterol or the consumption of cholesterol-rich foods and cardiovascular disease risk, or from intervention trials for major effects of dietary cholesterol on blood cholesterol levels. By contrast, evidence is emerging from epidemiological studies that consumption of eggs is associated with cardiovascular disease in diabetics, and from intervention trials that dietary cholesterol has greater effects on blood cholesterol levels in insulin-resistant people. Since insulin plays a role in cholesterol homeostasis, these are not surprising findings. ■

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# Patents

## Published Patents

### $\Delta$ -15 desaturases suitable for altering levels of polyunsaturated fatty acids in oleaginous plants and yeast

Yadav, N.S., and H. Zhang, E.I. du Pont de Nemours and Co., US7659120, February 9, 2010

The present invention relates to fungal  $\Delta$ -15 fatty acid desaturases that are able to catalyze the conversion of linoleic acid (18:2, LA) to alpha-linolenic acid (18:3, ALA). Nucleic acid sequences encoding the desaturases, nucleic acid sequences which hybridize thereto, DNA constructs comprising the desaturase genes, and recombinant host plants and microorganisms expressing increased levels of the desaturases are described. Methods of increasing production of specific omega-3 and omega-6 fatty acids by over-expression of the  $\Delta$ -15 fatty acid desaturases are also described herein.

### Composition comprising protein material and compounds comprising non-oxidizable fatty acid entities

Berge, R., Thia Medica AS, US7659242, February 9, 2010

The present invention concerns a composition prepared from a combination of non- $\beta$ -oxidizable fatty acid entities and a protein material, and the use of said composition for the preparation of a pharmaceutical or nutritional composition for the prevention and/or treatment of insulin resistance, obesity, diabetes, fatty liver, hypercholesterolemia, dyslipidemia, atherosclerosis, coronary heart disease, thrombosis, stenosis, secondary stenosis, myocardial infarction, stroke, elevated blood pressure, endothelial dysfunction, procoagulant state, polycystic ovary syndrome, the metabolic syndrome, cancer, inflammatory disorders, and proliferate skin disorders. An alternative embodiment of the invention includes oil in the composition. The present invention also concerns an animal feed prepared from a combination of a protein material and a compound comprising non- $\beta$ -oxidizable fatty acid analogs, the use of said feed for improving the body composition of an animal, and a product produced from said animal.

### Impact resistant rigid vinyl chloride polymer composition and method of making the same

Berard, M.T., and C.M. Vanek, Dow Global Technologies Inc., US7659334, February 9, 2010

The instant invention is an impact-resistant rigid vinyl chloride polymer composition, and method of making the same. The impact-resistant rigid vinyl chloride polymer composition, according to instant invention, includes a vinyl chloride polymer, an impact

modifier, and a lubricant system. The impact modifier includes a chlorinated olefin polymer, and an ethylene/alpha-olefin copolymer. The lubricant system includes a first component, a second component, and a third component. The first component is a carboxylic acid selected from the group consisting of stearic acid, lauric acid, myristic acid, palmitic acid, blends thereof, and combinations thereof. The second component is a hydrocarbon wax selected from the group consisting of a paraffin wax, polyolefin wax, blends thereof, and combinations thereof. The third component is a metal soap selected from the group consisting of calcium stearate, aluminum stearate, copper stearate, lithium stearate, magnesium stearate, sodium stearate, zinc stearate, blends thereof, and combinations thereof. The process for preparing the impact-resistant rigid vinyl chloride polymer composition of the instant invention includes the following steps: (i) providing a vinyl chloride polymer; (ii) providing an impact modifier as described above; (iii) providing a lubricant system as described above; (iv) blending the vinyl chloride polymer, the impact modifier, and the lubricant system thereby forming the impact-resistant rigid vinyl chloride polymer composition.

