inform **March 2010** Volume 21 (3) 125–188

www.aocs.org

inform

AOCS

International News on Fats, Oils, and Related Materials

Hempseed oil in a nutshell

ALSO INSIDE:

Biobased lubricants

Plant lipids meeting preview

Dealing with the media: A cautionary tale

Investing in the sustainability of AOCS

www.aocs.org

inform

AOCS

March 2010 Volume 21 (3) 125–188

Departments and Information

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

inform • International News on Fats, Oils, and Related Materials
ISSN: 0897-8026 IFRMEC 21 (3) 125–188

Calendar

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

April

April 11–13, 2010. 78th Oil Mill Operators Short Course, Omaha, Nebraska, USA. Information: Rich Clough, Food Protein R&D Center, College Station, Texas, USA; phone: +1-979-862-2262; fax: +1-979-845-2744; http://foodprotein.tamu.edu/extractionprotein/scvegoil.php.

April 14–15, 2010. CED 40 Annual Meeting [Comité Español de la Detergencia, Tensioactivos y Afines], Barcelona, Spain. Information: www.cedmeeting.com.

April 20–21, 2010. Oils & Fats International Turkey 2010, Hilton Hotel and Convention Centre, Istanbul, Turkey. Information: www.oilsandfatsinternational.com/publication.asp?pubid=28&nav=3&exid=165&subnav=0.

April 24–28, 2010. Lipids Interactions in Physiology and Disease: American Society for Biochemistry and Molecular Biology Annual Meeting, Anaheim Convention Center, Anaheim, California, USA. Information: www.asbmb.org/Meetings_01/2010mtg/2010mtgint.aspx?id=3158.

April 25–27, 2010. IMR Conference Food Hydrocolloids, Grand Hyatt Hotel, Berlin, Germany. Information: www.hydrocolloid.com.

April 27–29, 2010. Advanced Biofuels Leadership Conference, Hilton Embassy Row, Washington, DC, USA. Information: http://advancedbiofuelssummit.com.

April 29–30, 2010. National Algae Association Conference, Doubletree Hotel Houston Intercontinental, Houston, Texas, USA. Information: www.nationalalgaeassociation.com.

May

May 3–4, 2010. LIPIDS MAPS Annual Meeting 2010: Lipidomics Impact on Cell Biology, Atherosclerosis and Inflammatory Disease, Scripps Seaside Forum of the University of California San Diego's Scripps Institution of Oceanography, La Jolla, California, USA. Information: www.lipidmaps.org/meetings/2010annual/index.html.

May 3–6, 2010. BIO [Biotechnology Industry Organization] International Convention, McCormick Place, Chicago, Illinois, USA. Information: http://convention.bio.org.

May 3–7, 2010. 18th European Biomass Conference and Exhibition, Cité Internationale—Centre de Congrès, Lyon, France. Information: www.conference-biomass.com.

May 5–6, 2010. Biofuels International Expo & Conference, Barceló Hotel, Prague, Czech Republic. Information: www.biofuelsinternationalexpo.com.

May 11–13, 2010. Bioenergy Markets Africa, Maputo, Mozambique. Information: www2.greenpowerconferences.co.uk/v8-12/Prospectus/Index.php?sEventCode=BF1002MZ.

May 13–15, 2010. International Symposium on Microbial Lipids: From Genomics to Lipidomics, Vienna, Austria. Information: www.eurofedlipid.org/meetings/vienna2010.

May 16–19, 2010. 101st AOCS Annual Meeting and Expo, Phoenix Convention

Index to advertisers

*Corporate member of AOCS who supports the Society through corporate membership dues.

AOCS Meeting Watch

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

July 11–16, 2010. 19th International Symposium on Plant Lipids, Cairns Convention Centre, Cairns, Australia. Information: www.ispl2010.org.

October 4–7, 2010. 7th World Conference on Detergents: New Strategies in a Dynamic Global Economy, Montreux Music & Convention Centre, Montreux, Switzerland. Information: www.aocs.org/meetings/montreux.

