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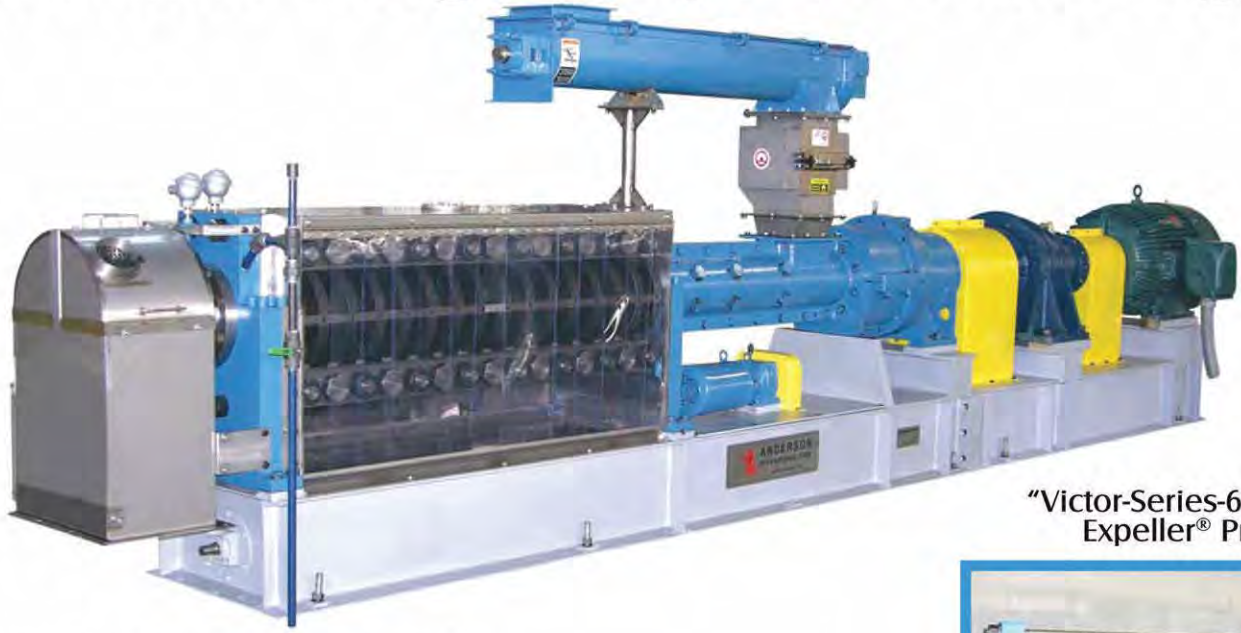

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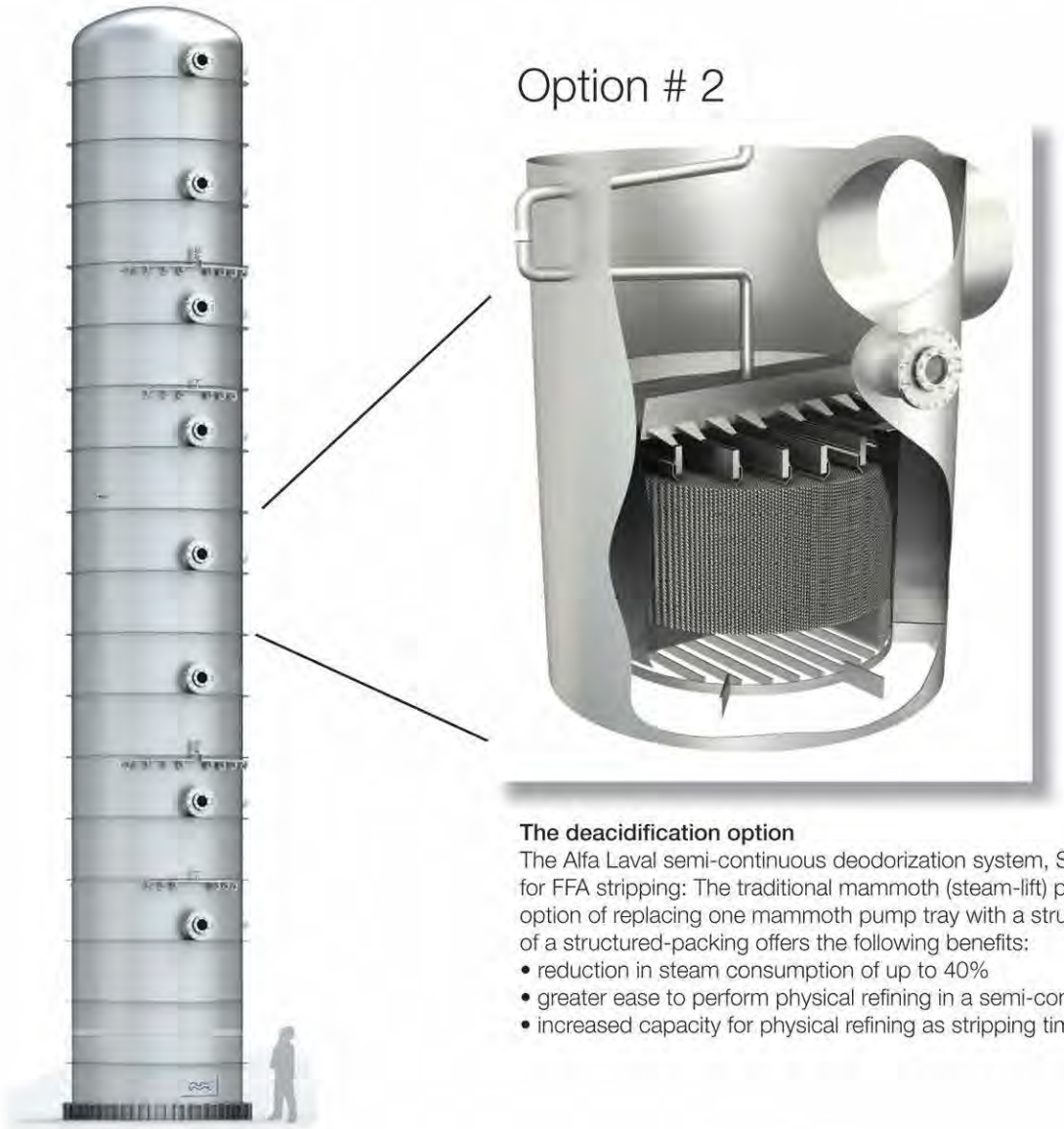

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inform • International News on Fats, Oils, and Related Materials
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Calendar

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

December

December 15–20, 2010. International Congress of Pacific Basin Societies (Pacifichem), Honolulu, Hawaii, USA. Information: www.pacifichem.org.

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

January

January 12–17, 2011. Obesity, Keystone Resort, Keystone, Colorado, USA. Information: www.keystonesymposia.org/Meetings/ViewMeetings.cfm?MeetingID=1115.

January 13–14, 2011. National Algae Association Conference, The Woodlands, Texas, USA. Information: info@nationalalgaeassociation.com; www.nationalalgaeassociation.com.

January 13–14, 2011. GOED [Global Organization for EPA and DHA Omega-3] Exchange Conference, Marriott City Center Hotel, Salt Lake City, Utah, USA. Information: www.goedexchange.com.

January 30–February 4, 2011. Gordon Conference on Plant Lipids: Structure, Metabolism & Function, Hotel Galvez, Galveston, Texas, USA. Information: www.grc.org/programs.aspx?year=2011&program=plantlipid.

February

February 6–9, 2011. National Biodiesel Board Conference & Expo, Phoenix Convention Center and Venues, Phoenix, Arizona, USA. Information: www.biodiesel.org.

February 10–11, 2011. Municipal Solid Waste to Biofuels Summit 2011, Wyndham Chicago Hotel, Chicago, Illinois, USA. Information: email (Oliver Saunders): osaunders@fcbusinessintelligence.com; www.eyeforenergy.com/biofuels.

February 20–22, 2011. 16th National Ethanol Conference, JW Marriott Desert Ridge, Phoenix, Arizona, USA. Information: www.ethanolrfa.org or www.nationalethanolconference.com.

February 24–25, 2011. US Department of Agriculture Agricultural Outlook Forum, Crystal Gateway Marriott Hotel, Arlington, Virginia, USA. Information: www.usda.gov/oce/forum.

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

February 27–March 4, 2011. Gordon Conference on Signal Transduction within the Nucleus, Four Points Sheraton, Ventura, California, USA. Information: www.grc.org/programs.aspx?year=2011&program=sigtrans.

February 27–March 2, 2011. Practical Short Course on Biodiesel/Biofuel from Algae and Other Feedstocks–Industrial Applications of Vegetable Oil, Food Protein Research & Development Center, Texas Engineering Experiment Station, Texas A&M University System, College Station, Texas, USA. Information:

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AOCS Meeting Watch

April 30, 2011. Basics of Edible Oil Processing and Refining—AOCS Short Course, Hyatt Regency Hotel, Cincinnati, Ohio, USA. Information: email: meetings@aocs.org; http://AnnualMeeting.aocs.org.

April 30–May 1, 2011. Functionality of Lipids in Foods—AOCS Short Course, Hyatt Regency Hotel, Cincinnati, Ohio, USA. Information: email: meetings@aocs.org; http://AnnualMeeting.aocs.org.

May 1, 2011. New Technologies in Oilseed Extraction and Edible Oil Refining—AOCS Short Course, Hyatt Regency Hotel, Cincinnati, Ohio, USA. Information: email: meetings@aocs.org; http://AnnualMeeting.aocs.org.

May 1–4, 2011. 102nd AOCS Annual Meeting & Expo, Duke Energy Convention Center, Cincinnati, Ohio, USA. Information: phone: +1 217-359-2344; fax: +1 217-351-8091; email: meetings@aocs.org; http://AnnualMeeting.aocs.org.

June 18, 2011. Sensory Evaluation of Olive Oil Short Course, Hilton Hotel, Izmir, Turkey. Information: email: meetings@aocs.org; www.aocs.org/goto/Turkey2011.

June 18–19, 2011. Basics of Oilseed Processing Short Course, Hilton Hotel, Izmir, Turkey. Information: email: meetings@aocs.org; www.aocs.org/goto/Turkey2011.

June 19, 2011. Edible Oil Refinery and Optimization and Maintenance Short Course, Hilton Hotel, Izmir, Turkey. Information: email: meetings@aocs.org; www.aocs.org/goto/Turkey2011.

June 19–21, 2011. Oils and Fats World Market Update 2011, Izmir Hilton, Izmir, Turkey. Information: www.aocs.org/goto/WorldMarket.

June 21–23, 2011. World Conference on Oilseed Processing, Fats & Oils Processing, Biofuels & Applications, Izmir Hilton, Izmir, Turkey. Information: www.aocs.org/goto/Turkey2011.

October 19–21, 2011. 14th Latin American Congress on Fats and Oils, Hotel Cartagena, Cartagena, Colombia. Information: email: meetings@aocs.org; www.aocs.org/goto/LACongress.

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

http://foodprotein.tamu.edu/fatsoils/scbiodiesel.php.

March

March 1–4, 2011. DEUEL Conference on Lipids, Silverado Resort, Napa, California, USA. Information: www.deuelconference.org.

March 1–6, 2011. Biofuels, Swissotel The Stamford, Singapore. Information: www.keystonesymposia.org/meetings/viewMeetings.cfm?MeetingID=1125.

March 13–15, 2011. NIOP [National Institute of Oilseed Products] Annual Convention, Camelback Inn, Scottsdale, Arizona, USA. Information: niop@kellencompany.com; www.oilseed.org.

March 13–17, 2011. NACE Corrosion 2011 Conference & Expo, George R. Brown Convention Center, Houston, Texas, USA. Information: http://events.nace.org/conferences/c2011/c2011index.asp.

March 13–18, 2011. Pittcon 2011, Georgia World Congress Center, Atlanta, Georgia, USA. Information: www.pittcon.org/about.

March 14–15, 2011. Biowise 2011: Biofuels from Lab to Finance, The Crowne Plaza Hotel, Kuala Lumpur, Malaysia. Information: www.greenworldconferences.com.

March 15–17, 2011. 8th International Conference Functional Foods for Chronic Diseases: Science and Practice, University of Nevada, Las Vegas, Nevada, USA. Information: http://www.functionalfoodscenter.net/Conference_2011.html. ■

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inform (ISSN: 0897-8026) is published monthly by AOCS Press, 2710 South Boulder Drive, Urbana, IL 61802-6996 USA . Phone: +1 217-359-2344. Periodicals Postage paid at Urbana, IL, and additional mailing offices. POSTMASTER: Send address changes to *inform*, P.O. Box 17190, Urbana, IL 61803-7190 USA.

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World Conference on Oilseed Processing, Fats & Oils Processing, Biofuels & Applications

June 21–23, 2011
Hilton Izmir · Izmir, Turkey

World Conference Short Courses:

June 18, 2011	Sensory Evaluation of Olive Oil
June 18–19, 2011	Basics of Oilseed Processing
June 19, 2011	Edible Oil Refinery Optimization and Maintenance

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Biofuels could be cleared for aircraft use

Graham Warwick

In just five years, the aviation industry's decades-long reliance on petroleum-based fuels has been turned on its head. The future lies in fuels from sources that range from animal fat to microalgae. But with the technology in hand, the question now is whether biofuel producers can raise the investment needed to launch commercial-scale production.

Approval of biofuels for use in aircraft, expected by mid-2011, is a critical step. A standard for jet fuels using synthesized hydrocarbons has already been crafted and the first annex, covering synthetic paraffinic kerosene (SPK) produced via the Fischer-Tropsch (F-T) process, was approved last year. But a second annex covering bio-SPK—also called hydrotreated renewable jet fuel (HRJ)—is eagerly awaited, as these promise to reduce aviation's greenhouse gas emissions.

For an industry that has used one jet fuel for decades, development of the new D7566 specification by standards organization ASTM International has moved surprisingly quickly. But it has not been easy, requiring substantial fuel and engine testing to ensure synthetic kerosenes are truly drop-in replacements for petroleum-based jet fuel.

As expected, the proposal to amend D7566 to include bio-SPK did not pass a ballot of ASTM members in June. Opponents, mainly the engine manufacturers, argued that more data are needed on different fuels from different manufacturers and more engine testing is required. One reason is that most of the fuel tested came from Honeywell International's UOP, which won a Pentagon contract to supply HRJ for qualification testing, says Tim Edwards, who is leading biofuels research at the US Air Force Research Laboratory (AFRL; Wright-Patterson Air Force Base, Dayton, Ohio).

After the vote, the Air Force agreed to share fuel to allow additional commercial engine demonstrations. The service is also conducting biofuel tests on military derivatives of commercial engines, which will help with certification. These include flight tests of the F117 derivative of Pratt & Whitney's PW2000 turbofan on the C-17 airlifter. An aircraft flew in August with all four engines fueled by a 50:50 blend of conventional JP-8 and HRJ [made from] from beef tallow.

Data from the additional fuel and engine testing will be presented to ASTM members, and a re-ballot in December 2010 is expected to succeed. This should lead to approval early next year of an annex to the D7566 synthetic-fuel standard allowing bio-SPK to be used in aircraft in blends of up to 50% with conventional jet fuel. This will be a pivotal event, as certification is expected to remove a significant barrier to investment in large-scale facilities to produce HRJ fuels in economic quantities.

"Nothing matters until you get that approval," says Tom Todaro, chief executive officer (CEO) of AltAir Fuels (Seattle, Washington, USA) and chairman of the board of Sustainable Oils (Bozeman, Montana, USA), which produces oil from camelina, a plant that largely does not compete with food crops for land or water. "The problem is the availability of financing, not camelina. We can't get the money until the fuel is certified," he says.

AltAir Fuels is the first to license UOP's process to produce HRJ. The Seattle-based company signed memorandums of understanding with 14 airlines in December 2009 to negotiate the purchase of up to 750 million gallons (2,800 million liters) of camelina-derived fuel. This is to be produced at a facility in Anacortes, Washington, and would replace about 10% of the fuel consumed annually at Seattle-Tacoma International Airport. "Once ASTM approves the fuel, we can begin the permitting process," he says, adding that construction will take 18 months.

The creation of AltAir illustrates the challenges of starting biofuel production. Sustainable Oils works by signing contracts with farmers to grow camelina that it will buy back at an agreed price. Farmers grow a specific strain of camelina developed by biotechnology company Targeted Growth. Sustainable Oils extracts the oil from camelina seeds, "but we hoped someone else would build the refinery," says Todaro.

Eventually, to kick-start the market, Sustainable Oils decided to form AltAir as an independent company. The business plan is to build add-on units at traditional refineries. With 100-million-gallon capacity, these bolt-on facilities will each cost "a couple of hundred million dollars" and provide about 10% of the fuel required annually at an average-sized airport, he says.

A different business model is being pursued by St. Paul, Minnesota-based JetE, which is proposing to sell small turnkey HRJ plants to farming cooperatives looking to add value to their feedstock. "Ultimately it is all about feedstock, and who controls it? Farmers. We can put them in the business of making fuel," says Tim Kubista, senior vice president. JetE's role includes bringing fuel buyers to the table.

JetE has licensed small-scale hydroprocessing technology from Danish company Haldor Topsoe and is offering a 7.5-million-gallon-per-year plant for $40 million and a 30-million-gallon plant for $85–90 million. Kubista is hopeful of a deal by year-end, and says the feedstocks that are economically viable and available in commercial quantities in the United States are crude corn oil from ethanol production, soybean oil, and tallow.

While the near-term focus is on plant oils and animal fats as feedstocks, aviation is enamored of algae because it promises high oil yields from small land areas and does not compete with food for land or water. Work is underway scaling up algae production in both open ponds and closed bioreactors, in a bid to drive down costs, but San Francisco-based Solazyme says it is ready to move into commercial-scale oil production using a different algae pathway (for more information on Solazyme, see *inform 21*:373–375, 2010).

Solazyme has adapted the fermentation process used to produce ethanol, replacing yeast with algae. Sugars produced from a wide range of feedstocks—switchgrass, corn stover, sugar cane, municipal waste, and cellulosic biomass—are fed to the algae, which convert the sugar to oil. The oil is then extracted from the algae and converted to HRJ using UOP's process. Solazyme has delivered 1,500 gallons of algal HRJ to the US Navy for engine testing.

The company says it is on track to be cost-competitive with petroleum-based fuel in 18–24 months, targeting $60–$80 a barrel. "We should be producing quantities that can fill some demand in the aviation market in the next three years," says CEO Jonathan Wolfson.

Solazyme is talking to airlines about long-term supply agreements and to refining partners about establishing a supply chain. "We are working with numerous partners to provide a rapid path to commercialization that includes access to feedstock and financing," he says, noting the addition of US agribusiness Bunge as a strategic investor "is an indicator of how we are thinking about feedstock . . . we are confident that the supply will be there."

After playing a key role in the rapid progress of biofuels from idea to reality, UOP is turning its attention to new processes and feedstocks.

"We've made [bio-SPK] fuels from about 12 different types of natural oils," says Jim Rekoske, vice president and general manager of UOP's renewable energy business. "We are confident we can look at an oil and say what yield of jet fuel you will get from that feedstock."

UOP's process "is completely feedstock flexible," Rekoske says, and can convert any natural oil with hydrocarbon chains of appropriate lengths into jet fuel. "A flexible process allows you to source the cheapest available oil." The challenge now, he says, is in bringing together three different industries—agriculture, refining, and transportation—to reach long-term agreements that will provide the confidence needed to scale up feedstock and fuel production. "That's the process that is taking time."

Feedstock flexibility will allow an HRJ fuel producer to switch to a higher-yield feedstock. "If the question is, do you want to invest in growing camelina if you can be supplanted in five years by algae, the answer is long-term agreements with customers and refiners. It's just negotiation," says Rekoske. He believes there has been significant progress, with two groups close to definitive supply agreements with airlines.

With approval for bio-SPK now within sight, interest is shifting to more advanced biofuels, and there is growing excitement—and debate—over which pathways will be next to be approved. "Part of our work is to figure out what is next, what's the most mature," says AFRL's Edwards. "It starts with people sending us fuels. We're working on different feedstocks, different processes, and fully synthetic fuels."

Much of the work is focused on processes for producing jet fuel from ligno-cellulosic feedstocks such as forest, agricultural, and municipal waste, which is available in huge quantities. UOP is working on upgrading pyrolysis oil to liquid fuel. Fast pyrolysis is the rapid decomposition of biomass in the presence of heat and absence of oxygen. The resulting bio-oil can be upgraded to fuel. "We are looking at a variety of different things for next-generation fuels. But there is a tremendous capacity to supply natural oils without going to biomass and other carbon sources," argues Rekoske.

One of the most promising new pathways, Edwards says, is being called "alcohol oligomerization." This starts with an alcohol, like ethanol or butanol; removes the oxygen; and grows hydrocarbons from the molecules. Gevo, Virent, and Swedish Biofuels are among the companies working on this "catalytic renewable jet" pathway. Brazilian biotechnology company Amyris, meanwhile, is pursuing an advanced fer-

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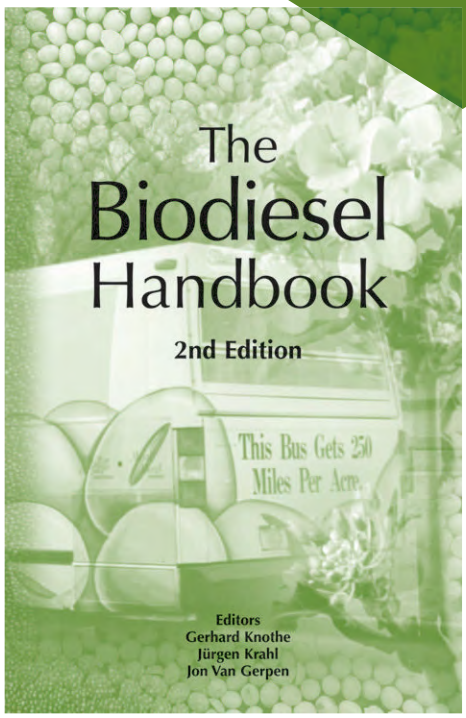

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Biomass—The next revolution in surfactants?

Neil A. Burns

There is constant debate about when and how quickly the world will run out of oil, but there is no doubt that, at some point, it will. The term "peak oil" has passed into the popular lexicon to describe the point at which oil production reaches its highest historical level, a point beyond which, literally and figuratively, it is downhill for oil producers. Figure 1 uses Energy Information Administration (EIA; an agency of the US Department of Energy) data to illustrate various predictions of when, and at what point, global oil and natural gas liquid production reaches its peak. You will quickly see from this figure that most predictions are grouped around about now as the time that the peak is reached.

The issue of peak oil has implications, of course, for transportation and other essential areas such as heating. Not as widely discussed, at least in the mainstream media, are its implications for the chemical industry and surfactants in particular. Crude oil-based products end up as alcohol sulfates, ether sulfates, linear alkylbenzene sulfonates (LAB), alcohol ethoxylates, nonylphenol ethoxylates, softener, conditioner, antimicrobial quats, and amphoterics—that is, in essentially every major surfactant class used in every class of detergent, personal care, and industrial cleaning product. Try maintaining basic personal, household, and institutional hygiene for a day without oil.

If the prospect of an ultimately disappearing supply of oil does not keep you awake at night, then the recent trends in pricing and its volatility surely do, as illustrated in Figure 2. Since the early 1990s, oil prices have steadily marched up and the volatility has increased.

Since the oil embargoes of the early 1970s, the surfactant industry has looked to the oleochemical value chain as the counterbalance to a crude oil-based system. Since the early 1990s, the adoption of palm- and coconut-derived oleochemicals as "the answer" to a depleting and nonrenewable resource has accelerated. Although perfectly fine feedstocks, palm and coconut oils are not the answer. In recent years, as many supply chain professionals will attest, the vegetable oil market has started to behave increasingly like the crude market. Figure 3 bears an eerie resemblance to the last 15 years of

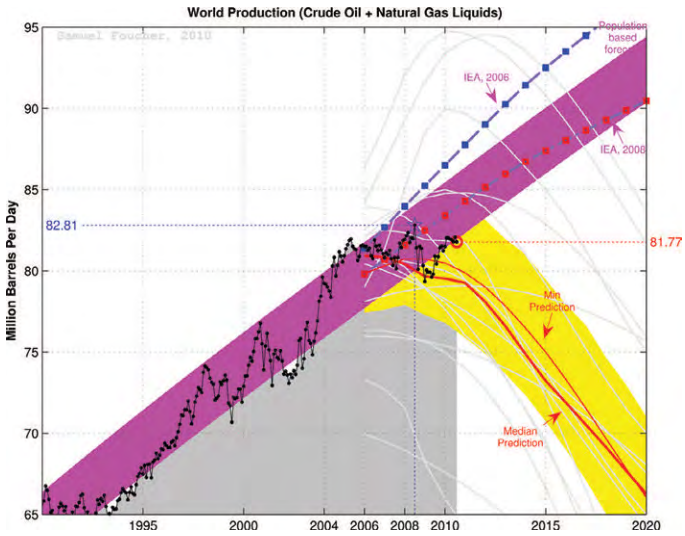


FIG. 1. *Peak oil predictions (crude oil [CO] and natural gas liquid [NGL]). Abbreviations: IEA, International Energy Agency (an agency of the Organisation for Economic Co-operation and Development); mbpd, million barrels per day. Source: The Oil Drum, Sam Foucher (www.theoildrum.com/node/3439, dated December 29, 2007).*

the crude oil prices in Figure 2—which for better illustration, I have superimposed on the vegetable oil chart.