### Aqueous ink-jet ink composition

Saito, T., and H. Yamamoto, Riso Kagaku Corp., US7662223, February 16, 2010

An aqueous ink-jet ink composition contains: (i) a polyglycerol fatty acid ester in which the number of carbon atoms of the fatty acid moiety is equal to 14, the polyglycerol fatty acid ester being contained in a proportion falling within the range of more than 0.1 percent by mass to less than 3.5 percent by mass, and (ii) an acetylene glycol, in which the number of mols of ethylene oxide added is equal to at least 10 mols, the acetylene glycol being contained in a proportion falling within the range of 0.2 percent by mass, inclusive, to 10 percent by mass, inclusive.

### Membrane scaffold proteins and embedded membrane proteins

Sligar, S.G., and T.H. Bayburt, The Board of Trustees of the University of Illinois, US7662410, February 16, 2010

Membrane proteins are difficult to express in recombinant form, purify, and characterize, at least in part due to their hydrophobic or partially hydrophobic properties. Membrane scaffold proteins (MSP) assemble with target membrane or other hydrophobic or partially hydrophobic proteins or membrane fragments to form soluble nanoscale particles that preserve their native structure and function; they are improved over liposomes and detergent micelles. In the presence of phospholipids, MSP form nanoscopic phospholipid bilayer disks, with the MSP stabilizing the particle at the perimeter of the bilayer domain. The particle bilayer structure allows manipulation of incorporated proteins in solution or on solid supports, including for use with such surface-sensitive techniques as scanning probe microscopy or surface plasmon resonance. The nanoscale particles facilitate pharmaceutical and biological research, structure/function correlation, structure determination, bioseparation, and drug discovery.

CONTINUED ON NEXT PAGE



## Polypeptides having lipase activity and polynucleotides encoding same

Yaver, D., *et al.*, US7662602, February 16, 2010

The present invention relates to isolated polypeptides having lipase activity and isolated polynucleotides encoding the polypeptides. The invention also relates to nucleic acid constructs, vectors, and host cells comprising the polynucleotides as well as methods for producing and using the polypeptides.

## Process for the preparation of fatty acid methyl ester from triglyceride oil by transesterification

Ghosh, P.K., *et al.*, Council of Scientific and Industrial Research, US7666234, February 23, 2010

The present invention relates to an improved process for the preparation of biodiesel from triglyceride oils through transesterification, particularly the fatty acid methyl ester of oil mechanically expelled from whole seeds of *Jatropha curcas*, a plant with potential for cultivation on wastelands in India and other countries, all unit operations being carried out at ambient temperature.

## Aircraft cleaner formula

Britton, C.E., Spray Nine Corp., US7666264, February 23, 2010

A cleaning composition based on an aqueous or non-petroleum solvent, and useful for cleaning exterior surfaces such as aircraft exterior surfaces and other metal, glass, rubber, and polymer surfaces possesses solvent-like properties with respect to greasy soils; inhibits corrosion and degradation of rubber; is biodegradable; forms a stable emulsion with water; remains optically clear and stable at multiple dilutions with water; and conforms to MIL-PRF 87937D. The composition includes at least one fatty acid methyl ester, at least one ethoxylated alcohol having an HLB [hydrophilic-lipophilic balance] ranging from about 10 to about 14, at least one alkyl polyglycoside having an HLB ranging from about 10 to about 14, at least one hydrotrope, an alkali metal silicate, at least one corrosion inhibitor in an amount effective to prevent corrosion on metals, and water.

## Oral formulation for delivery of poorly absorbed drugs

Choi, S.-H., and S.-W. Cho, Procarrier, Inc., US7666446, February 23, 2010

A composition for oral delivery of a poorly absorbed drug is disclosed. The composition includes the drug, an enhancer for increasing absorption of the drug through the intestinal mucosa, a promoter, which alone does not increase absorption of the drug through the intestinal mucosa, but which further increases the absorption of the drug in the presence of the enhancer, and optionally a protector for protecting the drug from physical or chemical decomposition or inactivation in the gastrointestinal tract. Illustrative enhancers include sucrose fatty acid esters and illustrative promoters include aminosugars and amino acid derivatives, such as poly(amino acids).

Illustrative protectors include methylcellulose poly(vinyl alcohol), and poly(vinyl pyrrolidone).