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

Center, Phoenix, Arizona, USA. Information: phone: +1-217-359-2344; fax: +1-217-351-8091; e-mail: meetings@aocs.org; http://Annual_Mtg.aocs.org.

May 16–20, 2010. STLE [Society of Tribologists and Lubrication Engineers] 2010 Annual Meeting, Bally's Hotel & Casino, Las Vegas, Nevada, USA. Information: www.stle.org.

May 23–27, 2010. Practical-Short Course: Trends in Margarine and Shortening Manufacture. Non-Trans Products, Food Protein Research & Development Center, Texas A&M University, College Station, Texas, USA. Information: http://foodprotein.tamu.edu/fatsoils/scmargarine.php.

May 26–29, 2010. OLIVEX 2010: The 8th International Exhibition for Olive Oil, Edible Oil & Oil Processing Technology, Damascus Fairground, Syria. Information: www.olivex-sy.com.

May 29–June 2, 2010. 9th ISSFAL Congress, Maastricht, Netherlands. Information: www.unimaas.nl/congresbureau/issfal2010.

June

June 1–4, 2010. AchemAsia, 8th International Exhibition, Congress on Chemical Engineering and Biotechnology, Beijng, P.R. China. Information: www.achemasia.de.

June 2–5, 2010. European Fat Processors and Renderers Association, Kempinski Hotel Corvinus, Budapest, Hungary. Information: www.efpra2010.org.

June 3–4, 2010. Third European Workshop on Lipid Mediators, Pasteur Institute, Paris, France. Information: http://workshop-lipid.eu.

June 6–11, 2010. Bioactive Lipids: Biochemistry and Diseases, Westin Miyako Kyoto, Kyoto, Japan. Information: www.keystonesymposia.org/Meetings/ViewMeetings.cfm?MeetingID=1024.

June 10–11, 2010. International Lecithin & Phospholipid Society, Lecithin Short Course, Ghent University, Ghent, Belgium. Information: email: ilps@lecipro.nl; www.ilps.org.

June 12–15, 2010. National Lubricating Grease Institute Annual Meeting, Bonita Springs, Florida, USA. Information: www.nlgi.org/annual_meeting.

June 12–15, 2010. International Oil Mill Superintendents Association Convention, Marriott Hotel, Williamsburg, Virginia, USA. Informa-

CONTINUED ON PAGE 188

inform
AOCS

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

Formerly published as *Chemists' Section, Cotton Oil Press*, 1917–1924; *Journal of the Oil and Fat Industries*, 1924–1931; *Oil & Soap*, 1932–1947; news portion of *JAOCS*, 1948–1989. The American Oil Chemists' Society assumes no responsibility for statements or opinions of contributors to its columns.

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

Subscriptions to *inform* for members of the American Oil Chemists' Society are included in the annual dues. An individual subscription to *inform* is $175. Outside the U.S., add $30 for surface mail, or add $115 for air mail. Institutional subscriptions to the *Journal of the American Oil Chemists' Society* and *inform* combined are now being handled by Springer Verlag. Price list information is available at www.springer.com/pricelist. Claims for copies lost in the mail must be received within 30 days (90 days outside the U.S.) of the date of issue. Notice of change of address must be received two weeks before the date of issue. For subscription inquiries, please contact Doreen Berning at AOCS, doreenb@aocs.org or phone +1-217-693-4813. AOCS membership information and applications can be obtained from: AOCS, P.O. Box 17190, Urbana, IL 61803-7190 USA or membership@ aocs.org.

Sustainability

AOCS FOUNDATION
Influencing Innovation

Jean Wills Hinton

Sustainability is a common theme in business today. It is a broad term that requires explanation each time it is used. Alberto Luis Dominguez, who spoke at the recent 84th Annual Meeting & Industry Convention of The Soap & Detergent Association, talked about sustainability. He is vice president, divisional merchandise manager of Household Paper Goods and Chemicals for Wal-Mart Stores, Inc. Dominguez said he found through a Google search that the word "sustainability" is used 10 times more often now than 10 years ago. It clearly is a buzzword in today's culture.