That there is a high degree of correlation between the crude oil and vegetable oil markets is now widely accepted. The reasons behind this are still debated, and the oft-touted food vs. fuel factor

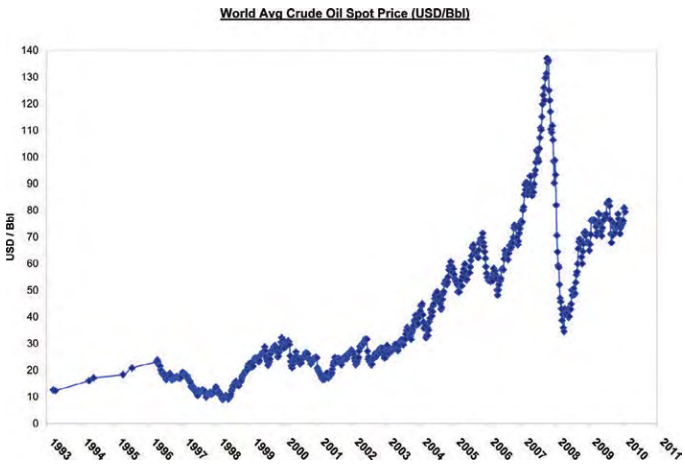
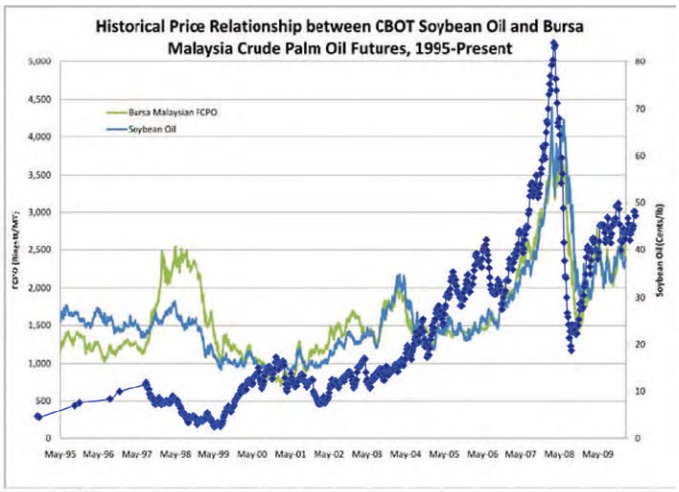


FIG. 2. *World average crude oil spot price (USD/Bbl). Source: US Energy Information Agency.*



Source: MPOB

FIG. 3. *Historical price relationship between Chicago Board of Trade (CBOT) soybean oil and Bursa Malaysia crude palm oil futures (FCPO), 1995–present. MT, metric ton. Source: Malaysian Palm Oil Board.*

FIG. 4. *Lauryl alcohol pricing (freight on board southeast Asia). Source: ICIS.*

is clearly relevant. Products such as palm and soybean that can be used as food (as they have been for thousands of years) and fuel (as they have recently in biodiesel) are inevitably going to take some pricing cues from the major fuel, which is crude oil.

So where does this leave surfactant producers? Today, the pricing of key feedstocks such as lauryl alcohol is following, as one would expect, the vegetable oil markets, which in turn seem correlated with the crude oil markets. Figure 4 illustrates recent lauryl alcohol pricing trends. Petrochemical-derived alcohol is apparently offering little real alternative in current conditions, and the ability to substitute LAB for fatty alcohols has been tapped as far as it can go.

So, this leaves surfactant producers looking for a viable alternative feedstock source that is renewable and less tightly correlated with the petrol and oleo oils now supporting the industry. This is where biomass and the recent technology developed around energy and, more recently, chemicals, comes in.

Biomass, by many definitions, is biological material derived from living or recently living organisms. Clearly this leaves out coal and oil but includes palm oil and the other vegetable oils. For the purposes of this article we shall focus on emerging technology that is being used to convert traditional (e.g., palm, sugarcane) and new (e.g., algae) sources of biomass into chemicals, including surfactants.

In the last few years much time, energy, and money have been invested in trying to find a route from biomass to a gasoline substitute, given the overarching challenge posed by peak oil to the global economy. A number of companies have been formed for the original purpose of pursuing biofuel alternatives including Amyris, Gevo, Petroalgae, Codexis, Solazyme, Coskata, and Virent. Other major companies, such as ExxonMobil, have established business initiatives around biofuel (in the case of ExxonMobil, most notably from algae). More recently, however, a number of biomass companies have realized that a quicker and more profitable route to market may initially be via chemicals and not biofuel.

The reasons for a "chemicals first" strategy include, firstly, that the cost barriers are not necessarily so onerous for the production of certain chemicals for application in, say, cosmetics as they are for mass-marketed gasoline. Chemicals markets are also more fragmented and niched than the transportation fuels markets. This makes it easier for a company to start small, commercialize, and earn money at a scale that is often still that of a demonstration plant for fuels production. For example, a 10 million lb (4.5 million kg)/yr chemical plant can produce a number of products and be commercially self sustainable. Even a 1 million lb/yr chemical plant is viable for the right product mix—this is the equivalent of about 140,000 gallons (530,000 liters) of fuel—hardly a meaningful amount of gasoline or any other transportation fuel.

Given the keen interest of surfactant producers in a good alternative to the oleo/petro duopoly—and the realization by the biofuel companies that chemicals represent a shorter, quicker route to revenues and profits—we see the emergence of a very attractive area for both parties: biomass for the surfactant value chain.

This new potential third leg to the surfactant value-chain stool is much more than just conceptual at this stage. A number

TABLE 1. *Comparison of some sources of biodiesel*

Crop	Oil yield (L/ha)	Land area needed (M ha)[a]	% of existing US crop area[a]
Corn	172	1,540	846
Soybean	446	594	326
Canola	1,190	223	122
Jatropha	1,892	140	77
Coconut	2,689	99	54
Oil palm	5,950	45	24
Microalgae[b]	136,900	2	1.1
Microalgae[c]	58,700	4.5	2.5

[a]For meeting of all transport fuel needs of the United States. M ha, million hectares.
[b]70% oil by weight in biomass.
[c]30% oil by weight in biomass.

TABLE 2. *Oil content of some microalgae*

Microalga	Oil content (% dry weight)
Botryococcus braunii	25–75
Chlorella sp.	28–32
Crypthecodinium cohnii	20
Cylindrotheca sp.	16–37
Dunaliella primolecta	23
Isochrysis sp.	25–33
Monallanthus salina	>20
Nannochloropsis sp.	31–68
Neochloris oleoabundans	35–54
Nitzschia sp.	45–47
Phaeodactylum tricornutum	20–30
Schizochytrium sp.	50–77
Tetraselmis sueica	15–23

of companies have commercial or near-commercial activities focused in this area. A key question relating to any such serious initiative relates to the supply of sufficient quantities of biomass at the right price and in a timely manner. A biomass source that ends up being as tightly correlated in pricing to crude oil as vegetable oil has been is interesting, but not the sourcing revolution that the industry is looking for.

Algae represent just one such interesting source of biomass. It is an efficient crop, in terms of yield per acre, vs. others such as corn or sugar, and it does not have a competing food application (like both of the aforementioned alternatives). In an important paper published in *Biotechnology Advances* (*25:*294–306, 2007), Yusuf Chisti, a researcher at Massey University in New Zealand, outlines the case for microalgae as the only currently identified renewable source of biomass that potentially can be made available in sufficient quantity to represent a viable source of biomass for transportation fuel. This analysis provides, I believe, a logical underpinning for the use of algae-derived biomass as an alternative for the production of surfactant feedstocks.

Table 1, developed by Chisti, illustrates the efficiency of algae as a source of biomass for biodiesel production. It tabulates the acreage of commonly used crops that would be needed just to replace the current US consumption of gasoline with a biodiesel-based alternative.

Table 2 shows that the assumptions of either 30 or 70% oil content in microalgae species are not unreasonable.

The statistics in Tables 1 and 2, while meant to support the use of algae as a biodiesel source and thus a gasoline alternative, are also supportive of the broader concept of a crude oil and vegetable oil alternative in the surfactant value chain.

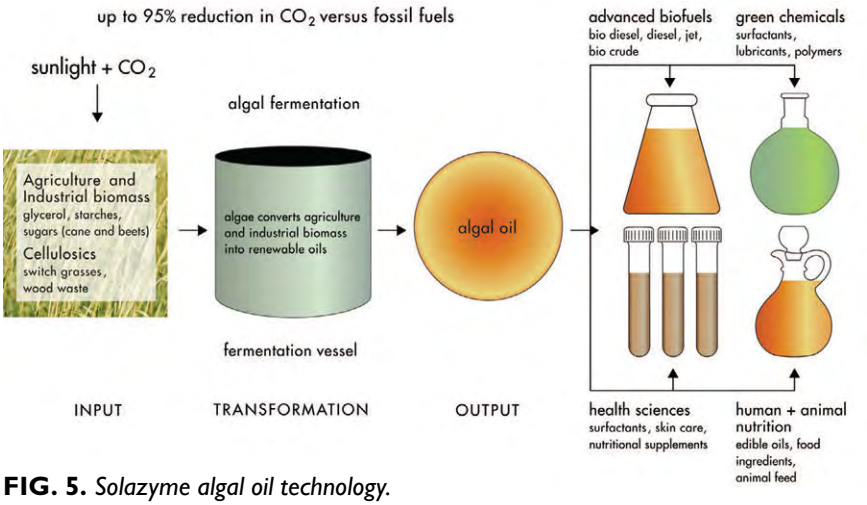


FIG. 5. *Solazyme algal oil technology.*

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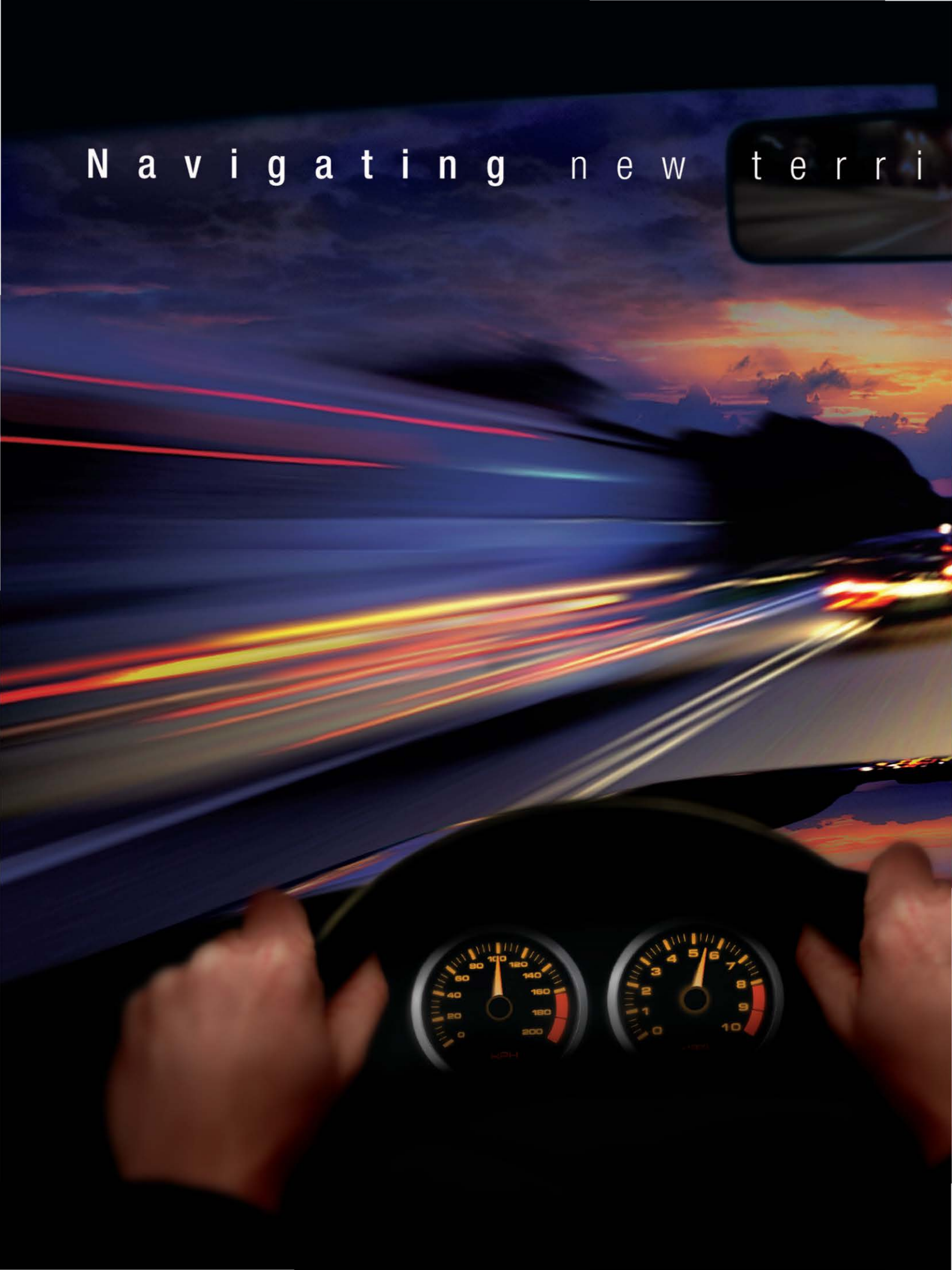
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News & Noteworthy

Briefs

Levels of 3-MCPD (3-monochloro-1,2-propanediol) and other process contaminants present in foods are not a cause for increased concern about the risk to human health, according to a survey conducted by UK's Food Standards Agency (FSA). In its three-year study, FSA conducted 458 analyses on 308 samples representing 10 food groups for combinations of acrylamide, furan, 3-MCPD, and ethyl carbamate. Average levels of 3-MCPD were all "relatively low." (Esters of 3-MCPD have been identified in vegetable oil; AOCS formed an Expert Panel on Process Contaminants in December 2009 to develop methodology for their analysis.)

■■■

The Kyodo news agency reported that Japan's Consumer Affairs Agency said on October 8 that it plans to ask manufacturers to disclose voluntarily the amount of *trans* fat, if any, in their products in order to reduce the risk of cardiac disease. The agency released draft guidelines and hoped to make them final by the end of November 2010. The draft calls for indicating the amount of *trans* fat per 100 grams or per serving.

■■■

The US Food and Drug Administration has confirmed the Generally Recognized As Safe (GRAS) status of Lipid Nutrition's PinnoThin ingredient. The ingredient contains pinolenic acid from the seeds of the Korean pine nut tree (*Pinus koraiensis*) and is reported to boost expression of the appetite-suppressing hormones glucagon-like peptide-1 and cholecystokinin.

■■■

Stratas Foods' distribution center in Jacksonville, Illinois, USA, will close in January 2011, according to the *Jacksonville Journal-Courier* newspaper. Stratas is a joint venture between Archer Daniels Midland Co. and ACH Food Companies, Inc., which is owned by Associated British Foods plc. The ACH plant on the east side of Jacksonville

CONTINUED ON NEXT PAGE

Olive oil production to increase

Olive oil production around the world will increase significantly in the 2011/2012 marketing year (MY), according to an account by the *Olive Oil Times* of the International Olive Council's (IOC) 8th Expert's Olive Oil Tasting Course, which was held in Jaén, Spain, in October 2010.

World leader Spain should continue its annual production of around 1.4 million metric tons (MT) of olive oil, although the IOC's outgoing executive director, Mohamed Ouhmad Sbitri, reportedly said that final production could be higher, depending on favorable weather conditions.

The IOC predicted similar increases in olive oil production elsewhere during the 2011/2012 MY, according to the *Olive Oil Times* report (see Table 1, page 734). The only country in which production is expected to decrease is Tunisia, whose projected 120,000 MT production amounts to a 20% drop from last MY's figures. The IOC withheld predictions about other olive oil-producing countries "since these estimates would be less precise and are still undergoing evaluation," the *Olive Oil Times* said.

The expected increase in production is a concern, given that prices continue to decline. However, Sbitri noted that global demand for olive oil has steadily increased along with rising production. Furthermore, US consumption of olive oil has increased steadily in the past decade, reaching 260,000 MT/year. Sbitri predicted that US consumption of olive oil will continue to increase at a rate of 4,000–6,000 MT/year.

Bunge opens innovation center; expands capacity

Bunge North America, the North American operating arm of Bunge Ltd. (White Plains, New York, USA), has opened the Bunge Ingredient Innovation Center (BIIC) for Edible Oils & Carbohydrates in Bradley, Illinois, USA. This center combines Bunge's food ingredient innovation and pilot plant facilities into one location.

The BIIC includes a scaled-down version of an actual edible oil plant capable of creating shortenings, oils, and other products used by food manufacturers, bakeries, and restaurants. The center also has an

ceased operations in January 2010, the newspaper said. Stratas will move the distribution center to St. Louis, Missouri, USA.

■■■

The US Food and Drug Administration (FDA) has released a report outlining the agency's plans to advance regulatory science through its Regulatory Science Initiative. The report provides examples of current FDA activities in regulatory science and considers how advancements in the field can help better seven different public health areas. The report, "Advancing Regulatory Science for Public Health," is available at http://tinyurl.com/36fadg.

■■■

The Committee on Internal Market and Consumer Protection of the European Parliament adopted its report on the future of the European Standardization System in October 2010. The report can be downloaded from the European Committee for Standardization website at www.cen.eu. ■

TABLE 1. *IOC olive oil production predictions*[a]

Country	2011/2012 MY production (MT)	Increase from 2010/2011 MY (%)
Greece	336,000	5
Israel	9,000	157
Algeria	60,000	126
Iran	8,000	50
Albania	7,000	40
Syria	193,500	29
Turkey	160,000	9
Argentina	15,500	9

[a]Abbreviations: IOC, International Olive Council; MY, marketing year; MT, metric ton.

extrusion pilot plant to test snack food and cereal applications made from milled grain products, along with analytical and sensory laboratories.

In other company news, Bunge announced in October 2010 that it will more than double capacity at its canola processing plant in Altona, Manitoba, Canada. The expansion should be complete by the 2012 harvest, pending necessary approvals. The facility's capacity will increase from 1,100 MT/day to 1,500 MT/day. In addition, Bunge will add a new deodorizer to fully process the oil.

The project is part of a multiyear expansion program at the company's four processing plants in western Canada. In addition to Altona, Bunge has processing plants in Nipawin, Saskatchewan; Hamilton, Ontario; Ft. Saskatchewan, Alberta; and Harrowby, Manitoba.

In related news, Verenium Corp. (San Diego, California, USA) announced that it has licensed a new lipase for use in the production of edible oil products to Bunge Oils, Inc., a part of Bunge North America. Commercial introduction of the product awaits, pending regulatory approvals.

Under the terms of the agreement, Verenium is responsible for the discovery and optimization of novel enzymes for the production of edible oil products with enhanced nutritional profiles. Bunge intends to use the enzymes to commercialize edible oil products such as bottled vegetable and cooking oils, shortenings, margarines, and other products derived from soybeans, other oilseeds, and corn.

New standard for marine oils proposed

Switzerland has put forward a proposal for a new international standard for marine oils. The purpose is to establish common definitions, composition, and quality factors

CONTINUED ON PAGE 736

Commodities

CACAO/CHOCOLATE

Reuters reported in October 2010 that **West African cacao production** could rebound in the 2010/2011 marketing year because of good weather and improved husbandry, although disease remains a risk.

CANOLA/RAPESEED

PICO Holdings, Inc. of La Jolla, California, USA, has entered into an agreement to build and operate a canola processing plant with an integrated refinery near Hallock, Minnesota, according to Grainnet.com. Plant capacity will be up to 365,000 short tons (about 332,000 MT) of canola seed annually, which will produce over 280 million pounds (approximately 130,000 MT) of refined, bleached, and deodorized canola oil and 195,000 short tons (almost 177,000 MT) of canola meal annually. The plant is expected to be operational by the fourth quarter of 2012, and capacity ultimately will reach 570,000 short tons (about 518,000 MT)/year. The total cost of the facility, including the expansion, was estimated at $168 million.

■■■

Scotland's chief statistician recently released a report noting that rapeseed production in the country increased in 2010 over the 2009 harvest by 31,000 MT, or 30%, to 132,000 MT.

CORN

GreenShift Corp. (New York, New York, USA) has signed a license agreement with **Corn, LP** for use of GreenShift's patented corn oil extraction technologies at Corn's 50-million-gallon (almost 190-million-liter)/year ethanol plant in Goldfield, Iowa, USA. Under the terms of the agreement, Corn will finance, build, and operate a new corn oil extraction facility based on GreenShift's patented corn oil extraction processes.

FISH OIL/MEAL

More than 20% of the world's fishmeal and oil production capacity has achieved certification a year after the **International Fishmeal and Fish Oil Organisation** (IFFO) introduced its **Global Standard for Responsible Supply** (IFFO-RS). As of the end September 2010, there were 47 fully certified factories in four countries utilizing six approved fisheries, which represents more than one-fifth of world production of fishmeal and fish oil, IFFO said.

The RS Standard initially applied only to the sourcing of whole fish, which make up 75% of raw material used for fishmeal and fish oil production. IFFO has extended the standard to cover the remaining 25%—by-product raw material (trimmings from seafood processing)—which is recycled by industry into fishmeal and fish oil.

OLIVE

The **Indian Olive Association** (IOA) predicted in October that olive oil consumption in India would go up by 125% in 2010. India imported 2,600 MT of olive oil in 2009, IOA said; from January to June 2010, the country had already imported 2,950 MT. The IOA predictions appeared in a report by the Indo-Asian News Service.

■■■

In a new study, Stefania Vichi and colleagues at the Universitat de Barcelona concluded that the degree of ripening of olives should be taken into consideration when considering the sesquiterpenic profile of virgin olive oils for their authentication. The research appeared in the *Journal of Agricultural and Food Chemistry* (*58*:6972–6976, 2010).

■■■

Jordanian olive oil producers are against the decision of that country's Agriculture Ministry to allow olive oil to be exported to Israel, the Al Jazeera TV network reported at the end of September 2010. According to the satellite TV network, the Jordanian Association of Olive Producers and the Association of Olive Press Owners have called the government decision a move that "will destroy the identity of the Jordanian producer."

PALM

Malaysia said in October 2010 that its palm oil exports will increase by 32% to 65.2 billion ringgit ($21 billion) this year, according to a report by the Agence France Presse service.

■■■

Malaysian Plantation Industries and Commodities Minister Bernard Dompok said that palm oil exports rose 4.3% to 13.38 million metric tons for the first eight months of the year, compared with the same period a year ago.

SOYBEAN

During the 2010 growing season, Kip Cullers set another **world record for soybean production** with 160.6 bushels/acre (about 10,800 kg/hectare). Typical production in the US state of Missouri, where he farms, is 40–44 bushels/acre.

SUNFLOWERSEED

In October 2010, the USDA sunflower production forecast for 2010 was 2.91 billion pounds (about 1.32 million metric tons [MMT]), down 4% from 2009, the **National Sunflower Association** (NSA; Mandan, North Dakota, USA) reported. Area planted, at 1.95 million acres or about 790,000 hectares, was down 7% from the June estimate and down 4% from 2009.

NSA expects that the 2009/2010 crush will be the largest since the 2000/2001 marketing year. "This market year, 779,649 MT of seed were processed into oil, compared to 697,343 MT last year" NSA said. "In September of this year, 70,684 MT were processed compared to 50,293 MT in August and 67,365 MT last year during September."

New ventures

The **American Feed Industry Association** (AFIA; Arlington, Virginia, USA) has contracted with **Eurofins Scientific, Inc.** (Des Moines, Iowa, USA) to provide audits to AFIA's International Safe Feed/Safe Food Certification Program that aims to meet requirements for the importing of feed ingredients into the European Union (EU). In other company news, Eurofins recently opened a food testing laboratory in Bangalore, India.

CONTINUED ON NEXT PAGE

Sustainability watch

With this issue, inform *begins a new column, featuring some of the latest news and research on sustainability.*

Driving a car increases global temperatures in the long run more than making the same long-distance journey by air according to a new study. However, in the short run, traveling by air has a larger adverse climate impact because airplanes strongly affect short-lived warming processes at high altitudes. The study appears in *Environmental Science & Technology* (*44*:5700–5706, 2010).

■■■

Wal-Mart Stores, Inc.—the world's largest retailer—has introduced a new global initiative aimed at reducing the environmental impact of farming and at helping small- and medium-sized farms expand their businesses. Among other measures, the company said it will require sustainably sourced palm oil for all Walmart private brand products globally by the end of 2015. "Sourcing sustainable palm oil for our UK and US private brand products alone will reduce greenhouse gas emissions by five million metric tons by the end of 2015," the company said in a news release (http://tinyurl.com/WalmartSustain).

■■■

Frito-Lay Inc. (Plano, Texas, USA), a division of PepsiCo, has sacked its compostable SunChips bag less than a year after its introduction in January 2010. The "green" packaging is made of 100% compostable PLA (polylactic acid). *The Wall Street Journal*'s Suzanne Vranica spoke with Frito-Lay's North American Manager of Sustainable Packaging Brad Rodgers about the new packaging. She writes:

"So why is the packaging so loud? The new polymers have a higher 'glass transition temperature,' which is when a polymer goes from a harder, glasslike state to a rubber state. Because the transition to rubberiness happens a bit above room temperature, the bag is 'kind of crispy and crunchy,'" says Rodgers.

The move signals the increasing power of social media to affect decisions by industry: A Facebook group with more than 52,000 members calling itself Sorry But I Can't Hear You Over This Sun Chips Bag is credited in part with Frito-Lay's decision.

■■■

A recent report from Statistics Canada details a troubling decline in total water resources for the southern part of the country, where most of the population lives and where the bulk of manufacturing and agricultural operations are located. According to the study, renewable water resources in southern Canada have declined during the period 1971–2004 by an average of 3.5 cubic kilometers a year, which represents enough water to fill 1.4 million Olympic-size swimming pools. The report is available online at http://tinyurl.com/SCWaterReport.

■■■

Citing the ability to balance long-term sustainability goals with the need to perform competitively, McDonald's USA has selected Cargill for its 2010 US Sustainability

CONTINUED ON PAGE 780

R&D

Dutch research firm **TNO** and **Unilever** announced in October 2010 that they have entered into a three-year collaboration to explore the links between diet and health. The collaboration has received a grant from the Dutch governmental innovation program, Food and Nutrition Delta.

■■■

Nestlé will establish an R&D center in Manesar, India, close to Nestlé India's headquarters in Gurgaon. The center is expected to be operational in 2012. The company also recently announced the creation of **Nestlé Health Science SA** and the **Nestlé Institute of Health Sciences** "to pioneer a new industry between food and pharma." These two separate organizations will deal with personalized nutrition to prevent and treat conditions such as diabetes, obesity, cardiovascular disease, and Alzheimer's disease. ■

for fish oils as well as other oils of marine origin, such as squid and algal oils.

The proposal to the Codex Alimentarius Commission's (CAC) Committee on Fats and Oils (CCFO) suggests that the proposed standard be put on the fast track to acceptance. If that suggestion is confirmed by the CCFO at its meeting in Penang, Malaysia, on February 21–25, 2011, the new standard could be final as soon as July 2013. If not, the work could be completed by July 2015.

The CAC is a joint food standards program of two agencies of the United Nations: the Food and Agriculture Organization and the World Health Organization. It is based in Rome, Italy.

Canola oil market expands

The market for canola oil continues to expand, according to a report by PortageOnline.com.