## Compositions including Krill extracts and conjugated linoleic acid and methods of using same

Rockway, S., Pharmanutrients, US7666447, February 23, 2010

Methods and compositions for the prevention, therapy, and/or treatment of several disease states. The methods comprise the administration of a therapeutically effective amount of a composition including krill extract and conjugated linoleic acid. In addition, the present invention provides new and improved therapeutic compositions including krill extracts and conjugated linoleic acid.

## Lipolytic enzyme: Uses thereof in the food industry

Miasnikov, A., *et al.*, Danisco A/S, US7666618, February 23, 2010

The invention encompasses the use of a lipolytic enzyme obtainable from one of the following genera: *Streptomyces*, *Corynebacterium*, and *Thermobifida* in various methods and uses wherein the lipolytic enzyme hydrolyzes a glycolipid or a phospholipid or transfers an acyl group from a glycolipid or phospholipids to an acyl acceptor. The present invention also relates to a lipolytic enzyme that hydrolyzes at least a galactolipid or transfers an acyl group from a galactolipid to one or more acyl acceptor substrates, wherein the enzyme is obtainable from *Streptomyces* species.

## Polypeptides having lipase activity and polynucleotides encoding same

Yaver, D., *et al.*, Novozymes, Inc., US7666630, February 23, 2010

The present invention relates to isolated polypeptides having lipase activity and isolated polynucleotides encoding the polypeptides. The invention also relates to nucleic acid constructs, vectors, and host cells comprising the polynucleotides as well as methods for producing and using the polypeptides.

## Aliphatic polyester resin composition and sheets, films or other products molded by the resin

Sashida, K., and S. Kamiya, Riken Vitamin Co., Ltd., US7666934, February 23, 2010

Provided is a thermoplastic resin composition, in particular, an aliphatic polyester resin composition comprising a plasticizer which is soft, exhibits high transparency, is reduced in bleeding out and exhibits high resistance to the extraction by a paraffinic solvent; and a sheet, a film, or a molded article formed from the thermoplastic resin composition. An aliphatic polyester resin composition characterized in that it comprises 100 parts by mass of an aliphatic polyester and, as a plasticizer, 1.0 to 100 parts by mass of a specific ester compound which is an ester formed from a trivalent

polyhydric alcohol and an acyl group derived from a carboxylic acid having 2 to 18 carbon atoms and has an average acylation degree of 50 to 90%.

## Process for producing glycerin and fatty alcohol via hydrogenation

Sakamoto, T., *et al.*, Kao Corp., US7667059, February 23, 2010

The invention relates to a process for producing a fatty alcohol and glycerin by hydrogenation reaction of fats and oils in the presence of a catalyst, wherein the reaction is carried out in the coexistence of an organic solvent.

## Method of producing biodiesel

Yu, J., *et al.*, Sichuan Gushan Oil Chemical Co., Ltd., US7667060, February 23, 2010

This invention involves a kind of fatty acid methyl ester (biodiesel fuel), especially the method of obtaining ester-like substances by means of chemical alterations of oil.

## Method of preparing a composition using argentation chromatography

Binder, T.P., *et al.*, Archer Daniels Midland Co., US7667061, February 23, 2010

The present invention is directed to a method of preparing compositions enriched in compounds containing carbon chains of varying degrees of unsaturation using argentation chromatography. The present method utilizes an argentized cationic resin or a conditioned argentized alumina to separate compounds containing saturated or mono-unsaturated carbon chains from compounds having polyunsaturated carbon chains present in a starting composition. The invention is particularly useful for preparing a composition enriched in polyunsaturated fatty acid alkyl esters from mixtures of fatty acid esters in a starting composition derived from vegetable oils. The present invention is also directed to a method of preparing a conditioned argentized alumina adsorbent having increased selectivity for compounds containing one or more polyunsaturated carbon chains.

