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International News on Fats, Oils, and Related Materials

Montreux keynote address from P&G's Bob McDonald

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Point-counterpoint on UC Davis olive oil report

Regulatory issues in the international trade of oils & fats

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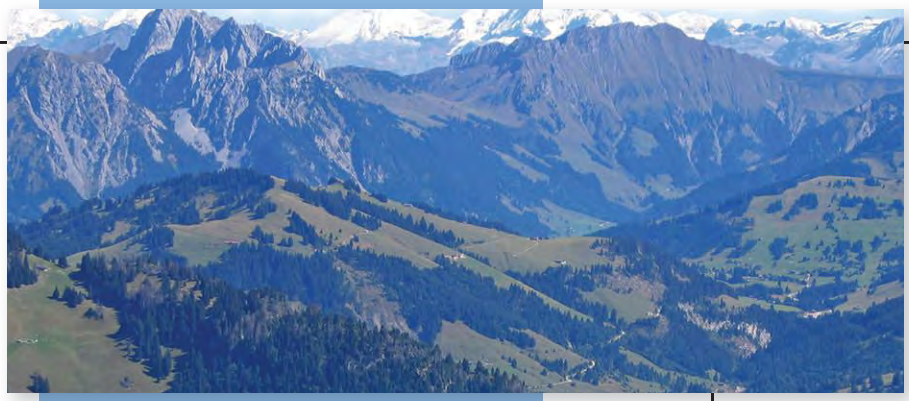

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AOCS Mission Statement
To be a global forum to promote the exchange of ideas, information, and experience, to enhance personal excellence, and to provide high standards of quality among those with a professional interest in the science and technology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

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Calendar

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

January

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 1–2, 2011. 2nd Kuwait Laboratory Technology Conference & Exposition, Radisson Blu Hotel, Kuwait. Information: email: info@promediakw.com; www.kuwaitlabex.com.

February 3–4, 2011. 6th Practical Short Course–Advanced Oil Processing: Palm, Palm Kernel and Coconut Oil Processing and Food Applications, Newport Beach Marriott Hotel & Spa, California, USA. Information: www.smartshortcourses.com.

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

February 7–9, 2011. 2011 Packaging Conference, ARIA Resort at CityCenter, Las Vegas, Nevada, USA. Information: www.thepackagingconference.com.

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

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.

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: http://www.keystonesymposia.org/meetings/viewMeetings.cfm?MeetingID=1125.

March 3–4, 2011. Global Summit on Nutrition, Health and Human Behav-

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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/index.cfm.

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/index.cfm.

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/index.cfm.

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/index.cfm.

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

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.

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

iour: LC-Omega-3 for a Better World, Kempinski Hotel Duke's Palace, Bruges, Belgium. Information: www.omega3summit.org.

March 13–15, 2011. NIOP [National Institute of Oilseed Products] Annual Convention, Camelback Inn, Scottsdale, Arizona, USA. Information: email: 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 13–18, 2011. 15th Annual Practical Short Course on Snack Foods Processing, College Station, Texas, USA. Information: http://foodprotein.tamu.edu/extrusion/ShortCourses/snack/scsnackfood.php.

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.

March 20–22, 2011. 4th Workshop on Fats and Oils as Renewable Feedstock for the Chemical Industry, Karlsruhe Institute of Technology, Karlsruhe, Germany. Information: www.abiosus.org/kit-workshop-2011.html.

March 22–24, 2011. World Biofuels Markets, Beurs–World Trade Center, Rotterdam, Netherlands. Information: http://greenpower.msgfocus.com/q/1NeTXkWKWk1ab2/wv.

March 23–24, 2011. Wellness 11, InterContinental Chicago O'Hare, Rosemont, Illinois, USA. Information: www.ift.org/meetings-and-events/wellness.aspx.

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President's letter

I just returned from chairing the 2010 Montreux Conference (7th World Conference on Detergents) in Montreux, Switzerland, which is held every four years. The conference was a great success in every respect. We had almost 900 total registrants of all types, including exhibitors, representing 60 countries, underlining the global nature of this business. This means that the financial basis of the conference was very sound, which is important, given its significance in AOCS financial planning. The exhibit was sold out (50 exhibitors) and received rave reviews from the representatives of the companies attending. The central location of the exhibit and its well-established role as the conference meeting place in this location virtually guarantee high traffic for the exhibitors. The program was well received, and all speakers delivered in terms of audience engagement and content interest. Happily (and by design), we were able to hold attendance high throughout the week by distributing high-impact speakers throughout the three days. Bottom line, the planning teams and staff deserve a well-earned round of applause for a very successful event. It was a privilege to serve as General Chair surrounded by such professionalism.

Given the high level of speakers in the program—containing several chief executive officers (CEOs), chief technical officers, and high level researchers—and the transparently global nature of the meeting, the content provided a great snapshot of the global economy and issues and their effects on research and development in the Fabric & Home Care and related businesses. In particular, listening to the three CEOs from Procter & Gamble, Henkel, and Unilever in the space of 24 hours was a unique opportunity to compare and contrast the prevailing direction as seen from these three thought leaders. While the meeting focused on the fabric and home care industry and all who support it, I think the big messages of the conference are relevant in any business area and worth summarizing and adding some editorial comment.

I would group my takeaways into four main themes:

Breakthrough innovation is mandatory. The call for innovation has become such a standard element of any survey on corporate leadership wants and needs that it can get lost in the background noise. However, "activity" can sometimes be confused with innovation. Indeed, recent surveys have shown that most product activity is focused on line extensions, and many are failing traditional financial milestones. The missing factor is *disruptive, breakthrough* innovation. Perhaps the most sobering, but realistic message in the conference came from Wall Street analyst Bill Schmitz, who made an unvarnished call to action for *disruptive* product innovation in the industry as a response to lackluster product differentiation, market results, and the growth of private labels in 2009. Citing the alternative as market commoditization, he called for ". . . real disruptive innovation to get things back on track in the short term, especially in a weak consumption environment. . . ."

Sustainability. It's clear that most accept that this has gone beyond the notion of "green" chemistry" and can best be defined as" the ability of humanity to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs" (as defined in 1987 by Gro Harlem Brundtland, the prime minister of Norway). It's clear that for the Fabric & Home Care business this has moved from "would be nice" in Montreux 2006 to a foundational premise of business strategy and as such, appears now in most mission statements. Most aim for ambitious long-term goals, such as 100% sustainable formulations; however, this goal is clearly is a decade away.

Responsibility. In concert, the consensus is that it is the *responsibility* of the business to *lead* sustainable development, not just achieve minimum milestones or respond to regulatory demands. In my experience, that is the only option for issues having a social or regulatory origin, as it avoids the distraction of defensive action, which can paralyze a business, and replaces it with a focus on innovative solutions. This inevitably leads to business growth opportunities as well as positive consumer and market response . . . a win for all concerned.

In the sustainability realm, we must move beyond exhortation and support to the phase of novel and creative solutions reaching market viability, and this intent resonated in the program from several speakers. Those who are serious will solve the complex issues with creative approaches to everything from energy management to package design. In the area of product chemistry, the answers will come from sophisticated science, not the simple and ineffective "kitchen chemistry" approaches touted in years gone by. Not surprisingly, the surfactant area will be the most challenging due to its size and impact on product performance. Nonetheless, the economic, social, and regulatory environments will drive solutions, and most serious players are already engaged in comprehensive searches, joint ventures, and developments. It will take contributions from commercial, academic, and governmental technologists, many of whom are not currently engaged in this business directly . . . a classic opportunity for open innovation.

I would group my takeaways into four main themes: Breakthrough innovation is mandatory. Sustainability. Responsibility. Opportunity, optimism, and the "new normal."

Opportunity, optimism, and the "new normal." The four years that have passed since the 2006 conference have been defined by massive economic uncertainty and business difficulties for everyone. These have been highlighted by pressure on raw material costs and supplies, profits and margins, product market declines, and tremendous pressure on innovation capability. One anticipated outcome could have been a retrenchment, a "circle the wagons" or "wait and see" approach. During the course of the conference, however, I heard something different that fills me with much more optimism. There was clearly a sense of *opportunity and optimism in the presentations*. This was articulated by a phrase that is becoming popular at the moment (and as with

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The future of professional societies

At a recent meeting of staff executives of professional societies, it was noted that the existence of such groups over the past several hundred years has been based on a need for interaction over information. That information, processed through leaders in the field, became the knowledge base for the field.

The speaker questioned the role, or market niche, or value proposition, of associations in a world where (i) information is available in massive quantity over the Internet, and(ii) social networking and technology in general facilitate the interaction over that information to create the new knowledge database (think wiki).

Our goal is to link the world in order to harness the brainpower of our very gifted constituency.

My colleagues who manage associations and professional societies consoled themselves with the idea that wikis weren't "peer reviewed" or even reliable sources of information, that is, they pose no threat to their magazines, journals, books, and so on.

Unfortunately (or as it turns out, fortunately) the journal *Nature* blew this line of thinking out of the water when commenting on a study that appeared in its pages in December 2005: "Wikipedia is about as good a source of accurate information as Britannica, the venerable standard-bearer of facts about the world around us." So then, a wiki that was populated by experts, say all of you, for your colleagues, specifically addressing issues of professional relevance to you, would be even that much more accurate and useful, wouldn't it?

Well, the fact is that the AOCS leadership has a strategic vision to create the AOCS "wiki." That is, to network the fields we serve, with hopes of drawing our colleague associations around the world into the network, so as to create the richest repository of knowledge, a source of immediate feedback regarding questions, research opportunities, product design problems, product development processes, formulations, and the like.

This future is being paid for at the moment through the efforts of the AOCS Foundation. This is basically a "new" funding source for these types of strategic initiatives, although the Foundation has been around for many years and funded many great things for AOCS. By investing in electronic infrastructure with Foundation funds, we are able to move into the future, regardless of financial projections for a given year, thus reducing the risk to our "business."

So, watch for developments of this strategic initiative, and think about the possibilities, both to you personally, and to your field of endeavor. Our goal is to link the world in order to harness the brainpower of our very gifted constituency, resulting in great advances in health, nutrition, personal care, detergents, sustainability, and "green" processes for getting to all of these places. Basically, the goal is to continue to improve the human condition as AOCS members have done for over 100 years but to do it more rapidly and efficiently.

It's a lofty goal, *but* ***what's the use in having anything less than a lofty goal***? And from what I know of this scientific community (all of you) . . . I know you can and will do it!

So our job as AOCS is to give you the tools, and this is just a message to let you know that we're working on it.

Regards,
Jean Wills Hinton
AOCS Executive Vice President

PRESIDENT'S LETTER (CONTINUED FROM PAGE 5)

all such phrases will no doubt quickly get overused), that is, "the new normal," as mentioned by Paul Polman, the Unilever CEO. It describes an emerging attitude that accepts that the uncertainty we live in and the actions that we have had to take to survive it have defined a new equilibrium in which creativity and new solutions will be required "win." We simply can't expect to return to the environment of three years ago. Those times are gone, and it's time to move on. The science, consumer, and business models of five years ago have been replaced or are in the process of being replaced. As we talked on the final day, we have to find a "smarter way of doing things." Smarter sourcing, smarter experimentation and testing, smarter formulation and packaging, smarter, more efficient and effective technologies that use less space, appliances and products that use less water. To be very clear, these are not new goals and didn't come out of this conference. I've been in this business for over 30 years, and many of these objectives have been around for most of that time. However, with a "new normal" and "smart R&D" mindset the opportunity to redefine the landscape arises. It seems this movement is underway, and this time many of the barriers, some real, some perceived, will fall. If this mindset prevails, my prediction is that by Montreux 2014 we will be talking about new formulations, new technology, new product categories, and a much more sustainable and growing business. I hope the message from our Wall Street speaker by then will be, What a transformation! I look forward to that prospect, and I'm delighted that AOCS can provide the forum for such pivotal discussions.

J. Keith Grime
AOCS President 2010–2011

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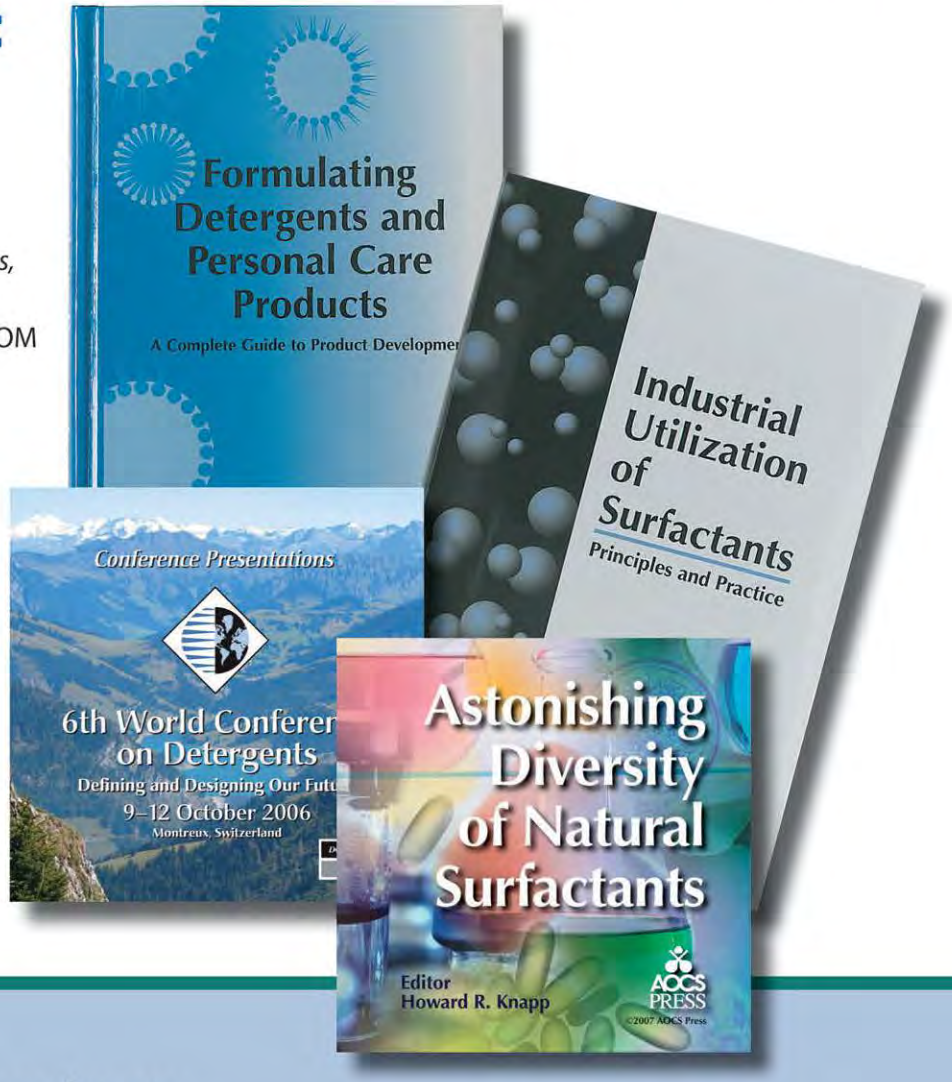

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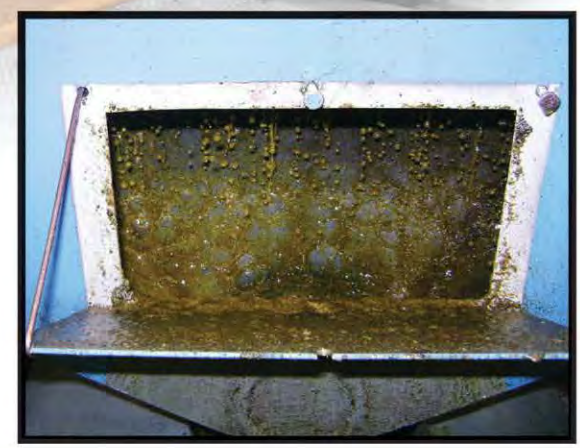

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Bob McDonald

Editor's note: Bob McDonald provided the opening keynote presentation at the AOCS 7th World Conference on Detergents held October 4–7, 2010, in Montreux, Switzerland. Subtitled "New Strategies in a Dynamic Global Economy," the meeting brought together nearly 900 participants from almost 60 countries. Also of note, the heads of the three largest detergents companies—Henkel, P&G, and Unilever—provided keynote presentations, which was a first for the conference. A meeting report appeared in the December 2010 issue of inform *(21:770–773). McDonald is chairman of the board, president, and chief executive officer of The Procter & Gamble Co. (P&G) in Cincinnati, Ohio, USA.*

Fabric & Home Care (F&HC) remains a critical part of P&G's business—30% of sales and 28% of net earnings. It's where I began my P&G career 30 years ago, and it continues to be a great source of innovation. Ours is an industry that has made a tremendous impact on the world over generations. Our products and services have fundamentally improved quality of life in literally every part of the world.

Touching and improving consumers' lives is our opportunity AND our responsibility. Improving lives is also the most important way to address the challenges facing our industry today—and, as we all know, those challenges are significant.

Industry Challenges

The financial crisis of 2008 and the global recession from which we are still recovering have had a huge impact:

- Market growth has slowed. In 2009, market growth for the F&HC segments slowed to just above 4%, vs. an average of 5% per year over the previous three years.
- We've seen evidence that consumer habits changed during the recession, and it's not yet clear whether they will become new norms in the category.
- Commodity costs remain volatile and unpredictable. In the past two years, for example, oil prices dropped from nearly US$150 a barrel to below US$50 a barrel, and today they are hovering around US$88 a barrel.

We also face challenges beyond economics. The regulatory environment has become more complex than ever. Tax and trade issues threaten our growth and our ability to invest and innovate. And, of course, there is the never-ending challenge of innovating in what many perceive to be a mature industry that some see as less responsive to innovation than it used to be.

I'm clear-eyed about these challenges, but not intimidated by them. On the contrary, I think this is and will continue to be a very good industry to be in.

A Good Industry To Be In

First, this industry still has plenty of room to grow. Annual per capita spending on F&HC products in China, for example, is just US$6 and only US$3 in India, vs. more than US$60 in North America and Western Europe. If the global annual average per capita spending were to increase from $18 to $30, which is the current figure in Brazil, the total F&HC market size would increase by nearly US$100 billion.

Second, this is an industry that is highly responsive to innovation—not just at the premium tier but up and down the value chain. The number of new F&HC products that reach the shelf per year has consistently increased by 20% every year for the past decade. In just the last 18 months, 60% of all new laundry detergent products came from lower-tier segments, showing that innovation is the driver of value at every price point.

These are terrific strengths but with them come demands that we must step up to as industry leaders. Demands for life-improving innovation . . . for robust, consumer-driven strategies and brilliant execution . . . or inspiration that unleashes creativity in every facet of our industry.

It's with these demands in mind that I want to focus on three things:

- The **power of purpose**—why we've made it a centerpiece of P&G's leadership agenda and why I believe it can lift our entire industry to new levels of growth and performance.
- The **responsibility of companies** to be a force for good in the world—why there is no distinction between profitable growth and purpose-inspired responsibility.

- The opportunity and need for **industry action** in a few areas that will enable us to touch and improve lives and drive industry growth.

The Power of Purpose

We've placed Purpose at the center of P&G's leadership agenda for one simple reason: People seek meaning in their lives and their work. They want to be part of something larger than themselves. They want to make a difference in the world. Achieving business and financial goals can be highly motivating—and is essential to do—but it is rarely inspiring as an end in itself.

A Purpose like P&G's is powerful because it transcends business and financial goals. We don't have to make a profit SO we can improve lives. We make a profit BY improving lives. This is our Purpose AND our business model.

I believe this is true throughout our industry. When we commit ourselves to "Touching and Improving Lives, Now and for Generations to Come," we inspire higher levels of performance. A sense of purpose captures our imagination and passion. It focuses us on the people we serve and inspires empathy for them. This is where innovation comes from. Empathy helps us identify tensions in people's lives that we can help resolve, which leads to insights that inspire big ideas, which become life-improving innovations.

Simply put: Touching and improving lives inspires peak performance. I believe that to my core. And I believe it is true not just for P&G, but for every company in our industry.

Force for Good

Fifty-one of the largest economies in the world are companies, not countries. About 40% of global trade comes from and goes through large multinational companies. This reality creates new responsibilities for companies like ours to be a force for good in the world; but being a force for good is not limited to philanthropy and disaster relief. We are a force for good when we create products and services that improve people's lives, when we find ways to innovate and operate responsibly, ethically, and with less environmental impact, when we create new product formulations that improve consumer value, or new distribution models that make our products more affordable, when we create jobs, pay taxes, and help make our communities a better place to live and work.

In other words, we are a force for good when we integrate responsibility for improving lives into every aspect of our business and operations.

Priorities for Industry Action

What can we all do to touch and improve more lives? I believe there are three priorities.

First, we as an industry need to create and deliver more transformational innovation. By this, I mean innovation that fundamentally changes the consumer experience in three ways:

- Provides much better performance than what consumers get today. In laundry, for example, there are still too many stains, soils don't come out in the first wash, multiple steps are required. There are abundant opportunities to delight consumers so the experience of caring for their homes and clothes is enjoyable. We can make the performance better.

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IOC responds to UC Davis report

Executive Secretariat of the International Olive Council

The International Olive Council (IOC; Madrid, Spain) is a nonprofit, intergovernmental organization formed in 1959 under the auspices of the United Nations. IOC's prime concerns include the prevention of fraud and the protection of consumers. The harmonization and fulfillment of official standards and the application of official methods are of key importance in achieving greater transparency and fair trade. It is important for the authorities of importing countries to harmonize and comply with the official IOC standards, and it is their responsibility to guarantee product quality and protect consumers. IOC standards are developed and revised in light of scientific, technological, and commercial advances.

The Council of Members of the IOC is the forum where members draw up and adopt rules by consensus for the quality improvement and quality control of olive products in order to facilitate a fair international market for olive oils, olive-pomace oils, and table olives and so stimulate consumption of these products. Speaking as the intergovernmental point of reference for olive products standardization, the IOC urges the competent authorities of producing and importing countries to harmonize their rules and regulations and offers its cooperation on any issues that might arise.

The IOC currently has 17 member states. Membership is open only to the governments of states with responsibilities for the negotiation, conclusion, and application of international agreements, especially commodity agreements.

Article 1(2) of the *General Objectives* of the International Agreement on Olive Oil and Table Olives, 2005 is to develop the definitions and analytical characteristics of all the grades of olive oils and olive-pomace oils included in the trade standards adopted by Members for compulsory application in international trade.

IOC standards are revised and updated in light of scientific advances that help to make testing methods more accurate, or of technological and commercial developments. Expert chemists and sensory analysts designated by member countries study and develop testing methods to determine the quality and to control the purity of olive oils and olive-pomace oils. Representatives of standards agencies and institutions from nonmember entities such as AOCS, the Codex Alimentarius Commission (CAC), California Olive Oil Council, Canadian Food Inspection Agency, United States Department of Agriculture, Australian Olive Association, North American Olive Oil Association (NAOOA), and the International Organization for Standardization (ISO) are also invited to attend meetings.

Methods are constantly being improved to adapt them to industry needs and technological developments. Before a method of analysis is approved by the IOC, ring tests are conducted at laboratories to validate the method. For a method to be made final, its precision data must be checked and its applicability to olive oil be confirmed. Once adopted, the IOC fixes the permissible limits for each parameter and grade and includes them in its trade standard.

The testing methods recommended by the IOC are included in the current trade standard. Both the standards and the methods, the latter referenced as COI/T.20, are posted on the IOC website (www.internationaloliveoil.org) as they are reviewed and adopted.