The online portal for news from Manitoba, Canada, provided a summary of a

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AOCS CORPORATE MEMBER

Briefs

Venture Foods LLC, which produces Smart Balance margarine and Hidden Valley salad dressings at its Ontario, California (USA) manufacturing plant, has added technology for removing fat, oil, and grease (FOG) from its wastewater to its production. The technology, supplied by FogBusters, Inc. (Oakland, California), will aid the plant's compliance with local wastewater regulations and recover waste oil from its wastewater streams in concentrated form for recycling into biodiesel. Recovering the oil and selling it has reduced chemical treatment expenses by about 30%, according to Tom Rochester, maintenance engineering manager for the plant. He added that the company is projecting a payback on its investment in the technology in just over a year.

■■■

Justus Wesseler and Vujadin Dovacevic of Wageningen University (Netherlands) calculated in the October issue of *Energy Policy* (*38*:5749–5757, 2010) that the cost of producing biodiesel from algae is now 3.3 times more than producing diesel from oil, and 2.3 times as much as producing fuel from rapeseed. The high costs of algae reactors used in the calculations were based especially on figures from American algae processors. For algae biodiesel to be competitive with other biofuels within 15 years, the productivity of algal reactors would have to increase 3–4% more than the productivity of other bioreactors.

■■■

SG Biofuels (Encinitas, California, USA) announced its development of a proprietary technology for large-scale production of *Jatropha curcas* hybrid seeds designed to boost yield and vigor and reduce distribution and handling costs. The new technology will allow the company to increase global jatropha acreage significantly and raise growers' profitability.

■■■

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Biofuels News

GENERAL

Proposed fuel economy requirements for large trucks

On October 25, the US Environmental Protection Agency and the Department of Transportation proposed fuel economy requirements and reductions in tailpipe emissions for medium- and heavy-duty trucks, beginning with those sold in the 2014 model year and into the 2018 model year. The proposal seeks a 20% reduction in CO_2 emissions and fuel consumption from big-rig combination tractors by 2018; large tractor-trailers tend to be driven up to 150,000 miles (240,000 km) annually, making them logical candidates for improved fuel efficiency. Heavy-duty pickup trucks using gasoline would need to reach a 10% cut in fuel consumption and emissions by 2018; diesel-fueled vehicles would need to achieve a 10% reduction. The proposal is expected to be finalized by mid-2011.

In a statement released by the American Trucking Associations, ATA Vice President and Environmental Counsel Glen Kedzie said, "The trucking industry strongly supports fuel economy standards that are both economically and technologically feasible. . . . We believe the regulations proposed by the EPA and the National Highway Traffic Safety Administration can be attained through technologies currently available to motor carriers with expected returns on investments of between 12 to 24 months."

Mapping bioenergy

The US National Renewable Energy Laboratory (NREL) has developed visualization screening tools—BioPower and BioFuels Atlas—that allow users to layer bioenergy data onto a single map to gather information on biomass feedstocks, biopower and biofuels potential, production, and distribution. BioEnergy Atlas (http://maps.nrel.gov/bioenergyatlas), the web portal that provides access to these tools, is an improvement over current tools because it enables more timely and accurate analysis of the biomass potential of sites.

On September 28, 2010, the US House of Representatives passed the Algae-based Renewable Fuel Promotion Act of 2010 (H.R. 4168). The Act amends the Internal Revenue Code to (i) expand the definition of "cellulosic biofuel" to include algae-based biofuel for purposes of the $1.01 per gallon cellulosic biofuel producer tax credit; and (ii) provide for accelerated depreciation of property used in the production of algae-based biofuel. The bill was then referred to the Senate Finance Committee for further action. However, Congress adjourned on October 8 without taking further action on the Act. At press time it was unknown whether Congress would take this up in its lame-duck session.

■■■

Hong Yan, general manager of research and operations for Singapore-based JOil, a joint venture between Temasek Life Sciences and Tata Chemicals, announced the company has devised a tissue culture technique that could potentially clone one million jatropha plants. The goal is to create a jatropha hybrid that produces more fruits and that matches the 4–6 metric tons per hectare that palm oil produces. The toxic content of jatropha, accompanied by its inconsistent yield, has slowed commercialization of jatropha. The ability to clone desirable strains should enhance the development of this plant as a biofuels feedstock.

■■■

In its continuing efforts to develop biofuels for commercial use, aerospace company Boeing is planning to test a commercial-jet biofuel in China by May or June 2011. Al Bryant, vice president of research and technology at Boeing's China operations, told *The Wall Street Journal* on October 18 that Boeing will partner with Air China Ltd. and others during the program. Fuel to be tested will be based on jatropha oil, and Chinese oil company PetroChina is expected to supply it from its plantings in southern China for aviation use. Bryant said, "This flight is going to demonstrate that China has the ability to create a new biofuel industry here in China." ■

BioEnergy Atlas users will include government and state agencies, universities, the petroleum and pipeline industries, research institutions, vehicle manufacturers, investment firms, geographic information systems (GIS) companies, private citizens, and media. Technology providers and biofuels project developers can easily view areas with the highest concentration of available feedstocks and target those areas for project development. The tool combines the geographic visualization of regional resources and energy usage with high-level yield calculations to provide first-level screening of project feasibility and state bioenergy potential.

US military command urges using less fossil fuel

US troops found good reasons in 2010 to decrease their dependence on fossil fuels. Truck convoys transporting diesel and kerosene-based fuel to bases in Iraq and Afghanistan came under fire from opposing forces, either finding themselves unable to move or, in some cases, destroyed under fire. According to *The New York Times* (October 5), fossil fuel accounts for 30–80% of the load in convoys into Afghanistan. A US Department of Defense estimate in October 2009 calculated that the average cost of importing fuel into Afghanistan could be as high as $400 per gallon.

Ray Mabus, US Secretary of the Navy, was quoted in *The New York Times* (October 5) as saying, "There are a lot of profound reasons of doing this [using renewables], but for us at the core it's practical." The Navy and Marines already have a goal of obtaining 50% of their power from renewable energy sources by 2020.

In a June 2010 white paper (http://biodieselinafghanistan.org), Wayne Arden and John Fox developed a financial analysis on the practicality of building small-scale, truck-based biofuel plants that could transform local Afghan crops—such as poppies—into fuel.

In mid-October, Syracuse University (New York, USA) announced a partnership with Arden and Fox to allow for piloting the recommendations in their report and documenting the economic viability of the proposal. Gina Lee-Glauser, vice president for research at the university, said, "We believe that these recommendations have the potential to reduce US casualties and lessen the military's dependence on petroleum."

The US Air Force also is actively developing biofuels for use in its planes. The entire fleet is supposed to be certified to fly on biofuels by 2011, and there have already been test flights using 50:50 plant-based biofuel and jet fuel (*inform 21*:679, 2010).

Uzbekistan considers camelina

Officials in Uzbekistan are considering developing camelina production in their country as a source of biofuels. In its recent past, Uzbekistan has been a major producer of cotton. But the continuing demands that cotton makes on water resources have stimulated officials to investigate alternative sources of agricultural income. Camelina would do well in the country because it is drought-resistant and immune to spring freezing and can be used as a rotation crop with wheat. It also tolerates poorer, less fertile conditions. And after processing of the seed for its oil, the plant debris can be used for livestock silage.

US fuel efficiency goals for 2025

Rules adopted by the US Transportation Department and Environmental Protection Agency in 2010 require the new fleet average for cars and small trucks to reach 35.5 miles per gallon (mpg; 15 kilometers per liter, or 6.6 L/100 km) by 2016, an increase of more than 40% over the 2010 standards of 27.5 mpg. In early October these agencies issued a Notice of Intent regarding fuel economy and greenhouse gas emissions standards for cars and small trucks manufactured between 2017 and 2025. In 2017, the fleet average would need to be 47 mpg, rising to 62 mpg by 2025 (5.0–3.8 L/100 km). The mileage gains would be equivalent to an annual decrease in CO_2 emissions per mile of 3–6%.

These standards are intended to improve mileage across each automaker's lineup, as well as across the nation's entire fleet of new vehicles. Standards are based in part on vehicle dimensions. Sport utility vehicles

are not required to be as efficient as compact cars, but requirements for all types will go up.

The government plans to issue an official proposal in September 2011, and a final rule by late July 2012. A major factor in determining how restrictive new regulations will be is the amount of time it takes for the automotive industry to develop electric vehicles, which will not burn liquid fuels, and other advanced technologies.

ALGAE

Technical standards proposed for algae

At the Algae Biomass Summit of the Algal Biomass Organization (ABO), held in Phoenix, Arizona, USA, at the end of September 2010, a Technical Standards Committee met to consider a Mid-Level Draft Guidance Document: Algal Industry Minimum Descriptive Language. The document intends to recommend the language required for characterizing the economic and environmental inputs and outputs of aquatic biomass operation. Adoption of uniform descriptive language should accelerate industry growth and unify research.

The functions of the Technical Standards Committee include developing and advocating algal industry standards and best practices; establishing liaisons with ABO members, other standards organizations, and government; facilitating information flow between industry stakeholders; and reviewing ABO technical positions and recommendations.

Jim Sears is chair of the Technical Standards Committee; he is also president and chief technology officer of A2BE Carbon Capture LLC (Boulder, Colorado, USA).

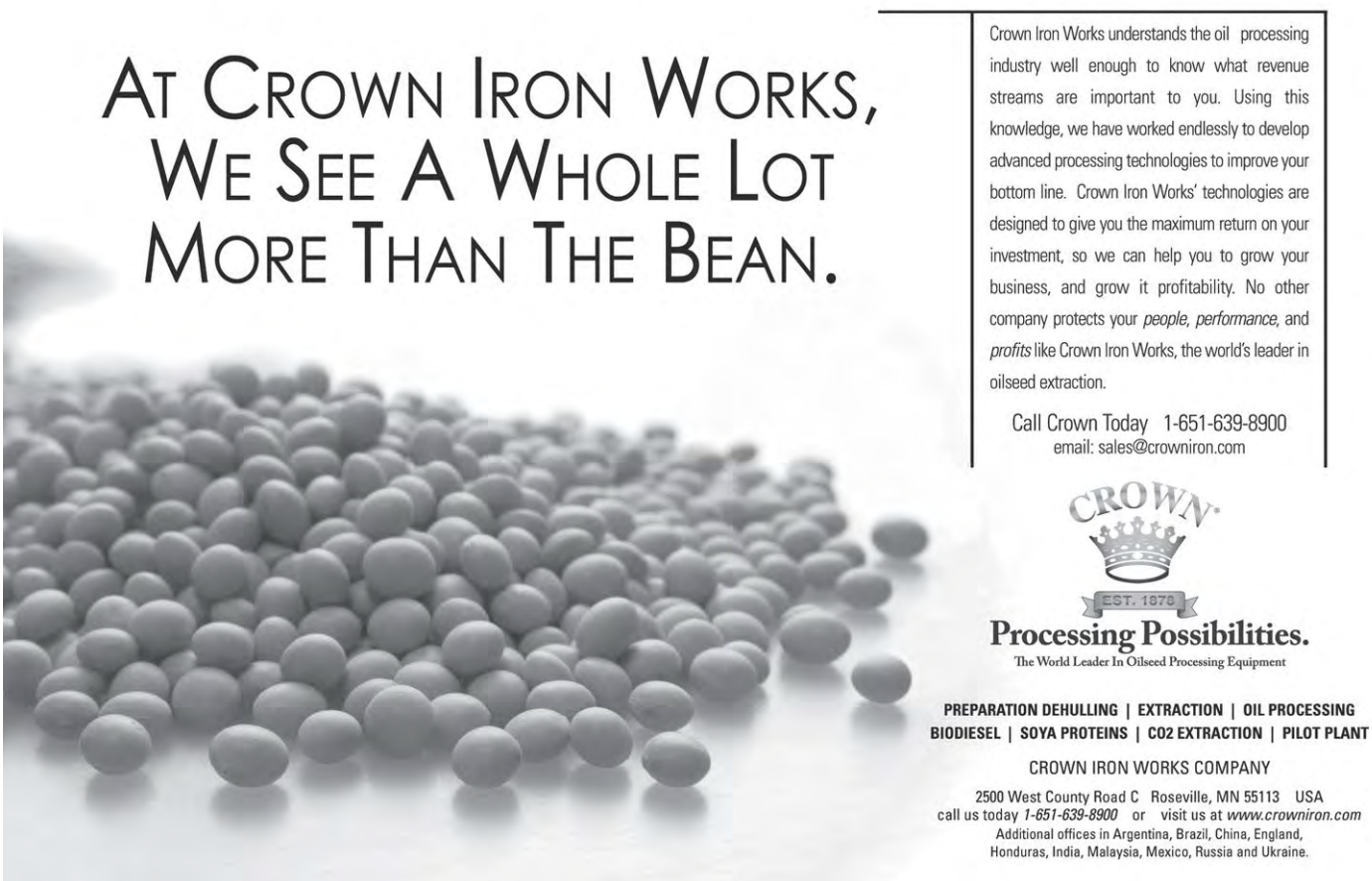
Industry stakeholders and other interested parties are welcome to provide feedback and comment that may influence the Committee's final recommendations on Minimum Description Language from October 2010 to January 2011. Interested persons should register with Committee Administrator Deb Quella at dquella@algalbiomass.org or phone +1 303-541-9112. The Final Document will incorporate selected feedback and will be published by the ABO in early 2011.

"Bubble-maker" receives innovation award

On October 14 the UK's Royal Society presented its 2010 Brian Mercer Feasibility Award, in the amount of £250,000 ($400,000), to inventor Will Zimmerman, a chemical engineer at the University of Sheffield, for his fluidic oscillator that delivers tiny, perfectly formed bubbles. The award is intended to aid the recipient to commercialize the technology being recognized.

Zimmerman and coworkers have devised a bioreactor that creates microbubbles, or miniature gas bubbles of less than 50 μm diameter. Microbubbles are able to transfer materials, such as biomass materials, in a bioreactor much more rapidly than larger bubbles produced by conventional bubble generation techniques.

Among other applications, the technology is being evaluated for growing algae for biofuel (using exhaust gas from the



chimneys of steel maker Corus, a subsidiary of Tata Steel). Zimmerman said that the microbubbles efficiently deliver CO_2 to the algae and, unlike large bubbles, carry away waste oxygen and allow 100% of the algae to survive. The bubblemaker also stirs the algae, meaning better exposure to light for each cell. The technology is also being tested as a means to lower the cost of treating sewage.

According to the UK newspaper *The Guardian*, the system Zimmerman has devised requires 80% less energy than existing methods for making bubbles needed for chemical processes.

BIODIESEL

Hemp as biodiesel feedstock

Researchers at the University of Connecticut (Waterbury, USA) have proposed using seeds from industrial hemp (*Cannabis sativa*) as a feedstock for biodiesel production. According to Richard Parnas, a professor of chemical, materials and biomolecular engineering, who led the study, the oil-containing hemp seeds are often discarded. He added, "If someone is already growing hemp, they might be able to produce enough fuel to power their whole farm with the oil from the seeds they produce."

Parnas and his colleagues tranesterified the oils from hemp, finding the efficiency of conversion was 97%. Laboratory tests suggested the biodiesel they made from hemp had a low cloud point (–5°C) and kinematic viscosity (3.48 mm^2/s), which the researchers attributed to the high content of polyunsaturated fatty acids in hempseed oil and its 3:1 ratio of linoleic to α-linolenic acid. Study results appeared in *Bioresource Technology 101*:8457–8460 (2010).

In October Parnas announced he and selected research students will build a research refining plant that can use hemp as a fuel feedstock. It will be built using a two-year, $1.8 million grant from the US Department of Energy; when completed, the refinery is expected to produce 200,000 gallons (800,000 liters) of biodiesel annually.

Industrial hemp contains less than 1% psychoactive chemicals in its flowers (e.g., tetrahydrocannabinol), compared with hemp known as marijuana.

A review article by J.C. Callaway and David W. Pate that considers the properties of hempseed oil appears in the AOCS Press publication *Gourmet and Health-Promoting Specialty Oils* (R.A. Moreau and A. Kamal-Eldin, editors, 2009, pp. 185–213).

Improved synthesis of biodiesel

Using two catalysts common in organic chemistry, two chemists with Brown University (Providence, Rhode Island, USA) have synthesized biodiesel in a single reaction vessel (*Org. Biomol. Chem 8*:4753–4756, 2010). The method developed by Jason Sello and Aaron Socha is six times faster than current methods, requires less energy overall, and is more environmentally friendly. In developing the new procedures, they opted to use bismuth triflate and scandium triflate. When the catalysts did not initially yield biodiesel under standard conditions, Socha suggested using a microwave reactor.

The combination of the two catalysts and the microwave reactor yielded biodiesel in 20 minutes at 150°C. The two catalysts can be recycled up to five times while still obtaining a 97% yield.

Tests have not yet been initiated to transfer the reaction to a pilot or an industrial scale.

JATROPHA

EU to build jatropha processing plant in Ghana

The European Union (EU) announced a project to produce bio-energy at Walewale, in the West Mamprusi District of Ghana, on October 7. The project is funded (€2 million) for five years. Unfertile lands in the Walewale area will be planted with jatropha, and the seeds will be processed in-country to obtain crude oil and by-products.

According to Giuseppe Enne, project coordinator of the Ghana Jatropha Project and the Nucleo Ricerca Desertificatione of the Universitá de Sassari (Italy), an "appropriate and cost-effective expeller for jatropha oil extraction" will be constructed (http://ghanaian-chronicle.com/?p=8812). Several governmental and non-governmental organizations within the country are collaborating with the Ghana Jatropha Project to implement the plans.

The project aims to improve Ghana's sustainable renewable energy, to create income-generating activities, and to mitigate land degradation effects in rural area in the country.

San Nasamu Asabigi, Deputy Northern Regional Minister of Ghana, said jatropha could be an alternative to reduce the energy crisis facing the country. He added, "About 69% of the total energy consumed in Ghana is from the already depleted forest, 10% from electricity, and 21% from imported petroleum."

Jatoil schedules regular shipments of crude jatropha oil

After purchasing more oil-producing fields, Jatoil Ltd. (Pyrmont, New South Wales, Australia) announced plans in October to make regular weekly shipments of crude jatropha oil from its plantations in Central Java (Indonesia) to a power station customer in the Netherlands. The company's 70%-owned joint venture (JV), PT Jatoil Waterland, purchased an additional 522 hectares (ha) of three- to four-year-old jatropha trees near its 1,000 ha plantation, which in July produced Jatoil's first shipment of second-generation biofuel for a consortium of airline companies for use in commercial operations (*inform 21*:555, 2010). A company statement indicated the acquisition of these additional hectares effectively doubles the JV's current capacity of 700 metric tons over the next 12–18 months.

Mexico to grow jatropha

Antonio Brufau, chairman of Repsol, an integrated international oil and gas company headquartered in Madrid, Spain, and Fernando Senderos Mestre, chairman of the KUO Group, one of Mexico's largest conglomerates, signed an agreement on October 28 to create a joint company called Kuosol,

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Briefs

Further research is needed into the use of models of digestion in the development of foods, according to a study in *Food Chemistry* (doi: 10.1016/j.foodchem.2010.08.036). The review, led by AOCS member Julian McClements of the University of Massachusetts (Amherst, USA), suggests the need for better correlations between *in vitro* and *in vivo* research models of digestion.

■■■

A review of research on the effects of eating interesterified (IE) fats led by KC Hayes of Brandeis University finds that those studies incorporating stearic acid as IE 18:0 "clearly reveal negative biological effects on lipoproteins, blood glucose, insulin, immune function, or liver enzymes when relatively high intake of IE-18:0 or palmitic acid (IE-16:0) [was] fed in fats with *sn*-2-saturated fatty acids." Further: "It is not clear that IE-16:0 is as problematic as IE-18:0, but IE-16:0 has been studied less." The review appeared in the *Journal of the American College of Nutrition* (*29*:253S–284S, 2010).

■■■

A recent study found that mothers consuming over 4.5 grams of *trans* fats per day while breastfeeding were more than five times more likely to have a body fat percentage greater than 30%, and their infants were more than two times more likely to have a body fat percentage over 24%. The authors stated that the findings were statistically significant, irrespective of the feeding method and independent of maternal total caloric intake. Alex Anderson, assistant professor of foods and nutrition at the University of Georgia in Athens (USA), led the review. It appeared in the *European Journal of Clinical Nutrition* (doi: 10.1038/ejcn.2010.166, 2010).

■■■

In related news, researchers at the University College London Institute of Child Health have demonstrated for the first time in humans that feeding

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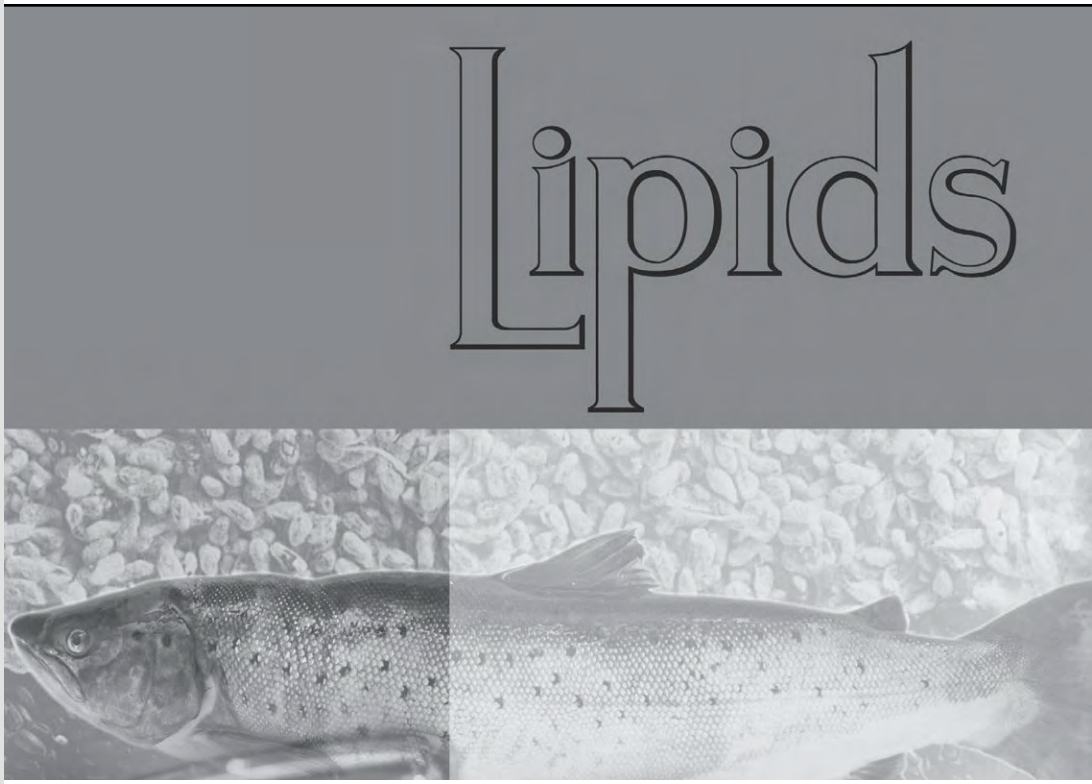
Health & Nutrition



Lipids focuses on saturated fat

"Think saturated fat contributes to heart disease? Think again," read the headline on a news release issued in October 2010 by the Global Dairy Platform (GDF). (Based in Rosemont, Illinois, USA, the GDF is a trade association whose website describes its objective as aiming "to increase worldwide demand for dairy [foods] by providing insight, guidance, and networking.") The news release was printed the world over as it publicized a series of articles appearing in the October issue of *Lipids*, a publication of AOCS Press and Springer Science+Business Media.

As GDF points out, saturated fat has for the past 30 years been considered a major culprit in the development of cardiovascular disease (CVD). As a result, dietary advice continues to recommend reduced consumption of saturated fat. Evidence is mounting, however, that saturated fat intake has only a limited impact on the risk of CVD.

". . . Assuming that saturated fat at any intake level is harmful is an oversimplification and not supported by scientific evidence," said J. Bruce German of the University of California in the news release.

The special issue of *Lipids* highlights research presented at the 100th AOCS Annual Meeting & Expo in Orlando, Florida, USA, in May 2009. During a symposium entitled "Saturated Fats and Health: Facts and Feelings," scientists analyzed the evidence then available on the link between saturated fat intake and health.

Results from a research review conducted by Dariush Mozaffarian of the Harvard Medical School in Cambridge, Massachusetts, USA, found that the effects of saturated fat intake on CVD risk depend on simultaneous changes in other nutrients. For example, replacing saturated fat with monounsaturated fat yielded uncertain effects on CVD risk, whereas replacing saturated fat with carbohydrates was found to be ineffective or even harmful particularly when refined carbohydrates such as starches or sugars were used in place of fat. Similarly, replacing saturated fat with polyunsaturated fat gave a small reduction in CVD risk, but even with optimal replacement, the magnitude of the benefit was very small.

"Carbohydrate intake has been intimately linked to metabolic syndrome, which

babies nutrient-enriched milk led to statistically significant increases in body fat between the ages of 5 and 8. The study, which was led by Atul Singhal, appeared in the *American Journal of Clinical Nutrition* (2:1133–1144, 2010).

■■■

A review study led by Konrad M. Szymanski of McGill University Health Center in Montréal, Québec, Canada, found that men who ate more fish were 44% less likely to develop metastatic prostate cancer. Higher fish consumption also was associated with a 63% lower risk of dying from prostate cancer. The study appeared in the *American Journal of Clinical Nutrition* (doi:10.3945/ajcn.2010.29530, 2010).

■■■

As the world awaited publication of the final US 2010 *Dietary Guidelines for Americans*, Adele H. Hite and colleagues sharply criticized the preliminary report published on June 15, 2010. Writing in *Nutrition* (doi: 10.1016/j.nut.2010.08.012), the authors blame the advisory committee for issuing "one-size-fits-all recommendations that are based on evidence that is weak, fragmented, and even contradictory in nature."

■■■

A diet rich in walnuts and walnut oil may help the body to deal better with stress and positively affect blood pressure at rest and under stress. This is according to a random crossover study by Penn State researchers led by Sheila West, which appeared in the *Journal of the American College of Nutrition* (in press). The average portion of walnuts added to the diet was 1.3 ounces (3.7 g), which constitutes about nine whole walnuts or 18 walnut halves. ■

is a combination of risk factors that can increase CVD risk," said Jeff Volek of the University of Connecticut in Storrs (USA). His research showed that very low-carbohydrate diets could favorably impact a broad spectrum of risk factors for the metabolic syndrome and CVD, even in the presence of high saturated fat intake and in the absence of weight loss.