## Image forming method, liquid developing device, and image forming apparatus

Miura, S., *et al.*, Seiko Epson Corp., US7670732, March 02, 2010

An image-forming method includes: by using a plurality of liquid developers having different colors, forming a plurality of single-color images corresponding to the colors; transferring a non-fixed color image onto a recording medium; and fixing the non-fixed color image onto the recording medium. In the image-forming method, each of the liquid developers includes an insulating liquid containing unsaturated fatty acid components and toner particles dispersed in the insulating liquid, and an oxidation polymerization accelerator that accelerates an oxidation polymerization reaction of the unsaturated fatty acid components during fixation is contained in the liquid developer forming the single color image that is positioned

closest to the recording medium among the plurality of single-color images forming the non-fixed color image.

## Cosmetic emulsifiers

Clendennen, S.K., and N.W. Boaz, Eastman Chemical Co., US7667067, February 23, 2010

A composition, process of preparation, and utility of salts of fatty acid esters of amino-alcohols such as dimethylaminoethanol (DMAE) as emulsifiers useful for formulating with lipids and waxes is described. DMAE fatty acid esters were prepared enzymatically in the absence of added solvent and then salified directly with carboxylic acids to form the salts. The compounds were used to make stable emulsions with a variety of cosmetically acceptable lipids.

## Method for purification of glycerol

Rezkallah, A., Rohm and Haas Co., US7667081, February 23, 2010

A method for purification of glycerol, especially crude glycerol from biodiesel production. The method uses gel-type acidic ion exchange resin beads to separate fatty acid salts and inorganic salts from the crude glycerol.

## Transgenic plants having anthelmintic activity and methods of producing them

Verbsky, M.L., *et al.*, Divergence Inc., US7667095, February 23, 2010

The present invention provides DNA constructs, transgenic plants containing such constructs, and methods of making the plants. The DNA constructs encode a polypeptide that when expressed results in the production of fatty acid compounds having anthelmintic activity. Transgenic plants expressing such a polypeptide can exhibit enhanced resistance to plant parasitic nematodes particularly when expressed in vegetative tissues. Transgenic plants expressing such a polypeptide can also be useful for non-pesticidal industrial uses.

## Method and apparatus of coating articles

Sanders, N.H., *et al.*, Cadbury Schweppes Ltd., US7669546, March 2, 2010

A coating such as liquid milk chocolate is applied to articles such as confectionery bars. The bars are conveyed by conveyor under a curtain of liquid chocolate issuing through an outlet slot in a trough. A layer of air is caused to flow through the outlet slot in the trough so as to modify the flow characteristics of the curtain. The layer of air permits a curtain of even thickness to be achieved. ■

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](mailto:scott_bloomer@admworld.com).





## HUFA AND PUFA (CONTINUED FROM PAGE 427)

Database to form the interactive personalized menu-planning software, KIM-2, that is freely available at <http://efaeducation.nih.gov/sig/kim.html>. The software assembles nutrient data for desired food servings selected from nearly 12,000 options, sums the milligrams of PUFA and HUFA, and estimates the likely outcome in terms of the percentage of n-6 in a person's HUFA. The outcome can be confirmed by a simple finger-tip blood assay. Such quantitative feedback about the consequence of food choices gives explicit guidance on foods that will meet each individual's personal tastes and sense of risk.

In contrast to the relatively indiscriminate process of accumulating HUFA in tissues, the processes making active hormones and their receptor-mediated actions do discriminate and give stronger actions for n-6 than n-3 derivatives (detailed by Wada *et al.*, 2007). That difference makes the choice of dietary supplies (which determine tissue precursor proportions) an important aspect of human health. Ignoring the preventable overabundance of n-6 in tissue HUFA maintains an imprecise belief that current

health-related financial losses are inherently "normal" human conditions. Employers and employees reluctant to observe quantitative assay results of each individual's HUFA status (and likely n-3 deficit) will probably neglect or misinterpret the simple dietary steps already available for choosing foods that balance competing n-3 and n-6 acids and preventing massive annual financial losses by American employers and employees.