Ever since its initial involvement in the standardization of olive products, the IOC has cultivated a solid cooperative relationship with a number of international organizations—including CAC, the World Customs Organization, ISO, and the European Union—to define the minimum compositional, quality, and purity requirements of olive oils and to harmonize the methods of analysis in use. The CAC is responsible for the joint FAO–WHO (UN Food and Agricultural Organization–World Health Organization) program for the development of food standards with an eye to consumer health protection and fair trade. The World Trade Organization (WTO) takes into account the standards and recommendations of the CAC in the application of the WTO Agreements on Sanitary and Phytosanitary Measures (SPS Agreement) and Technical Barriers to Trade (TBT Agreement). The CAC standards for olive oils and table olives are currently being revised to bring them into line with the IOC trade standards.

The IOC runs a quality recognition scheme for physicochemical and sensory testing laboratories (tasting panels) aimed at increasing mutual confidence between testing facilities and heightening the confidence of the olive business sector in laboratories. The IOC annually recognizes laboratories and panels that fulfill its requirements and satisfactorily pass the proficiency check tests it holds every year.

In 2009/10 a total of 40 tasting panels obtained IOC recognition; 56 panels took part in the two check tests arranged for 2010/11. Forty-eight physicochemical testing laboratories obtained IOC recognition in 2009/10, and 62 are participating in the 2010/11 ring test. The list

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UC Davis stands behind the report

Edwin N. Frankel, Rodney J. Mailer, Selina Wang, Charles F. Shoemaker, and Dan Flynn

The response to the University of California Davis report ("Tests indicate that imported 'extra virgin' olive oil often fails international and USDA standards," UC Davis Olive Center, July 2010) has ranged from knowing nods to sharp criticisms such as those offered by the Chemistry Expert Group of the International Olive Council (IOC; Madrid, Spain). We respect the members of the Expert Group but stand fully behind the report.

To quickly review the source of the controversy, the UC Davis study found that 69% of the imported olive oils that we tested failed the IOC's official sensory test, with that result confirmed in 31% of the cases by the IOC's tests for UV absorbance of oxidation products, and in 86% of the cases by German diacylglycerol (DAG) and pyropheophytin (PPP) tests.

The report was completed by the UC Davis Olive Center and the Australian Oils Research Laboratory. The Australian laboratory is recognized by the IOC and the AOCS for proficiency in conducting IOC chemical and sensory tests.

While the Expert Group's statement does not adequately represent the diversity of opinion among members of the panel, many of whom were not offered an opportunity to review or sign the statement, we will respond to the statement as written.

Statistical significance. The IOC Expert Group asserts that the UC Davis report is "not statistically significant," but actually UC Davis analyzed samples at four times the rate of the IOC's own quality control program (on an annualized basis). According to an official IOC report available from the IOC website, the IOC analyzed an average of 116 extra virgin samples per year in 2008 and 2009 collected from the United States and Canada. These countries have a combined population of 340 million, so the IOC analyzed one sample for every 2.93 million people. The UC Davis study is based on 52 samples collected from the state of California, which has a population of 38 million. Thus, the UC Davis study analyzed one sample for every 730,000 people, or at four times the rate of the IOC.

Storage conditions. The Expert Group, while accepting our findings that many oils were noncompliant with IOC standards, contends that "it is impossible to consider the results reliable" without information on shipping or time of testing. Here is the factual information: All oil samples were collected and managed at UC Davis by a single member of the research team. Samples were collected within a seven-day period when daytime temperatures ranged between 52°F and 56°F (11°C and 13°C). The samples were in transit to UC Davis for no more than nine hours. The research team promptly coded, wrapped in foil, packaged for shipment, and shipped the samples to the Australian lab, with the samples arriving in Australia five days after shipment. The Australian Oils Research Laboratory is IOC-certified and follows IOC quality standards relating to time of testing and all other parameters.

Chemical methods. The Expert Group states that the IOC trade standard "contains all the necessary methods to assess the quality and purity of olive oil . . . hence it was not necessary to apply the non-official methods cited in the report." While we appreciate the work that the IOC has performed in developing standards, we expect that few chemists would agree that IOC standards are fully adequate, and we feel strongly in supplementing IOC methods with additional tests (DAG and PPP) adopted in Germany and Australia. In fact, the German/Australian chemical tests confirmed negative sensory results for 86% of the cases, whereas the IOC chemical tests confirmed negative sensory results for just 31% of the cases. The Expert Group also states that it rejected the DAG and PPP tests because "these compounds change dynamically during the shelf life of the oil." Using this reasoning, the panel would also need to disavow IOC tests for free fatty acidity, conjugated dienes (K232) and trienes (K270), and peroxide values, which all would change during the shelf life of the oil. The Expert Group also says that the UC Davis study cannot conclude that refined oils were added because the stigmastadienes and sterol profiles were in compliance with IOC standards. Actually, the UC Davis study indicated that the addition of refined oils was a *possibility*, and our study team concluded "if any of the samples were adulterated, it is most likely that the adulterant was refined olive oil rather than refined nut, seed, or vegetable oils."

Sensory analysis. The Expert Group, while accepting our finding that many of the oils failed the sensory analysis conducted by an official IOC panel, says that IOC procedures require a second analysis to be performed by another IOC panel, and faults the UC Davis study for not having a second test conducted. Actually, the IOC does not require a sensory panel to get a second opinion when a panel finds that an oil sample has failed an initial test.

Although the UC Davis report was just one study, and should be viewed as such, we should note that serious olive oil quality problems were found by *Consumer Reports* in September 2004, *Der Feinschmecker* in May 2005, Australian Oils Research Laboratory over several years,

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of recognized laboratories and panels is posted on the IOC website and updated every year.

The test certificates issued by recognized panels can carry legal weight in disputes. Each country is responsible for official product control. The IOC also sponsors a voluntary, self-regulatory scheme currently in place in Australia, Brazil, Canada, and the United States, where exporters, importers, and distributors of olive oil and olive-pomace oil are required to adhere to IOC standards in order to help achieve orderly market development and fair trading. In the case of North America (USA and Canada), this quality control scheme has been operating since 1991 under an agreement signed by the IOC with the NAOOA to undertake product quality control at recognized laboratories using updated methods of analysis and taking into account the designations and quality criteria specified in the IOC standards.

Some 200 samples of imported oils sold in the United States are chemically tested every year by the IOC under the quality control scheme, and the labeling also is checked to ensure that the product contents tally with the labeling declarations. According to IOC findings, anomalies are detected in less than 10% of the imported oils analyzed; NAOOA is notified of the nature of the irregularities with a view toward taking action.

In July 2010, the UC Davis Olive Center released a report on olive oil labeling that caused a ripple in the media. The report applies methods that have not been validated or adopted by the IOC.

In doing so, the Chemistry Expert Group of the IOC feels that an attempt has been made to distort reality by giving data that, taken out of context and without knowledge of the technical background, might mislead consumers and seriously damage the image of olive oil.

In view of all these considerations, the IOC group of experts on olive oil chemistry and standardization officially designated by the IOC member states signed a consensus document (below) in which they express their unanimous technical opinion on the UC Davis study. The statement was signed on October 8, 2010, by 27 experts from laboratories recognized by the IOC and officially designated by 15 countries.

Statement by the Chemistry Expert Group

A report issued by the UC Davis laboratory questioning the trueness-to-grade of extra virgin olive oil imported into the United States has been published recently in various news media. The IOC Chemistry Expert Group have discussed this subject at their latest meeting.

The Group is made up of expert chemists from almost all the IOC member and nonmember countries (Australia, Canada, and the United States) and international organizations (AOCS, Codex Alimentarius Commission, and the ISO). The main aim of the group is to study testing methods and revise them when necessary to determine the quality and control the purity of olive oils and olive-pomace oils. Methods are constantly being improved to adapt them to industry needs and technological developments.

IOC standards are revised in light of scientific advances that help to make testing methods more accurate, or of technological and commercial developments. Their aims are to enhance and control quality, as well as to ensure transparency on the international market for olive oils, olive-pomace oils, and table olives, and to promote their consumption.

Considering the report published by UC Davis, there are several points this Expert Group wishes to clarify.

The results reported are for only 52 samples of 19 brands. This is not statistically significant of the olive oil imported into the United States, because samples traded in three cities of California are not representative of the whole olive oil market in the country; therefore, the claim questioning the trueness-to-grade of imported extra virgin olive oil is not realistic.

There are no details of storage conditions during shipping or time of testing. Without this information, it is impossible to consider the results to be reliable. In addition, the recommendations stated on the product labels indicate that the oils must be kept in a cool, dry place and must not be exposed to direct light in order to comply with their assigned grade classification during their shelf life. We do not know if the noncompliance with the standards was due to the original characteristics of the oils or to storage conditions.

The IOC trade standard is under constant supervision by the IOC Chemistry Expert Group and contains all the necessary methods to assess the quality and purity of olive oil. Hence, it was not necessary to apply the nonofficial methods cited in the report.

Most of the samples were misclassified by the sensory analysis. The official method of the IOC was used, but was not applied according to the standardized procedure described in the method. When the grade assigned by the sensory analysis does not match the grade stated on the label classification, the procedure requires a second analysis to be performed by another IOC-recognized panel. This was not done in the UC Davis study.

The UC Davis study places particular emphasis on the application of nonofficial methods and gives the impression that the IOC methods are not sufficient to assess the quality and purity of olive oil. We would like to stress that some of the methods used in this study are not IOC methods, even though IOC methods are available (polyphenols and triacylglycerol) to assess the same parameters.

It is also important to point out that the IOC does have an official method to detect low-quality oils or the addition of soft refined oils obtained from low-quality oils (alkyl esters of fatty acids). Instead, the study used nonofficial methods that analyze 1,2-diacylglycerol and pyropheophytins content. These methods had already been studied by the IOC Chemistry Expert Group, which concluded that the scope of these methods could not include the assessment of the quality and purity of olive oil because these compounds change dynamically during the shelf life of the oil.

In this context, the UC Davis report claims that cheap refined oil was added to the oils they tested; however, all the parameters (stigmastadienes and sterol composition) that detect the addition of this type of oil were within the limits. Consequently, they cannot conclude that refined oils were added.

As the IOC Chemistry Expert Group, we are very concerned about the final recommendations of the study advocating the implementation of methods that have not been proven to have any relationship with the quality or purity of olive oils.

The Group wishes to end by saying it is ready and willing to discuss any new input to ensure the quality and authenticity of olive oil.

For more information about the IOC, visit www.internationaloliveoil.org. To contact the Council by email, write to iooc@internationaloliveoil.org. ■

Briefs

AOCS Official Method, Cd 3-25, Saponification Value, has been revised after technical changes were approved by the Uniform Methods Committee and were implemented by the AOCS Technical Department. The current version of the method has a revision date of 2010. If you have purchased the 6th edition of *Official Methods and Recommended Practice of the AOCS* or an individual method with a 2009 reapproval date, please contact AOCS at +1 217-693-4803 or at orders@aocs.org to obtain an updated copy of the method. Replacements for earlier versions may be purchased from www.aocs.org/Store/?navItemNumber=582.

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Members of the Roundtable for Sustainable Palm Oil (RSPO) reaffirmed commitments to protect valuable tropical forests, agreeing to uphold sustainability standards on new plantings and focus more attention on the rapidly growing Chinese and Indian markets. The RSPO's 8th annual conference, held in Jakarta in mid-November 2010, was attended by 750 participants. Representatives concluded the four-day meeting with a decision requiring plantation companies to show compliance with the RSPO criteria before making new plantings.

■■■

Although the United States, Europe, and Japan are still leading the global research and development (R&D) effort, they are increasingly being challenged by emerging countries, especially China. This is one of the findings of the 2010 UNESCO Science Report released in November 2010. (UNESCO, which is based in Paris, is the United Nations Educational, Scientific, and Cultural Organization.)

Led mainly by China, India, and the Republic of Korea, Asia's share of the global R&D effort increased from 27 to 32% between 2002 and 2007. Over the same period, the combined R&D efforts of the European Union, United States, and Japan registered a decrease. In 2002, almost 83% of global R&D was carried out in developed countries; by 2007 this share had dropped to 76%. ■

News & Noteworthy

IFFO meets in Beijing

"The fishmeal and fish oil industry must take full responsibility for demonstrating that its section of the value chain is sustainable. Then producers can look forward to a bright future where they can add value, supply their products as strategic feed ingredients, and take advantage of the burgeoning market for omega-3 supplements and nutraceuticals."

With these opening words at the Annual Conference 2010 of the International Fishmeal and Fish Oil Organisation (IFFO), held October 25–28 in Beijing, Director General Jonathan Shepherd set the theme of responsibility, value, and health.

RESPONSIBILITY

"Taking responsibility is a must for the industry," said Shepherd. "Chile and Peru have taken responsibility by adopting rights-based fishery management. IFFO is taking responsibility by defending the industry against the ever-changing criticisms with sound science and by forming closer links and alliances with government and the value chain. [As for] standards, we introduced the IFFO Responsible Supply certification program (IFFO-RS) 12 months ago," he said.

Following up on the recent news that more than 20% of global fishmeal and fish oil production capacity is already certified under the IFFO-RS, Technical Director Andrew Jackson announced the extension of the standard to include use of by-product raw material as well as whole fish, and that IFFO was currently piloting a chain-of-custody addition to the standard to enable companies further along the supply chain to apply for IFFO-RS certification.

The IFFO-RS certification program is based on key elements of the United Nations' Food and Agriculture Organization (FAO) Code of Conduct for Responsible Fisheries. Lahsen Ababouch of FAO told the conference that the world was consuming seven times as much fish and seafood now as in 1950, about half of it from aquaculture. He said the major industry issues were sustainability, food safety and quality, and food security.

ADDING VALUE

Shepherd told the conference that the combined firsthand sales value of global fishmeal and fish oil production is approaching $10 billion per annum and outlined the potential to create and add value.

Lahsen Ababouch, UN FAO

"Given the finite supply of marine ingredients, the industry is increasingly focused on the strategic use of fishmeal and fish oil at critical stages in the life cycle where they offer the greatest value to the growing animal.

"Our industry is also the main source of the healthy omega-3s, EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid), and the market is expanding rapidly with growing interest in fish proteins and amino acids as well," he said.

Approximately 90% of commercially available EPA and DHA is derived from fish oil, and IFFO works closely with the omega-3 trade association, GOED. Its executive director, Adam Ismail, told delegates that the value of the omega-3 supplement market in the United States alone had risen from $40 million in 1995 to $1 billion in 2009.

"The crude fish oil industry is transitioning from a commodity market to a value-added orientation. This means developing strategies to provide products that are uniquely suited for each use and also

Sustainability watch

Aldi discount supermarkets in Australia have begun disclosing carbon footprint information on some food labels, according to hydrocolloid consultant Dennis Seisun of IMR International in San Diego, California, USA.

"Carbon footprint declarations are not new in other parts of the world but their expansion into Australia, and probably other countries, is an indication of their growing importance," he said.

Based on labels he viewed in Australia, the carbon footprint of an Italian olive oil made from oil imported into Italy and then shipped to Australia is 280 grams (g) of CO_2 per 100 milliliters (mL). The footprint of Australian olive oil sold in Australia is 320 g/100 mL. "Shipping distance is evidently not always directly correlated to carbon footprint—a fallacy [that] has yet to be corrected in the minds of many consumers," Seisun noted.

■■■

Anglo-Dutch consumer products giant Unilever released a new sustainability plan in November 2010 aimed at "decoupling" its future business growth from its environmental impact. The plan requires the company to source 100% of its agricultural raw materials sustainably, to halve its environmental footprint, and boost the health and well-being of one billion people over the next 10 years. The plan is available for download at www.sustainable-living.unilever.com.

■■■

The Comment:Visions website (www.commentvisions.com) is a partnership between the global channel *euronews* and the Brussels-based newspaper, *European Voice*, in association with Shell. The project explores the views of thinkers, innovators, and scientists about possible solutions to global warming, overpopulation, and dwindling resources.

The website is divided into three sections:

- Streaming of the Comment:Visions program that airs on *euronews* in the first week of each month, and which interviews visionaries on different aspects of the energy and environmental debate.
- Videos and transcripts from the Comment:Visions events in Brussels.
- An online forum where invited, informed guests can share their opinions and visions on each month's topic.

■■■

The International Organization for Standardization (ISO) published ISO 26000: 2010, Guidance on Social Responsibility, in November 2010, after six years of development. The new standard is not a certification standard as are the more well-known ISO 9001 (quality) and 14001 (environmental management) standards. Instead, it is a guidance standard that covers six core areas: human rights, labor practices, the environment, fair operating practices, consumer issues, and community involvement and development. For more information, see www.iso.org.

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understanding the importance of consumer issues," said Ismail.

OUTLOOK FOR ASIA

Three sessions of the IFFO conference focused on developments in Asia. Among the key points:

- "Aquaculture will continue to increase to meet global requirements and Asia will remain the dominant producer with more than 90% of production. A problem area is the direct use of low-value fish as feeds. They are in limited supply and more formulated feeds are urgently needed"—Geoff Allan, Port Stephens Fisheries Institute, New South Wales, Australia.
- "China's future aquaculture will steadily increase but [will] change its developmental mode—meaning a transformation from 'resource-intensive, scale expansion, one-sided pursuit of quantity' to 'efficiency, quality, safety, and sustainability'"—Kangsen Mai, Ocean University of China, Qingdao.
- "Awareness by Chinese consumers of the importance of long-chain omega-3 fatty acids is very low and intake of omega-6 fatty acids is far too high. There's a huge potential for improving health by increasing the dietary ratio of omega-3 to omega-6 fats and this represents an important market opportunity"—Xiaofei Zeng, China Nutrition Association.

From plants to plastics

In theory, plants could be the ultimate "green" factories, engineered to pump out the kinds of raw materials we now obtain from petroleum-based chemicals. But in reality, getting plants to accumulate high levels of desired products has been an elusive goal. Now, in a first step toward achieving industrial-scale green production, scientists from the US Department of Energy's (DOE) Brookhaven National Laboratory and collaborators at Dow AgroSciences report engineering a plant that produces industrially relevant levels of compounds that could potentially be used to make plastics.

"We've engineered a new metabolic pathway in plants for producing a kind of fatty acid that could be used as a source of precursors to chemical building blocks for making plastics such as polyethylene," said Brookhaven biochemist John Shanklin, who led the research. "The raw materials for most

John Shanklin

precursors currently come from petroleum or coal-derived synthetic gas. Our new way of providing a feedstock sourced from fatty acids in plant seeds would be renewable and sustainable indefinitely. Additional technology to efficiently convert the plant fatty acids into chemical building blocks is needed, but our research shows that high levels of the appropriate feedstock can be made in plants."

The method builds on Shanklin's long-standing interest in fatty acids and the enzymes that control their production. Discovery of the genes that code for the enzymes responsible for "unusual" plant oil production has encouraged many researchers over the years to explore ways of expressing these genes and producing certain desired oils in various plants.

"There are plants that naturally produce the desired . . . omega-7 fatty acids in their seeds—for example, cat's claw vine and milkweed—but their yields and growth characteristics are not suitable for commercial production," Shanklin said. Initial attempts to express the relevant genes in more suitable plant species resulted in much lower levels of the desired oils than are produced in plants from which the genes were isolated. "This suggests that other metabolic modifications might be necessary to increase the accumulation of the desired plant seed oils," Shanklin said.

"To overcome the problem of poor accumulation, we performed a series of systematic metabolic engineering experiments to optimize the accumulation of omega-7 fatty acids in transgenic plants," Shanklin said. For these proof-of-principle experiments, the scientists worked with *Arabidopsis*, a common laboratory plant.

Enzymes that make the unusual fatty acids are variants of desaturases, which remove specific hydrogen atoms from fatty acid chains to form carbon–carbon double bonds, thus desaturating the fatty acid. First, the researchers identified naturally occurring variant desaturases with desired specificities, but they worked poorly when introduced into *Arabidopsis*. They next engineered a laboratory-derived variant of a natural plant enzyme that worked faster and with greater specificity than the natural enzymes, which increased the accumulation of the desired fatty acid from less than 2% to around 14%.

Though an improvement, that level was still insufficient for industrial-scale production. The scientists then assessed a number of additional modifications to the plant's metabolic pathways. For example, they down-regulated genes that compete for the introduced enzyme's fatty acid substrate. They also introduced desaturases capable of intercepting substrate that had escaped the first desaturase enzyme as it progressed through the

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Companies are not getting much credit for their sustainability efforts, according to a new report from The Hartman Group of Bellevue, Washington, USA. Titled "Marketing Sustainability 2010: Bridging the Gap Between Consumers and Companies," the report indicates that 15% more US consumers are now aware of the term "sustainability" as compared to three years ago (69% in 2010 say they are familiar with "sustainability" vs. 54% in 2007) but only 21% can identify a sustainable product. Even fewer (12%) can name specific companies as using "sustainable" practices.

■■■

Dutch chemical firm AkzoNobel is the leader in sustainability practices among competitors from the chemical industry, according to the 2010 Dow Jones Sustainability World Index. The index includes 318 firms this year, of which 20 are chemical companies, including Dow Chemical, BASF, DuPont, and Bayer. ■

oil-accumulation pathway. In many of these experiments, they observed more of the desired product accumulating. Having tested various traits individually, the scientists then combined the most promising traits into a single new plant.

The result was an accumulation of the desired omega-7 fatty acid at levels of about 71% in the best-engineered line of *Arabidopsis*. This was much higher than the omega-7 fatty acid levels in milkweed, and equivalent to those seen in cat's claw vine. Growth and development of the engineered *Arabidopsis* plants was unaffected by the genetic

Acquisitions/mergers

Cargill Foods India has acquired the Rath vanaspati brand from **Agro Tech Foods Ltd.**, according to Flexnews.com. Agro Tech is an affiliate of **ConAgra Foods** and is based in Gurgaon. Cargill owns and operates three edible oil refineries in India located at Paradip (Orissa), Kandla (Gujarat), and Kurkumbh (Maharastra).

Commodities

CACAO/CHOCOLATE

Cargill (Minneapolis, Minnesota, USA) is working with manufacturers to bring a reduced-calorie chocolate product to market by the end of 2011, according to FoodNavigator.com. The 30% reduction in calories "is equivalent to a saving of up to 160 calories for a 100-gram chocolate bar," the report said. The reduction has been achieved by a patented blend of sweeteners, including Cargill's Zerose erythritol bulk sweetener.

■■■

A new study from **Nestlé Product Technology** and the **University of Nottingham** finds that using defatted cocoa butter containing 11 grams of fat per 100 grams to produce low-fat chocolate is the most effective in terms of particle size and morphology. According to the research, there was no added benefit to using highly defatted cocoa powder with less than one gram of fat per 100 grams. The study appeared in *LWT–Food Science and Technology* (doi: 10.1016/j.lwt.2010.10.006) and was led by Bettina Wolf, associate professor in biomaterials science at Nottingham.

FISH OIL/MEAL

The **Commission on the Conservation of Antarctic Marine Living Resources**, which oversees the krill fishery in the Antarctic waters, failed to make progress at its November 2010 meeting toward designating marine protected areas in the Southern Ocean. The oil of the tiny crustaceans at the base of the marine food chain has gained market share recently in the omega-3 supplements segment.

■■■

Approval of new aquaculture guidelines by a European Union Parliament committee in January 2011 will be a "formality," according to the UN Food and Agriculture Organization. Established after four years of discussion with governments, producers, processors, and traders, the voluntary guidelines cover everything from fish health to food safety. According to UN figures, global aquaculture production reached 52.5 million metric tons in 2008.

OLIVE OIL

An article in Spain's *El Pais* newspaper in late November 2010 details an investigation by the government of Andalusia. In brief, the government conducted a supermarket survey of 50 top-selling brands of extra virgin olive oil (EVOO) in order to understand the reasons behind low prices. The survey found that 56% of the EVOO studied was not true to label because it contained either lower-quality oil (40%) or was adulterated (16%).

PALM OIL

Olam International Ltd. of Singapore has entered into a joint venture (JV) with the government of the **Republic of Gabon** (RoG) to develop 50,000 hectares of palm plantation in Gabon with an investment of $236 million. Olam will hold 70% interest in the JV, and the remaining 30% will be held by RoG. As part of the agreement, RoG has committed to the JV a land bank of 300,000 hectares for palm and rubber plantation development in multiple phases, of which 50,000 hectares will be developed in Phase I of the project.