Kiran Musunuru of Massachusetts General Hospital in Boston (USA) showed that low-carbohydrate diets appear to have beneficial lipoprotein effects in individuals with atherogenic dyslipidemia, compared to high-carbohydrate diets, whereas the content of saturated fat in the diet had no significant effect. (Atherogenic dyslipidemia involves three lipid abnormalities: elevated triglycerides, the presence of small low-density lipoprotein particles, and reduced high-density lipoprotein cholesterol.)

"As long as saturated fat targets remain firmly rooted in dietary advice, nutrient-rich foods that contribute saturated fat to the diet, like full-fat dairy products, will continue to be unduly criticized regardless of their health benefits," the GDF statement noted.

All research articles in the special issue are openly accessible at SpringerLink (http://tinyurl.com/LipidsOct2010).

Fish oil capsules in pregnancy

In October 2010, a study in the *Journal of the American Medical Association* (*JAMA*) on fish oil supplementation in pregnancy produced a wave of negative headlines around the world.

Take CNN International, for example: "Fish oil doesn't benefit new moms, babies." Or *The New York Times*: "Fish oil use in pregnancy didn't make babies smart."

The media churn that accompanies news about research studies in the age of the 24-hour news cycle can be discouraging for researchers and readers alike. Editors seem to forget that the progress of research is incremental, the human body is overwhelmingly complicated, and genetic differences among the population further complicate the ability to draw conclusions from scientific studies of individual micronutrients in infinitely variable individual human beings.

The research on fish oil supplementation (*JAMA 304*:1675–1683, 2010) was led by Maria Makrides of the Women's and Children's Health Research Institute in North Adelaide, South Australia. The double-blind, randomized controlled trial involved 2,399 pregnant women who were at less than 21 weeks' gestation. The aim of the study was to dispel uncertainty about the benefits of supplemental dietary docosahexaenoic acid (DHA, 22:6n-3) for pregnant women.

Women in the DHA group consumed three 500 milligram (mg) capsules/day (d) of DHA-rich fish oil concentrate, providing 800 mg/d of DHA and 100 mg/d of eicosapentaenoic acid (20:5n-3). Women in the control group were given three 500 mg/d capsules of vegetable oil without DHA. The capsules contained a blend of rapeseed, sunflower, and palm oil in equal proportions. Neither the women nor the newborns received supplements after the babies' birth.

"It is important to note that this was a very positive study for DHA supplementation during pregnancy and supports very strongly the use of DHA by pregnant women," commented Norman Salem, Jr., chief scientific officer of Martek Biosciences Corp. in Columbia, Maryland, USA, and an AOCS member.

Although the study did not find lower levels of postpartum depression in mothers or improved cognitive and language development in their offspring at 18 months, secondary results included lower incidence of both preterm birth and low-birthweight offspring. Both are associated with a number of positive outcomes, including better cognitive development.

Martek, which is the primary US supplier of DHA from microalgae for use in infant formulas and food, released a statement noting the "serious limitations of the study that may explain the lack of demonstrated benefits" in terms of postpartum depression and infant development. "These limitations include the brief supplementation period during only a portion of pregnancy, as well as the fact that the study investigators did not analyze the DHA intake of the infants during the period from birth until the cognitive testing as performed at 18 months of age. It is therefore not surprising that a brief supplementation period during pregnancy would not demonstrate significant developmental benefit at 18 months of age," the statement noted.

In an editorial accompanying the study, Emily Oken and Mandy B. Belfort of the Harvard Medical School cautioned that women should continue to "take care" to consume at least 200 mg of DHA per day, which is the minimum amount recommended by a variety of expert groups. In addition, Jatinder Bhatia, a neonatologist who heads the nutrition committee of the American Academy of Pediatrics, told *The New York Times* "that unless further studies showed no benefit as children got older," he would continue recommending DHA, because he was not convinced at this time that healthcare professionals should reverse course.

Higher diabetes rate explained?

A higher rate of diabetes seen among adult Americans when compared to peers in England is explained primarily by a larger waist size rather than conventional risk factors such as obesity, according to a new study by researchers from the RAND Corp., University College London, and the Institute for Fiscal Studies in London.

The researchers say the findings offer more evidence that accumulating fat around the midsection poses a health risk and suggest that studies of diabetes risk should emphasize waist size along with traditional risk factors.

"Americans carry more fat around their middle sections than the English, and that was the single factor that explained most of the higher rate of diabetes seen in the United States, especially among American women," said James P. Smith, one of the study's authors and corporate chair of economics at RAND, a nonprofit research organization based in Santa Monica, California, USA. "Waist size is the missing new risk factor we should be studying."

According to the findings, middle-aged and older Americans are significantly more likely to suffer from diabetes compared to their peers in England despite a similar standard of living. About 16% of American men report having diabetes as compared to 11% of English men. About 14% of American women have diabetes, compared to 7% of English women.

An earlier study demonstrated that middle-aged Americans are less healthy than their English counterparts, although medical spending in the United States is more than twice as high as it is in the United Kingdom.

Analyzing studies about the health and lifestyles of large numbers people from the United States and England, researchers found no association between higher diabetes rates in the United States and conventional risk factors such as age, smoking, socioeconomic status, or body mass index, the commonly used ratio of height and weight that is used to measure obesity and overweight.

The conventional risk factors for diabetes were similar for both the American and English populations. Americans had slightly higher scores on body mass index and were a little older. The English were less educated and more likely to have smoked.

However, American men had waists that averaged three centimeters larger than those of their English peers, and the waists of American women were five centimeters bigger than those of English women. American women were significantly more likely to face higher risk because of their waist size when compared to English women (69% to 56%), whereas American men had only a slightly higher risk than their English peers.

The higher waist size of Americans posed more risk compared to their English peers across most body mass index categories. For example, among women with normal weight, 41% of American women were categorized as having high waist risk compared to 9% of English women.

The study concludes that waist circumference explains a substantial proportion of

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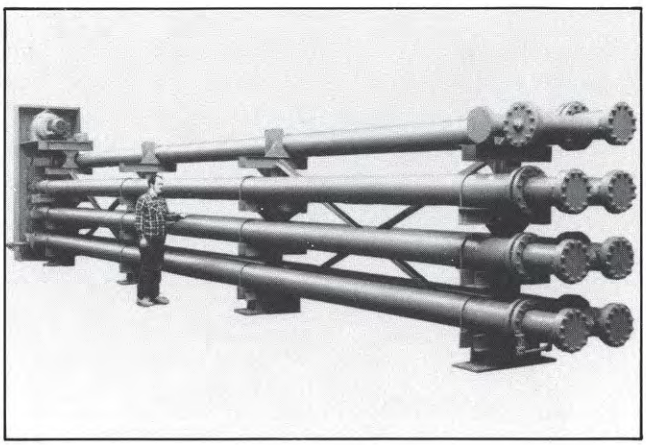
Crystallizers For Fatty Chemicals



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Surfactants, Detergents, & Personal Care News

Briefs

The Asia Pulse news service recently offered two items of interest from Japan: Cosmetics maker Shiseido said on September 21 that it will sell its skin care and makeup products in South Africa via a local distributor beginning in October 2010. Competitor Kao Corp. announced on September 20 that it will begin marketing its Attack Instant Clean Liquid laundry soap in China, targeting urban households.

■■■

Novozymes has introduced Easyzyme®, which it says is the first enzyme for use in laundry bars. According to a consumer survey conducted by the Chinese detergent manufacturer Liby in 2009–2010, nearly 30% of Chinese use laundry bars to either pretreat or posttreat stains that do not come out in the wash cycle.

■■■

"Detergent companies are having difficulties passing on raw material price increases to consumers," Thomas Mueller-Kirschbaum told *ICIS Chemical Business* in October. Mueller-Kirschbaum is senior vice president for Research & Development, Technology and Supply Chain of Henkel's laundry and home-care business.

■■■

The Harrah's Foundation donated $100,000 to the Clean the World Foundation of Orlando, Florida, USA, for development of a soap recycling facility in Las Vegas, Nevada. The center will collect and sanitize soap and bottled amenities (shampoos, conditioners, and lotions) from casino hotels and then distribute the products to children and families in need throughout the United States and more than 40 countries. Unused amenities will be sorted for distribution among area homeless shelters, domestic abuse safe havens, and women's shelters. The facility is expected to be operational by early 2011, according to a report by PlusNEWS, an online news service.

■■■

The Procter & Gamble Co. (P&G) will eliminate the remaining polyvinyl chlo-

CONTINUED ON PAGE 748

Consumers: "Natural" is better

Consumers across the globe consider personal care products formulated with "natural" products as being better for them; however, people remain concerned over the efficacy of natural ingredients, according to a new report from the independent market analyst Datamonitor.

More than half of global consumers (52%) believe that natural ingredients are better for them, according to Datamonitor's July/August 2010 consumer survey. On the other hand, consumers believe that synthetic ingredients such as phthalates, parabens, and triclosan can irritate the skin; purchasers increasingly are looking for natural alternatives.

These perceptions reflect a broader concern over the ingredients used in personal care products. Globally, Datamonitor found that 57% of consumers were either extremely concerned or somewhat concerned about knowing the ingredients used in cosmetics and toiletries. There is, however, a significant knowledge gap, as the survey also found that just 16% of global consumers considered themselves highly informed about the health impact of chemicals used in everyday products.

Despite the growing concern over ingredients, the survey found that consumers also were ambivalent about the efficacy of natural ingredients in personal care. Just 37% of global consumers agreed with the statement that "health and beauty products formulated with natural ingredients are equally as effective as nonnatural products," while 44% neither agreed nor disagreed. "This would suggest that marketers still have some way to go to convince consumers that natural ingredients are just as effective as synthetic ingredients," Datamonitor noted.

Matthew Jones, consumer trends analyst at Datamonitor, commented: "Shoppers will not be prepared to sacrifice performance benefits when it comes to personal care, particularly as many are actively seeking to minimize the time spent on personal hygiene and grooming. Price is also a factor, as consumers will find it difficult to justify any price premiums when there is doubt as to whether they will even see good results."

Clorox gains Platinum LEED-EB status

The Clorox Co. corporate headquarters facility in Oakland, California, USA, is now one of only 38 buildings in the United States to achieve Platinum Leadership in Energy and Environmental Design—Existing Building/Operating and Maintenance (LEED-EB) certification. Platinum LEED-EB certification is the highest sustainability recognition an existing building can attain, the company noted in late September 2010.

To achieve LEED-EB Platinum certification, Clorox's global real estate team focused on five key areas of building improvements for human and environmental health: sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality. Improvements included:

- Replacing every toilet and plumbing fixture in the building to reduce water consumption by more than 40% and 1.5 million gallons (about 5.7 million liters) annually;
- Replacing more than 1,700 lamps with more efficient lighting;
- Installing a new white reflective roof that keeps the building cooler;
- Making numerous efficiency improvements to the building's heating, cooling, and ventilation systems;
- Moving to nonpotable water for all irrigation; and
- Expanding solid waste recycling and implementing a composting program.

The LEED program is administered by the US Green Business Council, which is based in Washington, DC.

Bar soaps still big

Bar soaps are still a big business in mass retail stores in the United States, even as consumers shift to liquid hand soaps and body washes, *Mass Market Retailers* (*MMR*) magazine reported in October 2010.

"Sales of liquid hand soaps increased 6.5% in supermarkets, drug stores, and discount stores (excluding those operated by Wal-Mart) in the 52 weeks ended July 11, according to Symphony-IRI Group Inc., and sales of body washes increased 9.8%," MMR noted. By contrast, sales of deodorant bar soaps dropped by 5.5%. The larger

nondeodorant bar soap category fared better—sales were reduced by only 0.8%, to $553.9 million.

Unilever's Dove is the leader in the nondeodorant bar soap category, with a market share of 35.2%, *MMR* said.

Recent advance in anions

Oleochemical carbonates prepared through a carbonate interchange reaction between renewable C_{10}–C_{18} fatty alcohols and dimethyl or diethyl carbonate in the presence of a catalyst could be used in cosmetics.

"Oleochemical carbonates have not been examined for their applicability as phase change materials (PCM)," noted AOCS member James A. Kenar and colleagues at the National Center for Agricultural Utilization Research (NCAUR) in a study published in *Solar Energy Materials and Solar Cells* (*94*:1697–1703, 2010). "These carbonates represent novel renewable-based PCM chemicals that compl[e]ment fatty acids, fatty alcohols, and their fatty acid esters while providing a potentially valuable biobased alternative to paraffin wax and salt hydrate PCM currently dominating the PCM market."

NCAUR is based in Peoria, Illinois, USA, and is a unit of the Agricultural Research Service of the US Department of Agriculture.

EU detergents industry extends sustainability program

AISE, the International Association for Soaps, Detergents and Maintenance Products, has extended its voluntary Charter for Sustainable Cleaning program by introducing a new on-pack seal to be used to distinguish individual detergent and maintenance products that meet sustainability standards within their product categories.

The first products in the laundry powders, liquids, and fabric softeners categories carrying the new mark are expected to appear on shop shelves beginning in July 2011. When consumers see the green Charter seal on a laundry product, it will mean that the product has reduced dosage and concentrated format, is optimally packaged with minimal use of nonrecycled materials, has been tested for effectiveness at low temperature, and has no ingredients at levels that would adversely affect the aquatic environment. Such products will also carry advice on safe and sustainable use by consumers.

Commenting on the introduction, Susanne Zänker, director general of AISE in Brussels, Belgium, said: "The Charter offers all companies a simple and integrated way of demonstrating improved sustainability. It is not just about protecting the environment; it is a total life-cycle approach covering all three pillars of sustainability, which we believe is the correct long-term path to follow.

"With so many companies already active in the current scheme, we expect great interest in this new upgrade. We hope soon to widen the scope of categories using the advanced sustainability profile system, for example, to dish-washing products, specialty cleaners, air fresheners, and institutional cleaners. We will also be embarking on an awareness-raising campaign."

The voluntary Charter for Sustainable Cleaning was first introduced in 2005. More than 120 manufacturers and retailers participate, which AISE says covers over 80% of the industry's output in the European Union (EU).

In the four-year period of 2006–2009, substantial environmental benefits were delivered, AISE says, including a 9% reduction in CO_2 emissions. Independent verification continues to be a key feature of the scheme, with companies' internal management procedures for improving sustainability and their compliance with key performance indicator reporting and advanced sustainability profiles for products all subject to regular and random checks. ■

ride (PVC) from its product packaging in the next few years as part of its new 2020 sustainability goals, a company executive said in October. According to Len Sauers, vice president of global sustainability at P&G, the company has been reducing its use of PVC for the past 10 years, and the plastic now represents less than 1.5% of the company's total plastic packaging. "We want to get out of PVC mainly because it's not a material that's largely recycled," Sauers told *ICIS Chemical Business*. The firm is now using standard packaging materials such as No. 1 and No. 2 polyethylene terephthalate (PET) plastics that are recyclable, he added.

■■■

Seventh Generation, Inc. (Burlington, Vermont, USA) removed a video on its website after P&G challenged ads that suggested that Seventh Generation's products do not contain hazardous chemicals and are completely "natural," www.greenbiz.com said in October 2010. The advertising also reportedly claimed all competing products are not as safe as Seventh Generation products and are leading to increases in autism, cancer, and other illnesses in children.

■■■

Unilever's purchase of Alberto Culver at the end of September 2010 was greeted by analysts with almost universal enthusiasm. Before the purchase, the Anglo-Dutch consumer products giant had a market share in the hair-care category of about 7% in both the United States and the United Kingdom, according to *The Financial Times* (*FT*). The Alberto Culver acquisition was expected to double Unilever's market share in both countries. It will not, however, help with Unilever's plans to expand in developing economies. Although Alberto Culver has some business in Argentina and Mexico, it made 65% of its sales in the United States, with the United Kingdom accounting for another 15%, the *FT* report noted.

■■■

Ecolab Inc. will expand its presence in the Asia-Pacific region through its acquisition of the Cleantec business of Campbell Brothers Ltd., Brisbane, Queensland, Australia. Cleantec, with annual sales of about $55 million, is a developer, manufacturer, and marketer of cleaning and hygiene products principally within the Australian food and beverage processing, food service, hospitality, and textile care markets.

■■■

Unilever's Vaseline petroleum jelly celebrated its 140th anniversary in October 2010 with new packaging, a new online campaign, and the introduction of a new cocoa butter variety. The company also is publicizing the creator of the product—Robert Chesebrough—a 22-year-old chemist who traveled in 1859 to Pennsylvania to study oil extraction and refining. Once there, he noticed that riggers used petrolatum, a by-product of refining, to help heal cuts and burns. After testing and refinement, he introduced the product to the public as Vaseline petroleum jelly in 1870, and by 1974, it was being sold nationwide at the rate of a jar a minute, according to Unilever.

■■■

Confusion over definitions of terms such as "natural" and "organic" in the personal care industry has led the International Fragrance Association (IFRA) to release its "IFRA Green Definitions Document." The report defines "natural" as meaning an ingredient that exists in or is produced by nature. "Organic" materials are defined as elements created with natural raw ingredients that are "guaranteed organic" and are grown without using conventional pesticides or artificial fertilizers. The report (pdf) is available at http://tinyurl.com/IFRA-Green. ■

HEALTH & NUTRITION NEWS
(CONTINUED FROM PAGE 745)

the higher diabetes rate in the United States for men and virtually all the higher rate seen among women.

The findings were published online by the *Journal of Epidemiology and Community Health* (doi:10.1136/jech.2010.108415, 2010).

In related news, a group of researchers from the University of Hull in the United Kingdom and the Hull York Medical School have found that dark chocolate may have significant health benefits for people with type 2 diabetes. According to the study published in *Diabetic Medicine* (doi: 10.1111/j.1464-5491.2010.03108.x, 2010), high-density lipoprotein ("good" cholesterol) is improved and overall cholesterol balance is enhanced when patients consume 45 g of dark chocolate each day. ■

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People News/ Inside AOCS

New CEO for Soybean Export Council

Jim Sutter was scheduled to join the US Soybean Export Council (USSEC) on December 6 as chief executive officer (CEO). In this position he is tasked with leading the USSEC's efforts on behalf of US soybean farmers to expand international markets for US soybeans and soy products.

Sutter joins the USSEC after 30 years with Cargill, where he worked after graduating from Colorado State University with a degree in agricultural business/economics. His most recent role with Cargill was as vice-president of Cargill's grain and oilseed supply chain business unit with day-to-day responsibility for Cargill's Iowa soybean processing business. Sutter represented Cargill on several industry associations, including the National Oilseed Processors Association and QUALISOY.

Leaders in biofuels

BiofuelsDigest.com completed an informal, unscientific poll of its readership in October concerning who "The Top 100 People in Bioenergy" are. Government officials, company executives, association executives, biofuels investors, academic/government scientists as well as a sprinkling of politicians were some of the 100 names on the list. Former AOCS President **Ian Purtle**, who is director of sustainable energy for Cargill (Minneapolis, Minnesota, USA), and **Jim Sayre**, who is senior managing director of Cargill Ventures (San Mateo, California, USA), ranked 23rd in this list of 100 names.

New officers for SEA of India

The Solvent Extractors' Association of India elected new officers on September 24 for 2010–2011. **Sushil Goenka**, who is director of Foods Fats & Fertilisers Ltd., Hyderabad (Andhra Pradesh), is now president; **Vijay Data**, managing director of Vijay Solvex Ltd., Alwar (Rajasthan), is vice president; **Pravin S. Lunkad**, chief executive officer of Pranav Agro Industries Ltd., Pune (Maharashtra), is secretary; and **Nimish K. Patel**, who is managing director of N.K. Industries Ltd., Ahmedabad (Gujarat), is treasurer.

Sudhoff to lead Henkel Consumer Goods Inc.

In October, Henkel AG & Co. KGaA, located in Düsseldorf, Germany, announced the appointment of **Stefan Sudhoff**, pictured at right, corporate senior vice president cosmetics/toiletries at Henkel, to lead Henkel Consumer Goods Inc. Stefan Sudhoff succeeds **Georg Baratta**.

Henkel Consumer Goods Inc. is headquartered in Scottsdale, Arizona, USA, and markets a wide range of consumer brands including Dial® soaps and Purex® laundry detergents. Henkel purchased The Dial Corporation, located in Scottsdale, in 2004.

In Memoriam

FRANCIS E. LUDDY

AOCS has received word of the death of Francis E. Luddy. He was born in Pennsylvania on May 7, 1918, and died in Delray Beach, Florida, on August 18, 2006.

Luddy received his higher education at St. Francis College [now St. Francis University] in Loretto, Pennsylvania, USA. He joined the US Department of Agriculture Eastern Regional Research Center (ERRC), Wyndmoor, Pennsylvania, in 1942. His work with the ERRC concentrated on identifying fractions of animal fat that could be used in place of cocoa butter in the making of chocolate. He was also an early user and improver of gas-liquid chromatography for lipid analysis. In 1980 Luddy retired from the ERRC and worked as a consultant for three years before becoming president of Chem-Biotechs Research Inc.

Luddy was author or co-author of 50 published papers and 20 domestic or foreign patents.

He joined AOCS in 1944 and was a member of both the Edible Applications and the Processing Divisions. Luddy was active in the Northeast Section of AOCS, serving variously as secretary (1974–1975), vice president (1975–1976), and president (1976–1977).

Luddy served as AOCS national secretary in 1977–1979, and he also served as member-at-large of the Governing Board in 1979–1980.

He received the AOCS Bond Award in 1973, given for excellence for a technical presentation at the AOCS Annual Meeting. In 1975, Luddy and his colleague Samuel F. Herb, also of ERRC, received the Achievement Award of the Northeast

CONTINUED ON PAGE 764

New president/CEO named for New Generation Biofuels

Miles F. Mahoney became president, chief executive officer, and director of New Generation Biofuels Holdings (Columbia, Maryland, USA) on October 12. He replaced **Cary J. Claiborne**. New Generation makes renewable fuel from new or recycled plant oil or animal fat feedstocks. The company's technology is based on creating emulsions that can be used as a replacement for or blended up to 30% with distillate fuel, or heavy fuel oil.

University appointment

AOCS President **Keith Grime** has been appointed adjunct professor in the McCormick School of Engineering and Applied Science at Northwestern University, Evanston, Illinois, USA. He will teach a class on the management of product innovation in the Masters of Product Design and Development (MPDD) program. ■

A message from the AOCS Foundation . . .

AOCS and the AOCS Foundation working as one

Amy Lydic

I very recently had one of those moments. You know–the ones when suddenly everything makes sense. Some would say the light bulb went on, some would say it was an "Ah ha!" moment, and some even would call it an epiphany. However you categorize it, I had one of those!

I have been working for the AOCS Foundation for more than 10 years, diligently trying to keep the Foundation's message in front of our supporters . . . struggling at times to illustrate how AOCS and the AOCS Foundation fit together and how it is all possible because of our donors' generosity.

Then it hit me. I have approached it all wrong. You see, I have always worked as if AOCS and the AOCS Foundation were two separate entities. In reality, this separation only exists on paper and for legal reasons. AOCS and the AOCS Foundation really work as one to advance a very important, shared mission.

So then I got to thinking about how this original misconception has impacted the AOCS Foundation's fundraising efforts over the past decade. I mean, if I—the person who is thinking about the AOCS Foundation every day—didn't fully understand the connection, how could you, the donor, be expected to know? Don't get me wrong. The AOCS Foundation has experienced many successes and has raised significant dollars (nearly $2 million) since it was founded in 1986, but at times it has been very difficult to increase awareness and understanding of the AOCS Foundation's purpose.

In the simplest terms and the starkest reality, without AOCS, the AOCS Foundation would have no purpose and would not exist.

Could AOCS exist without the AOCS Foundation? The answer is yes, AOCS would still exist. It is a 100+ year old organization; it survived many years without the Foundation and probably could continue if necessary. The real question, however, is, would it be the same AOCS you have come to rely on for excellence and advancement in your field?

The answer to that question is no, and this is where the "Ah ha!" moment happens. AOCS has one overarching product that everyone associated with AOCS needs no matter your area of interest, and that one product is *knowledge*. To continue to grow and advance this bank of knowledge, as well as your access to it, the AOCS must work as one with the AOCS Foundation.

You see, through the generous support of our donors, the AOCS Foundation is able to support development of new products, new services, and new delivery avenues that AOCS needs to remain relevant and on the cutting edge without jeopardizing the financial position of AOCS.

Working together as one, AOCS and the AOCS Foundation are pursuing activities designed in every way to benefit you and your fellow constituents. All we need now is YOU! Your participation in our global network as well as your financial support will ensure that AOCS continues to be the one stop for knowledge necessary to benefit the world and everyone in it.

Make your gift now at www.aocsfoundation.org/donate.cfm and be a part of it!

AOCS Foundation Development Manager Amy Lydic can be reached via e-mail at amyl@aocs.org.

*inform*ation

GIVING TO THE AOCS FOUNDATION IS EASY AND CONVENIENT:

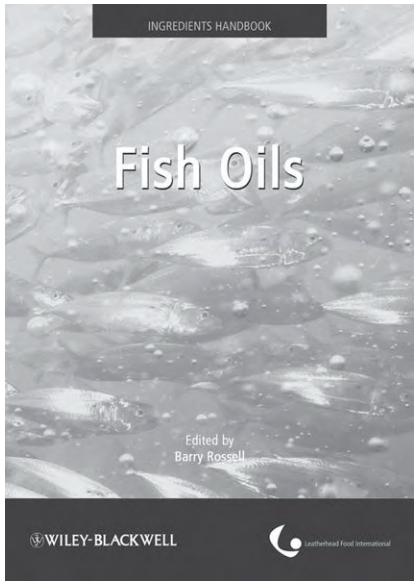
- Individual donors are invited to make a onetime donation, pledge a gift over a period of time, join the Century Club, or make a planned gift.
- Corporate donors can also participate by making a onetime donation, pledging a gift over a period of time, joining the Corporate Century Club, or by making a corporate foundation to foundation gift.
- For more information visit www.aocsfoundation.org or contact Amy Lydic, phone: +1 217-693-4807; fax: +1 217-693-4852; email: amyl@aocs.org.

Book Review

Fish Oils
Barry Rossel (ed.), Wiley-Blackwell/Leatherhead Food International, 2009
200 pages
ISBN: 978-1905224-63-0, $179.99

Ana Carvalho

Fish Oils is divided into 11 chapters, which can be grouped in six main areas: (i) physical and chemical properties of fish oils; (ii) dietary constituents (with a special focus on long-chain polyunsaturated fatty acids, or PUFA), various uses of fish oils in foods and implications for human health; (iii) general industrial processing and hydrogenation technology; (iv) comparison between farmed and wild fish composition with regard to diet; (v) rancidity; and (vi) regulatory issues.