Many social, ethical, and financial concerns caused by health-related events might be prevented by providing explicit information to the public about food choices that balance the competing metabolic steps that maintain tissue proportions of HUFA at levels that prevent an n-3 deficit and decrease unintended health risk. Personalized, quantitative, interactive menu planning software aids in designing explicit advice for successful primary prevention of what the Centers for Disease Control and Prevention regard as a preventable condition that is still predicted to cause \$503 billion of losses in 2010. The past 80 years have provided us tools to prevent future health-related losses

by individuals and corporations. Will we use them?

*Bill (William E.M.) Lands was professor of biochemistry at the University of Michigan (1955–1980) and the University of Illinois (1980–1991) Medical Schools. He wrote more than 260 papers, plus the text Fish, Omega-3 and Human Health, 2nd Edition. One of the world's 1000 most cited scientists in 1965–1978, his awards include: 1985 Pfizer Biomedical Research, 1997 Supelco/Nicholas Pelick-AOCS Research, 2006 ISSFAL Alexander Leaf Distinguished Scientist Award for Lifetime Achievement, and the 2010 AOCS Ralph Holman Lifetime Achievement. He is also a Fellow of American Association for the Advancement of Science, American Society for Nutrition, and the Society for Free Radical Biology and Medicine. He served at the National Institute on Alcohol Abuse and Alcoholism/National Institutes of Health (1990–2002). Now retired, he serves on the board of directors of Omega Protein, Inc. Reach him via email at [wemlands@att.net](mailto:wemlands@att.net).*

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## DEGUMMING REVISITED (CONTINUED FROM PAGE 430)

The Complete (Deffense, 1999) and SOFT® (Choukri *et al.*, 2001) degumming processes use EDTA as complexing agent for the calcium and magnesium ions that form part of the NHP. Figure 2 shows it as a further treatment of water-degummed oil, but in principle, it is also highly effective for other oil grades. Since EDTA is quite expensive, its use may be most appropriate as a kind of polishing operation that requires only little reagent. One such polishing operation would be the removal of pro-oxidant iron from acid oils that have become contaminated during transport and/or storage.

The largest box in Figure 2 refers to the acid refining process, either on its own or preceding an enzymatic treatment of the gums originating from this acid refining process. In the acid refining process, the NHP are decomposed by a degumming acid that is finely dispersed through the oil, and the resulting phosphatidic acid is then made hydratable by converting it to its alkali salt by the addition of caustic. There are various acid refining process variants on the market. TOP is now offered by Westfalia, and several other suppliers offer their own type of acid refining process. It has been proven in practice on a large variety of oils over a number of years, and I continue to regard it as the process of the future.

Whether to treat the acid refined oil with a PLA1 or LAT enzyme or treat the gums with these enzymes depends on local circumstances. If a plant with large holding vessels is already present, it does not cost much to treat the oil with enzymes and thereby increase the oil yield. Installing such large vessels may well be unduly costly, so in that case, treating the gums may well be preferable. This treatment can be enzymatic or chemical depending on what the refiner wants to achieve. If the processor wants to recuperate the fatty acids present in the gums, a chemical treatment is called for. If the plant manager has an outlet for oily material (a mixture of partial glycerides and triglycerides) and can dispose of residual organics, the enzymatic treatment offers opportunities, but then enzyme cost and patents have also to be taken into account.

*Albert J. Dijkstra, consultant, France, can be reached via email at [albert@dijkstra-tucker.be](mailto:albert@dijkstra-tucker.be).*

## ALTON E. BAILEY AWARD (CONTINUED FROM PAGE 434)

best uses for co-products will be feed," he said. Marketing wet distillers' dried grains with solubles saves processing energy, "but this is only practical within short distances."

10. The bioeconomy must be sustainable. "We cannot replace unsustainable petroleum production with another unsustainable system," Johnson said.

Will science ensure that we engineer a good revolution? "Yes," said Johnson, "but there is plenty of work to be done!"