New ventures

Viterra Inc. (Calgary, Alberta, Canada) announced in November 2010 that it has opened an office in Hamburg, Germany.

■■■

Burcon NutraScience Corp. (Winnipeg, Manitoba, Canada) said in November 2010 that it has signed a nonbinding letter of intent with **Archer Daniels Midland Co.** (Decatur, Illinois, USA), wherein Burcon will license its CLARISOY® technology to ADM on an exclusive basis to produce, market, and sell the soy protein isolates worldwide. ■

modifications and accumulation of omega-7 fatty acid.

"This proof-of-principle experiment is a successful demonstration of a general strategy for metabolically engineering the sustainable production of omega-7 fatty acids as an industrial feedstock source from plants," Shanklin said.

The research was funded by the DOE Office Science, and by The Dow Chemical Co. and Dow AgroSciences. The study appeared in *Plant Physiology* (*154*:1897–1904, 2010).

Lecithins may reduce acrylamide formation

Commercially available lecithins such as those from eggs and soybeans may reduce the formation of acrylamide, according to a study from the Instituto de la Grasa in Spain.

Acrylamide, a known neurotoxin and a suspected carcinogen, is formed by a heat-induced reaction between sugar and the amino acid asparagine. The process—known as the Maillard reaction—is responsible for the brown color and appetizing flavor of baked, fried, and toasted food. Swedish scientists discovered acrylamide in foods in April 2002. The discovery captured global attention, alarming consumers and food safety authorities alike.

The Spanish study, led by Rosario Zamora, tested commercially available egg and soybean lecithins, as well as phosphatidylethanolamine (PE) and ethanolamine. According to the results, PE, ethanolamine, and egg and soybean lecithins all significantly reduce the formation of acrylamide in a simple model. Ethanolamine was found to be more effective than PE in reducing acrylamide formation; the researchers observed an 85% reduction in its presence.

The study appeared in *Food Chemistry* (10.1016/j.foodchem.2010.10.084).

Egypt provides enriched oil

Egypt has begun a major national project to protect its population from vitamin deficiencies, through production of vitamin-enriched vegetable oil. The effort is a partnership among Egypt, the United Nations (UN) World Food Programme (WFP), and the Global Alliance for Improved Nutrition (GAIN).

The five-year national project targets 60 million Egyptians benefiting from the government's food subsidy system, especially children and women, with an investment of more than $13 million. More than 840,000 metric tons of subsidized vegetable oil (50% soybean oil and 50% sunflower oil) will be fortified with vitamins A and D, reaching close to 80% of Egypt's population.

Large-scale food fortification started in Egypt in 2008, with another partnership among the Egyptian government, WFP, and GAIN, to fortify wheat flour used in the making of baladi bread with iron and folic acid; that program now benefits more than 50 million Egyptians, according to GAIN. ■

2011

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Briefs

In mid-November Neste Oil (Espoo, Finland) announced the start-up of its renewable diesel plant in Singapore. Fuel will be made from 100% renewable materials such as palm oil and animal fat. Production will be ramped up on a phased basis. The plant was completed on-schedule at a cost of about €550 million. The plant has a capacity of 800,000 metric tons per year and employs about 120 persons. Neste has a similar-sized facility under construction in Rotterdam, which is due to be commissioned in the first half of 2011. It already operates two renewable diesel plants at Porvoo, Finland. Main markets for the company's diesel are Europe and North America.

■■■

The Agricultural Utilization Research Institute (AURI), of Crookston, Minnesota, USA, is evaluating the use of biodiesel in preserving wooden utility poles. Typically, the preservative DT-40 is delivered to wood using a liquid carrier made from off-stream petroleum products with strong odors. The carriers help the preservative stick to the wood. A Minnesota lumber company has used a 20% biodiesel blend carrier for several years and substantially reduced odor emissions. AURI and the Minnesota Soybean Research and Promotion Council are supporting a year-long quantitative research project on using biodiesel as a carrier for preservatives in response to challenges from wood preservative trade association members. Results should be available in the latter half of 2011. For further information see http://tinyurl.com/woodpreserv.

■■■

AMG Bioenergy Resources Holdings Ltd. (Calgary, Alberta, Canada) signed a Letter of Intent with China Zhejiang Biodiesel Co. Ltd. (CZBC) to acquire the eucalyptus and jatropha plantation assets that CZBC has developed in Guangdong province, Southern China. AMG will initially acquire these plantation assets for an amount up to CAD2.6 million, being approximately 145 and 330 hectares, respectively, in size, and subsequently further develop them into a 400 hectare plantation. The Eucalyptus

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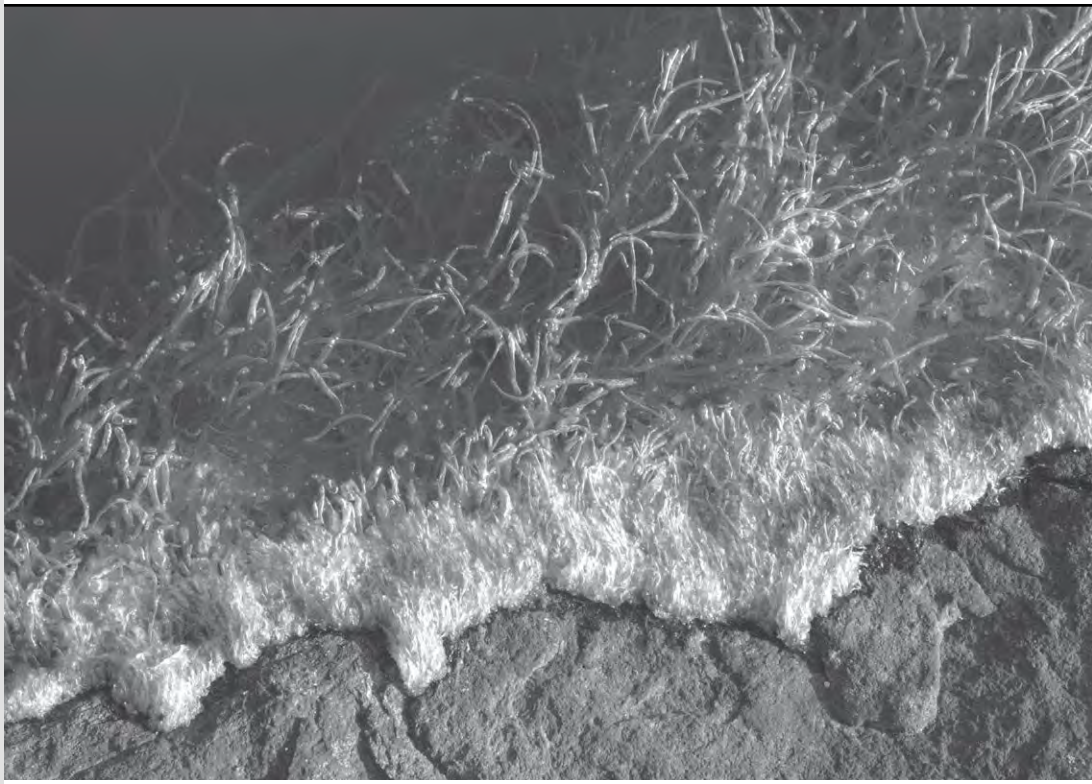
Biofuels News



ALGAE

Algal fuels: If not now, when?

The Energy Biosciences Institute (EBI) at the University of California-Berkeley (USA) released a 178-page report entitled "A realistic technology and engineering assessment of algae biofuel production" in October 2010. The authors—T.J. Lundquist, I.C. Woertz, N.W.T. Quinn, and J.R. Benemann—project that developing cost-competitive algae biofuel production will require much more long-term research, development, and demonstration than has heretofore taken place. Meanwhile, several nonfuel applications of algae may help the new industry gain a foothold on success.

In a report summary presented by EBI (http://tinyurl.com/algaeHowFast), Quinn and Lundquist wrote, "Even with relatively favorable and forward-looking process assumptions (from cultivation to harvesting to processing), algae oil production with microalgae cultures will be expensive and, at least in the near- to mid-term, will require additional income streams to be economically viable." Their conclusions stem from a detailed techno-economic analysis of algal biofuels production.

The EBI report focuses on algal biofuels produced in conjunction with wastewater treatment as a promising cost-effective strategy for fast development of a practical production process. Wastewater provides water and nutrients, and the use of wastewater provides the potential for income from the treatment service provided.

Some of the biological and engineering problems to be solved include (i) the ability to cultivate stable algal cultures under outdoor conditions while achieving both high productivities and oil content, (ii) the capacity to increase the volume of algal oil produced per unit of surface area per year, (iii) the ability to grow oil-rich algal strains that are biologically competitive with contaminating wild species and that consistently grow well in various climates, (iv) development of low-cost harvesting and oil extraction methods, and (v) ways to deal with the biomass remaining after oil extraction.

Plantation asset, which is located within the same area as the Jatropha Plantation asset and is being established as a source of raw material for the renewable forestry resource sector, has been identified by the company as another source of operational revenue and cash flow. AMG believes that acquiring the already-established plantation assets will reduce its financial risk in developing a jatropha business and allow the company to achieve operational revenues and cash flow in a shorter period of time.

■■■

Renewable diesel production is under way at the Dynamic Fuels plant in Geismar, Louisiana, USA (see *inform 21*:559, 2010). Non-food-grade animal fats and greases are being converted to fuel, according to officials from Syntroleum Corporation (Tulsa, Oklahoma, USA) and Tyson Foods (Springdale, Arkansas, USA), who are 50:50 owners of the joint venture. As of mid-November, renewable diesel was being manufactured with a cloud point as low as –26°F (–32°C) and cetane numbers as high as 88. All of ASTM D975 specifications for diesel fuel were being met.

■■■

On November 2, Archer Daniels Midland Company (ADM; Decatur, Illinois, USA) announced it will construct a second biodiesel plant in Brazil. The facility, to be built in Joaçaba, Santa Catarina, will be adjacent to existing ADM soybean crushing and refining facilities. With an annual biodiesel production capacity of 164,000 metric tons, the plant will increase ADM's biodiesel capacity in Brazil by more than 50%. Construction will begin in March 2011 and is expected to be completed during the first half of 2012.

■■■

GreenGold Ray Energies (Corpus Christi, Texas, USA) has completed jatropha plantations on approximately 100,000 acres (40,000 hectares) in the Mindanao region of the Philippines. In all, the company's holdings include 1.7 million acres, but the area converted to jatropha had been vacant. Planting this new crop will afford local farmers income from the jatropha seeds, which serve as feedstock for biodiesel, as well as reduce the risk of erosion on the once-vacant lands. ■

In the report summary, the EBI scientists concluded that "algal oil production will be neither quick nor plentiful—10 years is a reasonable projection for the R, D & D (research, development, and demonstration) to allow a conclusion about the ability to achieve, at least for specific locations, relatively low-cost algal biomass and oil production."

The full report may be downloaded in pdf format from www.ascension-publishing.com/BIZ/Algae-EBI.pdf.

In a follow-up critique of the EBI report, BiofuelsDigest.com (http://tinyurl.com/EBIcritique) noted that there was no "forward modeling" on how fast costs will come down. Second, the EBI authors chose to discount down to zero the value of by-product proteins, suggesting that the market for proteins would be saturated before significant quantities of biofuel were produced. In turn, Biofuels Digest suggested such discounting was unrealistic. Third, alternative routes to value were not considered, including growth of heterotrophic algae (e.g., Solazyme, South San Francisco, California, USA), ethanol production from cyanobacteria in photobioreactors (e.g., Algenol, Bonita Springs, Florida, USA), and growth of other aquatic organisms such as duckweed (e.g., PetroAlgae, Melbourne, Florida). Finally, venture capital funds tend to look unfavorably at a 10-year timeline, whereas larger companies and governmental organizations may be able to take a somewhat longer view.

Baking soda boosts algae oil production

Montana State University (MSU; Bozeman, USA) researchers report that addition of baking soda ($NaHCO_3$) in laboratory-scale experiments (~1 liter) to the growth medium of two different kinds of brown algae and one type of green algae boosted the amount of oil they produced. Keith Cooksey, research professor emeritus in microbiology at MSU, said baking soda may give algae extra CO_2 at a key point in their life cycle. If baking soda is added too early or too late, the algae do not respond. But when supplied at the right time in the growth cycle, algae produce two to three times the oil in half the time of conventional growth models. MSU is now offering the technology for licensing. For further information see http://tinyurl.com/MSUalgae.

ETHANOL

Coalition sues EPA over E15

On November 9 a coalition including the Grocery Manufacturers Association, the American Meat Institute, the National Meat Association, the National Council of Chain Restaurants, the National Turkey Federation, the National Chicken Council, the National Pork Producers Council, the Snack Food Association, and the American Frozen Food Institute filed suit with the US Court of Appeals against the Environmental Protection Agency (EPA) over its approval for the use of E15 (15% ethanol plus 85% gasoline) in vehicles made in 2007 or later (see *inform 21*:761, 2010).

According to *Enhanced Online News* (http://tinyurl.com/EPAFoodE15), the coalition said, "In approving E15, which is compatible only with certain, later-model automobile and other types of engines, the EPA has clearly exceeded its authority under the Clean Air Act. The EPA has unlawfully interpreted the statute to achieve a particular outcome. The agency has a legal obligation to adhere to the letter and spirit of the Clean Air Act and, in this case, has failed to do so."

To date, most of the ethanol used for fueling vehicles in the United States is manufactured from corn, which is also fed to poultry, cattle, and hogs. National Chicken Council Senior Vice President and Chief Economist Bill Roenigk said, "With corn supplies very tight and ending inventories [for 2010] projected to be precariously low, corn costs continue to head toward historical highs. Any unnecessary and arbitrary action by the government that would exacerbate the situation for traditional corn users is very questionable and an unwise move at this time."

J. Patrick Boyle, president of the American Meat Institute, said, "This will put pressure on the meat and poultry supply, which will lead to higher food prices for consumers."

New way to engineer fast plant growth?

In a *Cell* article (*143*:606–616, 2010), Philip Benfey and co-workers, of the Duke Institute

Near-Term Opportunities for Biorefineries Symposium

The Center for Advanced BioEnergy Research, University of Illinois, Urbana-Champaign, USA (UIUC), held a conference entitled "Near-Term Opportunities for Biorefineries Symposium" on October 11–12, 2010. Much of the program was devoted to considering the maturation of the US biofuels industry with respect to corn starch and the effect of the US Renewable Fuels Standards on the ethanol industry.

Technologies that improve biofuel production efficiency, reduce water use, and reduce carbon footprint were a major focus of the symposium. Kishore Rajagopalan (UIUC) reviewed efforts to reduce water consumption in dry grind ethanol plants, and AOCS member Vijay Singh (UIUC) compared wet and dry fractionation of corn prior to a dry grind ethanol process (see *inform 18*:658–660, 2007). Gary Reed (Eastern Illinois University, Charleston) presented the challenges the University is encountering in replacing a 1925 coal boiler with a biomass gasification plant. About 27,000 wet tons of biomass (such as wood chips and miscanthus) will be needed annually to supply heat/steam to the campus of 12,000 students. Hans Foerster presented information about the enzymes Genencor (Rochester, New York, USA) produces for hydrolyzing starch to ethanol and cellulose to ethanol.

Another segment of the program considered strategies to increase the profitability of corn starch ethanol and several advanced biofuels. AOCS member Robert Moreau (Eastern Regional Research Center, US Department of Agriculture, Agricultural Research Service, Wyndmoor, Pennsylvania) discussed some of the higher-value co-products that can be obtained during the conversion of corn to ethanol, such as gluten feed and gluten meal, DDGS (distillers' dried grains and solubles), carotenoid pigments (e.g., lutein and zeaxanthin), and zein as well as corn oil and corn fiber oil. According to Ned Harrison of the startup company Tetravitae Bioscience (Chicago, Illinois), his company is planning to commercialize the production of *n*-butanol and acetone, using modified dry-grind ethanol plants already in existence. Tetravitae will use proprietary fermentation technology developed by the team of Hans Blaschek at UIUC. Bob Randle of Genera Enegery LLC (Knoxville, Tennessee, USA) outlined the procedures Genera and DuPont-Danisco Cellulosic Ethanol are establishing in Vonore, Tennessee, to produce ethanol on a commercial scale from the cellulose in switchgrass.

Other cellulosic crops that can be considered for energy production, especially those that can grow on set-aside Conservation Reserve Program acres, were presented by D.K. Lee (UIUC). Kent Rausch (UIUC) spoke about his research on using membranes and other techniques to minimize fouling and reduce energy consumption in a dry grind ethanol plant. Mike Cecava of Archer Daniels Midland (ADM; headquartered in Decatur, Illinois) discussed experiments ADM has carried out in South Dakota on the parameters influencing the harvest, handling, and storage of corn stover in preparation for cellulosic ethanol production.

A theme running throughout the symposium was the impact of US biofuels policy on the corn and biomass-to-ethanol industries. For further information see http://bioenergy.illinois.edu/news/biorefinery.html. ■

for Genome Sciences & Policy (Durham, North Carolina, USA), presented data indicating that tinkering with a single gene may give perennial grasses more robust roots and speed up the timeline for creating biofuels.

Perennial grasses, such as switchgrass and miscanthus, are being developed for use as biofuel feedstocks. They can be harvested repeatedly, but only after the root system has become established, two or three years after planting.

Benfey's team identified genes that become active when cells stop dividing and start taking on the characteristics of the mature, adult cell they are to become. Using the familiar *Arabidopsis* plant and then screening mutant lines, they found a transcription factor, UPBEAT1 (UPB1), that controls the gene expression of peroxidases. Furthermore, they showed that peroxidases control the balance of free radicals in the root between the zone of cell proliferation and the zone of cell elongation, where differentiation begins.

By experimentally disrupting UPB1 activity in the plant root, they found the balance of free radicals was altered such that cells delayed their differentiation and continued growing. Those plants ended up with faster-growing roots, having more and larger cells. When UPB1 activity was artificially increased, the growth of plant roots slowed.

UPB1 appears to act independently of plant hormones that play well-known roles in the balance between cell division and differentiation.

Monsanto (St. Louis, Missouri, USA) is working with Benfey's startup company, GrassRoots Biotechnology, Inc., to develop this idea (http://monsanto.mediaroom.com/index.php?s=43&item=684).

GENERAL

Economic effects of increased US biofuels usage

The US Department of Agriculture Economic Research Service released a report entitled "Effects of increased biofuels on the U.S. economy in 2022" in October (downloadable at www.ers.usda.gov/publications/err102). According to the report, "Diversifying the Nation's energy supply is one of the primary means for providing long-term energy security. A diverse energy portfolio can also have far-reaching economic impacts by reducing dependence on foreign oil. The Energy Independence and Security Act of 2007 (EISA) mandates a Renewable Fuel Standard (RFS-2) under which the United States will annually produce 36 billion gallons [136 billion liters] of biofuel, primarily ethanol, by 2022. Transitioning away from nonrenewable fossil fuels (such as petroleum oil) without placing additional burden on the US economy is a long-term challenge."

The issue, according to the report, is this: "The RFS-2 mandate is accompanied by incentives in the form of tax credits to ethanol blenders. Tax credits, however, could add to taxpayers' costs and place a greater burden on the economy. This study examines the potential effects of the RFS-2 on the US economy as measured by gross domestic product (GDP), household income and consumption, price and quantity of energy fuels, and agricultural production and trade. We compare the U.S. economy in 2022 with and without the RFS-2."

Some of the conclusions reached in the report are these: (i) The RFS-2 could benefit the US economy if biofuel production technology advances and petroleum prices continue to rise as projected, and (ii) By substituting domestic biofuels for imported petroleum, the United States would pay less for imports overall and receive higher prices for exports, providing a gain for the economy from favorable terms of trade.

JATROPHA

SG Biofuels, Bunge sign biofuel partnership

SG Biofuels (San Diego, California, USA) announced the establishment of a strategic partnership with Bunge North America (St. Louis, Missouri, USA) on November 10. The purpose is to research and develop a model to process jatropha seeds into a biofuel feedstock.

Flint Hills Resources (Wichita, Kansas, USA), a wholly-owned subsidiary of Koch Industries, and Life Technologies Corp. (Carlsbad, California), have also joined with SG Biofuels in the past year to develop jatropha as a source for cost-effective sustainable crude plant oil.

In a similar fashion, Bunge has also signed agreements with Amyris (Emeryville, California) and invested in Solazyme (South San Francisco, California) as part of its plan to expand its oil, sugarcane, and ethanol interests. In late 2009 Bunge announced its purchase of the ethanol interests of Usina Moema Participaçöes, a Brazilian sugar-holding company, for $1.5 billion. That purchase boosted Bunge to one of the largest ethanol producers in the world.

BUTANOL

EPA lists Gevo's isobutanol

The first isobutanol to clear registration with the US Environmental Protection Agency (EPA) as a fuel additive was announced on November 11. Gevo, Inc. (Englewood, Colorado) believes isobutanol is a very attractive alcohol fuel gasoline blendstock. It has higher energy density than ethanol and lower Reid vapor pressure (RVP). RVP is regulated by the EPA under the Clean Air Act. Low RVP gasoline blends are required in many urban areas in order to comply with state-level ozone attainment plans. Under the Renewable Fuel Standard 2, isobutanol qualifies for 30% more renewable fuel value or Renewable Identification Number (RIN) than ethanol for obligated parties.

Isobutanol has characteristics that make it an attractive alternative to other gasoline components such as alkylate and aromatics, which should enable refiners to modify their gasoline formulation in ways that increase their operating margins. It can also be used directly as a specialty chemical, as a jet fuel blendstock, and through conversion into plastics, fibers, rubber, and other polymers.

Gevo will soon begin the retrofit of its first 22 million gallons per year (MGPY; 83 million liters per year) ethanol facility in Luverne, Minnesota, to produce 18 MGPY of isobutanol. Production is expected to begin in early 2012. The company also plans to expand its isobutanol production via the retrofit of additional ethanol facilities over the next few years.

Cobalt, US Navy to develop butanol for jet, diesel fuel

Cobalt Technologies announced the signing in November of a Cooperative Research and Development Agreement (CRADA) with the US Navy to develop technology for the conversion of biobutanol into full-performance jet and diesel fuels. Under the CRADA, a team of scientists from Cobalt (Mountain View, California, USA) and the US Naval Air Warfare Center Weapons Division (NAWCWD; China Lake, California) will investigate the optimum conditions for the conversion of Cobalt's *n*-biobutanol into jet fuel, while ensuring the process minimizes time, cost, and energy consumption. More specifically, the combined team will optimize dehydration chemistry for the conversion of bio-*n*-butanol to 1-butene, followed by oligomerization of the biobutene into jet fuel, based on a process developed at NAWCWD. Additional work will focus on converting the biobutanol into butyl ether, which the NAWCWD has shown can be mixed with *n*-butanol and other compounds to create a viable drop-in diesel fuel replacement.

BIODIESEL

Biodiesel plant for Alberta, Canada

TPA Inc., a biodiesel producer, process technology provider, and algal biodiesel research facility located in Royal Oak, Michigan, USA, has assembled at its Michigan site a modular biodiesel plant intended for relocation to Alberta, Canada. The plant is able to convert a variety of materials, including animal fats, soybean, corn, and canola, into biodiesel.

TPA Inc. will be a partner in the first project for which this plant is used in Alberta and get to showcase its system there.

According to the *Edmonton Journal* (November 16), this first project will likely be in association with All Peace Industries, a start-up company founded in 2007 by farmer Stan Peacock in High Prairie, Alberta. Four sites in northern Alberta are being considered.

Peacock's goal is to provide an outlet for the large amount of off-grade canola that presently goes into animal feed in that part of Canada. His idea is that the oil contained within the canola could more profitably be turned into biodiesel.