The book begins with a short chapter on production volumes and the trade in fish oil, including a discussion of the main producing countries, the primary fish species used in commercial fish oil production, and a discussion of the major uses of fish oil. The latest data presented are from 2006.

Chapter 2 covers fish oils as a source of valuable dietary constituents. It is very short and could easily have been combined with either Chapter 7 on the nutritional values of fish oil or with Chapter 8, which is on fish oil applications in foods. In Chapter 7, fish oil ingredients such as squalene, vitamins, glycerol ethers, and long-chain PUFA are briefly described. In Chapter 8, the nutritional aspects of vitamins A, D, and E and fatty acids are emphasized, with special attention to the biological roles of PUFA in terms of clinical aspects, from their discovery to chemical composition, reference nutrient intake, and levels present in different foods.

We are looking for additional book reviewers, including reviewers from outside North America. If you are interested in reviewing one or more books, please send an email to the book review editor (William Artz) at wartz@illinois.edu and indicate your subject area of interest. An email request for the review with information about the text is sent to each reviewer, before any book is mailed out for review. Reviews are generally expected three to four months later. After review submission, the books belong to the reviewer. AOCS provides a general review guideline, available to each reviewer upon request.

Chapter 7 is comprehensive, yet easy to read. The initial sections provide an interesting introduction (e.g., the use of cod liver oil as a medication in the mid-1700s) and are a valuable source of information for beginners (e.g., as it distinguishes between fish liver oil and fish body oil). Clinical aspects are focused on the effects of PUFA in heart health, brain health, joints, skin, lungs, kidney, gastrointestinal system, and pregnancy. The only negative remarks I have are on Table 7.V, which provides recommendations only up to 2004; it is difficult to read due to its low quality; and there was a small error in numbering clinical aspects.

Chapter 8 presents various subjects related to the use of fish oils in foods; it starts with the alternative use of fish oil as a supplement or as a functional ingredient to incorporate in foods. The section regarding products currently available, which describes the various formulations of industrial fish oils (in terms of eicosapentaenoic and docosahexaenoic acid composition), is well detailed. In contrast, the sections regarding methods used to increase the omega-3 concentration, microencapsulation, and algal oils are very short. It would have been useful to provide some suggestions for further reading, or at least some key references. The last section, on future prospects, is very interesting, with the latest developments on the subject and a clear description of the situation.

The physical and chemical properties of fish oils are described in Chapters 3 and 4, respectively. Both chapters are well organized, with plenty of information in each section (e.g., the main methods available for measuring each physical property, with a discussion of their specific advantages and disadvantages, largely supported by the literature). The final section of Chapter 4 discusses the presence of contaminants in fish oil. There are some minor errors: (i) the legends for the symbols used in the section on optical properties in Chapter 3, and Table 4.III, in Chapter 4, are missing; (ii) Table 4.III is poorly aligned; and (iii) Figures 4.6 and 4.7 are identical.

Chapter 5 covers the processing of fish oil, detailing the different processes depending on the intended use (e.g., aquaculture or incorporation in food products). Crude fish oil refining for use in nutraceuticals is emphasized, as processing dramatically affects the oil quality. Typical values for crude oil characteristics are provided, as well as legislation regarding maximum levels of contaminants. The diagrams presented facilitate the understanding of the process, whereas the glossary of terms used is useful for beginners.

Chapter 6 presents a detailed overview of the principles of hydrogenation technology, including reactor operation, scale-up of process, and hydrogenation time, and offers numerous figures and equations.

Chapter 9 discusses the evolution of aquaculture feed, from diets with large amounts of fish oils to their partial replacement by vegetable oils and its environmental impact, and future trends. Flesh and liver oil fatty acid concentrations for several species of farmed and wild fish are compared and discussed. A large list of references and suggestions for further reading have been provided, which is particularly useful since the chapter is relatively short.

CONTINUED ON PAGE 764

Patents

Published Patents

Method of preparing fatty acid alkyl esters from waste or recycled fatty acid stock

Geier, D.F., *et al*., Archer Daniels Midland Co., US7705170, April 27, 2010

The present invention is directed to a method of preparing fatty acid alkyl esters from fatty acids contained in co-product streams, or waste or recycled fatty acid stock. The present method utilizes an acidic resin to convert the fatty acid stock into esters. The present method encompasses the use of reactive simulated moving bed chromatography, wherein above about 95% of the fatty acid stock is converted to fatty acid alkyl esters. The present method has been optimized to separate the ester product from the raffinate stream formed during the chromatographic process, thereby improving the yield of the esterification and preventing acid hydrolysis of the ester.

Method of suppressing the effects of the translocase deficiency of a human infant comprising administration of a seven-carbon fatty acid

Roe, C., US7705048, April 27, 2010

A seven-carbon fatty acid or derivative thereof has been identified as an excellent energy source for humans or human infants. A nutritional supplement suitable for humans or human infants comprising a seven-carbon fatty acid chain compound or derivative thereof can be used to increase energy production derived from fatty acid metabolism. For example, administering a seven-carbon fatty acid chain compound or derivative thereof can be used to accelerate the growth rate of a prematurely born human infant.

Composition for coating fruits vegetables and fowl eggs especially useful for organic produce

Lahav, J., *et al*., Natratec International Ltd., US7708822, May 4, 2010

The invention relates to a composition for coating fruits, vegetables, fowl eggs, and especially for organically grown produce for protection and extension of the shelf life of said fruits, vegetables, and fowl eggs wherein said composition is an aqueous dispersion comprised of: (i) a hydrophobic component comprising at least one member of the following group consisting of natural wax, or vegetable oil; (ii) an alkali agent; (iii) water, wherein components (i) and (ii) are derived from natural biological sources. The invention also relates to a method for application of the composition.

Method for preparing ester compounds as bleach activators

Lee, C.-W., *et al.*, LG Household & Health Care Ltd., US7708905, May 4, 2010

A method for preparing an ester bleach activator compound is disclosed. The method includes (i) preparing fatty acid monoester; (ii) making chloroformate by reacting the fatty acid monoester with at least one selected from the group consisting of phosgene, diphosgene, and triphosgene in the presence of base; and (iii) reacting the chloroformate with hydroxybenzene, its derivatives, or its salts in solvent. According to the method, the ester bleach activator compound can be made in a simple and economic way.

Carboxylic acid-modified EDOT for bioconjugation

Kim, J., *et al.*, The Regents of the University of Michigan, US7708908, May 4, 2010

An electroconductive carboxylic acid functionalized monomer corresponding to Formula (I), wherein A represents a hydrogen or a carboxyl group. Polymerized monomers of Formula (I) conjugated with a biomolecule result in conjugated PEDOT [poly 3,4-ethylenedioxythiophene], polymers of Formula (III) wherein A is a hydrogen or a carboxylic acid group and B is a biomolecule selected from the group consisting of a peptide, a protein, a lipid, a carbohydrate, and a polynucleotide. The biomolecule conjugated polymers can be disposed onto an electrically conductive substrate wherein the substrate has a first layer of PEDOT polymerized on a surface of the substrate and a second layer of biomolecule conjugated PEDOT polymer of Formula (III) polymerized on the first layer of PEDOT. The first and second layers form a charge transport material in electrical communication with the conductive substrate. The electrically conductive substrate further comprises a dopant.

Low-fat cocoa powder

Purtle, I., *et al.*, Cargill, US7709041, May 4, 2010

Techniques for processing cocoa mass are provided. In general the techniques involve solvent extraction of cocoa fat from cocoa mass, to achieve a desirable cocoa butter and low-fat cocoa powder. In one preferred process, the cocoa mass is the result of grinding cocoa nibs, with absence of a mechanical pressing and heating step, to advantage. Preferred products and uses are characterized.

Method for removing enzyme and method of base exchange or hydrolysis of phospholipid using the same

Liu, X. and N. Taniwaki, Nagase ChemteX Corp., US7709238, May 4, 2010

A method of removing an enzyme from a liquid enzyme reaction mixture used in a hydrolysis reaction or a base exchange reaction of a phospholipid is provided. The method includes the step of treating the liquid enzyme reaction mixture with a solvent mixture of water and an organic solvent, wherein the solvent mixture includes

an inorganic metal salt, to remove the enzyme. Enzymes included in the reaction product can be easily removed without a treatment such as heating, and thus it becomes possible to easily produce various phospholipids that have a reduced risk of inducing an allergy, that retain a high quality, and that have excellent storage stability.

Rodenticidal composition in the form of vegetable paste

Zambotto, P., and M. Tagliaro, Zapi Industrie Chimiche S.p.A., US7709530, May 4, 2010

The present invention relates to a rodenticidal composition in the form of fresh paste for enticing mice and rats wherein the flour used is mainly of a vegetable origin and the fatty matter incorporated essentially consists of palm oil.

Homogenous process for the hydrogenation of carboxylic acids and derivatives thereof

Kilner, M., *et al.*, Davy Process Technololgy Limited, US7709689, May 4, 2010

A homogenous process for the hydrogenation of the carboxylic acids and/or derivatives thereof in the presence of a catalyst comprising ruthenium, rhodium, iron, osmium, or palladium and an organic phosphine is described in which the hydrogenation is carried out in the presence of at least about 1% by weight water. A process for regenerating a catalyst comprising ruthenium, rhodium, iron, osmium, or palladium and an organic phosphine is also described in which the regeneration is carried out in the presence of hydrogen and water.

Biodiesel candle

Jones, A., US7713314, May 11, 2010

A candle formed of a composition comprising biodiesel. In preferred implementations the candle composition includes fatty alcohols, e.g., cetyl alcohol and cetearyl alcohol, in mixture with the biodiesel, to constitute a candle composition that can be burned in a wicked or wickless form. The composition of biodiesel and fatty alcohols may include dyes and/or fragrances, to provide a candle article that is environmentally benign and of low cost.

Pretreating agent for electroless plating method of electroless plating using the same and product of electroless plating

Kawamura, T., *et al.*, Nippon Mining and Metals Co., US7713340, May 11, 2010

The object of the present invention is to provide a pretreating agent for electroless plating that is stable and soluble in organic solvents, a method of electroless plating with excellent adhesiveness using it and an electroless plated product. An object to be plated is pre-treated using a pretreating agent for electroless plating comprising a noble metal soap of naphthenic acid or a fatty acid having 5 to 25 carbon atoms or preferably using a pretreating agent for electroless plating additionally comprising an imidazole silane coupling agent or other silane coupling agent having metal-capturing ability, and then electroless plated. The noble metal soap is preferably a palladium soap.

Biological component comprising artificial membrane

Faucher, K., *et al.*, Emory University, US7713544, May 11, 2010

A biocompatible biological component is provided comprising a membrane-mimetic surface film covering a substrate. Suitable substrates include hydrated substrates, e.g., hydrogels, which may contain drugs for delivery to a patient through the membrane-mimetic film, or may be made up of cells, such as islet cells, for transplantation. The surface may present exposed bioactive molecules or moieties for binding to target molecules *in vivo*, for modulating host response when implanted into a patient (e.g., the surface may be anti-thrombogenic or anti-inflammatory) and the surface may have pores of selected sizes to facilitate transport of substances therethrough. An optional hydrophilic cushion or spacer between the substrate and the membrane-mimetic surface allows transmembrane proteins to extend from the surface through the hydrophilic cushion mimicking the structure of naturally occurring cells. An alkylated layer directly beneath the membrane-mimetic surface facilitates bonding of the surface to the remainder of the biological component. Alkyl chains may extend entirely through the hydrophilic cushion when present. To facilitate binding, the substrate may optionally be treated with a polyelectrolyte or alternating layers of oppositely charged polyelectrolytes to facilitate charged binding of the membrane-mimetic film or alkylated layer beneath the membrane-mimetic film to the substrate. The membrane-mimetic film is preferably made by *in situ* polymerization of phospholipid vesicles.

Compositions and methods for enhancing paracellular permeability across epithelial and endothelial barriers

Thakker, D., and P.D. Ward, The University of North Carolina-Chapel Hill, US7713949, May 11, 2010

Compositions and methods for enhancing paracellular permeability at an absorption site in a subject are disclosed. The method includes: (i) administering an effective amount of a phospholipase C inhibitor to a subject at a time in which enhanced paracellular permeability is desired; and (ii) enhancing paracellular permeability in the subject at the absorption site through the administering of the effective amount of the phospholipase C inhibitor. The disclosed compositions and methods provide enhanced absorption of a hydrophilic drug in a subject.

Method for monitoring the performance of a compression-ignition, internal combustion engine

Preston, W.H., Castrol Limited, US7716972, May 18, 2010

A method for monitoring the performance of a compression-ignition, internal combustion engine which method comprises lubricating the engine with a crankcase lubricant, and introducing a fuel to the engine to operate the engine, characterized in that the fuel comprises greater than 50% by weight of petroleum-based middle distillate fuel oil and/or a Fischer Tropsch derived middle distillate fuel oil and 2.5% to 25% by weight of at least one lower alkyl ester of a fatty acid. The performance of the engine is monitored by measuring the rate of ingress of lower alkyl ester of a fatty acid from the fuel into the crankcase lubricant by infrared spectroscopic analysis of the crankcase lubricant.

Process for reactive distillation of a carboxylic acid

Dirkzwager, H., *et al.*, Shell Oil Co., US7718039, May 18, 2010

A process for reactive distillation wherein a carboxylic acid is reacted in a reaction section of a reactive distillation column with an alcohol under esterifying conditions in the presence of a catalyst to form an ester, wherein a first supply stream comprising the carboxylic acid, a second supply stream comprising the alcohol, and a third supply stream comprising an inert entrainer are supplied to the reactive distillation column, wherein the first supply stream is supplied to the column at a first entry level located just above or at the top of the reaction section, the second supply stream is supplied to the column at a second entry level located in or just below the reaction section and below the first entry level, and the third supply stream is supplied to the column at a third entry level located in or below the reaction section and not above the second entry level and wherein a bottom stream comprising the ester formed and unreacted carboxylic acid is obtained and a top stream comprising unreacted alcohol, water, and entrainer is obtained.

Low *trans*-stereoisomer shortening system

Higgins, N.W., Bunge Oils Inc., US7718211, May 18, 2010

Shortening systems are prepared which include hydrogenated edible oils that are hydrogenated in a manner to minimize the formation of *trans*-stereoisomers. A conditioned catalyst is used that disfavors *trans*-stereoisomer formation without significantly negatively impacting the length of time required to form solids for a useful shortening base stock through hydrogenation. Preferred conditioning agents are organic acid phosphates and phosphoric acid. In a preferred embodiment, a confectionary shortening is provided which incorporates a polyglycerol ester emulsifier.

Method [of reducing diglycerides in oil]

Wassell, P., *et al.*, Danisco A/S, US7718408, May 18, 2010

The present application provides a method of reducing and/or removing diglyceride from an edible oil, comprising admixing an edible oil with an acyl acceptor substrate and a diglyceride:glycerol acyltransferase wherein the diglyceride:glycerol acyltransferase is characterized as an enzyme which in an edible oil is capable of transferring an acyl group from a diglyceride to glycerol. The diglyceride:glycerol acyltransferase can comprise the amino acid sequence motif GDSX. The present invention also relates to the use of a diglyceride:glycerol acyltransferase in the manufacture of an edible oil, for reducing and/or removing diglyceride from said edible oil, and to the use of said enzyme in the manufacture of a foodstuff comprising an edible oil for improving the crystallization properties of said foodstuff.

Aqueous dispersion of alkyde resin which is treated with an oxidizing agent and which has improved drying properties

Cogordan, F., and I. Rodriguez, Cray Valley SA, US7718731, May 18, 2010

An aqueous dispersion of alkyd resin based on fatty acids with conjugated unsaturation is treated with an oxidizing agent to form a drying oil that is used as binder in aqueous compositions for coatings. The coating may have a reduced level of drying agent, or no drying agent at all. The aqueous dispersion comprises at least one alkyd resin obtained from at least one unsaturated fatty acid having a level by weight of at least 5% of the said resin, which resin is treated before and/or during and/or after the forming of the aqueous dispersion with at least one oxidizing agent selected from: hydroperoxides, including H_2O_2, peroxides or singlet oxygen, and with the oxidizing treatment temperature being: (i) from ambient temperature to less than 100°C, when it takes place after the forming of the dispersion and (ii) from 50 to 150°C when it takes place before the forming of the dispersion, and (iii) from 50 to less than 100°C when it takes place during the dispersion stage.

Vegetable sterol ester-containing composition and additive that increases the feeling effects from a hair cosmetic

Watanabe, K., *et al.*, San-Ei Kagaku Co., US7718817, May 18, 2010

A safe additive that increases the feeling effects from a hair cosmetic is provided at low costs. The additive that increases the feeling effects has less stickiness, can be easily and uniformly mixed with hair cosmetics, and can provide feelings, effects, and advantages that are similar to those of sterol wax and lanolins including lanolin itself, liquid lanolin, and hard lanolin. The additive that increases the feeling effects contains a composition (I) prepared by distillation, fatty acid esterification, decoloring, and deodorization of a by-product obtained when tocopherol is extracted, separated, and purified from a vegetable oil deodorized distillate. ■

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.

Extracts & Distillates

Polar lipids from oat kernels

Doehlert, D.C., *et al., Cereal Chem. 87*:467–474, 2010.

Oat (*Avena sativa* L.) kernels appear to contain much higher polar lipid concentrations than other plant tissues. We have extracted, identified, and quantified polar lipids from 18 oat genotypes grown in replicated plots in three environments to determine genotypic or environmental variation in these lipids. Validation experiments indicated a solid-phase silica gel extraction step elution provided excellent and clean separation of extracted lipids into neutral lipid, glycolipid, and phospholipid fractions. Analysis of phospholipids by high-performance liquid chromatography (normal phase, diol column) indicated phosphatidylethanolamine, phosphatidylcholine, phosphatidic acid, phosphatidylglycerol, phosphatidylinositol, and *lyso*- forms but very little genotypic or environmental variation. Di-, tri-, and tetragalactosyl-diacylglycerols were quantified in the glycolipids, along with their mono-, di-, and triacyl estolides. Most of these exhibited significant genotypic variation. Molecular species analysis of the glycolipids in the Morton cultivar by direct infusion electrospray ionization tandem mass spectrometry confirmed the enormous diversity of galactosyl-lipids in oats. Analyses indicated total lipid of ≈8.3% (dry weight basis), of which ≈10% was phospholipid and 11% was glycolipids. These results indicate that oats are a rich source of polar lipids and contain an extremely rich diversity of galactosyl-lipids.

β-Sitosterol inhibits cell cycle progression of rat aortic smooth muscle cells through increases of $p21^{cip1}$ protein

Chien, M.-H., *et al.*, *J. Agric. Food Chem. 58*:10064–10069, 2010.

Abnormal proliferation of vascular smooth muscle cells (VSMC) plays a central role in the pathogenesis of atherosclerosis. β-Sitosterol, an important phytosterol found in plant food, is known to exert antiatherosclerosis activity. However, the molecular mechanisms underlying β-sitosterol-induced antiproliferation of VSMC were still not clear. This study demonstrated that β-sitosterol (1–20 μM) concentration-dependently inhibited proliferation of rat aortic smooth muscle cells (RASMC) without cytotoxic effect. Flow cytometric analysis revealed that β-sitosterol arrested cell cycle progression through down-regulation of cyclin E and cyclin-dependent kinase (CDK)2 and up-regulation of $p21^{cip1}$. In the β-sitosterol-treated RASMC, the formation of the CDK2-$p21^{cip1}$ complex was increased, and the assayable CDK2 activity was decreased. Knockdown of the expression of $p21^{cip1}$ gene prevented β-sitosterol-induced cell cycle arrest in RASMC. In conclusion, β-sitosterol inhibited VSMC proliferation by increasing the levels of $p21^{cip1}$ protein, which in turn inhibited the CDK2 activity, and finally interrupted the progress of the cell cycle.

Improvement of total lipid and glycerophospholipid recoveries from various food matrices using pressurized liquid extraction

Zhou, L., *et al.*, *J. Agric. Food Chem. 58*:9912–9917, 2010.

The extraction of three major phospholipid (PL) classes contained in soybean, egg yolk, calf brain, and ox liver was investigated by means of two methods. The PL amounts were evaluated. A new method, based on pressurized liquid extraction (PLE), was applied for total lipids (TL), including PL, extraction and compared with a standard liquid extraction method, a modified Folch method. The three PL classes (phosphatidylethanolamine (PE), phosphatidylinositol (PI), and phosphatidylcholine (PC)) that were recovered in the obtained TL extracts were quantified using HPLC with an evaporative light-scattering detector (ELSD). Using the PLE method, a single extraction allowed a recovery of more than 94% of TL and 96% of each PL class. Two successive extractions could achieve a total recovery of the three studied PL classes. With the modified Folch method, 77–83% of TL, 80–91% of PE, 82–94% of PC, and no more than 78% of PI could be achieved from various food matrices after one extraction. Four successive extractions were necessary to recover the whole TL content and each PL class. Results indicate that PLE is a rapid and efficient lipid extraction system for the broad range of plant and animal tissues.

Omega-3 fatty acids, cognitive decline, and Alzheimer's disease: A critical review and evaluation of the literature

Huang, T.L., *J. Alzheimers Dis. 21*:673–690, 2010.

The precipitous decline of memory and independence associated with cognitive decline, dementia, and Alzheimer's disease is emotionally and financially devastating to patients, their families, and caretakers. Studies from animal models and cell cultures have shown that omega-3 fatty acids (n-3 FA) are neuroprotective during development and aging. Numerous epidemiologic, postmortem, and clinical trials have been published on fish or n-3 FA and Alzheimer's disease, dementia, or cognitive decline. Yet results across the literature in humans are inconsistent and thus difficult to interpret. This review provides background and context needed for interpretation of the findings, summaries of the literature grouped by longitudinal studies of fish, dietary n-3 FA, blood levels of fatty acids, postmortem studies, and clinical trials, and subsequent interpretation of findings. Possible reasons for discrepancies in the literature are presented throughout, and conclusions suggest directions for future research.

Detection of lactobacillic acid in low erucic rapeseed oil—A note of caution when quantifying cyclic fatty acid monomers in vegetable oils

Berdeaux, O., *et al.*, *Chem. Phys. Lipids 163*:698–702, 2010.

The purpose of this work was to identify an unknown component that has been detected during the analysis of cyclic fatty acid monomers (CFAM) in low erucic acid rapeseed oils (LEAR). A sample of crude LEAR was transformed into fatty acid methyl esters (FAME) and hydrogenated using PtO_2. The hydrogenated sample was fractionated by reversed-phase high-performance liquid chromatography (RP-HPLC) and the

fraction containing the CFAM transformed into picolinyl esters. Analyzing these picolinyl derivatives by gas-liquid chromatography coupled to mass spectrometry (GC-MS) showed that the unknown product observed in LEAR is the 11,12-methylene-octadecanoic acid. This cyclic fatty acid was also found in crude LEAR and in the corresponding seeds but was not detected in crude soya and sunflower oils. As this acid is present in the same fraction as CFAM, known to be formed during heat treatment, great care must therefore be taken for not including it when quantifying CFAM. It is thus necessary to verify by mass spectrometry the structures of the CFAM in the isolated cyclic fatty acid fraction prior to quantification.

Comprehensive lipidomics analysis of bioactive lipids in complex regulatory networks

Masoodi, M., *et al.*, *Anal. Chem. 82*:8176–8185, 2010.

In the present work we describe the development of an analytical technique for simultaneous profiling of over 100 biochemically related lipid mediators in biological samples. A multistep procedure was implemented to extract eicosanoids and other bioactive lipids from the biological matrix; chromatographically separate them using fast reversed-phase liquid chromatography; tentatively identify new candidate eicosanoids through a matching process of retention times, isotope distribution patterns, and high-resolution orbitrap MS/MS [tandem mass spectroscopy] fragmentation patterns; and subsequently quantify tentative candidates by means of analytical reference standards. Key new aspects of this profiling technique included the classification of bioactive lipids into 12 groups according to their calculated exact masses and the development of optimized liquid chromatographic conditions for these groups to achieve sufficient separation of the numerous isobaric and isomeric species, many of which exhibited virtually identical collision-induced dissociation behavior. Importantly, no analytical standards were required at this screening stage of the assay, and tentative identifications were achieved by matching results to selected reference species from each of the groups. The analytical figures of merit for the orbitrap assay such as linear dynamic range, limit of detection, limit of quantitation, and precision demonstrated that the performance of the assay was very similar to that of a quadrupole linear ion trap assay, which was used for validation purposes. The method allowed us to examine eicosanoid profiles within the signaling cascade in chronic lymphocyte leukemia (CLL) cells under basal conditions and following arachidonic acid stimulation. The preliminary screening based on high-resolution MS/MS data along with isotope pattern and retention time matching revealed the presence of 15 bioactive lipids, belonging to a range of prostaglandin, leukotriene, and hydroxy and epoxy fatty acid lipid mediators produced by CLL cells.

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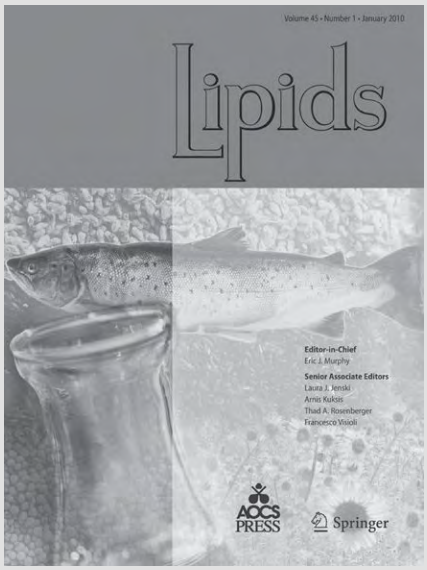

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Fat intake and asthma in Spanish schoolchildren

Rodríguez-Rodríguez, E., *et al.*, *Eur. J. Clin. Nutr. 64*:1065–1071, 2010.