Johnson received the Alton E. Bailey Award at the AOCS USA Section luncheon on Tuesday, May 18, at the 101st AOCS Annual Meeting & Expo in Phoenix, Arizona, USA. The award was established by the North Central Section (now part of the USA Section) to honor the memory of Alton E. Bailey. Bailey was a distinguished technologist, author of numerous textbooks in the field, and a leader in the work of the society. ■

## HOT TOPICS (CONTINUED FROM PAGE 439)

into co-op or work study programs. He also noted that educators need to create opportunities for industry representatives to talk to students about how their degrees can apply to industry, as well as to get industry input on curricula.

Roland Verhé of the University of Ghent presented an international perspective of lipid education. Noting the fivefold increase in the number of students since the 1980s, Verhé pointed to a similar increase in the number of disciplines in food science and life science. Globalization has created competition in education, he said, adding that "the development of joint and double degrees in Europe is a hot topic."

Karen Schaich of Rutgers University discussed facts and myths about lipids. "It is a myth that lipid chemistry is not 'sexy science,'" she said. "It is also a myth that it is not important."

Noting that many professors dealing with lipid chemistry pass along misinformation, she exhorted educators to evaluate the accuracy of the information they present. Three topics rife with myth or "fuzzy facts" are fat crystallization, lipid oxidation, and the effects of fats on health.

"We need to replace the old descriptions with thermodynamic concepts," she said, "and bring in new analytical techniques."

Most lipid chemistry is taught with too broad a brush, she suggested, noting that the explanation of lipid oxidation has not changed since the 1940s or 1950s.

"We need to change the way we think and the way we teach," Schaich said.

Those interested in helping the Professional Educators' Common Interest



*Blake Rassmussen presents during the Hot Topic sessions held at the 101st AOCS Annual Meeting & Expo.*

Group change the way lipid chemistry is taught should contact either Andy Proctor ([aproctor@uark.edu](mailto:aproctor@uark.edu)) or Randy Weselake ([randall.weselake@ualberta.ca](mailto:randall.weselake@ualberta.ca)) for more information.

*inform Associate Editor Catherine Watkins can be reached via email at [cwatkins@aocs.org](mailto:cwatkins@aocs.org).*



## BIOFUELS NEWS (CONTINUED FROM PAGE 405)

tion, bioreactor design, and the presence of pharmaceutical chemicals in sewage sludge.

Kargbo concludes, "Currently, the estimated cost of production of biodiesel from dry sludge is \$3.11 per gallon of biodiesel compared to \$3.00 per gallon for petro diesel (as of January 2010)."

## Argentine biodiesel use to increase

Claudio Molina, executive director of the Argentine biofuels association AABH (Asociación Argentina de Biocombustibles e Hidrógeno), said that the Argentine government wants to double the content of biodiesel in the local diesel blend to 10% in 2011 as a means to cut rising diesel imports, according to Reuters news agency (<http://in.reuters.com/article/idINN1924486920100519>). A new law requiring all diesel in the country to contain 5% biodiesel went into effect in January 2010.

Molina expects Argentine car manufacturers to agree to a 7% biodiesel mix, later to be raised to 10%.

According to Reuters, Argentina currently produces 2.5 million metric tons (MMT) of biodiesel annually. With the present 5% biodiesel law, the country needs 0.8 MMT to meet its annual needs.

## JATROPHA

### Jatropha in China

A research paper appearing in the journal *Science China–Earth Sciences* (53:120–127, 2010; DOI 10.1007/s11430-009-0204-y), by WeiGuang Wu and co-workers, considered the potential land for planting *Jatropha curcas* for use as a biofuel feedstock biodiesel in China. The authors wrote:

"Based on remote sensing data on land use, data on meteorological, soil and land slope, and suitable environment for *Jatropha curcas* plantation, this study uses Agro Ecological Zone method and considers social-economic constraints to evaluate potential suitable land for *Jatropha curcas* plantation in China's major *Jatropha curcas* production region, Southwest China. The results show that while there are some potential lands to expand *Jatropha curcas* areas, the amount of these lands will hardly meet the government's target for *Jatropha curcas*-based biodiesels development in the future. China may need to reconsider its long-term targets on the development of *Jatropha curcas*-based biodiesels." ■

### Published something lately?

We would like to begin listing recent publications of our student members, including dissertations. Please send complete citations to *inform* Associate Editor Catherine Watkins ([cwatkins@aocs.org](mailto:cwatkins@aocs.org)).