He also is working to convince Alberta farmers to grow pennycress (*Thlaspi arvense*, or stinkweed) as a feedstock for biodiesel. Besides producing oil, pennycress can accumulate contaminants such as lead, zinc, arsenic, and aluminum from the soil and isolate them in its stem. This property would be especially beneficial in areas of Alberta having clay soils, where aluminum causes acid soil conditions that lead to reduced yields.

At present, no biodiesel is being produced in Alberta that is suitable for the very cold winters it experiences, even though its green fuel standards call for all diesel sold in the province to contain 2% biodiesel by 2011. Peacock is promoting canola and pennycress as inexpensive feedstocks to fuel the province. Estimates are that the TPA/All Peace Industries project will cost $30 million and be able to produce 66 million liters of biodiesel a year. ■

Health & Nutrition News

Briefs

An interview with New York University (New York, USA) Professor Marion Nestle about "conflicts of interest between food companies and academics, the difference between food products and food, and the problem with pomegranates" appeared in the November–December 2010 issue of the journal *Academe*. According to Nestle, conflicts of interest in the food sciences "are rampant but rarely recognized as such," with many universities "actively" seeking support from food and beverage companies. The result is research that lacks "appropriately rigorous controls," she suggests. The interview is available online at http://tinyurl.com/NestleAcademe.

■■■

A small randomized panel study published in the *Canadian Medical Association Journal* (doi: 10.1503/cmaj.092128) found that by adding monounsaturated fats to a low-cholesterol diet of persons with mild to moderate cholesterol levels, high-density lipoprotein (HDL) increased by 12.5% and low-density lipoprotein (LDL) decreased by 35%. The two-month trial, led by David J.A. Jenkins of the University of Toronto, involved 24 participants (17 men and seven postmenopausal women) with mild to moderate hypercholesterolemia and no history of cardiovascular disease, high blood pressure, or diabetes.

■■■

Omega-3 fatty acid intake is inversely associated with periodontitis (inflammation of the gums) in the US population, according to research published in the *Journal of the American Dietetic Association* (*110*:1669–1675, 2010). The study found that a moderate dietary intake of the omega-3 long-chain polyunsaturated fatty acids DHA (docosahexaenoic acid) and EPA (eicosapentaenoic acid) was associated with a decreased prevalence of periodontitis of up to 20%. The research, led by Asghar Z. Naqvi of the Harvard Medical School (Cambridge, Massachusetts, USA), involved over 9,000 adults who participated in NHANES (National Health and Nutrition Examination Surveys) between 1999 and 2004 who had received dental examinations. ■

High α-carotene levels and long life

High blood levels of the antioxidant α-carotene appear to be associated with a reduced risk of dying over a 14-year period, according to a study in the *Archives of Internal Medicine* (doi: 10.1001/archinternmed.2010.440).

Oxygen-related damage to DNA, proteins, and fats may play a role in the development of chronic diseases such as heart disease and cancer, according to background information in the article. Carotenoids—including β-carotene, α-carotene, and lycopene—are produced by plants and microorganisms and act as antioxidants, counteracting this damage. Carotenoids in the human body are obtained mainly through eating fruits and vegetables rich in the nutrients, or through antioxidant supplements.

Although studies suggest eating more fruits and vegetables is associated with lower risk of chronic diseases, randomized controlled trials have not shown any benefit for β-carotene supplements, the authors note. "Therefore, carotenoids other than β-carotene may contribute to the reduction in disease risk, and their effects on risk of disease merit investigation," the authors write.

Chaoyang Li of the Centers for Disease Control and Prevention (Atlanta, Georgia, USA) and colleagues assessed the relationship between α-carotene and the risk of death among 15,318 adults age 20 and older who participated in the Third National Health and Nutrition Examination Survey Follow-up Study. Participants underwent a medical examination and provided blood samples between 1988 and 1994, and were followed through 2006 to determine whether and how they died.

Over the course of the study, 3,810 participants died; the risk for dying was lower with higher levels of α-carotene in the blood. Compared with individuals with blood α-carotene levels between zero and one microgram (μg) per deciliter (dL), the risk of death during the study period was 23% lower among those who had concentrations between 2 and 3 μg/dL, 27% lower with levels between 4 and 5 μg/dL, 34% lower with levels between 6 and 8 μg/dL, and 39% lower with levels of 9 μg/dL or higher.

Higher α-carotene concentration also appeared to be associated with lower risk of dying from cardiovascular disease or cancer

individually, and of all other causes. "The association between serum α-carotene concentrations and risk of death from all causes was significant in most subgroups stratified by demographic characteristics, lifestyle habits, and health risk factors," the authors write.

α-Carotene is chemically similar to β-carotene but may be more effective at inhibiting the growth of cancer cells in the brain, liver, and skin, they note. "Moreover, results from a population-based case-control study of the association between the consumption of fruits and vegetables and risk of lung cancer suggest that consumption of yellow-orange (carrots, sweet potatoes or pumpkin and winter squash) and dark-green (broccoli, green beans, green peas, spinach, turnip greens, collards, and leaf lettuce) vegetables, which have a high α-carotene content, was more strongly associated with a decreased risk of lung cancer than was consumption of all other types of vegetables," the authors write.

The results support increasing fruit and vegetable consumption as a way of preventing premature death and suggest a need for clinical research into the health benefits of α-carotene, they conclude.

DHA limits brain damage

A new study in rats suggests that docosahexaenoic acid (DHA), the long-chain polyunsaturated fatty acid found in fatty, cold-water fish, can protect brain tissue and promote recovery in an experimental model of acute ischemic stroke, even when treatment is delayed by up to five hours. These findings not only target a new stroke treatment approach but also provide vital information about the length of the therapeutic window. The research, which was funded by the US National Institutes of Health, appeared in *Translational Stroke Research* (online at doi: 10.1007/s12975-010-0046-0).

Ischemic strokes result from loss of blood flow to an area of the brain because of a blockage such as a clot or atherosclerosis (narrowing of the arteries). The damage includes an irreversibly injured core of tissue at the site of the blockage. The area of tissue surrounding the core, called the penumbra, is also damaged but potentially salvageable. The penumbra has a limited life span and appears to undergo irreversible damage within a few hours unless blood flow is reestablished and neuroprotective therapy is administered. A cascade of chemicals floods the tissue along with restored blood flow, including damaging free radicals and pro-inflammatory enzymes that can cause further damage and cell death.

DHA is an essential omega-3-fatty acid with potent anti-inflammatory effects. Since inflammation is at the root of many chronic diseases, DHA treatment has been demonstrated to have beneficial effects in patients with coronary heart disease, asthma, rheumatoid arthritis, osteoporosis, sepsis, cancer, dry eye disease, and age-related macular degeneration; but its potential benefit in stroke had not been known.

"We are just now beginning to understand the significant impact of omega-3 essential fatty acids on stroke," notes study leader Nicolas Bazan, director of the Neuroscience Center of Excellence at the Louisiana State University Health Sciences Center (LSUHSC; New Orleans, USA). "There is no simple solution just yet, but each new discovery brings us closer to defeating stroke and other debilitating neurodegenerative diseases."

To determine how DHA might be effective in stroke treatment and recovery, the LSUHSC research team administered either DHA or saline intravenously at three, four, five, and six hours after the onset of stroke. Magnetic resonance imaging showed that neurological deficits were reduced by the administration of DHA. DHA treatment reduced swelling and facilitated neurobehavioral recovery. The volume of the area of destroyed tissue was reduced by an average of 40% when DHA was administered at three hours, 66% at four hours, and 59% at five hours. Further analysis showed it triggered production of neuroprotectin D1 (NPD1), a naturally occurring neuroprotective molecule in the brain derived from DHA and discovered by Bazan. Not only did DHA treatment salvage brain tissue that would have died, its repair mechanisms rendered some areas indistinguishable from normal tissue by seven days.

Why fatty diets during pregnancy make kids obese

What a mother eats when she is pregnant may make her offspring obese or overweight by altering the function of genes that regulate circadian rhythm, according to a study published online in the *FASEB Journal* (doi: 10.1096/fj.10-172080). In the report, pregnant primate females consuming a high-fat diet altered the function of fetal genes that regulate circadian rhythm (including appetite and food intake) during development. The offspring also had nonalcoholic fatty liver disease.

"It is our hope that our studies will continue to guide research aimed at understanding the pivotal role that maternal health plays

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People News/ Inside AOCS

Moreau appointed to Codex Committee on Fats and Oils

AOCS member **Robert Moreau** of the Eastern Regional Research Center, Agricultural Research Service, US Department of Agriculture (ARS/USDA) in Wyndmoor, Pennsylvania, was nominated by the Office of the Under Secretary for Research, Education and Economics, ARS/USDA, as the US Alternate Delegate to the Codex Alimentarius Commission's Committee on Fats and Oils. The Codex Policy Committee approved Moreau's nomination, and he has assumed his duties. Moreau will initially work with the committee to develop standards for edible oils such as olive oil.

Moreau replaces Kathy Warner, formerly with the National Center for Agricultural Utilization Research, ARS/USDA, Peoria, Illinois, on this committee.

The Codex Alimentarius Commission was created in 1963 by the Food and Agriculture Organization (FAO) and the World Health Organization (WHO) of the United Nations to develop food standards, guidelines, and related texts such as codes of practice under the Joint FAO/WHO Food Standards Program. The main purposes of this program are protecting health of consumers, ensuring fair trade practices in the food trade, and promoting coordination of all food standards work undertaken by international governmental and nongovernmental organizations.

Johnson recognized

AACC International [American Association of Cereal Chemists] presented its Applied Research Award to former AOCS president **Larry Johnson** during its annual meeting, held October 24–27, 2010, in Savannah, Georgia, USA.

Darzins moves to DuPont

Al Darzins, a principal group manager at the US National Renewable Energy Laboratory (NREL; Golden, Colorado), has accepted a senior management position at DuPont, working out of their Experimental Station in Wilmington, Delaware, according to BiofuelsDigest.com (November 1, 2010).

Darzins joined NREL in 2005 and has led research on the use of algae as a feedstock for biofuel. He was quoted as saying, "The decision to leave NREL after re-establishing their microalgal research program is one of the most difficult things I have had to do in my career." He added, "I foresee great things coming out of the [algal] industry in the coming years."

In Memoriam

RHONDA GAYL COWAN AMENDT

Rhonda Cowan Amendt died November 12, 2010, in Farmville, North Carolina, USA at the age of 37. At the time of her death, she was employed as a research chemist with U.N.X. Inc. (Greenville, North Carolina), a company that supplies detergents and related chemical products to the laundry, institutional, and restaurant fields.

She received her bachelor of science degree in chemistry at Barton College, Wilson, North Carolina, and joined AOCS in 2004. As part of her work with U.N.X., she was a member of the Textile Rental Services Association of America, serving on committees related to cleaning.

Amendt is survived by her husband Scott Amendt and her son Grayson Amendt.

Svensson to head Technical Products & Feed, AAK

AAK, headquartered in Malmö, Sweden, announced in October 2010 that **Bo Svensson** has been appointed permanent manager of the business area Technical Products & Feed. He will continue as site manager for operations in Karlshamn, and he will be part of AAK's Group Management. He has had an extensive career with the AAK Group, having worked with both commercial and communications issues. Svensson's education is in food engineering. Svensson will be based in Karlshamn.

Van der Broek becomes COO at Bayer CropScience

Lykele van der Broek. Photograph courtesy of Bayer CropScience AG.

Sandra E. Peterson. Photograph courtesy of Bayer CropScience AG.

Effective November 1, 2010, **Lykele van der Broek** became chief operating officer (COO) for Bayer CropScience (Monheim, Germany). His responsibilities include further developing customer-based solutions in the company's regional crop protection and bioscience operations.

Before assuming the COO position, van der Broek was head of the animal health division at Bayer Health Care. The four existing crop protection regions—North America, Latin America, Asia Pacific, and Europe & Tamecis [Turkey, Africa, Middle East and Commonwealth of Independent States]—as well as the bioscience business unit will report to van der Broek.

In related news, New York-born **Sandra E. Peterson** became chief executive officer of Bayer CropScience on October 1.

New president at Danforth Center

James C. Carrington was named as the next president of the Danforth Plant Science Center on November 5. The Danforth Center is the world's largest independent research institute dedicated to plant science.

Carrington will succeed interim President **Phil Needleman**, who has led the Center since October 2009 when the founding President **Roger N. Beachy** was appointed the first director of the National Institute of Food and Agriculture at the US Department of Agriculture (*inform 20*:709, 2009).

At present, Carrington is the director of the Center for Genome Research and Biocomputing at Oregon State University (Corvallis, USA). He is internationally recognized for his research on gene silencing, the functions of small RNA, and virus-host interactions.

Carrington takes office on May 1, 2011.

Sapphire Energy creates role for Venardos

On November 1, Sapphire Energy (San Diego, California, USA) announced the appointment of **Dean Venardos** to the newly created position of vice president, operations. He has over 30 years of experience in the oil industry in refinery operations and processes, with Western Refining, BP, and Amoco Oil.

According to Sapphire Energy president **C.J. Warner**, Venardos will oversee operations for all of Sapphire Energy's facilities, including the Integrated Algal BioRefinery in Columbus, New Mexico, and the Las Cruces, New Mexico, research and development facility.

Sapphire Energy is a leading innovator in creating algae-based fuel.

Praj Industries appoints Nabar

Gajanan Nabar was appointed chief executive officer (CEO) and managing director (MD) of Praj Industries, Mumbai, India, on November 15. Praj provides innovative solutions, process equipment, and systems to bioethanol, biodiesel, brewery, and wastewater treatment plants. Nabar's previous management experience includes Praxair India and Monsanto India.

Outgoing CEO and MD **Shashank Inamdar** will remain a non-executive director and non-executive vice-chairman on the board.

Vilsack appoints 34 to United Soybean Board

US Secretary of Agriculture **Tom Vilsack** announced the appointment of 34 members and two alternate members to the United Soybean Board on November 5, 2010. All appointees will serve three-year terms, which began November 5.

Appointed Soybean Board members are: **Russell M. Smith**, Arkansas; **Richard F. Carlisle**, Delaware.; **Richard J. Stern, Jr.**, Eastern Region; **Philip E. Bradshaw** and **Sharon L. Covert**, Illinois; **James E. Schriver** and **Roger W. Hadley, II**, Indiana.; **Delbert J. Christensen**, Iowa; **Robert N. Haselwood** and **Ronald R. Ohlde**, Kansas; **Jules K. Bordelon**, Louisiana; **Granville S. Moore**, Maryland; **Mary Lou Smith** and **James E. Wilson**, Michigan; **James B. Willers** and **Robin H. Hanks**, Minnesota; **Marcus S. Curtis**, Mississippi; **Richard L. Fordyce**, Missouri; **Gregg A. Fujan** and **Michael S. Thede**, Nebraska; **Russell R. Carpenter**, New York; **Jacob J. Parker**, North Carolina; **Joel M. Thorsrud** and **Jared C. Hagert**, North Dakota; **Dale L. Profit** and **Keith L. Kemp**, Ohio; **Larry E. Davis**, Oklahoma; **William L. Beam**, Pennsylvania; **Douglas R. Hanson**, South Dakota; **John H. Dodson**, Tennessee; **Keith M. Dunn**, Virginia; **Ross A. Waterman**, Western Region; **Robert A. Derr** and **Nancy Kavazanjian**, Wisconsin.

Alternate members appointed are: **Dallas R. Wright**, Delaware; and **Todd O. DuMond**, New York.

The 69-member board is authorized by the Soybean Promotion, Research and Consumer Information Act. The Secretary selected the appointees from soybean producers nominated by Qualified State Soybean Boards.

These appointments follow the 17 plus one alternate made on February 12 (*inform 21*:247, 2001).

Simon becomes president/CEO of Heliae

Heliae Development LLC, of Gilbert Arizona, USA, announced the appointment of **Dan Simon** as president and chief executive officer of the company on November 1. Before coming to Heliae, Simon was the co-founder, chief operating officer, and executive vice president of BioFuel Energy Corp., a biofuel producer. Additionally, he has served as co-founder and chief operating officer of Biofuel Solutions, and founder and president of Renewable Energy Development Company. Prior to 2004, Mr. Simon served in various leadership positions for multinational companies building portfolios of manufacturing, technology, and energy-related enterprises in over 17 countries throughout the Americas, Europe, and Asia-Pacific.

In his first comments, Simon said, "Our goal is to transition Heliae's game-changing technology in algae production and processing from demo-scale into commercial-scale, thus becoming a leader in the production of algae for high value food products, biochemicals and alternate fuels." The company is pursuing algal strain development, refinement of proprietary photobioreactor design, and scaled testing of a patent-pending extraction process.

New leadership at NBB

Members of the National Biodiesel Board (NBB; St. Louis, Missouri, USA) trade association selected new leadership on November 17. Officers include **Gary Haer**, chairman, Renewable Energy Group, Inc. (producer); **Ed Ulch**, vice-chair, Iowa Soybean Board (farmer); **Ron Marr**, secretary, Minnesota Soybean Processors (producer); and **Jim Conway**, treasurer, Griffin Industries (producer).

Members elected to the governing board include the officers as well as **Greg Anderson**, Nebraska Soybean Board (farmer); **Ramon**

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2011–2012 AOCS Governing Board candidates

Editor's note: Ballots for the election of the American Oil Chemists' Society Governing Board members were sent to eligible members by mail or email in December. Completed ballots must be received (either electronically or via mail) at AOCS Headquarters (P.O. Box 17190, Urbana, IL 61803-7190 USA) by February 15, 2011. The new officers will be installed during the 102nd AOCS Annual Meeting & Expo in Cincinnati, Ohio, USA, on Tuesday, May 3, 2011.

President Candidate

Erich E. Dumelin (1987): Retired Vice President, Supply Chain Strategy and Technology Foods, Unilever, Zurich, Switzerland.

Education: Diploma and Ph.D., 1975, Food Science, Swiss Federal Institute of Technology (ETH), Zurich, Switzerland.

Previous Employment: Director, Global Technology Unit Spreads and Cooking Products Category, and member, Food Research Management Team, Unilever Foods R & D, Vlaardingen, Netherlands, 1997–2006; technical director, Lipton-Sais (Unilever's foods business in Switzerland with activities in oil milling, oil processing, oil and spreads manufacturing, savory, dressings products, and tea), 1985; head, Industrial Business Unit, 1995; member, Issue Management Team (i.e., GMO), Swiss Food Industry, 1985–1997; production manager, Loders-Croklaan, Silvertown, London, United Kingdom, 1982; oil processing manager, Maple Leaf Monarch, Windsor, Ontario, Canada, 1980; assistant refinery manager, Union Deutsche Lebensmittelwerke, Kleve, Germany, 1979; joined Unilever, Switzerland (with Sais-Astra) in product development, 1977; postdoctoral fellow, Department of Food Science, University of California, Davis, 1975.

AOCS Activities: Vice President, AOCS Governing Board, 2010 to present; member-at-large, AOCS Governing Board, 2006–2010; second vice chairperson, Education and Meetings Steering Committee (EMSC), 2009–2010; second vice chairperson, Financial Steering Committee (FSC), 2007–2008; second vice chairperson, Technical Steering Committee (TSC), 2006–2007 and 2008–2009; chairperson, AOCS Sections Committee, 2007–present; session chairperson, World Conference, Istanbul, 2002 and AOCS Annual Meeting & Expo, 2009; member-at-large, AOCS European Section; contributor and presenter, AOCS conferences, short courses, and workshops focusing on sustainability and renewable energy.

Other: Various papers and presentations in the area of oil and fat technology, sustainability of raw materials and renewable energy resources, e.g., at the Canola Council Annual Convention, Vancouver, 2001; the Roundtable for Sustainable Palm Oil, Kuala Lumpur, 2003; Renewable Energy/Biodiesel Workshop (ISF), Prague, 2005; UNEP meeting, Nairobi; winner, International Lecture Award of the Society of Chemical Industries, UK, 2009; member, Swiss Society of Food Science and Technology, 1970–present; member, Institute of Food Technologists (IFT), 1976–2007.

Research Interests: Sustainability and environmental impact of the total supply chain in foods and renewable energy. Management of the interface between innovation and supply chain processes.

Vice President Candidate

Deland J. Myers (1990): Professor and Director, School of Food Systems, Great Plains Institute of Food Safety, North Dakota State University, 2007–Present.

Education: B.S., 1978, Biology, University of Missouri-Kansas City; M.S. 1981, Food Technology, Iowa State University; 1984, Ph.D., Food Technology, Iowa State University.

Previous Employment: Product Development Scientist, Pillsbury Company, 1984–1987; Senior Product Development Scientist, Pillsbury Company, 1984–1989; Assistant Professor of Food Science, Iowa State University, 1989–1995; Associate Professor of Food Science, Iowa State University, 1995–2003; Professor of Food Science, Iowa State University, 2003–2007.

AOCS Activities: Secretary, AOCS Foundation Board of Directors, 2009–present; chairperson, Education & Meetings Steering Committee, 2005–present; chairperson, Program Committee, 2002–2004; chairperson, 94th AOCS Annual Meeting & Expo, Kansas City, Kansas, 2003; member, Annual Meeting Action Committee, 2000–2004; technical program chairperson, 90th Annual Meeting & Expo, Orlando Florida, 1999; representative, Leadership Canvassing Committee, 1998–1999; associate editor, inform, 1998–2000; chairperson, Protein and Co-Products Division, 1998–2000; vice chairperson, Protein and Co-Products Division, May 1996–98; member, Education and Conferences Administration Committee, 1996–1997; member, Membership Development Committee, 1994–1997; member-at-large, Academia, Protein and Co-Products Section, 1994–1995.

Other: Invited speaker to the following conferences: Corn Derived Ethanol Conference, Peoria, Illinois, 1992; Corn Utilization Conference, St. Louis, Missouri, 1992; Corn Utilization Symposium, Seoul, South Korea, 1992; American Society of Agronomy Annual Meeting, Minneapolis, Minnesota, 1992; AOCS World Conference & Exhibition on Oilseed Technology & Utilization, Budapest, Hungary, 1992; American Seed Trade Association (ASTA) Soybean Seed Research Conference, Chicago, Illinois, 1994; USDA-sponsored Food Marketing Workshop, 1994 Brasov, Romania; Soybean Utilization Conference, Washington, DC, 1994; USDA Food Marketing Workshop, 1996, Pardubice, Czech Republic; Eastern Region of the Forest Products Society, Winnipeg, Manitoba, Canada, 1999; World Soybean Conference, Chicago, Illinois, 1999; World Soybean Research Conference VII, Foz do Iguassu, Brazil, 2004; The Industrial Utilization of Soy Protein and Soybean Industrial Uses Conference in Rio de Janeiro, Brazil, 2006. Proposal reviewer for United States Department of

Agriculture Small Business Innovation Research, United States Department of Agriculture National Research Initiative Competitive Research Program, United Soybean Board, *Journal of Agriculture and Food Chemistry*, *Journal of the American Oil Chemists' Society*, *Journal of Industrial Crops and Products*, *Cereal Chemistry*, and *Journal of Food Chemistry*. Member of Institute of Food Technologists and American Association of Cereal Chemists.

Research Interests: Functionality and utilization of cereal and legume proteins in food, industrial nonfood, and feed applications; product development, food safety, strategic planning of organizations.

Candidate Statement: Before I elaborate on my statement as a candidate for Vice President of AOCS, let me first state how humbled and honored I am to be considered for this position. I believe that this position, which ultimately leads to the office of President, carries a tremendous responsibility that I will take very seriously. Moreover, I believe that the position of Vice President will provide me with the ultimate opportunity to give back to AOCS what it has given me as a member for over 20 years including: leadership development, technical knowledge, and a venue to network with colleagues from around the world. My platform, if I am chosen for this position, will be to use the authority and influence of the office to lead and support efforts to continue to grow the influence and awareness of AOCS throughout industry, government, and academia. To meet this goal, I plan to focus on three key areas: expanding and encouraging leadership development, continuing to expand the use of new communication technologies, and identifying new markets and expanding current markets for AOCS products and services.