The objective of this work was to study the relationship between lipid, fatty acid, and lipid-rich food intake and current asthma in a group of Spanish schoolchildren. The subjects of this cross-sectional study were 638 Spanish schoolchildren (8–13 years of age). The weight and height of all the subjects were recorded. A questionnaire, completed by the subjects' parents, was used to obtain personal and health information. Current asthma was established when the children had ever had asthma, if they had been diagnosed with asthma by a doctor, and if they had been treated with medications at some time in the previous 12 months. Food intake was monitored using a 3-day food record. All foods consumed were converted into energy and nutrients. The energy derived from lipids, saturated fatty acids (SFA), and myristic and palmitic acids was independently associated with current asthma (Odds Ratio (OR) third tertile 2.85 (1.01–8.07) $P = 0.049$, 10.00 (0.89–111.97) $P = 0.002$, 11.21 (1.36–92.24) $P = 0.002$, 7.58 (1.40–41.03) $P = 0.022$, respectively), as was the intake of butter (OR third tertile 2.97 (1.01–8.68) $P = 0.001$). No relationship was seen between this condition and the intake of any other fatty acid, the n-6/n-3 ratio, nor the consumption of margarine, milk products, fish, meat, eggs, or vegetable oils. Increased intakes of SFA, myristic and palmitic acids, and butter seem to be related to the risk of current asthma in children.

Effects of margarines and butter consumption on lipid profiles, inflammation markers and lipid transfer to HDL particles in free-living subjects with the metabolic syndrome

Gagliardi, A.C.M., *et al.*, *Eur. J. Clin. Nutr. 64*:1141–1149, 2010

Our purpose was to examine the effects of daily servings of butter, no-*trans*-fat margarine, and plant sterol margarine, within recommended amounts, on plasma lipids, apolipoproteins (Apos), biomarkers of inflammation and endothelial dysfunction, and on the transfer of lipids to high density lipoprotein (HDL) particles in free-living subjects with the metabolic syndrome. This was a randomized, single-blind study where 53 metabolic syndrome subjects (62% women, mean age 54 years) received isocaloric servings of butter, no-*trans*-fat margarine, or plant sterol margarine in addition to their usual diets for 5 weeks. The main outcome measures were plasma lipids, Apo, inflammatory and endothelial dysfunction markers (CRP, IL-6, CD40L or E-selectin), small dense low density lipoprotein (LDL)-cholesterol concentrations, and *in vitro* radioactive lipid transfer from cholesterol-rich emulsions to HDL. Difference among groups was evaluated by analysis of

variance. There was a significant reduction in Apo-B (−10.4%, $P = 0.043$) and in the Apo-B/Apo-A-1 ratio (−11.1%, $P = 0.034$) with plant sterol margarine. No changes in plasma lipids were noticed with butter and no-*trans*-fat margarine. Transfer rates of lipids to HDL were reduced in the no-*trans*-fat margarine group: triglycerides −42.0%, ($P < 0.001$ vs. butter and sterol margarine) and free cholesterol −16.2% ($P = 0.006$ vs. sterol margarine). No significant effects were noted on the concentrations of inflammatory and endothelial dysfunction markers among the groups. In free-living subjects with the metabolic syndrome, consumption of plant sterol and no-*trans*-fat margarines within recommended amounts reduced, respectively, Apo-B concentrations and the ability of HDL to accept lipids.

Development of a phenol-enriched olive oil with phenolic compounds from olive cake

Suárez, M., *et al.*, *J. Agric. Food Chem. 58*:10396–10403, 2010.

The recent information regarding the healthy properties of virgin olive oil phenols and the interest in increasing the value of by-products from the oil extraction process support the standardized development of phenol-enriched olive oil. Accordingly, the aim of this research work was to evaluate strategies for the development of a virgin olive oil enriched with phenolic compounds obtained from olive cake to increase phenolic ingestion without the drawback of a higher calorie intake. For this proposal, different combinations of phenolic extracts were evaluated at a range of concentrations to obtain the best prototype of enriched olive oil. To study the functionality of the phenol enrichments, the total phenolic content and the oxidative stability were determined by the Folin−Ciocalteu and Rancimat tests, respectively. In addition, the phenolic composition and antioxidant capacity (ORAC assay) of the oils were studied. Finally, the stability and potential bioaccessibility of the phenolic fraction of the enriched oils were tested by an *in vitro* gastrointestinal digestion model. Results of the study showed different strategies to select the best prototype of enriched olive oil, taking into consideration not only their phenolic content but also other important factors such as the feasibility of implementing the preparation process in the food industry.

Study of the retention and selectivity of cholesterol bonded phases with different linkage spacers

Bocian, S., *et al., J. Chromatogr. A 1217*:6891–6897, 2010.

The chromatographic properties of four cholesterol bonded phases with different structures were studied. The columns used were packed with a stationary phase containing a cholesterol molecule attached to the silica surface using different types of linkage molecules. As a basic characteristic of the bonded phases, the hydrophobicity and silanol activity (polarity) were investigated. The presence of the polar amino and carboxyl groups in the structure of the bonded ligand strongly influences the polarity of the bonded phase. Columns were compared according to methylene selectivity using a series of benzene homologs and according to their shape and size selectivity using polycyclic aromatic hydrocarbons (PAH). The measurements were done using methanol–water and acetonitrile–water mobile phases. The presented results show that the coverage density of the bonded ligands and length of the linkage strongly influence the retention and selectivity of cholesterol bonded phases.

Lipidomics reveals a remarkable diversity of lipids in human plasma

Quehenberger, O., *et al.*, *J. Lipid Res. 51*:3299–3305, 2010.

The focus of the present study was to define the human plasma lipidome and to establish novel analytical methodologies to quantify the large spectrum of plasma lipids. Partial lipid analysis is now a regular part of every patient's blood test, and physicians readily and regularly prescribe drugs that alter the levels of major plasma lipids such as cholesterol and triglycerides. Plasma contains many thousands of distinct lipid molecular species that fall into six main categories including fatty acyls, glycerolipids, glycerophospholipids, sphingolipids, sterols, and prenols. The physiological contributions of these diverse lipids and how their levels change in response to therapy remain largely unknown. As a first step toward answering these questions, we provide herein an in-depth lipidomics analysis of a pooled human plasma obtained from healthy individuals after overnight fasting and with a gender balance and an ethnic distribution that is representative of the US population. In total, we quantitatively assessed the levels of over 500 distinct molecular species distributed among the main lipid categories. As more information is obtained regarding the roles of individual lipids in health and disease, it seems likely that future blood tests will include an ever increasing number of these lipid molecules.

A lipase inhibitor monoterpene and monoterpene glycosides from *Monarda punctata*

Yamada, K., *et al.*, *Phytochemistry 71*:1884–1891, 2010.

An 80% acetone extract of *Monarda punctata* showed an inhibitory effect on lipase activity in isolated mouse plasma *in vitro* and carvacrol was obtained as the active constituent. It had an IC_{50} value of 4.07 mM *in vitro* and suppressed elevations in blood triacylglycerol levels in olive oil-loaded mice. Furthermore, from the whole plant, 22 compounds were isolated. Six monoterpene glycosides (**3**–**8**), a flavone glucuronide (**9**), and other known compounds were identified based on the results of spectroscopic analyses.

Comparison of the fatty acid profiles in cheeses from ewes fed diets supplemented with different plant oils

Bodas, R., *et al.*, *J. Agric. Food Chem. 58*:10493–10502, 2010.

The purpose of this work was to obtain a cheese from ewes' milk with a healthier fatty acid (FA) profile. To achieve our aim, 48 ewes (12 per treatment) were fed diets supplemented with 3% of plant oils: palm (used as control), olive (OO), soybean (SO), and linseed (LO). Milk samples from each treatment were collected to manufacture cheeses. The cheesemaking process did not modify the dairy fat FA profile, but OO, SO, and LO did reduce the C12:0 + C14:0 + C16:0 content in dairy fat, thus decreasing the atherogenic index value in the cheeses. Percentages of *cis*-9 *trans*-11 C18:2 in cheeses ranged from the 0.43 control value to 0.92, 1.64, and 2.71 with OO, LO, and SO respectively, following the same pattern as

trans-11 C18:1. In contrast, *trans*-10 C18:1 levels were always below 1%. The lowest n-6/n-3 ratio obtained with LO (1.43) suggests that such lipid supplementation would be the most effective nutritional strategy for improving cheese FA profiles.

Composition and fatty acid distribution of bovine milk phospholipids from processed milk products

Gallier, S., *et al.*, *J. Agric. Food Chem. 58*:10503–10511, 2010.

The aim of this work was to assess the accuracy of different extraction methods of phospholipids and to measure the effect that processing has on phospholipid composition. Four methods of extracting phospholipids from buttermilk powder were compared to optimize recovery of sphingomyelin. Using the optimal method, the phospholipid profile of four dairy products (raw milk, raw cream, homogenized and pasteurized milk, and buttermilk powder) was determined. A total lipid extraction by the Folch method followed by a solid-phase extraction using the Bitman method was the most efficient technique to recover milk sphingomyelin. Milk processing (churning, centrifuging, homogenization, spray-drying) affected the profile of milk phospholipids, leading to a loss of sphingomyelin and phosphatidylcholine after centrifugation for cream separation. A corresponding decrease in the saturation content of the raw cream phospholipids and a loss of phosphatidylethanolamine after spray-drying to produce buttermilk powder were also observed.

Long-chain and very long-chain polyunsaturated fatty acids in ocular aging and age-related macular degeneration

Liu, A., *et al.*, *J. Lipid Res. 51*:3217–3229, 2010.

Retinal long-chain PUFA (LC-PUFA, C_{12}–C_{22}) play important roles in normal human retinal function and visual development, and some epidemiological studies of LC-PUFA intake suggest a protective role against the incidence of advanced age-related macular degeneration (AMD). On the other hand, retinal very long-chain PUFA (VLC-PUFA, $C_{n>22}$) have received much less attention since their identification decades ago, due to their minor abundance and more difficult assays, but recent discoveries that defects in VLC-PUFA synthetic enzymes are associated with rare forms of inherited macular degenerations have refocused attention on their potential roles in retinal health and disease. We thus developed improved GC-MS methods to detect LC-PUFA and VLC-PUFA, and we then applied them to the study of their changes in ocular aging and AMD. With ocular aging, some VLC-PUFA in retina and retinal pigment epithelium (RPE)/choroid peaked in middle age. Compared with age-matched normal donors, docosahexaenoic acid, adrenic acid, and some VLC-PUFA in AMD retina and RPE/choroid were significantly decreased, whereas the ratio of n-6/n-3 PUFA was significantly increased. All these findings suggest that deficiency of LC-PUFA and VLC-PUFA, and/or an imbalance of n-6/n-3 PUFA, may be involved in AMD pathology.

Analysis of carotenoids and vitamin E in selected oilseeds, press cakes and oils

Franke, S., *et al.*, *Eur. J. Lipid Sci. Technol. 112*:1122–1129, 2010.

Carotenoids and vitamin E in oils from the market—six rapeseed and six sunflower oils, half of each cold pressed and refined—and in the oils of rape, sunflower, flax, and safflower as well as the respective seeds and press cakes from a local oil mill were quantified by HPLC (high-performance liquid chromatography). Furthermore, a photometric determination of carotenoid content was tested and checked against the chromatographic method. In the cold-pressed oils minor amounts of xanthophylls (*all-E*)-lutein and (*all-E*)-zeaxanthin were determined. With exception of traces of (*all-E*)-β-carotene in cold-pressed rapeseed oil, this provitamin A active compound did not occur. Cold-pressed rapeseed oils contained 0.5–1.5 mg total carotenoids/100 g, which was manifold the content of the further oils. Vitamin E was found in all vegetable oils at plant-typic tocopherol patterns. The photometric determination of carotenoids resulted in significantly higher concentrations compared to the HPLC. This overestimation was based on the carotenoid pattern, which was validated by comparison with known high-carotenoid materials, i.e., maize flour with an abundant amount of xanthophylls and carrots with an abundant amount of carotenes.

The complexity of HDL

Francis, G.A., *Biochim. Biophys. Acta–Mol. Cell Biol. Lipids 1801*:1286-1293, 2010.

Plasma high-density lipoprotein cholesterol (HDL-C) levels are inversely associated with coronary artery disease risk in large epidemiologic studies. This rule, however, has many exceptions in individual patients, and evidence suggests that other facets of HDL particle biology not captured by measuring HDL-C levels are responsible for HDL effects *in vivo*. This article reviews the evidence for the protective nature of HDL, current evidence from animal and human studies regarding HDL-based therapies, the major steps in HDL particle formation and metabolism, alterations leading to dysfunctional HDL in diabetes and inflammatory states, and potential alternatives to HDL-C to measure HDL function and predict its protective value clinically.

Marine phospholipids as dietary carriers of long-chain polyunsaturated fatty acids

Cansell, M., *Lipid Technol. 22*:223–226, 2010.

Eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) are polyunsaturated fatty acids (PUFA) of the n-3 series. Fish oil is a classical source of n-3 PUFA, where they occur in the form of triacylglycerols (TAG). However, new sources of n-3 PUFA esterified in phospholipids (PL) are emerging. We prepared liposomes from a natural marine lipid extract and examined their behavior under conditions mimicking that of the gastrointestinal tract. This physicochemical approach proved that liposomes could be used as an effective oral PUFA delivery system. *In vivo* studies in rats were performed to examine the metabolic fate of EPA (20:5n-3) and DHA (22:6n-3) delivered either in PL from liposomes or in TAG from oil. Liposome ingestion increased PUFA bioavailability in lymph compared with fish oil. The proportion of n-3 PUFA esterified in the *sn*-2 position of chylomicron TAG depended on the dietary lipid source. Complex time-course profiles were observed for plasma lipids with liposome supplementation over a 2-week period, suggesting time-dependent regulations. Taken

together, the type of PUFA, EPA or DHA, as well as its intramolecular distribution in chylomicron TAG seemed to influence the metabolic fate of the fatty acids and their physiological activities.

Are conjugated linoleic acid (CLA) isomers good or bad trans fats?

Yavari, A., *et al.*, *Lipid Technol. 22*:227–229, 2010.

Even though *trans* fatty acids (TFA) are present in natural sources such as foods from ruminant origins, the development of partially hydrogenated vegetable oil contributed to a significant increase in total TFA consumption in humans. Currently, TFA consumption is considered to be a risk factor for coronary heart diseases. Researchers are now starting to discover that not all TFA behave in a similar manner, that is, isomer specificity may be found. Among nonconjugated TFA, plant-originated TFA (mainly elaidic and linolelaidic acids) are particularly linked to increased risk for coronary heart diseases, while animal-originated TFA (mainly vaccenic acid) are not. Among conjugated TFA, two major isomers of conjugated linoleic acid (CLA), *cis*-9, *trans*-11 and *trans*-10, *cis*-12, show distinctive biological activities. A number of clinical trials of CLA with effects on body composition have been reported, but effects on coronary heart disease risk factors have been inconsistent. Meanwhile, safety concerns regarding CLA, in particular isomer specificity, have also been raised. Thus, it is critical to identify isomer-specific effects of TFA on particular risk factors, to determine their health impact.

High-resolution ^{1}H magic angle spinning NMR spectroscopy of intact Arctic char (*Salvelinus alpinus*) muscle. Quantitative analysis of n-3 fatty acids, EPA and DHA

Nestor, G., *et al.*, *J. Agric. Food Chem. 58*:10799–10803, 2010.

The lipid and small metabolite profiles from intact muscles of Arctic char were investigated using ^{1}H high-resolution magic angle spinning (^{1}H HR-MAS) nuclear magnetic resonance (NMR) spectroscopy. Not only the total n-3 fatty acid content but also the eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) contents of the muscle were obtained from the ^{1}H HR-MAS NMR spectra without pretreatment of the tissue or lipophilic extraction. A number of small metabolites could also be observed, where creatine/phosphocreatine, anserine, and taurine were the most abundant. Thus, the use of ^{1}H HR-MAS NMR led to simplified analysis techniques that can give direct information on the nutritional value of the fish.

Analysis of milk odd- and branched-chain fatty acids using Fourier transform (FT)-Raman spectroscopy

Stefanov, I., *et al.*, *J. Agric. Food Chem. 58*:10804–10811, 2010.

Fourier transform (FT)-Raman spectra of pure C13:0, C15:0, C17:0, *iso* C14:0, *iso* C15:0, and *ante* C15:0 fatty acid methyl ester standards (FAMES) and 75 milk fat samples from six different dietary experiments were acquired at room temperature (RT) and immediately after freezing at –80°C (FT). The latter generally included much more well-defined and sharper scattering bands than those obtained at RT. Further, the spectra at FT revealed additional acuate bands in the vicinity of peculiar wavenumber regions, as well as an increase of Raman scattering intensity, which was sometimes associated with a shift of the peak. Partial least-squares (PLS) regression models based on either selected regions or the full spectra and using two pretreatment methods [multiplicative scatter correction (MSC, using raw spectra of milk fat only) and modified MSC (MMSC, a combination of pure FAMES and milk fat spectra)] with cross-validation were used to evaluate the different types of milk fat FT-Raman spectra for the predictions of individual odd- and branched-chain fatty acids (OBCFA) and their sums. In general, most individual (C15:0, *ante* C15:0, *iso* C17:0, and *ante* C17:0) and grouped (ODD, ANTE, and total OBCFA) fatty acids were favorably (coefficient of determination, $R^2 > 0.65$) predicted using models with FT spectra only or a combination of RT and FT spectra (RFT), when compared to models with spectra analyzed at RT only. The results indicate the interest to use FT-Raman spectra collected at different temperatures for the prediction of narrow concentrations of saturated OBCFA in milk fat.

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Dietary intake and status of n-3 polyunsaturated fatty acids in a population of fish-eating and non-fish-eating meat-eaters, vegetarians, and vegans and the precursor-product ratio of α-linolenic acid to long-chain n-3 polyunsaturated fatty acids: Results from the EPIC-Norfolk cohort

Welch, A.A., *et al.*, *Am. J. Clin. Nutr.* *92*:1040–1051, 2010.

Intakes of n-3 (omega-3) polyunsaturated fatty acids (PUFA) are important for health. Because fish is the major source of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), non-fish-eaters may have suboptimal n-3 PUFA status, although the importance of the conversion of plant-derived α-linolenic acid (ALA) to EPA and DHA is debated. The objective was to determine intakes, food sources, and status of n-3 PUFA according to dietary habit (fish-eaters and non-fish-eating meat-eaters, vegetarians, or vegans) and estimated conversion between dietary ALA and circulating long-chain n-3 PUFA. This study included 14,422 men and women aged 39–78 y from the EPIC (European Prospective Investigation into Cancer and Nutrition)-Norfolk cohort with 7-d diary data and a substudy in 4,902 individuals with plasma phospholipid fatty acid measures. Intakes and status of n-3 PUFA were measured, and the precursor-product ratio of ALA to circulating n-3 PUFA was calculated. Most of the dietary intake of EPA and DHA was supplied by fish; however, meat was the major source in meat-eaters, and spreading fats, soups, and sauces were the major sources in vegetarians. Total n-3 PUFA intakes were 57–80% lower in non-fish-eaters than in fish-eaters, but status differences were considerably smaller. The estimated precursor-product ratio was greater in women than in men and greater in non-fish-eaters than in fish-eaters. Substantial differences in intakes and in sources of n-3 PUFA existed between the dietary-habit groups, but the differences in status were smaller than expected, possibly because the precursor-product ratio was greater in non-fish-eaters than in fish-eaters, potentially indicating increased estimated conversion of ALA. If intervention studies were to confirm these findings, it could have implications for fish requirements. ■

BIOFUELS NEWS (CONTINUED FROM PAGE 742)

dedicated to the development of bioenergy from the cultivation of *Jatropha curcas*.

Both Repsol and the KUO Group will have a 50% stake in Kuosol; the total investment is estimated at $80 million. The headquarters of Kuosol will be in Mexico, and its activities are envisioned to range from farming to industrial installations. Its main objective will be to use integrated biomass plantations of *J. curcas* oil to generate biofuels and bioenergy in a sustainable manner.

In 2008, the KUO Group began a pilot project in the Yucatan state of Mexico to produce bioenergy from nonedible second-generation crops on land not suitable for agriculture. The first phase was developed with more than 300 hectares of *J. curcas* oilseeds to obtain an oil to produce biodiesel. The project allows the KUO Group to harness vacant lots formerly used for pork-raising, to reuse recycled water, rich in nutrients, for irrigation on its farms, and to provide easy access to carbon credits under the Clean Development Mechanism (CDM) of the 2007 Kyoto Protocol.

The immediate objectives of the Kuosol company are (i) to plant and cultivate 10,000 hectares of jatropha in Yucatán, Mexico, principally on third-party lands; (ii) to harvest 44 million liters of crude oil for biofuels; and (iii) to develop an integrated use of biomass from forest plantations, cogeneration of steam and electricity for self-supply, with surplus production sold.

It is estimated that agricultural development will be completed in the next three years, allowing industrial production to start in 2013.

ETHANOL

US EPA permits 15% ethanol in newer cars/trucks

The US Environmental Protection Agency (EPA) has agreed to allow refiners to add as much as 15% ethanol to gasoline (E15), up from the current 10%, for use in vehicles made in 2007 or later. The EPA said the Department of Energy expected to complete further testing on vehicles made in 2001–2006 regarding the safety of E15. No waiver has been granted in 2010 for E15 use in model year 2000 and older cars and light trucks—or in any motorcycles, heavy-duty vehicles, or non-road engines—because currently there are no testing data to support such a waiver.

Fig. 1. *Proposed label.*

Several steps are being taken to help consumers easily identify the correct fuel for their vehicles and equipment. EPA is proposing E15 pump labeling requirements (see Figure 1), including a requirement that the fuel industry specify the ethanol content of gasoline sold to retailers. There would also be a quarterly survey of retail stations to help ensure their gas pumps are properly labeled.

EPA Administrator Lisa Jackson said in a statement issued October 13, "Thorough testing has now shown that E15 does not harm emissions control equipment in newer cars and light trucks."

For further information see www.epa.gov/otaq/regs/fuels/additive/e15/ or http://tinyurl.com/epa-doeE15.

Implementation of E15 will not be immediate. For example, the Oregon Department of Agriculture announced in a news release on October 20 that E15 will not be offered for sale in Oregon at this time.

Jason Barber, administrator of the Oregon Department of Agriculture's Measurement Standards Division, said, "Even though it has been approved by the EPA, several other steps need to happen at the state and national level before consumers can expect E15 at the pump in Oregon."

The most important step is for the governor and the state legislature to approve E15. Another step is the creation of national standards for ethanol-gasoline blends up to E15. Most states require fuels and fuel blends to meet appropriate standards developed and maintained by ASTM International. Currently, ASTM does not have a standard that covers E15. ■

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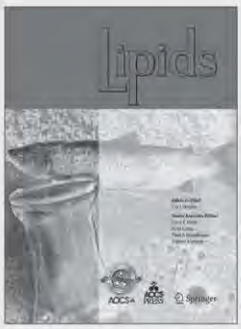

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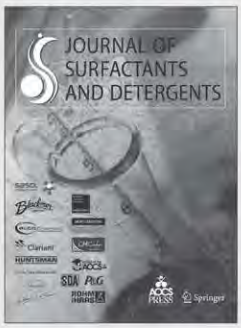

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Soybean Quality Traits Program update: Looking down the pipeline

Amy L. Johnson

The American Oil Chemists' Society (AOCS) and the United Soybean Board (USB) jointly formed the Soybean Quality Traits (SQT) Program in 2002. The goal of this collaboration was to establish a comprehensive system of quality assurance for analytical methods used to quantify the improvement of soybean quality traits. In the initial development of the program, six phases were identified: (i) primary methods, (ii) secondary methods (such as near infrared [NIR] spectroscopy), (iii) identification of participants and needs, (iv) SQT proficiency program, (v) laboratory quality assurance, and (vi) International Organization for Standardization (ISO) 17025 certification. The six phases were introduced during the initial program timeline (2002–2005).

ANALYTICAL STANDARDS PROGRAM (ASP)

The *Official Methods and Recommended Practices of the AOCS* was established by the SQT Oversight Committee as the primary methods for the determination of moisture, protein, and oil content as well as fatty acid composition. Participants indicated that these methods were the industry standards, and the program's proficiency testing scheme, the Analytical Standards Program (ASP), was developed using them as the required techniques. In addition to the primary methods, participants also indicated that NIR was a secondary method being used for soybean analysis. Currently, three series are offered in ASP: Soybean Wet Chemistry (required tests—moisture, oil, nitrogen, and fatty acid composition); Soybean NIR (required tests—moisture, oil, nitrogen, and crude fiber); and Soybean Meal NIR (required tests—moisture, oil, nitrogen, and crude fiber).

To improve participants' experience with ASP and expand the SQT Programs, the SQT website (www.SoybeanQualityTraits.org) is undergoing reconstruction. Once the updated website is functional, fatty acid analysis will be added to the Soybean NIR and Soybean Meal NIR series. In addition a new series, Soybean Meal Wet Chemistry, will be added to the program (proposed required tests—moisture, oil, nitrogen, fatty acid composition, and crude fiber).

Enrollment in ASP is free, courtesy of USB support. For more information, contact SQT Program Manager Amy Johnson at +1 217-693-4820, or via email at sqt@aocs.org. You may also enroll online at www.soybeanqualitytraits.org/enroll.

NIR APPLICABILITY STUDY

In addition to the two NIR series in ASP, SQT conducts an annual NIR Applicability Study. Now in its fourth year, the study involves the collection of both commodity and low-linolenic acid soybean samples from grain elevators around the United States and their analysis for moisture, protein, oil, and linolenic acid by reference chemistry laboratories and NIR users. The results are analyzed statistically and may be incorporated into the future calibrations provided by NIR instrument manufacturers.

In 2009, 69 soybean samples were collected with help from Iowa State University, Monsanto Co., the North Carolina Department of Agriculture and Consumer Services, and Pioneer Hi-Bred. All 69 samples were sent to two laboratories for reference chemistry analysis and nine laboratories for NIR analysis. The majority of the NIR participants analyzed the samples on more than one instrument, resulting in a total of 23 sets of NIR results. Although the study has initially focused on low-linolenic acid soybeans, the protocol has been developed for the study of future traits in the soybean pipeline such as modified oleic acid, high stearic acid, and improved amino acid composition. Results indicate that NIR can consistently differentiate commodity from low-linolenic soybeans but certain platforms provide results that are higher or lower than the reference chemistry value.

PRIMARY METHOD DEVELOPMENT

Primary techniques for the measurement of moisture, protein, oil, and fatty acid composition are well developed and consensus methods are available; however, such methods for the determination of amino acid composition, phytate, and other analytes, such as sugars, are less well developed. The establishment of agreed methodologies to determine reference values for these less well-defined analytes is an SQT requirement before calibrations for the determination of analytes by secondary techniques, such as NIR, are established.