## THOUGHT PROCESSES (CONTINUED FROM PAGE 433)

by approximately 10°C for every methylene group. It increased by about 30°C for every EO group. We also measured rheological properties of the anionic/cationic combinations and observed that at particular ratios the viscosity increased to such a large degree that a gel was formed.

## SUMMARY

A need to be met and a challenge to be overcome are starting points for innovation. The next step is to convert the need into a problem or problems and then convert the problems into critical questions. To answer the critical questions, one should access the different parts of the IL by asking specific as well as general questions. Specific questions would tap into your expertise in the area of interest and give a direct answer if it exists. If not, asking general questions helps you to step "out of the box" and tap into the rest of your IL for answers that may lead to a clue.

Treat each answer as a hypothesis until it is experimentally proven. Precede physical experiments with "thought experiments." Pay attention to details without losing the bigger picture. Thoroughness and attentiveness to details expand our IL in general and build our expertise in particular. Accessible expertise is what helps us meet our needs and overcome our challenges with ease and efficiency.

I have shared the thought processes I have used to find answers to most of my questions. I hope that the readers of this article will also reflect on, think about, and analyze the thought processes they use during their creative moments. It is my hope that, in the future, we will have consolidated and refined our collective approaches in order to give new scientists a head start in the creative process to problem solving.

## ACKNOWLEDGMENTS

I would like to thank Professor Milton Rosen, AOCS and the Samuel Rosen Memorial Award committee for selecting me to be this year's recipient of the award.

Ammanuel Mehreteab received his B.A. degree in chemistry from Central College in Pella, Iowa, USA, and his M.S. and Ph.D. in physical chemistry from Rutgers University, New Brunswick, New Jersey, USA; he was awarded a post-doctoral position at the University of Pennsylvania, Philadelphia, USA. He has held a number of positions at Colgate-Palmolive Co. and is currently the worldwide director of Cross-Category Innovation, Global Technology. Mehreteab has pioneered work on pseudo-nonionics or anionic/cationic surfactant mixtures that behave like nonionic surfactants in some ways, but have superior properties such as ultralow surface and interfacial tensions, excellent emulsification, detergency, and rheological behavior. He helped organize the 4th World Conference and Exhibition on Detergents in Montreux, Switzerland, and has served as an associate editor for the Journal of Surfactants and Detergents. Email him at [ammanuel\\_mehreteab@colpal.com](mailto:ammanuel_mehreteab@colpal.com).

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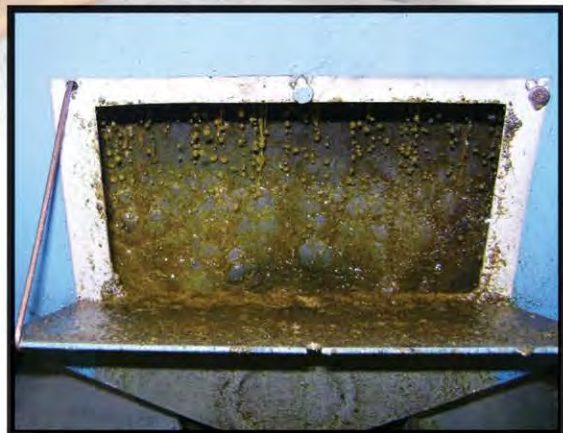
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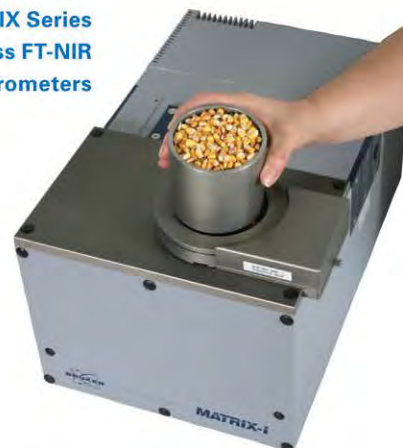
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