Expand and Encourage Leadership Development. I attended my first AOCS meeting in Baltimore in 1990. As a food scientist I knew of other professional organizations associated with the food industry, but was not aware of the opportunities of being a member of AOCS. My colleague and mentor, Dr. Larry Johnson, brought me to the meeting because of the area of interest that I chose to build my academic career: soy protein utilization. Attending the meeting allowed me to network with other scientists with the same interest. Larry also informed me that AOCS was a very welcoming organization, particularly for new members, and would provide me with the opportunity to grow my professional career through a variety of leadership opportunities. I not only learned that Larry was correct in his characterization of AOCS, but had in fact understated the welcoming attitude and leadership opportunities available. I was enthusiastically welcomed at the meeting and was immediately invited to participate in the Protein and Co-Products Division. With training and encouragement from a number of AOCS members, my involvement in the division led me to become an active member in the AOCS organization for now over 20 years in numerous leadership positions including: Protein and Co-Products Division Chairperson, Technical Chairperson of the Annual Meeting & Expo in Orlando in 1999, Chairperson of the Annual Meeting & Expo in Kansas City in 2003, Annual Meeting Program Chairperson, and now a member of the Governing Board as the Chairperson of the Education and Meetings Steering Committee (EMSC). While learning some of the basic principles of leadership and organizational dynamics, I also learned that AOCS takes great pride in developing their members for leadership, realizing that the organization is only as strong as its members. I want to maintain and enhance this core value of AOCS. I will work with the Governing Board, AOCS staff, and with you, the members, to ensure that we keep professional development as one of our core values, find ways to improve leadership development, and provide more opportunities for members to become leaders in the organization. Through continued leadership development, we will not only grow our membership in numbers, by gaining new and retaining current members, but also continue to develop our membership professionally thereby strengthening the organization.

Continue to Grow the Use of New Communication Technologies. In addition to being a professional science organization, AOCS is an international brand that stands as a resource for reliable and scientifically based technical information, particularly in the chemistry, processing, and utilization of oilseeds, and in surfactant and detergent technology. AOCS has protected and grown this brand with excellent resources including conferences, books, journals, and the development and cataloguing of standard methods. As the technology of providing information becomes more varied and immediate, AOCS will need to continue to leverage these technologies to continue to provide information and services. With the direction and support of the Governing Board, Foundation, and members, there continue to be ongoing efforts to take advantage of these technologies including a revamped website, social networking, digital reproduction of conferences and symposia, and webcasting. These efforts must continue if AOCS is to maintain its level of excellence and respectability in the aforementioned areas of oilseed and surfactant and detergent technologies. As the EMSC Chairperson, I am very aware of the trends, challenges, and opportunities presented to AOCS in the use of these technologies. I will continue to work not only with the EMSC, but all AOCS departments, e.g., Books and Special Publications, Technical Services, Marketing, etc. to ensure that we continue to be aware of these technologies and to identify where they can be implemented to improve all of our services to the membership, customers, and the public at large.

Identify New and Expand Current Markets for AOCS Products and Services. Many of the major issues that confront the world today are very complex and require interdisciplinary approaches to solve them. Issues such as Food Safety and Security, Human Health and Obesity, and Sustainability and the Environment are examples of some of these issues that impact all of us. As the world looks for solutions to these and other issues, leaders will seek to identify experts who can help solve these problems. Because of the diversity of disciplines that represent the membership of AOCS, we have expertise and information resources within the organization that can help solve some of these problems. This presents a tremendous opportunity, and in fact an obligation, for AOCS to expand its services in markets that we have traditionally served, i.e., oilseed production and processing, food processing, detergents and cosmetics, etc., and in new "non-traditional" markets as evidenced by the efforts in biodiesel and nonfood industrial uses that have expanded our knowledge and influence into fuels and specialty industrial chemicals and our research in the metabolism of lipids and proteins that have garnered interest in the medical community. With the help of you, the membership, I will work with AOCS staff to stay abreast of world issues and trends for the purpose of identifying where we have the knowledge and services that can have a positive impact and by doing so, provide an opportunity to gain new members and customers and increase the awareness and good reputation of AOCS.

As I have identified the areas that I would like to focus on while serving in this position, I want to assure you, the membership, that fiscal responsibility will be a high priority. In the years that I have been a member and in the leadership of AOCS, I have witnessed some of the major financial pressures that the organization has faced. There were tough times and very difficult decisions that needed to be made in order to maintain financial stability. Through the efforts of strong leaders in the organization, wise, thoughtful, and yes, some very difficult decisions, were made to ensure financial stability. This resulted

in the stable financial position that AOCS enjoys today. Having witnessed this first-hand and understanding the sacrifices that were made to place us in this position, I want to assure the membership that I take fiscal responsibility very seriously and will work with the board and staff to ensure that we are very thoughtful in our decisions. This does not mean that we will not look for new opportunities; but rather we will do so judiciously as we seek to identify opportunities to create new revenue streams in the areas of education, meetings, technical services, publications, etc., along with building membership that will better our financial position. Moreover, I will work closely with the Foundation to increase our efforts to encourage members and organizations to invest in our efforts to grow the organization through support of some of our initiatives.

Thank you again for the opportunity to be placed on the ballot as a candidate for the position of Vice President of AOCS. By working with and listening to you, the membership, along with working with our excellent AOCS staff, I believe that in the position of Vice President, I will be able to support and lead in the continued growth of the AOCS as a strong, responsive, and reliable resource for scientific expertise and services.

Treasurer Candidate

Timothy G. Kemper (1988): President and CEO, Desmet Ballestra North America, Inc., Marietta, Georgia, USA, the North American regional office of the global Desmet Ballestra Group.

Education: M.B.A., 2001, Indiana Wesleyan University; B.S., 1986, Mechanical Engineering, University of Cincinnati.

Previous Employment: Director of Engineering, The French Oil Mill Machinery Company, 1993–1999; product manager, solvent extraction, The French Oil Mill Machinery Company, 1988–1992; project engineer, The French Oil Mill Machinery Company, 1986–1987; engineering co-op, The French Oil Mill Machinery Company, 1982–1985.

AOCS Activities: Treasurer, AOCS Governing Board, 2008–present; director, AOCS Foundation, 2008–present; member-at-large, AOCS Governing Board, 2006–2007; second vice chairperson, Technical Steering Committee (TSC), 2007; second vice chairperson, Financial Steering Committee (FSC), 2006–2007; annual meeting exhibitor, 1988–present; member, Processing Division, 1994–present; member, Processing Division Board, 1996–2002; session chairperson, AOCS Annual Meeting & Expo, 1996, 1998, 2000; presenter, AOCS Annual Meeting & Expo and short courses, 1988–2010; winner, Outstanding Paper Presentation, 1994, 2000; presenter, World Conference and Exhibition on Oilseed and Vegetable Oil Utilization, Istanbul, Turkey, 2002; presenter, SODEOPEC, Fort Lauderdale, Florida, 2005; presenter, Latin American Section of AOCS (LA-AOCS) Short Course, Rosario, Argentina, 2005; presenter, AOCS Biodiesel Short Course, Vienna, Austria, 2007; organizing committee member and presenter, 2nd International Congress on Biodiesel: The Science and The Technologies, Munich, Germany, 2009.

Other: Registered professional engineer, Ohio, 1993; primary inventor on six United States patents; presenter, Texas A&M Short Courses, 1987–present; member, IOMSA, 1987–present; author, Oil Extraction chapter, *Bailey's Industrial Oil & Fat Products,* Sixth Edition, 2005.

Member-at-Large Candidates

Douglas M. Bibus (1994): Community Faculty, Center for Spirituality and Healing, University of Minnesota; president, Lipid Technologies, LLC; director, Holman Center for Lipid Research, 2002–present.

Education: B.S., 1991, Chemistry, Mankato State University, Mankato, Minnesota; M.S., 1995, nutrition, University of Minnesota, Minneapolis, Minnesota; Ph.D., 1998, Nutritional Biochemistry, University of Minnesota, Minneapolis, Minnesota.

Previous Employment: Assistant Scientist, Scientist, and Fellow, Hormel Institute at the University of Minnesota, 1986–2002; research assistant, Department of Surgery, University of Minnesota, 1990–1997; scientist, Surgical Research, St. Paul-Ramsey Medical Center, 1989–1997.

AOCS Activities: Chairperson, AOCS Awards Administration Committee, 2003–2009; director, AOCS Foundation, 2003–2009; member, Membership Steering Committee (MSC), 2003–present; chairperson, Health and Nutrition Division, 2006–2008; vice chairperson, Health and Nutrition Division, 2004–2006; Division representative to Membership Development Committee, 2002–2004; treasurer, Health and Nutrition Division, 2000–2003.

Other: AOCS Honored Student Award Winner, 1994; member, American Chemical Society; member, International Society for the Study of Fatty Acids and Lipids; awardee, American Chemical Society Award in Analytical Chemistry, 1990 and 1991; scientific advisor, Essential Nutrient Research Corporation (ENRECO); scientific advisor, Coromega, Inc.

Research Interests: The role of essential fatty acids in human and companion animal nutrition; role of omega-3 fatty acids in the down-regulation of the inflammatory response; role of polyunsaturated fatty acids in disease and the role of omega-3 fatty acids in mood disorders; oxidative adaptation of living systems and its implications in atherogenesis; role of polyunsaturated fatty acids in tumor incidence and promotion; neuropsychiatric implications of nutrients in aggression models; analytical techniques for determining lipid and fatty acid content in tissues and food products.

Michael A. Snow (2003): Industrial Director, Bunge North America, St. Louis, Missouri, 2006–present.

Education: B.S., 1980, Agricultural Engineering, Texas A&M University.

Previous Employment: Manager, Oilseed Processing Division, Bunge, 2004–2006; operations support manager, Oilseed Processing Division, Bunge, 2003–2004; facility manager, Council Bluffs, Iowa, Bunge, 1999–2003; facility manager, Cairo, Illinois, Bunge, 1989–1999; project engineering and department manager, Cairo, Illinois, Bunge, 1986–1989; plant engineer and assistant plant manager, Destrehan, Louisiana, Bunge, 1980–1982.

AOCS Activities: Member, Processing Division; Chairperson, Processing Division, 2008–present; vice chairperson, Processing Division, 2006–2008; member, Proven Practices Ad Hoc Committee, 2009; Processing Division presenter and regular technical session co-chairperson.

Agriculture Small Business Innovation Research, United States Department of Agriculture National Research Initiative Competitive Research Program, United Soybean Board, *Journal of Agriculture and Food Chemistry*, *Journal of the American Oil Chemists' Society*, *Journal of Industrial Crops and Products*, *Cereal Chemistry*, and *Journal of Food Chemistry*. Member of Institute of Food Technologists and American Association of Cereal Chemists.

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Candidate Statement: Before I elaborate on my statement as a candidate for Vice President of AOCS, let me first state how humbled and honored I am to be considered for this position. I believe that this position, which ultimately leads to the office of President, carries a tremendous responsibility that I will take very seriously. Moreover, I believe that the position of Vice President will provide me with the ultimate opportunity to give back to AOCS what it has given me as a member for over 20 years including: leadership development, technical knowledge, and a venue to network with colleagues from around the world. My platform, if I am chosen for this position, will be to use the authority and influence of the office to lead and support efforts to continue to grow the influence and awareness of AOCS throughout industry, government, and academia. To meet this goal, I plan to focus on three key areas: expanding and encouraging leadership development, continuing to expand the use of new communication technologies, and identifying new markets and expanding current markets for AOCS products and services.

Expand and Encourage Leadership Development. I attended my first AOCS meeting in Baltimore in 1990. As a food scientist I knew of other professional organizations associated with the food industry, but was not aware of the opportunities of being a member of AOCS. My colleague and mentor, Dr. Larry Johnson, brought me to the meeting because of the area of interest that I chose to build my academic career: soy protein utilization. Attending the meeting allowed me to network with other scientists with the same interest. Larry also informed me that AOCS was a very welcoming organization, particularly for new members, and would provide me with the opportunity to grow my professional career through a variety of leadership opportunities. I not only learned that Larry was correct in his characterization of AOCS, but had in fact understated the welcoming attitude and leadership opportunities available. I was enthusiastically welcomed at the meeting and was immediately invited to participate in the Protein and Co-Products Division. With training and encouragement from a number of AOCS members, my involvement in the division led me to become an active member in the AOCS organization for now over 20 years in numerous leadership positions including: Protein and Co-Products Division Chairperson, Technical Chairperson of the Annual Meeting & Expo in Orlando in 1999, Chairperson of the Annual Meeting & Expo in Kansas City in 2003, Annual Meeting Program Chairperson, and now a member of the Governing Board as the Chairperson of the Education and Meetings Steering Committee (EMSC). While learning some of the basic principles of leadership and organizational dynamics, I also learned that AOCS takes great pride in developing their members for leadership, realizing that the organization is only as strong as its members. I want to maintain and enhance this core value of AOCS. I will work with the Governing Board, AOCS staff, and with you, the members, to ensure that we keep professional development as one of our core values, find ways to improve leadership development, and provide more opportunities for members to become leaders in the organization. Through continued leadership development, we will not only grow our membership in numbers, by gaining new and retaining current members, but also continue to develop our membership professionally thereby strengthening the organization.

Continue to Grow the Use of New Communication Technologies. In addition to being a professional science organization, AOCS is an international brand that stands as a resource for reliable and scientifically based technical information, particularly in the chemistry, processing, and utilization of oilseeds, and in surfactant and detergent technology. AOCS has protected and grown this brand with excellent resources including conferences, books, journals, and the development and cataloguing of standard methods. As the technology of providing information becomes more varied and immediate, AOCS will need to continue to leverage these technologies to continue to provide information and services. With the direction and support of the Governing Board, Foundation, and members, there continue to be ongoing efforts to take advantage of these technologies including a revamped website, social networking, digital reproduction of conferences and symposia, and webcasting. These efforts must continue if AOCS is to maintain its level of excellence and respectability in the aforementioned areas of oilseed and surfactant and detergent technologies. As the EMSC Chairperson, I am very aware of the trends, challenges, and opportunities presented to AOCS in the use of these technologies. I will continue to work not only with the EMSC, but all AOCS departments, e.g., Books and Special Publications, Technical Services, Marketing, etc. to ensure that we continue to be aware of these technologies and to identify where they can be implemented to improve all of our services to the membership, customers, and the public at large.

Identify New and Expand Current Markets for AOCS Products and Services. Many of the major issues that confront the world today are very complex and require interdisciplinary approaches to solve them. Issues such as Food Safety and Security, Human Health and Obesity, and Sustainability and the Environment are examples of some of these issues that impact all of us. As the world looks for solutions to these and other issues, leaders will seek to identify experts who can help solve these problems. Because of the diversity of disciplines that represent the membership of AOCS, we have expertise and information resources within the organization that can help solve some of these problems. This presents a tremendous opportunity, and in fact an obligation, for AOCS to expand its services in markets that we have traditionally served, i.e., oilseed production and processing, food processing, detergents and cosmetics, etc., and in new "non-traditional" markets as evidenced by the efforts in biodiesel and nonfood industrial uses that have expanded our knowledge and influence into fuels and specialty industrial chemicals and our research in the metabolism of lipids and proteins that have garnered interest in the medical community. With the help of you, the membership, I will work with AOCS staff to stay abreast of world issues and trends for the purpose of identifying where we have the knowledge and services that can have a positive impact and by doing so, provide an opportunity to gain new members and customers and increase the awareness and good reputation of AOCS.

As I have identified the areas that I would like to focus on while serving in this position, I want to assure you, the membership, that fiscal responsibility will be a high priority. In the years that I have been a member and in the leadership of AOCS, I have witnessed some of the major financial pressures that the organization has faced. There were tough times and very difficult decisions that needed to be made in order to maintain financial stability. Through the efforts of strong leaders in the organization, wise, thoughtful, and yes, some very difficult decisions, were made to ensure financial stability. This resulted

Patents

Published Patents

Gas-generating additives having improved shelf lives for use in cement compositions

Santra, A.K., and R.J. McKinley, Halliburton Energy Services, Inc., US7722954, May 25, 2010

According to various embodiments, gas-generating additives for use in a cement composition comprise: a gas-generating material at least partially coated with a mixture comprising a fatty acid ester of sorbitan, glycerol, or pentaerythritol and having a shelf life of about 12 months or greater. The gas-generating additives may also include a C_8–C_{18} hydrocarbon. In more embodiments, cement compositions comprise: a gas-generating material at least partially coated with a mixture comprising a fatty acid ester of sorbitan glycerol or pentaerythritol and a C_8–C_{18} hydrocarbon for increasing a shelf life of the gas-generating material. In yet more embodiments, cement compositions comprise: a cement; a fluid for making the cement composition pumpable; a hydrogen-generating material at least partially coated with a mixture for delaying a hydrogen-generating reaction, the mixture comprising sorbitan monooleate, and an isoparaffin.

Production of peracids using an enzyme having perhydrolysis activity

DiCosimo, R., *et al.*, E.I. du Pont de Nemours and Co., US7723083, May 25, 2010

A process is provided for producing peroxycarboxylic acids from carboxylic acid esters. Carboxylic acid esters are reacted with an inorganic peroxide, such as hydrogen peroxide, in the presence of an enzyme catalyst having perhydrolysis activity. The present perhydrolase catalysts are classified as members of the carbohydrate esterase family 7 (CE-7) based on the conserved structural features. Disinfectant formulations comprising the peracids produced by the processes described herein are provided.

Method of dry fractionation of fat or oil

Kuwabara, Y., *et al.*, Fuji Oil Co. Ltd., US7727569, June 1, 2010

A procedure is provided for the solvent-free fractionation of vegetable butter, transesterified fat or oil, isomerized hydrogenated fat or oil, etc. to obtain a fraction enriched in G2U (defined below) by reducing the amount of liquid olein in stearin. Fat or oil (A) containing components G2U and GU2 is fractionated through crystallization/solid-liquid separation into crystal fraction of concentrated G2U (AF) and liquid fraction of concentrated GU2 (AL). Subsequently the AF crystal fraction is mixed with a liquid G2U-containing fat or oil (B) whose GU2 concentration is lower than that of the liquid fraction (AL), and thereafter the mixture is separated into crystal fraction (BF) and liquid fraction (BL). G = a saturated or *trans* acid form fatty acid residue; U = a *cis* form unsaturated fatty acid residue; and G2U= a triglyceride of G2-residue and U1-residue bonded together.

Method of producing water-containing chocolates

Ushioda, T., *et al.*, Fuji Oil Co. Ltd., US7727574, June 1, 2010

The present invention provides a method of producing water-containing chocolates in which an aqueous component and a fat and oil composition containing trisaturated fatty acid glyceride crystals dispersed in a fat or oil whose melting point is at or below body temperature are added to and emulsified with a chocolate mass.

Soluble phospholipids for use in clotting factor assays

Lentz, B., *et al.*, The University of North Carolina at Chapel Hill, US7727736, June 1, 2010

The present invention provides a soluble phospholipid reagent and assays of clotting activity using the same. The methods of the invention can be used to carry out any clotting assay or other assay of clotting activity that traditionally relies on platelet membranes or synthetic membrane preparation by substituting therefore the soluble phospholipids of the invention. Assay compositions and kits comprising the soluble phospholipids of the invention are also provided.

Nonaqueous gels for consolidating and stabilizing wellbore formations

Ballard, D.A., M-I LLC, US7727938, June 1, 2010

A method of treating an earth formation that includes injecting at least one lipophilic monomer into the earthen formation; the lipophilic monomer is selected from an epoxide-functionalized derivative of soybean oil, linseed oil, rapeseed oil, cashew nut shell oil, perilla oil, tung oil, oiticia oil, safflower oil, poppy oil, hemp oil, cottonseed oil, sunflower oil, high-oleic triglycerides, triglycerides of euphorbia plants, peanut oil, olive oil, olive kernel oil, almond oil, kapok oil, hazelnut oil, apricot kernel oil, beechnut oil, lupine oil, maize oil, sesame oil, grapeseed oil, lallemantia oil, castor oil, herring oil, sardine oil, menhaden oil, whale oil, and tall oil; injecting at least one crosslinking agent into the earthen formation; wherein the at least one crosslinking agent comprises at least one primary amine; and allowing the lipophilic monomer and the crosslinking agent to react in the earth formation is disclosed.

Saponified fatty acids as breakers for viscoelastic surfactant-gelled fluids

Crews, J.B., Baker Hughes Inc., US7728044, June 1, 2010

Fluids viscosified with viscoelastic surfactants (VES) may have their viscosities affected (increased or reduced, e.g., gels broken) by the indirect or direct action of a composition that contains at least one fatty acid modified with an alkali metal base, an alkali earth metal base, ammonium base, and/or organic base compound (optionally with an alkali metal halide salt, an alkali earth metal halide salt, and/or an ammonium halide salt). The composition containing the resulting saponification product is believed to either act as a co-surfactant with the VES itself to increase viscosity and/or possibly by disaggregating or otherwise affecting the micellar structure of the VES-gelled

fluid. In a specific, non-limiting instance, a brine fluid gelled with an amine oxide surfactant may have its viscosity broken with a composition containing naturally occurring fatty acids in canola oil or corn oil affected with $Ca(OH)_2$, $Mg(OH)_2$, NaOH, and the like.

Vegetable lipid-based composition and candle

Tao, B.Y., Indiana Soybean Board, Inc., US7731767, June 8, 2010

A vegetable lipid-based composition and candle comprised of a vegetable lipid component and a petroleum wax is described. The vegetable lipid component may include a triglyceride or a free fatty acid/triglyceride mixture. The vegetable lipid-based composition has properties that make it advantageous in candle production.

Diesel fuel emulsion

Oldfield, A.S., and L. Thompson, Croda International Plc, US7731768, June 8, 2010

A fuel emulsion consists of diesel fuel, water, and an emulsifier composition having a hydrophile/lipophile balance value of at least 4. The emulsifier composition comprises a polymeric nonionic surfactant with hydrophilic and hydrophobic repeating units, together with at least one component selected from fatty acid esters or partial esters of polyhydric alcohols; alkoxylated fatty acid esters or partial esters of polyhydric alcohols; and alkoxylated primary alcohols. Preferred emulsifier compositions include mixtures of the polymeric non-ionic surfactant with at least two of the components. Especially preferred compositions comprise mixtures of the polymeric nonionic surfactant with the fatty acid (partial) esters or alkoxylated fatty acid (partial) esters. The emulsifier composition may include an emulsion coupler such as a primary alcohol, e.g., octanol.

Edible emulsions

Smorholm, O., Bioli Innovation AS, US7732001, June 8, 2010

The invention provides an edible oil-in-water emulsion concentrate comprising as a continuous aqueous phase a physiologically tolerable plant juice concentrate and a discontinuous phase comprising a physiologically tolerable, oxidation-labile unsaturated lipid or fatty acid, wherein the emulsion is produced by homogenization. At least 95% by number of the droplets of said discontinuous phase have a particle diameter of no more than 10 micrometers.

Method for screening of a lipase having improved enzymatic activity using yeast surface display vector and the lipase

Choi, E., *et al.*, Korea Research Institute of Bioscience and Biotechnology, US7736643, June 15, 2010

The present invention relates to a method for screening of the lipase having improved enzymatic activity using yeast surface display vector and the mutant lipase prepared by the same more particularly to the method comprising (i) cloning lipase gene into surface display vector; (ii) preparing mutant lipase gene library of the step i by mutagenic PCR [polymerase chain reaction]; (iii) transforming the mutant lipase gene library of the step ii and surface display vector into host cell; and (iv) measuring the activity of the mutant lipase displayed in the surface of the transformed host cell and selecting the mutant lipase prepared by the same. The method of the present invention can screen the lipase having improved enzymatic activity.

Natural emulsifier for cosmetics based on olive oil

Amari, S., and C. Schubert, B&T S.R.L., US7736662, June 15, 2010

The present invention relates to a natural ethylene oxide-free emulsifier composed of olive oil, the fatty acids of which have been esterified, preferably with sorbitol and/or cetyl stearyl alcohol. The present invention also relates to cosmetics containing an emulsifier as described above as well as a method for manufacturing such a product for cosmetic use.