Following a preliminary study in 2008, a Phase I collaborative study in 2009 compared amino acid test methods for animal feed analysis. Fourteen laboratories submitted results using one of four technologies: high-performance liquid chromatography (HPLC) with

post-column derivatization, HPLC with pre-column derivatization, ultra performance liquid chromatography (UPLC) with pre-column derivatization, or liquid chromatography-mass spectrometry-mass spectrometry (LC/MS/MS) with pre-column derivatization. Results indicated that the variations between laboratories may be greater than the error between methods. In addition, sample treatment seems to be a major contributing factor of accuracy and reproducibility in the data. A Phase II collaborative study was scheduled for the third quarter of 2010. The study will compare methods of hydrolysis of animal feed for amino acid analysis.

Also in 2009, a collaborative study compared modifications of two methods (previously described in the literature) for testing phytate content in soybeans. Both methods are high-throughput, low-cost, and low-technology colorimetric methods for phytic acid assay. Nine laboratories submitted results and a manuscript is being prepared for submission to the *Journal of the American Oil Chemists' Society (JAOCS)*.

The SQT Program is also investigating methods of analysis for sugar content in soybeans as well as the use of miniaturized technologies such as mass spectroscopy for possible use in field analysis of soybeans.

In the initial development of the program, six phases were identified. Since then, the SQT Program has matured to meet the needs of the soybean industry and the different USB constituencies and projects. Quality traits analysis is a feature of a number of USB projects (Fig. 1) where analytical requirements can be met by laboratories participating in the SQT Program. Each group of SQT users has been approached and encouraged to integrate their analytical laboratories into the proficiency testing program. Furthermore, a number of schemes exist to provide quality data based on NIR measurement. These users have also been approached so that their calibrations and wet chemistry data can be brought in line with SQT developments.

For more information about soybeans and the work being done by SQT, look for the AOCS monograph, *Designing Soybeans for the 21st Century* set for release in the first half of 2011.

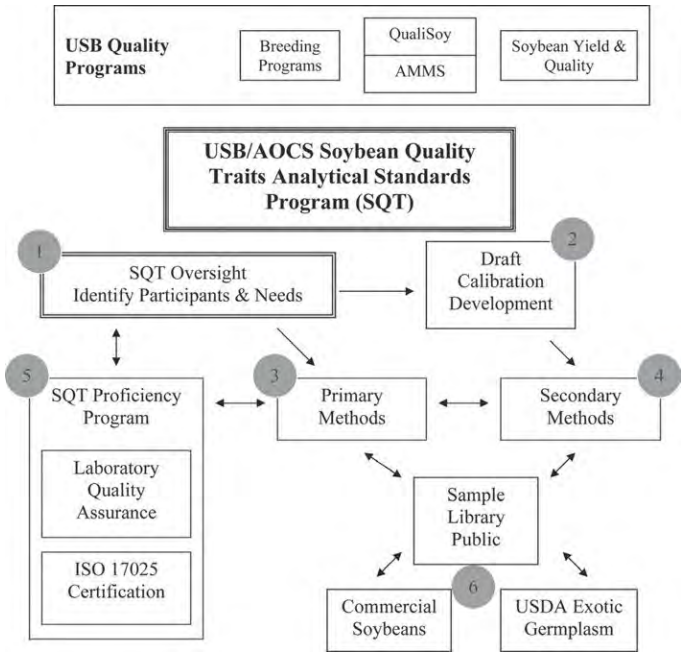

FIG. 1. *Revised Soybean Quality Trait (SQT) phases. Other abbreviations: AMMS, Analytical Measurements and Marketing Standards Initiative; ISO, International Organization for Standardization; USB, United Soybean Board; USDA, US Department of Agriculture.*

Amy Johnson is the SQT Program Manager at AOCS. She may be contacted by telephone at +1 217-693-4820 or email at amyj@aocs.org.

BOOK REVIEW (CONTINUED FROM PAGE 751)

Each type of reaction that has a deleterious effect on fish oil quality, i.e., polymerization, absorption, contamination, hydrolysis, and the various types of oxidation reactions, is explained in detail in Chapter 10, with the aid of graphs and tables. There is a large section on antioxidants, namely in their application to different food matrices, with examples of application and corresponding discussion.

The last chapter covers regulatory issues for fish oils, and it presents the regulatory issues for omega-3 PUFA-rich oils; these originate mainly—although not exclusively—from fish. The chapter includes a discussion of omega-3 PUFA-rich oils used as food supplements and food ingredients, either from alternative sources (e.g., oils rich in omega-3 PUFA from microalgae) or from fish. Some sections, such as those on hygiene requirements and contaminants, are specific for fish products, whereas others, such as the section on additives, are applicable to oils and fats in general. The section regarding labeling issues is directed to the use of omega-3 PUFA-rich oils, which may be derived either from fish or other sources such as microalgae. This section covers regulations in terms of nutritional and health claims; whereas the section on labeling issues includes legislation in the European Union, United States, and Australia. Health claims are only discussed in light of regulations in the United States and Australia.

Ana Carvalho's academic background includes a degree in food engineering and a Ph.D. in biotechnology from the Portuguese Catholic University (Escola Superior de Biotecnologia). She has 15+ years of experience researching omega-3 fatty acids from both fish and microalgal sources. She can be reached at apcarvalho@esb.ucp.pt.

IN MEMORIAM (CONTINUED FROM PAGE 749)

Section of AOCS. He also received the AOCS Award of Merit at the 75th Annual Meeting & Expo, held in Dallas in 1984.

EUGENE ROLLINS

Eugene Rollins, laboratory manager for the Food Science & Technology Centre (Maple Lodge Farms), Mississauga, Ontario, Canada, died on May 2, 2010. At the time of his death, he was involved with research and product development as well as quality assurance/control in the areas of food products, nutritional analyses, wastewater testing, pet food testing, and food safety testing.

He earned a bachelor's degree at York University (Toronto, Canada), and joined AOCS in 2005. Rollins was a member of the Analytical Division.

Rollins is survived by his wife Yvonne, son Najja, and daughters Shani and Tanisha. ■

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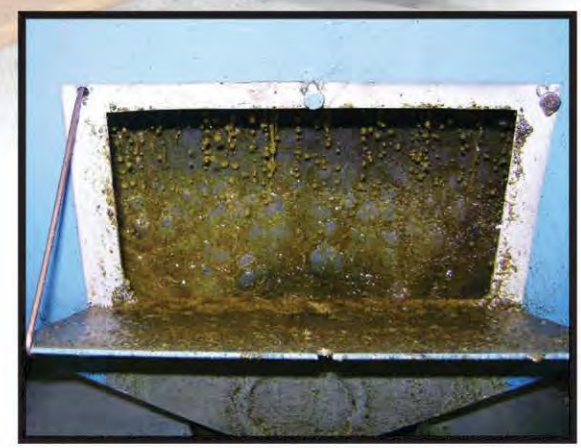

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Including American baseball: The Cincinnati Reds will host the Florida Marlins and Houston Astros during the 102nd AOCS Annual Meeting & Expo (AM&E), May 1–4, 2011, in Cincinnati, Ohio, USA. In fact, the Reds' Great American Ball Park is only one of the attractions within walking distance of the convention center, which is itself mere steps from the banks of the beautiful Ohio River.

"The river definitely is a focal point of the city," says *inform* Associate Editor Catherine Watkins. Watkins spent almost five years in Cincinnati in the early 1990s. "The river, the gently rolling hills of Ohio and Kentucky—it really is a lovely city."

Cincinnati also is renowned for celebrating anything and everything. Almost every week of the year, free activities occur along the riverfront. Minus an event, a walk along the riverfront along the Bicentennial Commons to Sawyer Point is well worth the time. There, you will find the Serpentine Wall: a curved, stepped wall rising from the Ohio River on the Cincinnati side and near the Public Landing Dock. You can usually spot an old-fashioned riverboat or two.

The Bicentennial Commons area was built by noted designer Andrew Leicester to reflect the city's past and to mark the occasion of the city's bicentennial in 1988. When he submitted his plans, one feature stood out: The entrance to Bicentennial Commons would feature four smokestacks in honor of the city's riverboat heritage, with four flying pigs on top. According to Leicester, the flying pigs represented the spirits of the pigs who gave their lives so that the city could grow.

This sentiment did not sit well with the Cincinnati City Council, who reportedly donned pig noses to debate whether the pigs would make the city a laughingstock. In the end, the Council approved the project and the pigs became the signature sculpture of the new Cincinnati riverfront.

If the arts are more to your liking, the Cincinnati Symphony Orchestra will perform a pops concert with singer Neil Sedaka on Sunday, May 1. The city also boasts a lively theater and visual art scene; visit www.cincinnatiarts.org for more information. With a population of only around 335,000, the cultural wealth of the city is surprising . . . until one realizes that the metropolitan area has a population of over 2 million. In addition, Cincinnati is home to 10 Fortune 500 companies and two Fortune 100 companies, including The Procter & Gamble Co.

The downtown and riverfront areas have benefited recently from an investment of more than $2 billion. The new Fountain Square entertainment district features 160,000 square feet of new restaurant space; more than 200 boutique and department stores are located

Cincinnati is famous for its Art Deco architecture. This building, which is a passenger train station, is known as the Cincinnati Museum Center. The complex is home to the Cincinnati History Museum, the Museum of Natural History & Science, the Robert D. Lindner Family Omnimax Theater, the Cincinnati Historical Society Library, the Duke Energy Children's Museum, and the Cincinnati Railroad Club. Courtesy of the Cincinnati Museum Center at Union Terminal.

The whimsical winged pigs at the entrance to Bicentennial Commons evoke a time when Cincinnati was nicknamed "Porkopolis" and meat packing and soap manufacturing dominated the local economy. Courtesy of the Cincinnati USA Regional Tourism Network.

Meeting at a glance

- 102nd AOCS Annual Meeting & Expo
- May 1–4, 2011
- Duke Energy Convention Center
  Cincinnati, Ohio, USA
- http://AnnualMeeting.aocs.org

Dates to remember

- Web-only discounts expire—February 11, 2011
- Early registration deadline—April 1, 2011

within the 1.5-square-mile downtown area. The more than 4,000 restaurants in the area range from four-star French to world-famous Cincinnati-style chili.

There is no reason to confine yourself to Cincinnati only when all it takes is a quick car or cab ride to cross the river and enjoy the many sights of Northern Kentucky. The city of Covington is home to a number of historic churches and homes; many other nearby cities offer a wide range of activities and sights.

MEETING HOTELS

All three official hotels are within walking distance—no surprise there—of the Duke Energy Convention Center. The headquarters hotel will be the Hilton Cincinnati Netherland Plaza. This art deco landmark is across from Fountain Square and within the Carew Tower complex, which features Tower Place Mall. Also offering special convention rates will be the Hyatt Regency Cincinnati and the Millennium Hotel Cincinnati.

With a number of hotels to choose from, why use the AOCS Housing Bureau? Strong hotel bookings help AOCS negotiate better rates at future annual meetings. In addition, the AOCS convention rates are significantly lower than the web rates offered by the three hotels.

Whichever hotel you choose, one thing is clear: There will be no shortage of things to see and do apart from the AM&E itself.

The new Duke Energy Convention Center, courtesy of J. Miles Wolf.

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Detergent industry faces the future

Catherine Watkins

The French proverb suggesting that the more things change, the more they stay the same could be applied to the seven AOCS World Conferences on Detergents held in Montreux, Switzerland. Although the speed of change in 2010 is exponentially faster than the speed of change in 1977 when the first conference was held, many of the business realities facing the global fabric and home care industries remain the same.

Regulatory and environmental pressures, availability and pricing of raw materials, poor margins, the fickle consumer, a volatile economic environment, mature markets, the perpetual search for innovation—these are constants of the industry that have not changed over the years. Nonetheless, in light of the global focus on sustainability by both consumers and regulators, everything has changed.

Held October 4–7, 2010, the Montreux meeting was billed as providing "New Strategies in a Dynamic Global Economy." Indeed, the "new normal" of recession and volatile commodity costs figured prominently during the three-day meeting, as did sustainability, innovation, collaboration, and the promise of emerging markets.

BIG BUSINESS

Annual retail sales for the global laundry care category have reached $65 billion, Bill Schmitz of Deutsche Bank told participants, comprising $49 billion in detergent sales, $9 billion for fabric softeners, and $6 billion for laundry aids.

For consumer products companies like The Procter & Gamble Co. (P&G), the laundry care category represents a significant percentage (30%) of revenue. But the industry is under pressure, P&G head Bob McDonald noted: Annual growth decreased to 4% in 2009, compared to 5% the previous three years; established brands in North America lost market share to private label brands during the recession; commodity and supply costs are unpredictable; and regulation has toughened.

Nonetheless, participants and speakers alike remained upbeat. Despite slow growth in developed markets, opportunities abound in developing countries such as China and India. Latin America is a more difficult challenge because of loyalty to local brands.

"Developing markets were the only place in the world last year where growth in the laundry segment was acceptable," Schmitz noted. Automatic washing machines are gaining traction in China and Eastern Europe, he added, but competition among product manufacturers in emerging markets is "brutal."

Looking to the future, Schmitz found that there is still room for global consolidation in the laundry market. "The top three players could control over 60% of the market in the next five years," he said.

MONTREUX BOOKSHELF

Here are books, reports, and websites recommended by various presenters at Montreux 2010:

- P&G's Bob McDonald—*The Surprising Solution: Creating Possibility in a Swift and Severe World*, Bruce Piasecki, Sourcebooks, 2009.
- Martin Butler, retail expert—*The Art of Being Chosen: Secrets of Success from the Giants of Retail*, Martin Butler, Management Books 2000 Ltd., 2010.
- Unilever's Paul Polman—"Winning in Emerging-Market Cities," report by The Boston Consulting Group, September 2010. Available online at www.bcg.com/documents/file60078.pdf.
- A new web portal created by the International Network of Cleaning Product Associations links to major cleaning product groups around the world (www.incpa.net).
- The "Rise of the Rest" video created by Chor Pharn Lee and the Futures Group (www.futuresgroup.wordpress.com) is available on YouTube at http://tinyurl.com/RiseoftheRest.

Coming from AOCS in 2011:

- Those who were unable to attend Montreux 2010 will be able to purchase a two-DVD set of presentations from the conference. The DVDs include video synchronized with the PowerPoint presentations of the three CEOs of Henkel, P&G, and Unilever. The set also features audio synchronized with PowerPoints from a number of the other presenters. The list price will be $195 (AOCS member price: $175). Visit www.aocs.org/store for more information.
- Narrative versions of the three CEO presentations will appear in future issues of *inform*, beginning in January 2011 with Bob McDonald's talk.
- Photos from the meeting are available now on Facebook at http://tinyurl.com/MontreuxPhotos.

THE FUTURE OF THE FUTURE

Designer and futurist Richard Seymour showed attendees a photo of a piece of glass printed with the entire human genome.

"This genome would have cost $40 million seven years ago; it costs $300 today," he said, reminding the audience that customization is a fundamental revolution that will affect all industries. DNA-specific cosmeceuticals are only months away from realization, he asserted.

Seymour also cautioned his listeners that the youngest generation is very different from those that have come before. "How do you market to people when you don't know who they are?" he asked.

To make his point, Seymour spoke of showing a typewriter to a group of eight-year-olds. Their reaction: "Cool! A laptop that prints as you write and you don't have to plug it in."

Courtesy of Kriss Szkurlatowski

Perhaps the greatest challenge for the industry is "discontinuous innovation, which opens doors for private label" goods, Schmitz said. "The lasting solution is innovation," he concluded.

Also sounding the call for innovation was Chris DeSoiza, vice president of Milliken Research Corp. (Spartanburg, South Carolina, USA), who spoke about the future of the textile business. Seven cents of every dollar spent globally is on clothing/textiles, he said; Asia is the number one consumer of textiles and apparel. Furthermore, developing countries produce more than 60% of all apparel and textiles.

Textile trends that DeSoiza feels will affect fabric care include customized three-dimensional printed apparel as well as electroluminescent materials or stimuli-sensitive polymers. A technology developed by Milliken for food service uniforms, called BioSmart, could be extended to other markets. When clothing treated with the BioSmart process is laundered with chlorine bleach, receptor sites bind the chlorine to the surface of the fabric, killing bacteria on contact.

SUSTAINABILITY HOW-TO

Kasper Rosted's call for "truly sustainable business models" was answered in part by Martin Wolf of Seventh Generation, Inc. (Burlington, Vermont, USA). As the company's director of product sustainability and authenticity, Wolf provided a sustainability how-to for attendees. (Seventh Generation is a self-declared "socially responsible" company that produces a variety of household, laundry, and cleaning products.)

"We look at the supply chain to understand where our materials are coming from, focusing first on palm kernel oil sustainability," he noted. But the company goal is not just sustainable products but rather sustainable relationships, governance, social justice, and equity.

Several speakers examined how the Japanese culture approaches

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The Montreux detergents conference provides ample opportunities to conduct business while surrounded by breathtaking scenery.

eco-consciousness. Emile Ishida of Tohoku University defined "nature technology" as technology for the creation of a spiritually rich life using the least energy and fewest materials. He gave as an example a small, efficient wind generator currently under development in Japan that is based on the wing of a dragonfly. The generator has a rotor with a diameter of only 200–500 millimeters, according to Ishida.

Koichi Nakamura of the Japan Soap & Detergent Association (JSDA) gave details of how the eco-consciousness of the Japanese has helped shape buying habits. For one, the market share of refillable liquid detergents in Japan has reached about 80% in 10 years. (Consumers first buy a plastic container of detergent; refills are packaged in pouches.) For another, JSDA members have reduced the amount of plastic packaging by 15% from levels used in 1995.

The issue of water use looms large in any discussion of sustainability in fabric and home care. (P&G's McDonald noted, "There are some places where water is more expensive than detergent.")

Life cycle analyses of laundry products clearly show that the majority of water use occurs in the user's home and not in the manufacture of products. Unilever's Randy Quinn, executive vice president of laundry, suggested that approximately 70% of the water used in laundering clothes by hand or machine is wasted in rinsing. Adding up the billions of washes in water-scarce countries (which soon will be virtually every country), and the rinse cycle becomes something that is important for the industry to address.

Quinn laid out the inescapable equation: Consumers equate the amount of foaming action with the cleaning power of a detergent. But foam requires extra rinsing to remove and therefore wastes water. (Consumers also still believe that bigger packs sold at the same price as concentrated versions give better value, which slows adoption of compacts.)

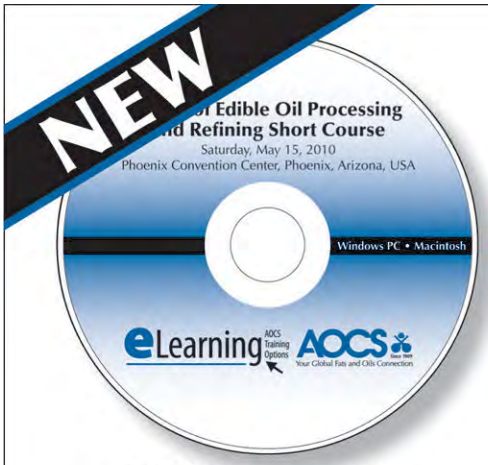
"We need to be bolder," he said, "and formulate for superior cleaning without foam for [laundering] without rinsing. But is this a step too far for industry?"

Regardless of whether the industry takes that step in the future, Quinn called upon his colleagues to roll out concentrates now "faster and better, in collaboration if possible."

CHINA AND THE RISE OF THE REST

The optimistic tone of the conference was due in part to the growth prospects for fabric and home care in emerging markets.

For example, India currently spends only $3 per capita on household cleaning products, whereas China spends only $6. Compare those figures to the US and Western European average of $60 and the cause for optimism is clear. As Deutsche Bank's Bill Schmitz noted,



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the Chinese detergent category would grow from $5 billion to $22 billion if Chinese consumption were equal to that of Russia's.

"When we think of China, we tend to forget about innovation and creativity," said Max von Zedtwitz, a professor at Tongji University in China, who advised participants not to underestimate the intellectual sophistication of that country. "I would not be surprised if the first person to set foot on Mars is Chinese," he added.

Chinese expenditures on research and development (R&D) have grown at eight times the pace of US expenditures; Chinese R&D spending likely will reach 2.5% of GDP (Gross Domestic Product) by 2020. In 2008, Guangdong province alone filed more patent applications (103,883) than Japan (38,408), the United States (27,656), and Germany (10,145).

The numbers are staggering: More than 10 million students take the college entrance exams every year, von Zedtwitz said, and between five and six million freshmen enter college each year. Furthermore, more than 50% major in engineering, science, or medicine.

"Send your most challenging R&D problems to China," von Zedtwitz urged. Many companies already have; more than 1,200 foreign-owned R&D centers had been set up in China by 2009, he noted.

Here are more statistics from Chor Pharn Lee and the Futures Group in Singapore: The global middle class will increase from 430 million in 2000 to 1.15 billion in 2030. In 10 years, the No. 1 English-speaking country in the world will be China. By 2025, five of the top 10 most populous cities will be in South Asia (Karachi, Pakistan; Dhaka, Bangladesh; and Delhi, Calcutta, and Mumbai in India). In 2030, 221 Chinese cities will have populations of more than one million; Europe has 35 today and the United States has nine.

But the story does not begin and end in Asia, the Futures Group notes. The Persian Gulf states are reinventing their petrochemical industries and will earn $9 trillion in the next 14 years from petroleum.

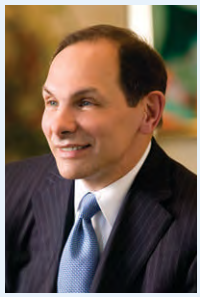
Many questions remain. China's working population is expected to peak in 2015. Will China get old before it gets rich? India's working population likely will peak in 2035. Will India become the new contender? Perhaps the answers to these questions will be clearer by the time the industry meets again in Montreux in 2014.

The far-ranging program, which also covered smarter ways of conducting R&D and neuromarketing, was organized by an executive committee comprising J. Keith Grime, president, JKG Consulting, LLC, USA; and co-chairs Thomas H. Mueller-Kirschbaum, corporate senior vice president, Henkel AG & Co. KGaA, Germany; and Manfred Trautmann, vice president and general manager, BU Detergents & Intermediates, Clariant International, Switzerland.

Co-sponsors of the meeting included the American Cleaning Institute; the International Association for Soaps, Detergents, and Maintenance Products (AISE); the Comité Europeén des Agents de Surface et leurs Intermédiaires Organiques (CESIO); the Japan Oil Chemists' Society; and the Japan Soap and Detergent Association. Participating organizations include the China Association of Surfactant Soap & Detergent Industries, the Italian Chemical Society, the Oil Technologists' Association of India, the Swiss Cosmetic and Detergent Association, and the UK Cleaning Products Industry Association.

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

Kasper Rorsted



Bob McDonald

Paul Polman

THREE CEOS CALL FOR COLLABORATION

The heads of the world's three top detergent companies (Henkel, P&G, and Unilever) delivered keynote speeches at the 7th World Conference on Detergents—a first for the Montreux conferences.

Henkel's chief executive officer (CEO), Kasper Rorsted, called for collaboration along the entire value chain to build a "truly sustainable business model" for the consumer products industry. The teamwork cannot end there, he noted, because unless suppliers and household products and appliance manufacturers create their own sustainability standards, they will face regulation by government.

"Sustainable development is no fad of the moment but rather a global task and a challenge for the entire industry that needs urgent attention," said Rorsted.

Unilever's Paul Polman, who said industry must collaborate to ensure that regulations are based on sound science and do not increase product costs, echoed that sentiment.

"Industry needs a mindset change toward collaboration," he said, adding that "we must create solutions that work for all consumers."

P&G's Bob McDonald proposed an industrywide effort to increase sustainability through the use of life cycle assessments throughout the value chain.

Neither consumers nor regulators will stand for "greenwashing," the three leaders noted, and transparency is essential in the wireless world of social networks and instant online news, Polman said.

"Digitalization means the world will be unrecognizable in the future," he added. "It is challenging all parts of our business model and has revolutionized relationship building."

Chemical regulation in the European Union (EU) is forcing collaboration, said Erwin Annys, director of REACH/Chemical Policy at CEFIC (European Chemical Industry Council; Belgium). With less than two months to go before the first registration deadline of November 30, there was "still a lot of uncertainty," he noted. "There will be an intensification of communication within the supply chain," he said, adding that industry must avoid panic. "We can still work together to find better solutions. The EU is not willing to jeopardize industries."

9th International Symposium on the Role of Soy in Health Promotion and Chronic Disease Prevention and Treatment

Mark Messina and Virginia Messina

Commercial soybean production in the United States began in the 1930s. Today, the United States grows more soybeans than any other country and is responsible for nearly one-third of the world's more than 200 million metric tons produced annually. The United States also leads the way in developing innovative soy products for human consumption and in investigating health effects of these new products, as well as those of the more traditional soyfoods such as miso, tempe, soymilk, and tofu. Nearly 2,000 peer-reviewed papers from research related to soy and health are published annually.

For four days this past October in Washington, DC, the latest of this research was presented and discussed by scientists from around the globe at the 9th International Symposium on the Role of Soy in Health Promotion and Chronic Disease Prevention and Treatment. Presentations addressed emerging research areas as well as issues that are vigorously debated within the research community. These included the cholesterol-lowering effects of soy protein and the use of soyfoods by women with breast cancer. A session was also devoted to findings regarding equol, a compound that is not found in soybeans but is produced by intestinal bacteria from the soy isoflavone daidzein.

Highlights from the symposium are presented below. A more in-depth report will appear in the *Journal of Nutrition*.

SOY AND BREAST CANCER

The influence of soy intake on breast cancer prognosis continues to be a contentious issue because of its potential public health impact. Several presenters at the symposium directly addressed this issue. Gertraud Maskarinec from the Cancer Research Center of Hawaii (Honolulu, USA) and Seema A. Khan, Northwestern University Feinberg School of Medicine (Chicago, Illinois, USA), discussed recently conducted clinical studies; Xiao Ou Shu, Vanderbilt University (Nashville, Tennessee, USA) and Xinmei Kang, from the Cancer Hospital of Harbin Medical University (Heilongjiang, China), presented findings from epidemiologic research.