Compound useful for pancreatic lipase inhibition and the process for isolation thereof

Sattur, A.P., *et al.*, Council of Scientific and Industrial Research, US7737146, June 15, 2010

The present invention relates to a novel nonadeca-6-enoic acid-3-(hexadecyloxy-hydroxy-thiophosphoryloxy)-quinoxalin-2-yl ester designated as streptolipin, useful for pancreatic lipase inhibition, isolated from the culture of *Streptomyces vayuensis* strain N2 and a process for the preparation thereof.

Cosmetic use of phytosphingosine as slimming agent and cosmetic compositions comprising phytosphingosine

Franchi, J., and F. Pellicier, LVMH Recherche, US7737186, June 15, 2010

The invention relates to novel cosmetic uses of phytosphingosine or of one of its cosmetically acceptable salts (particularly the hydrochloride) as a slimming agent and/or as an active agent which stimulates the synthesis of leptin by adipocytes, for preparing a cosmetic composition intended for reducing subcutaneous excess fat. The invention also relates to a method of cosmetic treatment intended for obtaining a slimming effect on the human body according to which a cosmetic composition containing phytosphingosine or one of its cosmetically acceptable salts particularly its hydrochloride, is applied on the parts of the body to be treated. The invention also relates to novel cosmetic compositions containing phytosphingosine or one of its cosmetically acceptable salts, particularly its hydrochloride, in combination with a lipolytic agent selected from the group consisting of cAMP [cyclic adenosine monophosphate] and its derivatives, adenylate cyclase enzyme-activating agents and phosphodiesterase enzyme-inhibiting agents.

Resin composition for water paint, water paint and production method for resin composition for water paint

Miyagaki, A., *et al.*, DIC Corp., US7737213, June 15, 2010

A water-based paint resin including water and a vinyl-modified epoxy ester resin which includes a fatty acid chain to which a vinyl polymer portion is combined; the vinyl polymer portion includes

a terminal carboxyl group, where all or part of the carboxylic acid is neutralized with a basic compound.

Fungicide compositions

Coleman, R.D., Robert D. Coleman, US7741244, June 22, 2010

This invention relates to agricultural compositions that find particular use as a fungicide composition. The fungicide composition can include one or more fatty acids and one or more organic acids different from the fatty acid. The organic acid can but need not exhibit any fungicidal activity; however, when combined with a fatty acid, the organic acid functions as a potent synergist for the fatty acid as a fungicide. Additionally, the fungicide composition can include other components such as emulsifiers, adjuvants, surfactants, and diluents. The fungicide composition significantly reduces or prevents the fungal infection of cash crops including vegetables, fruits, berries, seeds, grains, and at higher application rates can also be used as a harvest aid or desiccant for harvested crops such as potatoes.

Diacylglycerol acyl transferase proteins

Lardizabal, K.D., *et al.*, Monsanto Technology LLC, US7741532, June 22, 2010

The invention provides diacylglycerol acyltransferase (DAGAT) proteins, wherein said proteins are active in the formation of triacylglycerol from fatty acyl and diacylglycerol substrates. In one aspect, *Mortierella ramanniana* DAGAT proteins of about 36 and 37 kDa as measured by SDS-PAGE [sodium dodecyl sulfate-polyacrylamide gel electrophoresis] have been isolated. The invention also provides novel DAGAT polynucleotide and polypeptide sequences and to methods of producing such polypeptides using recombinant techniques. In addition, methods are provided for using such sequences to alter triacylglycerol levels in plants and to treat diseases associated with altered DAGAT activity or expression.

Canola oil having increased oleic acid and decreased linolenic acid content

DeBonte, L.R., and W.D. Hitz, Cargill Inc., US7741542, June 22, 2010

An endogenous oil extracted from Brassica seeds is disclosed that contains, after crushing and extraction, greater than 86% oleic acid and less than 2.5% α-linolenic acid. The oil also contains less than 7% linoleic acid. The Brassica seeds are produced by plants that contain seed-specific inhibition of microsomal oleate desaturase and microsomal linoleate desaturase gene expression. Such inhibition can be created by co-suppression or antisense technology. Such an oil has a very high oxidative stability in the absence of added antioxidants.

Use of unsaponifiable components of vegetable oils for preparing a cosmetic and related treatments

Boumediene, K., *et al.*, Laboratories Expanscience, US7744933, June 29, 2010

The invention relates to the use of at least one unsaponifiable component of vegetable oil, in particular of avocado, soya bean, and/or lupin oils, for the preparation of a medicament intended to stimulate the expression of TGF (transforming growth factor)-β or the expression of the plasminogen activator inhibitor PAI-1. The invention also relates to a method of cosmetic treatment comprising the application of at least one unsaponifiable component of vegetable oil as well as the use of the latter as additive in a food for human beings and/or for animals.

Integrated chemical processes for industrial utilization of seed oils

Lysenko, Z., *et al.*, Dow Global Technologies Inc., US7745652, June 29, 2010

Integrated processes of preparing industrial chemicals starting from seed oil feedstock compositions containing one or more unsaturated fatty acids or unsaturated fatty acid esters, which are essentially free of metathesis catalyst poisons, particularly hydroperoxides; metathesis of the feedstock composition with a lower olefin, such as ethylene, to form a reduced chain olefin, preferably a reduced chain α-olefin, and a reduced chain unsaturated acid or ester, preferably a reduced chain α,ω-unsaturated acid or ester. The reduced chain unsaturated acid or ester may be (trans)esterified to form a polyester polyolefin, which may be epoxidized to form a polyester polyepoxide. The reduced chain unsaturated acid or ester may be hydroformylated with reduction to produce an α,ω-hydroxy acid or α,ω-hydroxy ester which may be (trans)esterified with a polyol to form an α,ω-polyester polyol. Alternatively, the reduced chain unsaturated acid or ester may be hydroformylated with reductive amination to produce an α,ω-amino acid or α,ω-amino ester, which may be (trans)esterified to form α,ω-polyester polyamine.

Δ-12 desaturase gene suitable for altering levels of polyunsaturated fatty acids in oleaginous yeasts

Yadav, N.S., and X. Zhang, E.I. du Pont de Nemours and Co., US7749703, July 6, 2010

The present invention relates to a Δ-12 fatty acid desaturase able to catalyze the conversion of oleic acid to linoleic acid (LA; 18:2). Nucleic acid sequences encoding the desaturase, nucleic acid sequences that hybridize thereto, DNA constructs comprising the desaturase gene, and recombinant host microorganisms expressing increased levels of the desaturase are described. Methods of increasing production of specific ω-3 and/or ω-6 fatty acids are described by overexpression of the Δ-12 fatty acid desaturase or by disruption of the native gene.

Diagnostic assay for stroke

Hochstrasser, D.F., *et al.*, Electrophorectics Limited, US7754436, July 13, 2010

Heart and brain fatty acid binding proteins (H-FABP, B-FABP) are markers for stroke. The invention provides a diagnostic assay for either of these markers, preferably by ELISA (enzyme-linked immunosobent assay) using an anti-H-FABP or B-FABP antibody. Since H-FABP is also a marker for acute myocardial infarction (AMI), to distinguish stroke from AMI requires an assay specific to AMI, e.g., using troponin-1 or CK-MB (creatine kinase, muscle band) as a marker, also to be carried out.

Lipolytic enzyme ELIP

Jones, B.E., *et al.*, Danisco US Inc., US7754468, July 13, 2010

The present invention provides a novel nucleic acid sequence, designated ELIP, encoding a lipolytic enzyme and the corresponding encoded amino acid sequences. The invention also provides expression vectors and host cells comprising a nucleic acid sequence encoding at least one novel lipolytic enzyme, recombinant lipolytic enzyme proteins, and methods for producing the same.

Use of esters of unsaturated physiologically active fatty acids as nutrient media for cell cultures

Strube, A., *et al.*, Cognis IP Management GmbH, US7754484, July 13, 2010

The disclosed invention relates to the use of esters of unsaturated, physiologically active fatty acids as nutrient media for cell cultivation and, more particularly, as a substitute for fetal bovine serum. In one aspect the esters comprise more than 50 mol% of physiologically active fatty acids containing 16 to 24 carbon atoms and 2 to 5 double bonds as the acid component and a lower C_{1-4} alcohol, preferably ethanol, or a sterol as ester component. In another aspect the esters comprise a transesterification product of natural or synthetic oils or a mixture of such oils having greater than 50 mol% of unsaturated, physiologically active fatty acids, based on the acyl group and a lower C_{1-4} alcohol or a sterol. In a further aspect, the esters are used together with sterols, phospholipids, and/or vegetable proteins or are liposomally encapsulated.

Fatty acid nutritional supplement

Roe, C.R., Baylor Research Institute, US7754764, July 13, 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.

Vegetable based dioxanone derivatives, synthesis and uses thereof

Binder, T.P., and P.D. Bloom, Archer Daniels Midland Co., US7754823, July 13, 2010

The present invention is directed to carboxylic acid and ester moieties that are attached to a carbon chain that is between 2 and 24 carbons in length, wherein the chain contains at least one dioxanone ring system, said dioxanone being formed from two adjacent carbons in the chain and/or at least one carbon in the chain is substituted with a pendant dioxanone ring system. In preferred embodiments, the carbon chain is a fatty acid residue. The carbons of said chain can be optionally substituted, saturated, or unsaturated. When two or more said ester moieties are present, the invention is directed to a polyester such as a triglyceride, that contains multiple carbon chains wherein each chain is independently derivatized such that the triglyceride contains at least one dioxanone ring system, said dioxanone being formed from two adjacent carbons in at least one of said chains. The present invention is also directed to a method of preparing a dioxanone-containing composition or fatty acid derivative. The present invention is also directed to coating formulations and polymers that utilize a dioxanone containing composition or fatty acid derivative and methods of making such coatings and polymers.

Production of high-cetane diesel fuel from low-quality biomass-derived feedstocks

Monnier, J., *et al.*, Her Majesty the Queen in Right of Canada as Represented by the Minister of Natural Resources, US7754931, July 13, 2010

A method is taught for producing diesel fuels of high cetane value from a triglyceride feedstock, comprising pretreating the triglyceride feedstock by thermal cracking to partially convert the triglycerides and produce a middle distillates stream, and catalytically hydrotreating the middle distillate fraction to produce high cetane value diesel fuels. A biomass-derived diesel fuel is also taught having sulfur content below 10 ppm, a cetane value of at least 70, a cloud point below 0°C, and a pour point of less than –4°C. A blended diesel fuel is also taught comprising 5 to 20 vol% of the biomass-derived diesel fuel of the present invention and 80 to 95 vol% of a petroleum diesel, based on total volume of the blended diesel fuel.

Liquid developer

Teshima, T., and K. Akoika, Seiko Epson Corp., US7756444, July 13, 2010

A liquid developer which has excellent preservability, storage stability for a long period of time, and fixing characteristic of toner particles and which is also harmless to the environment is provided. The liquid developer contains an insulation liquid and toner particles dispersed in the insulation liquid. The insulation liquid contains a saturated fatty acid and at least one component selected from a group comprising a linolenic acid component, a linoleic acid component, and an oleic acid component. The liquid developer may contain an antioxidizing agent and an oxidation polymerization accelerator for accelerating an oxidation polymerization reaction of the linolenic acid component, the linoleic acid component, or the oleic acid component during a fixing process.

Process for enriching polyunsaturated fatty acids

Schorken, U., *et al.*, Cognis IP Management GmbH, June 15, 2010

A process for enriching and separating polyunsaturated fatty acids (PUFA) in a fatty acid mixture containing non-PUFA fatty acids is disclosed. ■

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

Novel sensitive determination of steryl glycosides in biodiesel by gas chromatography-mass spectroscopy

Pieber, B., *et al.*, *J. Chromatogr. A 1217*:6555–6561, 2010.

A new method was developed for the quantitative analysis of steryl glycosides in biodiesel (fatty acid methyl esters). This method is much more sensitive than existing methods and has minimum limits of quantification of 50 µg/kg, compared to previously published minimum limits of quantification of about 15 mg/kg. The analysis is based on gas chromatography-mass spectroscopy determination of simple pre-treated and silylated samples via single ion monitoring at 204, 217, 247 *m/z*, which are specific ions for the silylated sugar moiety. Quantification was carried out using cholesteryl β-D-glucopyranoside as internal standard. The modified synthesis and purification of the internal standard are also presented as well as the characterization by nuclear magnetic resonance and mass spectroscopy. The advantage of the method compared with other approaches is the simplified sample preparation avoiding extra pre-treatment steps coupled with complete derivatization of the sugar hydroxyl groups by using N,O-bis(trimethylsilyl)acetamide with 5% trimethylchlorosilane as derivatization reagent. On the given conditions high recovery rates ≥89% can be obtained. Evaluation of lab specific variance and intermediate precision underlines the robustness of the method, which will be further assessed by round-robin tests.

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.

Separation and determination of tocopherols in vegetable oils by solid phase extraction on porous polymers SPE cartridges and capillary gas chromatography analysis

Beldean-Galea, M.S., *et al.*, *Cent. Eur. J. Chem. 8*:1110–1116, 2010.

In this study we present the solid phase extraction (SPE) selectivity of tocopherols from vegetable oils using four porous polymers (Porapak P, Porapak Q, Porapak QS, Porapak N). The tocopherol elution from SPE cartridges was performed using several hexane/ethyl acetate mixtures (100:0, 95:5, 90:10, 85:15, v/v). Tocopherols (α-, γ-, and δ-tocopherol) were analyzed by gas chromatography without any derivation step. The amount of NaOH used for triglyceride removal was optimized. Particularly liquid-liquid and SPE methods for the extraction of tocopherols from vegetable oils were compared. The results confirmed that porous polymers represent promising SPE alternatives for the extraction of tocopherols from oils.

The impact of polyunsaturated fatty acids in reducing child attention deficit and hyperactivity disorders

Transler, C., *et al.*, *J. Atten. Disord. 14*:232–246, 2010.

The objective of this research is to review the impact of polyunsaturated fatty acids (PUFA) in reducing ADHD (attention deficit and hyperactivity disorder) symptoms in children. Peer-reviewed experimental literature published from 1980 to May 2009 is consulted (Psychinfo, Medline, and resulting reference lists). Placebo-controlled studies with ADHD or hyperactive children show no effects on behaviors or cognition when only n-6 (omega-6) PUFA, only docosahexaenoic acid (DHA), or n-6 and n-3 (omega-3) short-chain PUFA are supplemented. Yet three out of four studies suggest that a combination of long-chain n-3 and n-6 fatty acids (DHA, eicosapentaenoic acid [EPA], and γ-linolenic acid [GLA]) supplemented daily for 3 to 4 months could lead to a reduction in ADHD symptomatology. Results on cognitive outcomes are inconsistent. Evidence is too limited to reach definitive conclusions but suggests that research on the impact of long-chain PUFA (n-3 and n-6) should continue with special focus on individual differences (genetic and fatty acid markers), mechanisms (brain imaging), and new enhanced methods of systematic observations of behaviors.

Influence of harvest method and period on olive oil composition: An NMR and statistical study

D'Imperio, M., *et al.*, *J. Agric. Food Chem. 58*:11043–11051, 2010.

The influence of harvest period and harvest method on olive oil composition was investigated by nuclear magnetic resonance (NMR) spectroscopy and by some quality parameters such as free acidity, peroxide value, and ultraviolet spectrophotometric indices. This work focused on two secondary factors (harvest period and harvest method) and investigated their interactions with primary (genetic and pedoclimatic) and secondary (agronomic practices

and technological procedures) factors. To avoid misinterpretation, the general linear model (GLM) analysis was used to adjust the result obtained from the analysis of variance (ANOVA). In this way, the effect of the factor of interest was corrected for the effects of the other factors that might influence the variable under investigation. The weight of each factor was evaluated by the variance component analysis (VCA). Finally, multivariate statistical analyses, namely, principal component analysis (PCA) and linear discriminant analysis (LDA), were applied. Samples were grouped according to the harvest period and harvest method. Volatile compounds, that is, hexanal and *trans*-2-hexenal, as well as the *sn*-1,3-diglycerides and squalene, significantly decreased during the ripening. The relative value of the ΔK parameter and the hexanal amount were higher in the olive oils obtained from olives harvested by one type of hand-held machine (shaker), whereas the unsaturated fatty chains in the olive oils were higher when another type (comb) was used.

Prostaglandins in pathogenesis and treatment of multiple sclerosis

Mirshafiey, A., and F. Jadidi-Niaragh, *Immunopharmacol. Immunotoxicol. 32*:543–554, 2010.

Multiple sclerosis (MS) is a chronic inflammatory demyelinating disease of the central nervous system (CNS) characterized by inflammation, demyelination, axonal loss, and gliosis. The inflammatory lesions are manifested by a large infiltration and a heterogeneous population of cellular and soluble mediators of the immune system, such as T cells, B cells, macrophages, and microglia, as well as a broad range of cytokines, chemokines, antibodies, complement, and other toxic substances. Prostaglandins (PG) are arachidonic acid-derived autacoids that have a role in the modulation of many physiological systems including the central nervous system (CNS), respiratory, cardiovascular, gastrointestinal, genitourinary, endocrine, and immune systems. PG production is associated with inflammation, a major feature in MS that is characterized by the loss of myelinating oligodendrocytes in the CNS. With respect to the role of PG in the induction of inflammation, they can be effective mediators in the pathophysiology of MS. Thus, use of agonists or antagonists of PG receptors may

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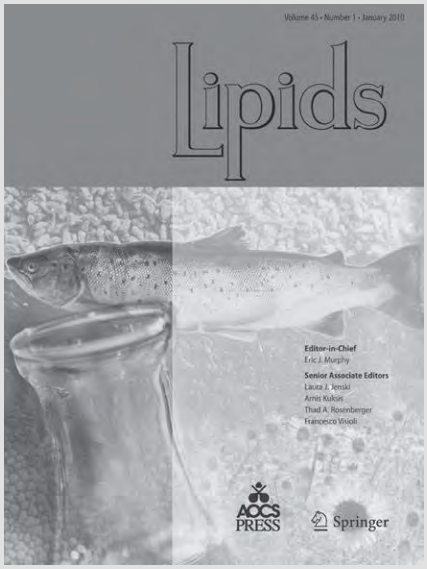

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be considered as a new therapeutic protocol in MS. In this review, we try to clarify the role of PGs in immunopathology and treatment of MS.

An improved method for the separation and quantification of major phospholipid classes by LC-ELSD

Yan, K.P., *et al.*, *Chromatographia* 72:815–819, 2010.

An improved high-performance liquid chromatography (LC) procedure for the separation of phospholipids is described. The method described utilizes a solvent mixture of acetonitrile/methanol/water/trifluoroacetic acid (100:25:1.7:2.5, v/v) as the mobile phase, which is more compatible with the pump than mobile phases containing inorganic acids. Separation was by isocratic elution on a Hypersil silica column coupled to an evaporative light-scattering detector (ELSD). Complete separation of phosphatidylserine (PS), phosphatidylethanolamine (PE), phosphatidylcholine (PC), and sphingomyelin (SM) was achieved in less than 20 min. The detection limits for PS, PE, PC, and SM were 50, 50, 80, and 150 ng (S/N = 3), respectively. Human, bovine, and porcine erythrocyte ghost membranes and animal tissues have been successfully analyzed for their phospholipid contents.

Dietary cholesterol and egg yolks: Not for patients at risk of vascular disease

Spence, J.D., *et al.*, *Can. J. Cardiol. 26*:E336–E339, 2010.

A widespread misconception has been developing among the Canadian public and among physicians. It is increasingly believed that consumption of dietary cholesterol and egg yolks is harmless. There are good reasons for long-standing recommendations that dietary cholesterol should be limited to less than 200 mg/day; a single large egg yolk contains approximately 275 mg of cholesterol (more than a day's worth of cholesterol). Although some studies showed no harm from consumption of eggs in healthy people, this outcome may have been due to lack of power to detect clinically relevant increases in a low-risk population. Moreover, the same studies showed that among participants who became diabetic during observation, consumption of one egg a day doubled their risk compared with less than one egg a week. Diet is not just about fasting cholesterol, it is mainly about the postprandial effects of cholesterol, saturated fats, oxidative stress, and inflammation. A misplaced focus on fasting lipids obscures three key issues. Dietary cholesterol increases the susceptibility of low density lipoprotein to oxidation, increases postprandial lipemia, and potentiates the adverse effects of dietary saturated fat. Dietary cholesterol, including egg yolks, is harmful to the arteries. Patients at risk of cardiovascular disease should limit their intake of cholesterol. Stopping the consumption of egg yolks after a stroke or myocardial infarction would be like quitting smoking after a diagnosis of lung cancer: a necessary action, but late. The evidence presented in the current review suggests that the widespread perception among the public and health care professionals that dietary cholesterol is benign is misplaced and that improved education is needed to correct this misconception.

Anti-obesity effect of phosphatidylinositol on diet-induced obesity in mice

Shimizu, K., *et al.*, *J. Agric. Food Chem. 58*:11218–11225, 2010.

The aim of this study is to investigate the biodistribution of phosphatidylinositol (PI) after oral administration and its anti-obesity effect. When a suspension of radiolabeled PI was orally administered to mice and the biodistribution was examined, PI radioactivity accumulated in the liver compared to *myo*-inositol radioactivity at 48 h or later after administration. Then, a PI suspension was orally administered to diet-induced obesity (DIO) mice every 4 days, and the anti-obesity effect of PI was examined. As a result, PI suppressed the body weight increase of DIO mice and significantly reduced the plasma levels of aspartate aminotransferase (AST) and cholesterol. Furthermore, PI regulated the expression of some genes in the liver involved in lipid synthesis and metabolism. The present study demonstrated that PI accumulated in the liver after oral administration and exerted its anti-obesity effect on DIO by regulating the expression of certain genes involved in lipid metabolism in the liver.

Functional comparison of esterified and free forms of conjugated linoleic acid in high-fat-diet-induced obese C57BL/6J mice

Kim, J.H., *et al.*, *J. Agric. Food Chem.* 58:11441–11447, 2010.

This study investigated the effects of dietary conjugated linoleic acid (CLA), in the form of free fatty acid (FFA-CLA) or triacylglycerol (TG-CLA), on serum and liver lipid composition and gene expression associated with lipogenesis and β-oxidation in high-fat-diet (HFD)-induced obese C57BL/6J mice. Animals were fed a control diet, HFD, HFD supplemented with 2% FFA-CLA, or HFD supplemented with 2% TG-CLA for 8 weeks. Supplementation with both forms of CLA significantly reduced the weights of whole body and adipose tissue and was positively associated with significant liver enlargement. Both forms of CLA significantly decreased serum TG concentration, but had no effect on total cholesterol levels, which were increased in mice fed HFD. There was a prominent increase in serum alanine aminotransferase levels in mice that received either form of CLA. TG accumulation and lipogenic gene expression, including the expression of genes for fatty acid synthase, acetyl-coenzyme A carboxylase, and malate dehydrogenase, were significantly lower in the livers of mice that received TG-CLA as compared to FFA-CLA. The gene expressions of sterol regulatory element binding protein-1c (SREBP-1c) in both liver and adipose tissue were suppressed in mice that were fed either form of CLA as compared to the mice fed HFD alone, whereas there were no increases in the levels of expression of β-oxidation-related genes. These findings demonstrated that free and esterified forms of CLA have differing effects on liver and adipose tissue lipogenesis.

Effect of n-3 fatty acid enriched eggs and organic eggs on serum lutein in free-living lacto-ovo vegetarians

Burns-Whitmore, B.L., *et al., Eur. J. Clin. Nutr.* *64*:1332–1337, 2010.

Lutein is a xanthophyll found in the chloroplasts of dark green leafy vegetables, chromoplasts of fruits, and egg yolk. Dietary, serum, and macular lutein concentrations are inversely related to the risk of age-related macular degeneration. Although the lutein from egg is known to be more bioavailable than that from spinach, not much is known about lutein bioavailability from n-3 fatty acid-enriched eggs and organic eggs, both of which are increasingly available to consumers. We determined the effects of feeding n-3 fatty acid-enriched eggs and organic eggs on serum lutein, zeaxanthin, and β-carotene in 20 healthy lacto-ovo-vegetarian (LOV) adults using a single-blind, randomized, crossover study design with a 4-week washout between treatments: six organic eggs or six n-3 fatty acid-enriched eggs per week or no egg control for 8 weeks each. Serum lutein was significantly higher in both egg treatments ($P < 0.009$) compared with the control, but was not different between the two egg treatments. Serum β-carotene was also higher in the egg groups compared with control but only approached significance ($P = 0.066$). Serum zeaxanthin increased in both egg treatments compared with control but did not reach statistical significance ($P = 0.139$).

Enzymatic degumming

Dijkstra, A.J., *Eur. J. Lipid Sci. Technol.* *112*:1178–1189, 2010.

The first enzymatic degumming process to be used industrially was the EnzyMax® process that was launched in 1992; it used porcine phospholipase A_2 (PLA2). Subsequently, various microbial phospholipases (PLases) with different specificities have been developed. They have the advantages of being kosher/halal and of having a non-limited availability and lower cost. The first of these microbial enzymes were the phospholipases A_1 (Lecitase® Novo and Ultra) and more recently, a phospholipase C (Purifine®) and a lipid acyl transferase (LysoMax®) with PLA2 activity have also become available in commercial quantities. These enzymes have different specificities. The Lecitases and the LysoMax enzymes catalyze the hydrolysis of all common phosphatides and differ in this respect from the Purifine enzyme, which is specific for phosphatidylcholine and phosphatidylethanolamine. These phosphatides are hydrolyzed to oil-soluble diacylglycerol and water-soluble phosphate esters. Since these diacylglycerols remain in the oil during refining, they contribute to the oil yield. That also holds for the sterol and stanol fatty esters formed as a consequence of the phosphatide hydrolysis catalyzed by the LysoMax enzyme. In addition, all enzymes cause less oil to be retained by the gums by decreasing the amount of gums and/or their oil retention, which also contributes to an improved oil yield. On the other hand and contrary to common belief, the enzymes are incapable of catalyzing the hydrolysis of non-hydratable phosphatides (alkaline earth salts of phosphatidic acid) under industrial conditions. Consequently, the industrial enzymatic degumming step has to be preceded by a chemical degumming step to arrive at a degummed oil with a sufficiently low residual phosphorus content that can be physically refined. Accordingly, it might well be preferable to limit the oil treatment to said chemical degumming and produce oil with a low residual phosphorus content and gums, and then treat the gums separately to recover their fatty matter, whereby this recovery can be enzymatic or chemical.

Quality differences between pre-pressed and solvent extracted rapeseed oil

Van Hoed, V., *et al.*, *Eur. J. Lipid Sci. Technol.* *112*:1241–1247, 2010.

Most seed oils are obtained by pre-pressing the crushed seeds followed by solvent extraction of oil from the press cake. The pre-pressed oil will contain no solvent residues, and is moreover expected to contain more nutritionally valuable compounds, which can in turn enhance the oxidative stability of the oil. However, reports on differences between extracted and pressed oils are scarce. Therefore, in this study, for a case study on rapeseed oil, the composition and quality were systematically compared between pre-pressed and solvent-extracted oil. In the extracted oil, solvent residues and a clear sensory difference were detected, which disappeared almost completely during refining. The crude oils had a high content in free fatty acids and in primary and secondary oxidation products, which were higher in the extracted than in the pressed oil. However, surprisingly the content of minor compounds , also was slightly higher in the extracted oil than in the pressed oil. This can be explained by a selective extraction of those compounds into the solvent. During refining, a difference between pressed and extracted oils still existed but was less pronounced. The slight difference in antioxidants content might explain the higher oxidative stability of extracted over pressed oils. Traditionally, high yields of vegetable oils are obtained by pre-pressing the seeds, followed

by solvent extraction of the residual oil from the press cake. The solvent extraction leads to higher oil yields, but is expected to affect the composition and quality of the oil, and has moreover negative environmental impacts. In this study, the solvent-extracted oil contained slightly higher levels of tocopherols and phytosterols, and had slightly higher oxidative stability, which are desirable quality aspects. In contrast, the solvent-extracted oil also contained higher levels of undesirable phospholipids as well as solvent residues, which were, however, removed during degumming and deodorization, respectively. These results suggest that the final quality of refined prepressed and solvent-extracted oils is comparable from nutritional and safety point of view. A choice for pressing instead of solvent extraction will therefore be driven by sustainability concerns rather than by nutritional aspects.

The ins and outs of cholesterol in the vertebrate retina

Fliesler, S.J., and L. Bretillon, *J. Lipid Res. 51*:3399–3413, 2010.

The vertebrate retina has multiple demands for utilization of cholesterol and must meet those demands either by synthesizing its own supply of cholesterol or by importing cholesterol from extraretinal sources, or both. Unlike the blood-brain barrier, the blood-retina barrier allows uptake of cholesterol from the circulation via a lipoprotein-based/receptor-mediated mechanism. Under normal conditions, cholesterol homeostasis is tightly regulated; also, cholesterol exists in the neural retina overwhelmingly in unesterified form, and sterol intermediates are present in minimal to negligible quantities. However, under certain pathological conditions, either due to an inborn error in cholesterol biosynthesis or as a consequence of exposure to selective inhibitors of enzymes in the cholesterol pathway, the ratio of sterol intermediates to cholesterol in the retina can rise dramatically and persist, in some cases resulting in progressive degeneration that significantly compromises the structure and function of the retina. Although the relative contributions of *de novo* synthesis vs. extraretinal uptake are not yet known, herein we review what is known about these processes and the dynamics of cholesterol in the vertebrate retina and indicate some future avenues of research in this area.

Modulation of salt (NaCl)-induced effects on oil composition and fatty acid profile of sunflower (*Helianthus annuus* L.) by exogenous application of salicylic acid

Noreen, S., and M. Ashraf, *J. Sci. Food Agric. 90*:2608–2616, 2010.

Salicylic acid (SA) is a potential endogenous plant hormone that plays an important role in plant growth and development. Since sunflower yield and its seed oil yield are adversely affected by salinity, in this study the role of SA in modulating salt (NaCl)-induced effects on various yield and oil characteristics of sunflower was investigated. For this purpose a greenhouse experiment comprising two sunflower hybrid lines (Hysun-33 and SF-187), two NaCl levels (0 and 120 mmol L^{-1}), and four SA levels (0, 100, 200 and 300 mg L^{-1}) was conducted. Salt stress markedly reduced yield and oil, linoleic acid, and δ-tocopherol contents in both sunflower lines, while it increased linolenic acid, palmitic acid, stearic acid, and α- and γ-tocopherols. However, increasing levels of foliar-applied SA resulted in improved achene yield and hundred-achene weight in both lines. Foliar-applied SA caused a significant decrease in oil stearic acid and α- and γ-tocopherols in both lines under non-saline and saline conditions. Salt-induced harmful effects on achene yield and oil characteristics of sunflower could be alleviated by exogenous application of SA. High doses of SA caused a marked increase in sunflower achene oil content as well as some key fatty acids.

Selective delivery of cargo entities to tumor cells by nanoscale artificial oil bodies

Chiang, C.-J., *et al.*, *J. Agric. Food Chem. 58*:11695–11702, 2010.

Artificial oil bodies (AOB) are oil droplets that result from self-assembly of a mixture containing triacylglycerols, phospholipids, and membrane proteins of plant seeds. Owing to their small size, stability, hydrophobic core, biocompatibility, and biodegradability, AOB were explored to examine their feasibility as a drug delivery carrier. This was approached by fusion sesame oleosin (Ole), the primary membrane protein of seed oil bodies, with a small domain consisting of the arginine-glycine-aspartic acid (RGD) motif. The resulting Ole-RGD fusion protein was overproduced in *Escherichia coli* and then isolated for reconstitution of AOB. At the optimal condition, the size of stable AOB was within the range of 100–400 nm. Furthermore, AOB entrapped with a hydrophobic fluorescence dye were incubated with human tumor cells. As visualized by fluorescent microscopy and confocal microscopy, the RGD-tagged AOB were able to selectively target cells expressing the $\alpha_v\beta_3$ integrin. Moreover, these AOB were effectively internalized and the fluorescence dye that they carried was subsequently released inside the cells. The percentage of cells internalized by AOB could reach 80% as analyzed by flow cytometry. Taken together, it illustrates a great promise of this proposed approach for targeted delivery of cargo entities to tumor cells.

Physical structures in soybean oil and their impact on lipid oxidation

Chen, B., *et al.*, *J. Agric. Food Chem. 58*:11993–11999, 2010.

The oxidation of edible oil yields both primary and secondary oxidation products (e.g., hydroperoxides, carbonyls, hydrocarbons, and epoxides), which produce undesirable sensory and biological effects. Consequently, the suppression of lipid oxidation in food matrices is of great importance. The rate and extent of lipid oxidation in many heterogeneous foods are strongly affected by the physicochemical characteristics of water–oil interfaces. This study examined the ability of dioleoylphosphatidylcholine (DOPC) and water to form association colloids within bulk oil, as well as their impact on lipid oxidation kinetics. Attenuation was used to show the DOPC and water concentrations at which association colloids existed without altering the optical properties of the oil. Interfacial tension and fluorescence spectrometry showed the critical micelle concentration (CMC) of DOPC in stripped soybean oil was around 650 μM at room temperature. Small-angle X-ray scattering (SAXS) and fluorescence probes showed that water had a very strong impact on the properties of the association colloids formed by DOPC. Measurement of primary and secondary lipid oxidation products revealed that the association colloids formed by DOPC had a pro-oxidant effect. The characterization of association colloids could provide a better understanding of the mechanisms of lipid oxidation in bulk oils and provide insights into new antioxidant technologies.

Phenolic compounds in seed oils

Van Hoed, V., *Lipid Technol. 22*:247–249, 2010.

Traditionally, phenolic compounds are known to be abundant in fruits, vegetables and cereals. Recently, however, their presence in seed oils has been discovered and this offers interesting nutritional and economical possibilities. The nutritional benefit arises from the high levels of polar antioxidants in crude seed oils, as it is known that these are antioxidants offering health benefits. Economical benefit results when seeds traditionally considered as a waste stream become the source of high-value vegetable oils. The main identified phenolic compounds in those oils are discussed, as well as the varying levels of total phenolic compounds as determined by the total phenol content (TPC) assay and by high-performance liquid chromatography methods. While not all compounds are yet identified, and further study is needed on this subject, it is clear that the phenolic compounds in seed oils contribute to their oxidative stability and to their nutritional importance. The available data show not only that phenolic compounds are not only abundant in fruits, cereals and vegetables, but also seed oils are good sources of a variety of these antioxidants, in particular phenolic acids. This gives possibilities for the use of otherwise waste streams, such as fruit seeds, as sources of high-value oils, with interesting nutritional properties, including essential fatty acids and antioxidants.

Ergosterol profiles, fatty acid composition, and antioxidant activities of button mushrooms as affected by tissue part and developmental stage

Shao, S., *et al., J. Agric. Food Chem. 58*:11616–11625, 2010.

This article investigated the mycochemical profiles and the antioxidant activities of the lipophilic extracts of white and brown button mushrooms. We found that only free ergosterols were present in both mushrooms at 2.04–4.82 mg/g dry matter (DM). Ergosterol concentration was higher in early growth stages but decreased as the mushrooms grew, and it distributed evenly between the caps and stems during early developmental stages but accumulated more in the caps after maturation. The photochemiluminescence (PCL) values of the two mushrooms were 5.49–10.48 nmol Trolox equivalent/mg DM, and the EC_{50} values of 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay ranged from 20.19 to 41.49 mg DM/μg DPPH. The ergosterol content positively correlated with the antioxidant activities ($r^2 > 0.89$). The total fatty acid content was 8.7 mg/g DM in the white and 5.1 mg/g DM in the brown button mushroom and contained mainly linoleic, palmitic, and stearic acids. Our data provide guidance for optimized harvesting time of mushrooms and maximized health benefits.

Can blood cholesterol levels be too low?

Stanley, J., *Lipid Technol. 22*:253–254, 2010.

Like glucose, cholesterol is an essential cellular nutrient, and like glucose, blood cholesterol levels need to be kept within limits. The deleterious effects of hypercholesterolemia on the risk of cardiovascular disease are well established and have resulted in the widespread prescription of statins to lower blood cholesterol levels and hence lower the risk of developing the disease. However, the possible deleterious effects of hypocholesterolemia on mental health are less well studied, and while there is enough evidence to cause concern, there is not enough evidence to be sure that these deleterious effects really exist. More research is urgently needed and in particular studies which investigate the possibility that low density lipoprotein-cholesterol and high density lipoprotein-cholesterol have different effects on mental health, as they do on cardiovascular health.

Algal biorefinery-based industry: An approach to address fuel and food insecurity for a carbon-smart world

Subhadra, B., and Grinson-George, *J. Sci. Food Agric 91*:2–13, 2011.

Food and fuel production are intricately interconnected. In a carbon-smart society, it is imperative to produce both food and fuel sustainably. Integration of the emerging biorefinery concept with other industries can bring many environmental deliverables while mitigating several sustainability-related issues with respect to greenhouse gas emissions, fossil fuel usage, land use change for fuel production, and future food insufficiency. A new biorefinery-based integrated industrial ecology encompasses the different value chain of products, co-products, and services from the biorefinery industries. This paper discusses a framework to integrate the algal biofuel-based biorefinery, a booming biofuel sector, with other industries such as livestock, lignocellulose and aquaculture. Using the USA as an example, this paper also illustrates the benefits associated with sustainable production of fuel and food. Policy and regulatory initiatives for synergistic development of the algal biofuel sector with other industries can bring many sustainable solutions for the future existence of mankind.

Circulating palmitoleic acid and risk of metabolic abnormalities and new-onset diabetes

Mozaffarian, D., *et al., Am. J. Clin. Nutr. 92*:1350–1358, 2010.

Animal experiments suggest that circulating palmitoleic acid (*cis*-16:1n–7) from adipocyte *de novo* fatty acid synthesis may directly regulate insulin resistance and metabolic dysregulation. We investigated the independent determinants of circulating palmitoleate in free-living humans and whether palmitoleate is related to lower metabolic risk and the incidence of diabetes. In a prospective cohort of 3,630 US men and women in the Cardiovascular Health Study, plasma phospholipid fatty acids, anthropometric variables, blood lipids, inflammatory markers, and glucose and insulin concentrations were measured between 1992 and 2006 by using standardized methods. Independent determinants of plasma phospholipid palmitoleate and relations of palmitoleate with metabolic risk factors were investigated by using multivariable-adjusted linear regression. Relations with incident diabetes (296 incident cases) were investigated by using Cox proportional hazards. The mean (±SD) palmitoleate value was 0.49 ± 0.20% (range: 0.11–2.55%) of total fatty acids. Greater body mass index, carbohydrate intake, protein intake, and alcohol use were each independent lifestyle correlates of higher palmitoleate concentrations. In multivariable analyses that adjusted for these factors and other potential confounders, higher palmitoleate concentrations were independently associated with lower low density protein-cholesterol ($P < 0.001$), higher high density lipoprotein (HDL)-cholesterol ($P < 0.001$), lower total/HDL-cholesterol ratio ($P = 0.04$), and lower fibrinogen ($P < 0.001$). However, palmitoleate was also associated with higher triglycerides ($P < 0.001$) and (in men only) with greater insulin resistance ($P < 0.001$). Palmitoleate was not significantly associated with incident diabetes. Adiposity (energy imbalance),

carbohydrate consumption, and alcohol use—even within typical ranges—are associated with higher circulating palmitoleate concentrations. Circulating palmitoleate is robustly associated with multiple metabolic risk factors but in mixed directions, perhaps related to divergent lifestyle determinants or endogenous sources (liver, adipose tissue) of fatty acid synthesis.

Lactosomes: Structural and compositional classification of unique nanometer-sized protein lipid particles of human milk

Argov-Argaman, N., *et al., J. Agric. Food Chem.* 58:11234–11242, 2010.

Milk fat globules (MFG) are accepted primarily as triacylglycerol delivery systems. The identification of nanometer-sized lipid–protein particles termed "lactosomes" that do not contain triacylglycerol raises the question of their possible functions. MFG were isolated by slow centrifugation, and lactosomes were isolated by ultracentrifugation at a density equivalent to plasma high density lipoproteins (HDL) (d > 1.063 g/mL) from human milk obtained from six volunteers at different lactation stages. Isolated lactosomes were analyzed and compared with MFG for their size distribution, lipidome, proteome, and functional activity. Lactosomes from early milk, day 8, were found to be similar in size as those from mature milk >28 days, averaging ~25 nm in diameter. In total, 97 nonredundant proteins were identified in the MFG and lactosome fractions, 46 of which were unique to the MFG fraction and 29 of which were unique to the lactosome fraction. The proteins identified in the lactosome and MFG fractions were enriched with proteins identified with immunomodulatory pathways. Unlike MFG and GM1 [monosialotetrahexosylganglioside]-laden reconstituted HDL that served as a positive control, lactosomal binding capacity to cholera toxin was weak. Lipidomic analyses found that lactosomes were devoid of triacylglycerol and gangliosides, unlike MFG, but rich in a variety of phospholipid species. The data found differences in structure, composition, and function between lactosomes and MFG, suggesting that these two particles are derived from different biosynthetic and/or secretory pathways. The results reveal a bioactive lipid–protein, nanometer-length scale particle that is secreted into milk not to supply energy to the infant but to play unique, protective, and regulatory roles. ■

HEALTH & NUTRITION NEWS (CONTINUED FROM PAGE 26)

in guiding the health of the next generation," said Kjersti Aagaard-Tillery, a researcher involved in the work from the Department of Obstetrics and Gynecology at Baylor College of Medicine in Houston, Texas, USA. "We are enthusiastic that our research will give hope that even small changes, such as improving one's diet in pregnancy and during breastfeeding, will translate into a lower chance for obesity in our next generation."

To make this discovery, Aagaard-Tillery and colleagues studied three groups of Japanese macaques. One group was fed a 12% fat diet (the control group). The second was fed a 35% fat diet (the high-fat diet group), and the third was fed the high-fat diet for up to five years and then switched back to the control diet. Each group maintained its specific diet prior to conception and throughout pregnancy. Offspring from the high-fat group developed nonalcoholic fatty liver disease, experienced changes in histones (the core set of proteins that DNA wraps around), and had altered metabolic profiles and circadian rhythms. Results also showed that the genes in the fetal liver, which are responsible for orchestrating circadian rhythms with appetite and food intake, are altered in offspring from the mothers on the high-fat diet. Specifically, one of these genes, called *Npas2*, is a key regulator of the circadian system and is itself regulated by changes in the fetal histone code. Scientists found that improving the diet, either for the pregnant or breastfeeding mother or for the infant after birth, helps to partially restore the circadian machinery, possibly lessening the risk of childhood diseases related to obesity.

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Such is the conclusion of a study in which two antioxidants—quercetin and ferulic acid—appeared to aggravate kidney cancer in severely diabetic laboratory rats. The study appeared in the *Journal of Agricultural and Food Chemistry* (58:9273–9280, 2010) and was led by Chiu-Lan Hsieh of the National Changhua University of Education in Taiwan.

The authors note that vegetables, fruits, and other plant-based foods are rich in antioxidants that appear to fight cancer, diabetes, heart disease, and other disorders. Among those antioxidants is quercetin, especially abundant in onions and black tea, and ferulic acid, found in corn, tomatoes, and rice bran. Both also are ingredients in certain herbal remedies and dietary supplements. But questions remain about the safety and effectiveness of some antioxidants, with research suggesting that quercetin could contribute to the development of cancer, the scientists note.

They found that diabetic laboratory rats fed either quercetin or ferulic acid developed more advanced forms of kidney cancer, and concluded the two antioxidants appear to aggravate or possibly cause kidney cancer. "Some researchers believe that quercetin should not be used by healthy people for prevention until it can be shown that quercetin does not itself cause cancer," the authors state. "In this study we report that quercetin aggravated, at least, if not directly caused, kidney cancer in rats," they add, suggesting that health agencies such as the US Food and Drug Administration should reevaluate the safety of plant-based antioxidants.

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Further: "Currently, the methods to determine the peroxide and the anisidine values are the most reliable chemical methods for rancidity measurements in bulk fish oils. However, gas chromatography methods that can measure the specific volatile oxidation products should be standardized and implemented. Current knowledge does not allow setting and recommending maximum acceptable values for these two indexes." ■

carbohydrate consumption, and alcohol use—even within typical ranges—are associated with higher circulating palmitoleate concentrations. Circulating palmitoleate is robustly associated with multiple metabolic risk factors but in mixed directions, perhaps related to divergent lifestyle determinants or endogenous sources (liver, adipose tissue) of fatty acid synthesis.

Lactosomes: Structural and compositional classification of unique nanometer-sized protein lipid particles of human milk

Argov-Argaman, N., *et al.*, *J. Agric. Food Chem.* 58:11234–11242, 2010.

Milk fat globules (MFG) are accepted primarily as triacylglycerol delivery systems. The identification of nanometer-sized lipid–protein particles termed "lactosomes" that do not contain triacylglycerol raises the question of their possible functions. MFG were isolated by slow centrifugation, and lactosomes were isolated by ultracentrifugation at a density equivalent to plasma high density lipoproteins (HDL) (d > 1.063 g/mL) from human milk obtained from six volunteers at different lactation stages. Isolated lactosomes were analyzed and compared with MFG for their size distribution, lipidome, proteome, and functional activity. Lactosomes from early milk, day 8, were found to be similar in size as those from mature milk >28 days, averaging ~25 nm in diameter. In total, 97 nonredundant proteins were identified in the MFG and lactosome fractions, 46 of which were unique to the MFG fraction and 29 of which were unique to the lactosome fraction. The proteins identified in the lactosome and MFG fractions were enriched with proteins identified with immunomodulatory pathways. Unlike MFG and GM1 [monosialotetrahexosylganglioside]-laden reconstituted HDL that served as a positive control, lactosomal binding capacity to cholera toxin was weak. Lipidomic analyses found that lactosomes were devoid of triacylglycerol and gangliosides, unlike MFG, but rich in a variety of phospholipid species. The data found differences in structure, composition, and function between lactosomes and MFG, suggesting that these two particles are derived from different biosynthetic and/or secretory pathways. The results reveal a bioactive lipid–protein, nanometer-length scale particle that is secreted into milk not to supply energy to the infant but to play unique, protective, and regulatory roles. ■

HEALTH & NUTRITION NEWS (CONTINUED FROM PAGE 26)

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PURPOSE-INSPIRED, INDUSTRY-LED GROWTH (CONTINUED FROM PAGE 11)

- Lessens the physical burden to the consumer of doing the task. If you watch most consumers do laundry by hand around the world, you are struck by how physically demanding the process is. We can make the process easier.
- Requires much less of three precious and scarce resources consumers need to use to get the job done—time, energy, and water. We can make our products and operations more environmentally friendly.

We need more of this from all of us. It's essential that innovation remain the primary driver of growth—and primary source of consumer benefits—across the industry.

The second area where we need industry action is in embracing sustainability as a broad industry priority all the way across the value chain. Specifically, we must reduce our carbon footprint over time, using a full life-cycle, science-based approach, and convert more and more of our formulas to renewable materials.

We've made great progress on sustainability through compaction. Today, more than 34% of laundry detergents sold globally are concentrated. Concentrated products represent more than 90% of the market in North America and Australasia. We now need to accelerate broader progress.