The clinical studies addressed markers of breast cancer risk. Maskarinec examined the effects of soyfood intake (~2 servings/d) on nipple aspirate fluid volume in a 12-mo crossover study (6 mo per phase) that included 96 healthy premenopausal women, and Khan looked at breast cell proliferation in high-risk pre- and postmenopausal women aged 25 to 55 y by examining cells obtained by fine needle aspiration, before and after 6 mo of isoflavone supplementation (100 mg/d). These markers were not affected in either study, which suggests that soy was not associated with breast cancer risk.

In the epidemiologic studies, soy intake was associated with improved prognosis among women with breast cancer. Shu reported that recurrence and mortality were reduced by about 30% among Shanghai breast cancer patients who consumed the equivalent of at least 2 servings/d of soy. Protective effects were noted in both pre- and postmenopausal patients and in patients with both estrogen-sensitive and hormone-independent tumors. There was also a 30% reduction in tumor recurrence in the study by Kang, which took place in Harbin (China); however, benefits were limited to postmenopausal women with estrogen-sensitive tumors and there was no effect on mortality.

The results of these two Chinese studies are impressive, but the findings are from a population of women who are likely to have consumed soyfoods for all or most of their lives. Before Western

oncologists can recommend soyfoods for the specific purpose of improving prognosis, it will be necessary to demonstrate that they apply to non-Chinese women who have not consumed soy prior to their diagnosis.

CHOLESTEROL REDUCTION

In 1999 the US Food and Drug Administration (FDA) approved a health claim for soyfoods and coronary heart disease, which was endorsed a year later by the American Heart Association (AHA). However, over the past 5 years, the cholesterol-lowering effects of soy protein have been challenged, most notably by the AHA. In their most recent position paper published in 2006, the AHA in essence withdrew its support of the health claim. Although they acknowledged the role soyfoods can play in heart-healthy diets because of their fatty acid profile, the AHA concluded, on the basis of 22 studies, that soy protein lowered LDL (low-density lipoprotein)-cholesterol by only 3%. However, the AHA's review of studies did not include a comprehensive statistical analysis. Based on a meta-analysis presented at the symposium, David Jenkins of the University of Toronto (Ontario, Canada) found that soy protein lowered LDL-cholesterol by almost 50% more than the AHA's estimate for a total average reduction of 4.3%. Furthermore, when the analysis was limited to the 11 studies in which the soy and control diets were evenly matched, LDL-cholesterol was reduced by 5.2%. James W. Anderson, University of Kentucky (Lexington, USA), presented similar findings on the basis of a meta-analysis of 20 parallel trials published since 1995.

The FDA is currently evaluating the evidence related to the soy protein health claim, and the results of these two meta-analyses suggest that their 1999 decision will be affirmed. In contrast, the European Food Safety Authority (EFSA) recently rejected a petition for a soy protein health claim similar to the one approved by the FDA. However, as explained by Janice Harland, HarlandHull (Gloucester, United Kingdom), EFSA considered only four of the 23 studies included in the petition. These were studies that used isolated soy protein (ISP) from which the isoflavones were extracted (ISP–) as the intervention product. This restriction was adopted in order to determine whether soy protein specifically was responsible for cholesterol reduction. However, since isoflavones are naturally associated (via hydrogen bonding) with the protein in soybeans and ISP– is produced for experimental purposes only, this approach has limited practical implications. The issue is currently under discussion between European authorities, EFSA, and those who submitted the petition.

Finally, Arash Mirrahimi, Claire E. Berryman, and Li Wang, from The Pennsylvania State University (University Park, USA), provided estimates of the extent to which substituting soyfoods for commonly consumed protein sources in the US diet may lower blood cholesterol as a result of differences in fatty acid intake. Using NHANES (National Health and Nutrition Examination Survey) III population data, they estimated LDL-cholesterol levels were lowered by 4.3% when 24 g soy protein (essentially the amount of soy protein established by the FDA for cholesterol reduction) from soyfoods replaced 24 g protein from animal products. Taken together, these findings suggest that soyfoods can lower LDL-cholesterol by approximately 9%, which in turn will theoretically lower the incidence of heart disease by 9 to 18%.

EQUOL

Equol is a bacterially derived product of the soybean isoflavone daidzein that is believed to have potential health benefits. Only approximately 25% of Westerners host the gut bacteria capable of converting daidzein to equol. Presentations at the symposium greatly expanded knowledge of the safety and efficacy of this compound. For example, Belinda Jenks, Pharmavite, LLC (Northridge, California, USA), discussed a wide array of safety studies that have been conducted using SE5-OH, an equol-rich product produced via fermentation of soy hypocotyledon. There now exists a Generally Recognized As Safe (GRAS) Self Determination Dossier for SE5-OH.

In regard to efficacy, Takeshi Aso, Tokyo Medical and Dental University (Japan), described the results of three Japanese studies showing that equol alleviates hot flashes. Evidence was also presented suggesting that equol may exert skeletal benefits (Yuko Tousen, from the Japanese National Institute of Health and Nutrition) and promote cardiovascular health (Takeshi Usui, Clinical Research Institute, National Hospital Organization Kyoto Medical Center).

EMERGING RESEARCH AREAS

In some cases, research presented in Washington provided the most definitive data to date in support of long-existing hypotheses. For example, Mindy Kurzer, University of Minnesota (Minneapolis-St. Paul, USA), presented the results of a systematic review and meta-analysis, which included 17 studies, that showed isoflavone supplements reduced both the frequency and severity of hot flashes. However, there were also several presentations that addressed emerging areas of research regarding soy and health.

For example, Robin van den Berg, Unilever, presented the results of a 14-wk clinical study that showed an isoflavone-containing beverage reduced facial wrinkles and increased collagen synthesis in postmenopausal women. Animal data presented by Thomas Badger, Arkansas Children's Hospital (Little Rock, United States), suggested that soy may have a role in helping to prevent nonalcoholic fatty liver disease, an emerging public health concern as rates of obesity increase among children and adults. Finally, Grzegorz Węgrzyn, University of Gdansk (Poland), described clinical work indicating that the soybean isoflavone genistein could play a role in treatment of children with mucopolysaccharidoses, an inherited metabolic disorder caused by genetic mutations leading to dysfunction of one of the enzymes involved in the degradation of glycosaminoglycans in lysosomes.

CONCLUSIONS

The diversity of presentations at the ninth international soy symposium is a testament to the continued interest in understanding the health effects of soyfoods and soybean components. Not all research areas will ultimately prove fruitful, but the symposium in Washington certainly supports the role that soyfoods can have in improving standard Western diets.

Mark Messina is the co-owner of Nutrition Matters, Inc., a nutrition consulting company, an adjunct associate professor at Loma Linda University, and the executive director of the Soy Nutrition Institute. He served as a co-chair of the 9th International Soy Symposium. Contact him at markm@olympus.net

Nuts and crackers

The 2010 Timothy L. Mounts Award winner takes a crack at the world of walnuts

Albert J. Dijkstra

In France, I live close to a walnut growing area, and it is therefore not surprising that some people in my neighborhood are nuts about nutcrackers, whereas others are "crackers" about walnuts. My wife belongs to the latter category and puts them in salads, mixes them with breakfast cereals, and makes chocolate cake with walnuts, which I must say is very nice. I am asked to crack the walnuts we collect from our garden, which tends to drive me into the former category.

My earliest recollection of a nutcracker is the one my parents used. It had a kind of scissor-like construction and the pointed cutting bit was intended to cut bunches of grapes and then, close to the pivoting point, the handles were somewhat bent to accommodate the walnut to be cracked by squeezing the handles. (I inherited it, and it appears in Figure 1, in the upper left.) As a nutcracker, it was pretty useless since squeezing too hard crushed the nut kernel.

So while still living at home, I used my father's lathe to make a wooden nutcracker. The lathe actually was intended for working metal, so I could cut a screw thread with it. This wooden nutcracker, which is also shown in Figure 1 (on the upper right), consisted of a cup into which a walnut would fit, and in the wall of the cup there was a hole with a thread. A wooden screw could then be screwed into this cup and made to gently squeeze the nut. It did not crush the kernel, but screwing and unscrewing took a long time. The nutcracker my wife inherited from her parents is shown in the upper middle of Figure 1. It is hinged, and the small recess is for hazelnuts and the large one for walnuts. It suffers from the same drawback as the one I inherited in that it tends to crush the kernel.

So when I moved to France and discovered two walnut trees in my garden, I was delighted to notice a small stand at the local market where a man demonstrated a novel type of nutcracker, shown at the bottom in Figure 1. It consists of a metal cup that has been divided into two halves along its axis of symmetry. On one side, where the plane dividing the two halves reaches the wall of the cup, hinges join the two halves. On the opposite side, handles have been fitted to each half. The inside of the cup has some knobs, which are clearly visible in the picture, to hold the nut inside the cup when the two handles are pressed together. A small spring joins the two halves on the handle side, ensuring that the cracker opens when pressure is released and that it cannot be opened too far.

FIG. 1. *Four types of hand-held nutcracker. The principle of operation of these nutcrackers is to squeeze the nut.*

This nutcracker turned out to be a great improvement on my previous models. Because the nutcracker opens only a short distance, the nut can only be squeezed to a limited extent and this prevents its kernel from being crushed. Moreover, the tight fit inside the cup ensures that the nut is squeezed on all sides, and this causes the shell to crack in many places at the same time. I liked it so much that I bought five more of them and presented these to my children, who share the yearly nut harvest with us.

Before starting on this paper, I tried to see if this particular cracker was the subject of any patent, so that I could use its figure to describe it. I went to http://be.espacenet.com, typed in "nutcracker," and got 319 hits. Not all referred to patents; some referred to registered designs. And to me, the surprising thing was that quite a few originated from the People's Republic of China. While collecting more background information on walnuts, I learned that this country

FIG. 2. *Walnut museum located in Castelnaud-la-Chapelle, France. Note the concrete walnuts arranged around the sign.*

overtook the United States as largest walnut producer in 1994; so there being many Chinese nutcracker patents is perhaps not that surprising after all. I also looked at American patents by going to http://google.com/patents, and there were over 200 hits. Not surprising, since the United States produces some 400,000 tons per annum, almost all of which are grown in California. The number of hits was too large to try and identify the particular nutcracker I was looking for, but I do want to highlight one hit (US 6,918,150). It describes a normal pliers type of nutcracker, but it distinguishes itself over the prior art by giving the handles "an aesthetically pleasing outer shape, such as that of the lower torso and legs of a human body."

The patents describe all kinds of contrivances: pliers, vises, piston-operated crackers, sets of four vertical rods that can be twisted so that the space in between the rods gets smaller and a nut inside is squeezed, and so on. There are household nutcrackers and industrial ones, handheld crackers, battery-operated ones, you name it. However, the most surprising thing is that none of the patents I read prescribes how the nut should be positioned before cracking it. And this is what I learned at the walnut museum in Castelnaud-la-Chapelle, France.

Concrete walnuts line the driveway to the entry of the museum (Fig. 2). My wife quite liked these concrete walnuts and asked the receptionist if they were for sale anywhere. She told us they were not but added that if they had been, she could have sold several hundred per annum. She obviously misses a market opportunity here.

The museum introduces visitors to walnuts with a movie. It shows how they are harvested by using a mechanical tree shaker similar to the one our neighbor uses to harvest his plums. Some kind of street-sweeping machine is then used to pick up the nuts. Nuts are cleaned and dried. At this point, they can be stored if necessary, until the next set of operations, when they are cracked and the kernels extracted. In the movie, one person cracks one nut after the other with a small hammer, and several other people then take out the kernels using a small kitchen knife. They work remarkably fast.

After we had seen the movie, the museum guide provided some further explanation. Whereas the nutcrackers I discussed above squeeze the nut until its shell cracks, using a hammer causes the shell to shatter. It is a bit like with nails: When you try to push them into wood, they bend. But when you use a hammer, they are driven into the wood (provided you hit them correctly). Nuts should also be hit in a particular way, and in practice this is not the way you would expect. Figure 3 shows an exploded view of a walnut. It was drawn by Allison Phillips, a professional artist living nearby. I hereby gratefully acknowledge her contribution.

Figure 3 shows the two halves of the nut kernel. In the intact nut, these halves are attached to each other at the lower end in the drawing. Where the halves are not joined, the septum, which has become a papery packing tissue in the ripe nut, extends between these halves. In the intact nut, this septum (shown in the center of the drawing) is connected to the middle of the shell halves or where the vertical plane of symmetry cuts through the shell halves. Accordingly, the shells have been drawn in such a way that the plane that separates the two shell halves is perpendicular to the plane that separates the two cotyledon halves. This nut anatomy determines how the nut should be cracked.

On cracking, you should aim at exposing a full kernel half. Inserting a small kitchen knife in between the two halves breaks them apart and exposes the septum. This septum, which is loosely attached to the nut shells, can then be removed using the same kitchen knife. This exposes the other kernel half, which can then be eased out of its shell remnants by lifting the end that was attached to the other kernel half. This means that the bits of shell that have to be removed to expose a full kernel half are those on both sides of the "seam" joining the two shell halves. You should in fact pull the seams away from the nut and thereby expose an entire kernel half. So you should hit the nut from above while holding it in such a way that the plane separating the two shell halves is horizontal. That is how the nut is positioned on the "anvil" in Figure 4.

When you hit the nut on one of its "cheeks" in between the seam, it may well crack along a plane that includes the ends and is perpendicular to the plane going through the seam. This crack allows the nut to be pulled apart into two halves that each contain half a

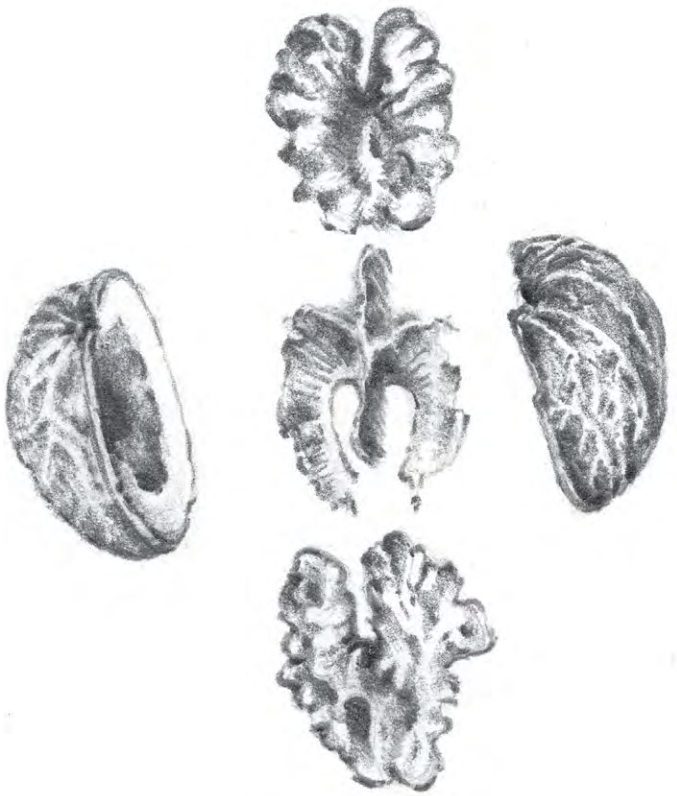


FIG. 3. *An exploded view of a walnut. Image courtesy Allison Phillips.*

nut kernel. If you hit a bit harder, the shell may shatter, and so bits of shell can be removed by pulling them away in the direction in which the seams move outward. If you hit too hard, you will crush the kernel. You are also likely to crush the kernel when, for a second time, you hit a nut that has already been cracked.

Figure 4 shows the nutcracker used in the above cracking process. If you know somebody who does wood turning, he or she will be glad to make one for you. When I was at grammar school, I was a keen wood turner myself (*cf*. Fig. 1), and I was always looking for things to turn. The cracker consists of a wooden bowl (walnut wood is ideal—most appropriate, but not mandatory) of some 23 cm (11″) diameter and a height of 6 cm (2.5″) and a wooden hammer. In the center of the bowl is an elevation that supports the nut. It has a diameter of about 4.5 cm and a rim of 4 mm, but I think these measurements are not that critical. The hammer handle is 24 cm (11.5″) long, and has a diameter of 25 mm (1.0″), which tapers off to some 15 mm (0.6″) toward where the handle is inserted into the hammerhead. This head is 12 cm (almost 5″) and its diameters are 4 cm (1.6″) at the middle and 2 cm (0.8″) at the ends.

According to my teacher in the walnut museum, it takes less than 10 hits before you get the knack of hitting the nut properly, not too hard but hard enough. Nuts that are still rather fresh must be hit a bit harder than well-dried nuts that shatter quite easily on impact. So why don't you get cracking and have a go?

Albert Dijkstra worked in the edible oils industry as research and development director for 20 years. Since 1997, he has been enjoying working at home as scientific consultant, author (e.g., his article on a small walnut-oil-processing mill in inform *14:755–756, 2003), editor* (The Lipid Handbook), *critical reviewer, and translator (of M.E. Chevreul's* A Chemical Study of Oils and Fats of Animal Origin, *first published in 1823), and he regularly lectures at short courses. His scientific achievements deal with the chemistry of edible oil refining and modification processes. He has been the recipient of five scientific awards, and last year he was elected fellow of the AOCS. His e-mail address is albert@dijkstra-tucker.be.*

FIG. 4. *A nutcracker that requires the nut to be hit, rather than squeezed.*

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BIOMASS (CONTINUED FROM PAGE 729)

Commercial activity in the field of converting biomass to surfactants is well underway, and the biomass source is not confined to algae, as the following profiles show.

SOLAZYME

Headquartered in South San Francisco, California, USA, Solazyme (www.solazyme.com) was founded in 2003. A venture capital-funded company, it is well beyond the start-up stage. Solazyme's technology allows algae to produce oil and biomaterials. The company has partnered with Unilever in March 2010 to commercialize its technology in a range of consumer products.

Figure 5 illustrates the basic Solazyme technology.

Figure 6 indicates the range of surfactant-related products currently contemplated for the customized algal oils produced by Solazyme.

ELEVANCE

Headquartered in Bolingbrook, Illinois, USA, Elevance (www.elevance.com) uses metathesis technology to convert natural oils from a variety of sources (potentially including algal oil) to chemical feedstocks. Elevance recently formed a partnership with the sugar and palm plantation company, Wilmar, to build a biorefinery in Indonesia. The company also has a partnership with Stepan (Northfield, Illinois) to commercialize its technology in Stepan's range of surfactants and polyols. Figure 7 illustrates the basic Elevance biorefinery technology.

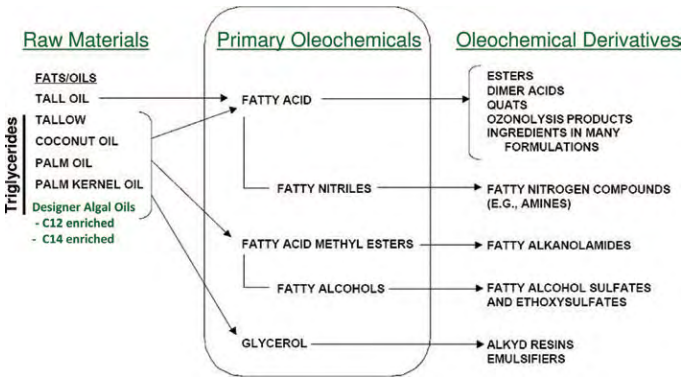

FIG. 6. *Algal oils in the surfactant value chain.*

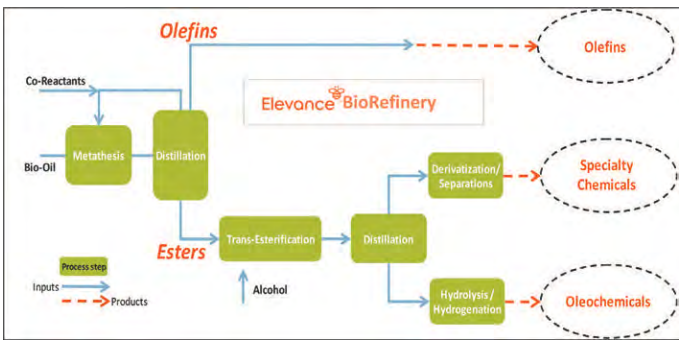

FIG. 7. *Elevance biorefinery.*

Figure 8 illustrates the potential of just one of the building block chemicals produced by the Elevance technology and a subject of some of the joint development work with Stepan in surfactants.

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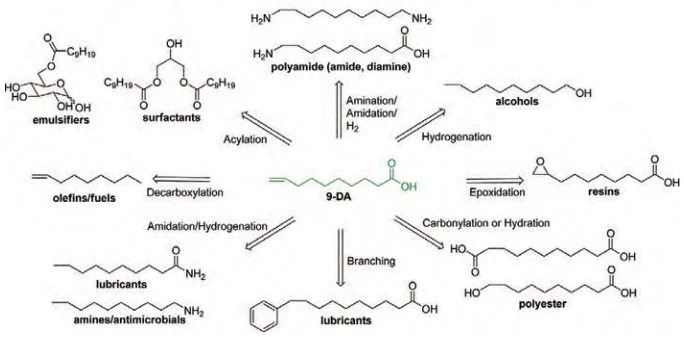

FIG. 8. *9-Decenoic acid (9DA) building block applications.*

CONCLUSIONS

The field of biorenewables is fast moving, and chemical feedstock development is clearly a key objective of many of the formerly biofuels-only companies. As the need for additional options in surfactant feedstocks becomes more apparent, expect more companies to adapt their biomass technology to this area. Expect also further partnerships to be formed to accelerate commercialization. Such partnerships will go both downstream to consumer products (such as the Unilever/Solazyme arrangement) or upstream to the biomass sources themselves (as in Elevance/Wilmar).

Neil Burns is the managing partner of Neil A Burns LLC, an investment and advisory firm. The firm invests equity capital in specialty chemicals companies with enterprise value between $50 million and $1.5 billion. The firm also provides advisory services in the field of surfactants, oleochemicals, and feedstocks. Burns serves on the board of directors of SiVance, a specialty silicones manufacturer and on the operating advisory boards of GenNx360 Capital Partners and Linley Capital Partners. Burns has over 20 years experience in specialty chemicals, including terms as CEO at Oxiteno USA, VP US Operations at VVF Ltd and a board director at Pilot Chemical Company. His education includes a BS in Chemistry from the University of York and an MBA from the Wharton School.

BIOFUELS COULD BE CLEARED FOR AIRCRAFT USE (CONTINUED FROM PAGE 725)

mentation process that goes direct from cellulosic biomass to liquid fuel using specially tailored microorganisms.

Richard Altman, executive director of the Commercial Aviation Alternative Fuels Initiative, says the catalytic, fermentation, and pyrolysis renewable jet pathways are competing to be the next process approved by ASTM in the 2013 timeframe. ASTM, meanwhile, has formed a task force to look at fully synthetic fuels, called SKA, for "synthetic kerosene with aromatics."

Synthetic paraffinic kerosenes are limited to 50% blends by the need for aromatic hydrocarbons found in conventional jet fuel, but synthesized aromatics—or changes to engine seal materials—could allow 100% synthetic fuels. "We are doing a lot of work on fully synthetic fuels," says Edwards. Honeywell and the FAA are working to determine by 2013–2014 the minimum aromatics required in engines, says Rekoske, adding that "100% synthetic is still the goal."

Graham Warwick is senior editor, technology, for Aviation Week. *He can be contacted via email at warwick@aviationweek.com.*
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NEWS & NOTEWORTHY (CONTINUED FROM PAGE 736)

presentation by Tyler Groeneveld, omega-9 canola oil market manager for Dow AgroScience's Nexera high-oleic canola varieties. Groeneveld pointed to steady adoption of canola oil by food service companies over the past five to seven years as a trend that is likely to continue.

Groeneveld noted that regulation and dietary guidelines have helped increase canola oil adoption. "The entire industry has benefited from the legislation aimed at removing *trans* fats from the diet," the PortageOnline.com report quoted him as saying. "It was one of the logical solutions."

Dow's Nexera varieties account for about 5% of the canola grown in western Canada, Groeneveld said, adding that Dow plans to register two new hybrid Nexera varieties to be ready for use in spring of 2011.

Krill oil claims approved by Health Canada

Health Canada has approved health claims for Neptune Krill Oil (NKO), a lipid derived from the shrimp-like planktonic crustacean sourced from waters around Antarctica. Neptune Technologies & Bioressources of Laval, Québec, Canada, manufactures NKO. (For more about krill oil, see *inform 18*:588–592, 2007).

The approved label claims are:

1. Cardiovascular health—
   - Helps to reduce the levels of low-density lipoprotein cholesterol (in conjunction with conventional statin therapy): 1 gram (g)/day
   - Helps to increase the levels of high-density lipoprotein ("good") cholesterol (in conjunction with conventional statin therapy): 1 g/day
   - Helps to reduce the levels of triglycerides (in conjunction with conventional statin therapy): 2 g/day
2. Inflammation—
   - Helps to reduce levels of C-reactive protein, a clinical marker of inflammation: 0.5 g/day
   - Helps to reduce pain associated with osteoarthritis: 0.5 g/day
3. Women's health—
   - Helps to relieve symptoms of premenstrual syndrome (PMS): 2 g/day
   - Helps to relieve symptoms of dysmenorrhea (painful menstruation): 2 g/day

"The NKO approved claims are competitive when compared to the already approved claims for fish oils since not only have they been accepted at significantly much lower doses, but they also offer more specific health benefits in cardiovascular, joint, and women's health," said André Godin, Neptune's chief financial officer. ■

SUSTAINABILITY WATCH (CONTINUED FROM PAGE 736)

Award. Among other accomplishments, McDonald's cited Cargill's establishment of 2015 environmental goals in energy efficiency, greenhouse gas intensity, renewable energy use, and freshwater efficiency; as well as reporting annual progress against those goals.

The US Sustainability Award follows McDonald's recognition of five Cargill business units in its "2010 Global Best of Sustainable Supply Report," which was released earlier this year, as well as Cargill Meats Europe earning McDonald's European Sustainability Supplier of the Year Award 2010. The award was announced in September at the company's US Suppliers Summit in Schaumburg, Illinois.

■■■

Key articles in a special print edition of *Environmental Science & Technology* (*ES&T*) are now available online at http://pubs.acs.org/journal/esthag. The articles will appear January 1, 2011, in an *ES&T* print issue on environmental policy. The entire special issue will be available without charge online throughout 2011, when the world celebrates the International Year of Chemistry.

■■■

Kraft Foods, Inc. (Northfield, Illinois, USA) is the first US-based food company to appear on the Carbon Disclosure Leadership Index—a database of firms that disclose carbon emissions data through the Carbon Disclosure Project (CDP). The company joins the top scoring 10% of the world's companies in the Global 500 and Standard & Poor's 500. ■

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