We've taken a step in this direction at P&G with a new sustainability vision and 10-year goals. We're committed to:

- Power our plants with 100% renewable energy.
- Use 100% renewable or recycled materials for all products and packaging.
- Have zero consumer and manufacturing waste go to landfills.
- Design products that please consumers while maximizing the conservation of resources.

It will take decades to achieve this vision but we're committed to steady, sequential progress year-by-year and decade-by-decade.

I know that others here have made similar bold commitments. My challenge is for all of us to identify how we can work not only to accomplish our individual goals but also, and more importantly, to make even greater progress as a total industry.

Third, we need to work together to influence and shape the regulatory agenda, in order to ensure whatever laws and rules are implemented are based on sound science and don't add unnecessary additional costs for consumers. Concerted industry action can have an important impact here, not just within individual markets but also regionally and globally. We need to work together to influence legislators, regulators, and policy makers to achieve science-based, consumer-focused regulations that are mutually recognized, if not globally standardized, around the world. This will not happen without the focused, collaborative effort across this entire industry.

Overview

Taken together, these three industry priorities—transformational innovation, bold progress in sustainability, and a science- and benefit-based approach to industry regulation—are key to touching and improving as many people's lives in as many parts of the world as possible.

This is our opportunity, and our responsibility. I would like to challenge us all to look at our industry as a fulcrum. The detergents industry plays a critical role in the business and technology portfolios of every company represented here. The consumer categories we serve are foundational in every geographic market, developed and developing. The tensions we help solve in people's everyday lives give us the opportunity to genuinely improve life in very personal and meaningful ways.

We can all move with a shared, consumer-focused Purpose. We already have, and we can do more. We just need more. More creativity. More innovation. More leadership. This is what it will take to define the future of our industry. To be a force for good in the world. To touch and improve lives. Now, and for generations to come. ■

*inform*ation

- 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 is $195 (AOCS member price: $175). Visit www.aocs.org/store for more information.
- Look for the Montreux address from Unilever's Paul Polman in the February issue of *inform*.

Regulatory issues associated with the international oils & fats trade

John Hancock

There are three major areas of regulations concerning the global trading of oils and fats. Firstly, there is the international arena such as that of the International Maritime Organization (IMO). Secondly, there are the standard international contracts for trade such as the FOSFA (Federation of Oils, Seeds and Fats Associations) contracts and NIOP (National Institute of Oilseed Products) trading rules, as well as regional or national legislations such as those of the European Union (EU). Finally, there are some international codes of practice that are becoming increasingly important, for example, the use of the principles of HACCP (Hazard Analysis Critical Control Points) and the Codex Alimentarius Code of Practice for Oils and Fats.

Traders must understand all these laws and rules, and in particular, they should be completely familiar with their contracts. Also, recall that the vast majority of the time, we are dealing with the food industry and that the large amounts of oils and fats produced in the world are for human consumption. Today, food production involves risk management, and this risk must be managed at all stages of the food chain, from farm to fork. One of the most critical areas of risk is the transport of bulk cargoes of oils and fats by sea, from the producing countries to the consuming countries. The main reason the risk is high is that oils in transit are not under the direct control of any of the trading parties. For the duration of the voyage, they are the responsibility of a third party, that is, the shipowner. During this link in the food chain, a vessel carrying edible oil must comply with the legislation developed by the IMO.

IMO and the 2007 Rule Change

IMO is a body of the United Nations and is based in London, UK. Its goals are the development and maintenance of a regulatory framework for shipping, the prevention of accidents, the safety of seafarers, and the protection of the maritime environment. It is also in the process of establishing a compensation scheme such that, in the event of a major shipping accident, funds will be available to pay for the clean-up operation. This is a work in progress, but it will affect the edible oil industry if and when it is adopted. The regulations that govern the prevention of maritime pollution are called the "MARPOL convention." Recent changes to this legislation have had a significant effect on the oils and fats trade.

In 2007, the IMO changed its rules governing the carriage of oils and fats. Before January 1, 2007, their carriage was not regulated. Since then, oils and fats must be carried in ships that are designed and constructed to protect the tanks and limit the amount of oil released into the sea if a collision were to occur. These ships are designated as IMO type 2 vessels. During the development of these rules, it was believed that there would not be enough ship tank space to carry the roughly 50 million metric tons of oil that were being shipped annually at that time. Thus, after widespread country and shipowner representation, IMO issued a derogation, or exception, allowing IMO type 3 ships with certain tank protection characteristics to be used. One aspect of IMO 2 ships is that they are not allowed to load over 3,000 cubic meters of product into any single tank, but IMO 3 ships are allowed to

carry much larger volumes. This derogation may come under review in the future, but the rules as they exist currently are acceptable to the international trade.

Another aspect of the MARPOL regulations that has affected the trade is the limit that IMO has placed on the amount of tank residues that can be pumped to sea. Effectively, if the oil is viscous and thick at the time of discharge—meaning that significant quantities will remain in the tank after discharge—then the first tank washings must be pumped to shore and not to sea. This pumping to shore will incur a cost, as these washings must be disposed of in an environmentally acceptable way. Despite this, the overall effect of the change in the IMO rules has been to improve the quality of the shipping fleet that services the oils and fats trade while addressing the protection of the marine environment.

FOSFA Contracts

An estimated 85% of the current world trade in oils and fats uses FOSFA contracts, and it is interesting to consider the reasons for this. The main advantage is that the use of standard form contracts reduces the risk of trading parties misunderstanding the procedures they need to follow to enable the trade to go smoothly. The contracts also reduce the risk in trade as the clauses in the contracts are well known by all parties and reflect long-standing trade practices. This allows the parties to discuss and agree on the important features such as quality, quantity, price, and shipment/delivery dates. Their confirmation letters include these details and usually a statement saying, "All other terms as per FOSFA 80" (for crude palm oil, by way of an example). This means that they do not have to read all the other parties' contracts, which would be necessary if standard contract forms were not available or used. All trading parties would like the contracts to be in their own language and refer to their own national legislation, but this is not practical. Thus, the trade agrees to use one common language and one jurisdiction and, by virtue of history, these happen to be English and the rule of English law, as is common to nearly all internationally traded commodities.

The contracts also reduce risk as they include rules for the hygienic carriage of oils and fats in bulk by sea. These rules are tried and tested and have been developed now over two decades and with much experience. For a FOSFA contract, these rules are contained in the publication generally referred to as "The Carriage of Oils and Fats." Of particular importance in these rules are the two lists of banned previous cargoes and acceptable previous cargoes.

Previous Cargoes

The standard FOSFA trading contracts are based on "banned list terms." The banned list includes the cargoes that led to problems in the 1980s. It was drawn up following work carried out by Unilever when bulk shipping replaced drums, and two-way freight space occupancy became a reality. These materials have persistent properties, are difficult to remove and clean from the tanks, and are generally toxic. The risk of contamination from previous cargoes or from poor cleaning of the tanks is reduced if these substances are not allowed to be carried prior to vegetable oils. So, the basic terms mean that a receiver will accept the parcel of oil if the previous cargo is not on the banned list.

However, some companies wanted to reduce the risk from

contamination even further so that their major brands, which have been built up over many years and are very valuable, were not at risk from contamination. The risk to the consumer, and therefore the risk to the manufacturer, can be reduced if the previous cargo is not toxic, is easily cleaned, or is removed by further processing. This desire to reduce the risk led to the development of the lists of acceptable immediate previous cargoes. FOSFA developed its acceptable list in the early 1990s. This led to the writing of an optional clause, which could be added to the standard contract, thus converting it into an "acceptable list terms" contract. In other words, the receiver will accept the cargo only if the previous cargo is on the acceptable list. This requirement for a lower risk and the use of this type of contract are entirely the choice of the purchaser or receiving company, except when national regulations apply. It is also evident that Acceptable List trade is increasing and going well beyond European shorelines, where it had its dominance in the 1990s and influenced EU regulation development at that time.

Certain regions such as the EU and the United States (via NIOP acting as the US trade body) have already made this choice for the trader by virtue of their wish to protect the health of the consumer. EU legislation requires that all food products be carried in dedicated transport. However, FOSFA approached the European Commission (EC) on behalf of its members and persuaded the EU that dedicated shipping, initiated in 1995, was not in the interests of any country. The distances are large and the freight is expensive, so ships returning with empty tanks are not economic. More recently, this has been supported by the need to minimize the carbon footprint of the whole transport chain. Thus, the EU adopted a similar list to the FOSFA list of acceptable previous cargoes, but the European Food Safety Authority (EFSA) did not agree with the inclusion of a few of the products on the list. They felt that data were insufficient to make a judgment and changed the FOSFA list slightly. But most of these cargoes are not carried in great volumes, and they could be removed from the FOSFA and NIOP Acceptable Lists without reducing the available ship space or the flexibility that charterers and owners seek. The recent decision by the EC to re-evaluate their acceptable list has meant that the decision to amend these trade lists has been postponed.

International Codes of Practice

The final area concerning the legislation for oils and fats is the issues related to international codes of practice. One code that has been adopted by several countries is the use of HACCP. This control scheme for safe food manufacture has been included in the legislation of many countries, including those of the EU and United States. The HACCP scheme and its seven principles can readily be applied to the transport of oils and fats by sea.

The international body that is concerned with worldwide food safety and fair world trade is the Codex Alimentarius Commission. This international body was convened under the auspices of the Food and Agriculture Organization and the United Nations in 1963. It develops food standards, guidelines, and related texts such as codes of practice, and has over 175 member countries and 15 committees. In the past decade, the food safety aspect of its work has dominated the committee proceedings, while the "trade forum" component has been left to other bodies such as the World Trade Organization.

CONTINUED ON PAGE 50

The Committee of most interest to our trade is the Codex Committee on Fats and Oils (CCFO); the Secretariat for this committee is now held by Malaysia. This Committee has had a code of practice since 1987: Recommended International Code of Hygienic Practice for the Storage and Transport of Edible Oils and Fats in Bulk. This code currently does not have much impact on the world trade as very little volume is traded on the basis of Codex standards and codes. It is used or referred to occasionally for intergovernmental dealings, usually for food relief purposes. However, this situation could change, and it may become an opportunity to generate an international harmonized banned list and an acceptable list for the purposes of trade in oils and fats. Codex already has an agreed banned list, which includes most of the products on the FOSFA banned list. It is noteworthy that FOSFA has recently added crude petroleum and some petroleum oil products to its banned list as a result of the introduction of the new IMO MARPOL regulations. Since these came into force, some ships that once traded only within the petroleum industry have moved into the vegetable oil industry. This has meant that FOFSA has had to include substances that were never considered at the time of the original list.

The CCFO is in the rather lengthy process of developing its acceptable list. It currently has a draft list at Step 7 and a smaller proposed draft list at Step 3. These steps relate to the progress of the standards as they move toward general acceptance, from Step 1 to Step 8. Thus, the major part of the acceptable list is in an agreed draft form. There have been no health issues with any of the substances in the draft list at Step 7, which is effectively equivalent to the FOSFA list as it was in 1996 when it was adopted by the EU. However, the proposed draft list at Step 3 is more contentious. CCFO has developed a set of draft criteria that it feels could be used to assess the suitability of a substance being regarded as an acceptable previous cargo.

Briefly, these criteria state that an oil is to be carried in appropriate systems with cleaning, inspection, and recording systems. The previous cargo must have a minimum Acceptable Daily Intake (ADI) of 0.1 mg/kg of body weight/day, it must not contain a known food allergen that is not removed by further processing, and any known reaction products with oils must also comply with these criteria. However, these criteria are deemed very cautious. As representing the industry, FOSFA generally supports these criteria but feels that the further processing of the oils at their destination should be taken into account, thus allowing a lower ADI to be allowed in this case. There is also the problem of assessing materials that do not have an ADI value. Nevertheless, we believe that overall, the criteria have a 10× safety margin built into them, but they are the only set of criteria that have a defined level of toxicity for previous cargoes.

The criteria have been discussed by the EFSA, which concluded that they do not contradict the criteria used by the EU to consider previous cargoes. Thus, the hope is that these amended criteria will be agreed at the next meeting of the CCFO in February 2011 and allow the acceptable list to be adopted. There will be opposition to this adoption from the US delegation as they are against Codex having any lists, believing that the trade lists are adequate. However, this would leave the industry with at least three major lists of acceptable previous cargoes, namely, FOSFA, EU, and NIOP. Harmonization of the lists is a praiseworthy goal as this would prevent any potential of costly errors being made in the allocation of tank space. But, this should not

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Extracting soybean oil with a switchable-hydrophilicity solvent

Carbon dioxide is used in a new process that is more environmentally friendly and cost efficient.

Neil Canter

Soybean oil is currently obtained from soybeans through a process involving extraction of the oil from flakes. Hexane is used as a solvent in this process because it is very compatible with soybean oil and easily removed by distillation.

Philip Jessop, professor of chemistry and Canada Research Chair in Green Chemistry at Queen's University in Kingston, Ontario, Canada, indicates that this is not an environmentally friendly process. He says, "Hexane is a volatile solvent that can cause a significant amount of smog formation. In Canada, it is estimated that 4,400 metric tons per year of hexane are emitted with a third sourced from oilseed processing. One other factor is that the final distillation process is very energy intensive."

In 2006, Canter introduced the concept of a switchable solvent. Jessop has been looking at this approach to use solvents in a more cost-effective and environmentally friendly standpoint.

His original switchable solvents could be converted reversibly from a nonpolar to a polar state. Jessop has been successful in doing this using carbon dioxide as a reagent. Carbon dioxide is utilized because it is very cost effective, readily available, and easily removed. Jessop has now reported a new kind of switchable solvent, which he calls a switchable-hydrophilicity solvent (SHS), meaning it can switch from a hydrophobic state to a hydrophilic state.

The switching process is shown in Figure 1. A hydrophobic organic solvent is typically insoluble in water, as shown on the left. Reaction with carbon dioxide in water (carbonated water) switches the solvent to a hydrophilic state that is soluble, leading to the formation of a homogeneous mixture on the right. Eventually, the SHS can be isolated in its original hydrophobic state through removal of the carbon dioxide.

Using an SHS to process soybean oil without the use of hexane and distillation has potential. The solvent in its hydrophobic state could be used to extract soybean oil and then switched to a hydrophilic state to enable the oil to be isolated. A suitable solvent that can reversibly react with carbon dioxide has now been found.

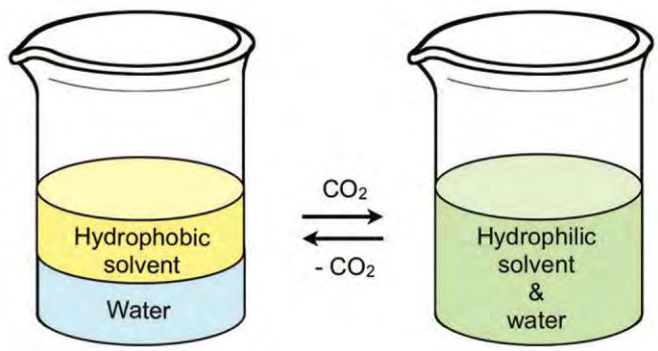

FIG. 1. *A switchable-hydrophilicity solvent is used in the hydrophobic state to extract soybean oil and then is converted into a hydrophilic solvent through the introduction of carbonated water. Isolation of soybean oil is then achieved followed by switching the solvent back to its hydrophobic state through removal of carbon dioxide. Courtesy of Queen's University.*

Amidines and Amines

Carbonation of water produces a weak acid (carbonic acid), which means that the desirable solvent should be basic. Jessop and his coworkers have known that amidines, amines, and guanidines can react with carbon dioxide and water to become hydrophilic. Jessop says, "We looked at a number of candidates by varying the number of alkyl groups attached to these nitrogen-based functionalities. Guanidines were eliminated as possible solvents because they are too basic and do not switch back to a hydrophobic state."

The parameter used to determine the best possible choice is the octanol-water partition coefficient. Jessop says, "We added a tiny amount of the solvent to a beaker with one-part octanol and one-part water. The percentage of solvent in octanol vs. water is measured. A higher value means that the solvent is more hydrophobic."

The researchers found that a solvent with a logarithmic octanol-water partition coefficient above seven is too hydrophobic and will not be miscible with carbonated water. One specific amidine solvent that worked well exhibited a value just above six.

This amidine solvent also happens to change polarity when exposed to carbon dioxide. Polarity measurements were obtained

*inform*ation

- Canter, N., Analyzing Switchable Solvents, *TLT 62*(2):15–16, 2006.
- Jessop, P., L. Phan, A. Carrier, S. Robinson, C. Durr, and J. Harjani, A Solvent Having Switchable Hydrophilicity, *Green Chem. 12*:809–814, 2010.

by determining the wavelength of maximum absorption of Nile Red dye in the absence and presence of carbon dioxide. Jessop says, "We found that the difference in the wavelengths of maximum absorption for the solvent in the absence and presence of water is far greater than any other solvent we have ever tested and shows a change in true solvent polarity."

The reason for this major change is that the solvent is very immiscible in water in the absence of carbon dioxide. This effect changes dramatically when carbon dioxide is added.

This amidine solvent was then used to extract soybean oil from the soybean flakes. An extraction experiment was conducted to compare the ability of the amidine to extract soybean oil vs. hexane. After stirring soybean flakes in both solvents overnight and then filtering, an equivalent amount of soybean oil was detected in both solvents.

Carbonated water was then introduced to remove the amidine solvent from the water. The efficacy of this technique was evaluated by using ^{1}H nuclear magnetic resonance (NMR) spectroscopy of deuterium water. After only one water wash, 96% of the amidine solvent had been removed. Jessop anticipates that additional washings will remove the remaining solvent.

The solvent can then be isolated from the water through removal of carbon dioxide by heating the mixture at a temperature of 80°C for one hour. Jessop indicates that further work needs to be done to determine the amount of residual solvent left in the flakes and how to remove it. This factor is important because the flakes are used in other applications.

One area of concern for Jessop is solvent durability.

He says, "We are uncertain that amidine solvents can be reused in this process because they can hydrolyze over time. We have recently looked at amines which are chemically more robust. Several promising amine candidates have been identified that will perform better than the amidine solvent we initially evaluated."

Jessop also indicates that further work will be done to determine how much energy can be saved by not distilling hexane.

Recycling Motor Oil

Jessop works with Green Center Canada, which is looking to commercialize sustainable technologies developed in the academic community. He says, "One new project that Green Center Canada is working on is to evaluate the ability of switchable solvents to extract residual motor oil from used plastic bottles. If an approach can be developed, then recycling of the plastic bottles will become feasible."

Such a process will significantly reduce waste disposal costs as plastic bottles with residual motor oil now have to be land-filled in Canada.

Additional information on the use of switchable solvents to extract soybean oil can be found in a 2010 article (listed in accompanying *inform*ation box) and by contacting Jessop at jessop@chem.queensu.ca.

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UC DAVIS STANDS BEHIND THE REPORT (CONTINUED FROM PAGE 13)

the University of the Republic in Uruguay in October 2010, and the Department of Health in Andulacía, Spain, in November 2010. With the United States now being the third-largest consumer of olive oil in the world, this issue deserves continued research.

We encourage readers to examine our Report and Appendix (see www.olivecenter.ucdavis.edu), and assess the validity of the study for themselves. We reiterate our desire to work collaboratively with the IOC to analyze the quality of olive oil in the United States. Let's test it and taste it together.

Edwin N. Frankel is an adjunct professor, Selina C. Wang is a research associate, Charles F. Shoemaker is professor and leader of the UC Davis Olive Oil Chemistry Laboratory, and Dan Flynn is the executive director of the UC Davis Olive Center, all at the University of California, Davis. Rodney Mailer is a research fellow at the Australian Oils Research Laboratory in Wagga Wagga, Australia.

REGULATORY ISSUES (CONTINUED FROM PAGE 50)

be pursued if it were to reduce the ship tank space available to the trade.

Further Considerations

Assuming that the lists are agreed within the Codex Code of Practice, there are still some anomalies as the Code does not reflect the current practice of world trade. Firstly, there needs to be a timely procedure for maintaining the lists with the removal and addition of materials. More than one or two proposed changes each year are unlikely, and as long as the proposing organization provides all the necessary data for making a full hazard profile, then this job should not be too arduous for a body such as the Joint Expert Committee on Food Additives (JECFA) to evaluate their status between the Codex meetings.

Secondly, the use of banned list terms and acceptable list terms must be included in the Code. Currently it does not say that tanks that have carried banned list cargoes as the immediate previous cargo cannot be used to carry edible oils. It also states, "Previous cargoes not on the current Codex Lists are only to be used if agreed upon by competent authorities of the importing countries." This is not a practical suggestion, as few countries would put in the required effort. On top of this, looking at the multitude of cargoes that are not on either list is unnecessary when the concepts of banned list terms and acceptable list terms are fully understood.

Making these few changes to the Codex Code of Practice would support the world trade and go a long way to providing a useful code of hygienic practice. The code would not replace the use of trade contracts since these include all the necessary commercial aspects of selling and buying oils and fats, but it could provide a universally acceptable scheme for protecting the health of the consumer during the most hazardous part of the food chain for oils and fats.

John Hancock is the technical manager of FOSFA International, based in London. He has represented and promoted the interests of the oils and fats trade in many national, regional, and international technical arenas. This article is based on his presentation to the Oils & Fats International Congress held in Kuala Lumpur, Malaysia, in October 2010. Contact him at John.Hancock@fosfa.org.

PEOPLE NEWS (CONTINUED FROM PAGE 28)

Benavides, GEN-X Energy Group (producer); **Steven Levy**, Sprague Energy (producer); **Dave Lyons**, Louis Dreyfus (producer); **Doug Smith**, Baker Commodities (producer); **David Womack**, Tennessee Soybean Promotion Board (farmer); **and John Wright**, Owensboro Grain Company (producer).

Ed Hegland, Kris Kappenman, Bob Metz, and **Darryl Brinkmann** also serve on the governing board.

Casale new president and CEO of CHS

In late November, CHS Inc. (St. Paul, Minnesota, USA) announced the appointment of **Carl Casale** as its new president and chief executive officer (CEO). He assumed the positions January 1, 2011. Before coming to CHS, Casale was executive vice president and chief financial officer for Monsanto Company. He replaces **John Johnson**, who retired.

CHS is a diversified energy, grains, and foods company that supplies energy, crop nutrients, grain, livestock feed, food and food ingredients; operates petroleum refineries/pipelines; and manufactures, markets, and distributes refined fuels, lubricants, and renewable energy products.

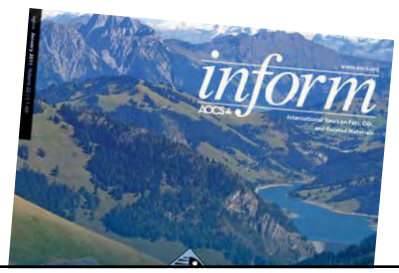
Harris joins PetroAlgae

Rob Harris, a 20-year veteran of British Petroleum, joined PetroAlgae Inc. and its operating company, PA LLC, as president and chief operating officer on November 15, 2010. PetroAlgae, based in Melbourne, Florida, USA, is a renewable energy company that licenses and deploys its biomass production platform in the energy and agriculture markets. The company's technology is designed for the growth and harvest of a wide variety of non-algae micro-crops suitable to local climates in open-pond bioreactors.

Harris is charged with transforming the company from an innovation and technology company to a commercial entity. ■

New in 2011

inform has a new schedule that will combine the July/August and November/December issues for a total of 10 issues instead of 12. This change will allow our staff to include more editorial content in our "most-read" issues.



Together we can.
Bring ideas to life. Today.

The challenge of removing phosphates

As of July 1. 2010, a number of states in the US have banned the use of phosphates in automatic dishwashing detergents to reduce the impact of detergents on the environment. This creates significant challenges for detergent manufacturers including lower cleaning performance and reduced enzyme stability. Genencor offers different enzymes solutions for automatic dishwashing detergent producers to mitigate the deficits of phosphate-free detergents.

Right now we are enabling our customers to develop high performing detergents that meet their environmental and performance demands.

Together we can bring greener ideas to life. Today.

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