One element related to sustainability makes it relevant to companies and to individuals, and that is the desire by both to invest time and resources in things that have meaning, that will make a difference, that will last. For many commercial organizations, it means undertaking "green initiatives." For charitable organizations, it may mean meeting emergency needs or undertaking projects now that will lead to a better future for people in need.

But what does sustainability mean to a 100-year-old scientific society such as AOCS?

One hundred years ago, the individuals who established this Society set out to meet an immediate need, which was to develop methods and to share research results. This early network of analysts created an opportunity to collaborate on research and established a journal to share information. As a result, more people joined the Society, and the fields of research expanded owing to the interaction. New products and improvements to health and vitality resulted. And then more facets of research, related to the original focus on cottonseed oil and soaps, emerged because of the work and collaboration, and friendships grew, and businesses grew, and the collaboration became more and more international, and meetings resulted, and books were published, etc.

And here we are, 100 years later, wondering what is next, as we continue to draw our disparate global membership into a

tightly knit group of colleagues whose efforts continue to result in the improvement of health, wellness, cleaning, personal care, nutrition, energy alternatives, and food products (to name just a few).

So, as far as the meaning of sustainability in the context of AOCS goes, it means the continual growth of the bodies of knowledge that exist within the professions of the members we serve—and the application of that knowledge to improve the human (and in some cases, animal) condition—an important pursuit by any estimation.

How do we sustain this dynamic that has contributed so richly to the world around us?

Only 10% of the annual AOCS budgeted revenue comes from membership dues. The other 90% comes from products and services developed by members, for members. If those products didn't have value, AOCS would not be here today. However, since expenses are tightly controlled and the motive, rather than profit, is to serve you with low prices and new products, there is very little revenue available for product development at the end of the budget year. In fact, the development of new products and the technology used to distribute them have been funded, almost exclusively, by the AOCS Foundation over the past five years. Which is just one of the reasons that the AOCS Foundation will introduce its Influencing Innovation Campaign in 2010, with the key goal of sustaining AOCS' future.

I make a pledge to the AOCS Foundation each year, just before the AOCS Annual Meeting & Expo, where the AOCS Foundation reaches out to all members present. I am not a chemist or an engineer or a businessperson in any of the fields served by AOCS. I give because I believe in the contribution made by AOCS and its members to the world around us—not only to the science and business communities we serve, but to the world at large. And the goodwill and respect we who work together from various countries and cultures gain by our connection through AOCS are immeasurable—and they are good.

As Executive Vice President of AOCS, I sit on the front line and I see a lot worth investing in at AOCS—and I want to sustain it. Won't you join me in helping to fund the future?

Jean Wills Hinton is AOCS executive vice president. Contact her at jeanwh@aocs.org.

*inform*ation

Giving to the AOCS Foundation is easy and convenient.

- Individual donors are invited to make a one-time donation, pledge a gift over a period of time, join the Century Club, or make a planned gift.
- Corporate donors can participate by making a one-time donation, pledging a gift over a period of time, joining the Corporate Century Club, or making a corporate foundation-to-foundation gift.

For more information visit www.aocs.org/found or contact Amy Lydic, phone: +1-217-693-4807; fax: +1-217-693-4852; email: amyl@aocs.org.

Hempseed oil in a nutshell

J.C. Callaway

Industrial hemp is as a class of non-drug *Cannabis sativa* varieties, and hempseed is technically an achene, or nut. Both the seed and hemp's tall stalk provide significant carbohydrate feedstocks for a wide variety of industrial purposes in several countries. The oil pressed from hempseed, in particular, is a rich source of polyunsaturated omega-3 and omega-6 fatty acids, which are essential for human health. These same fatty acids in hempseed oil make it a fine drying oil that is used in the production of paints, varnishes, and other coating materials. Plastic flooring such as linoleum and similar materials have been made from hempseed oil, and other non-food uses of hempseed oil are similar to those of linseed oil (flaxseed oil). Flax, of course, also has a long history as a companion species that parallels hemp in the founding of our civilizations.

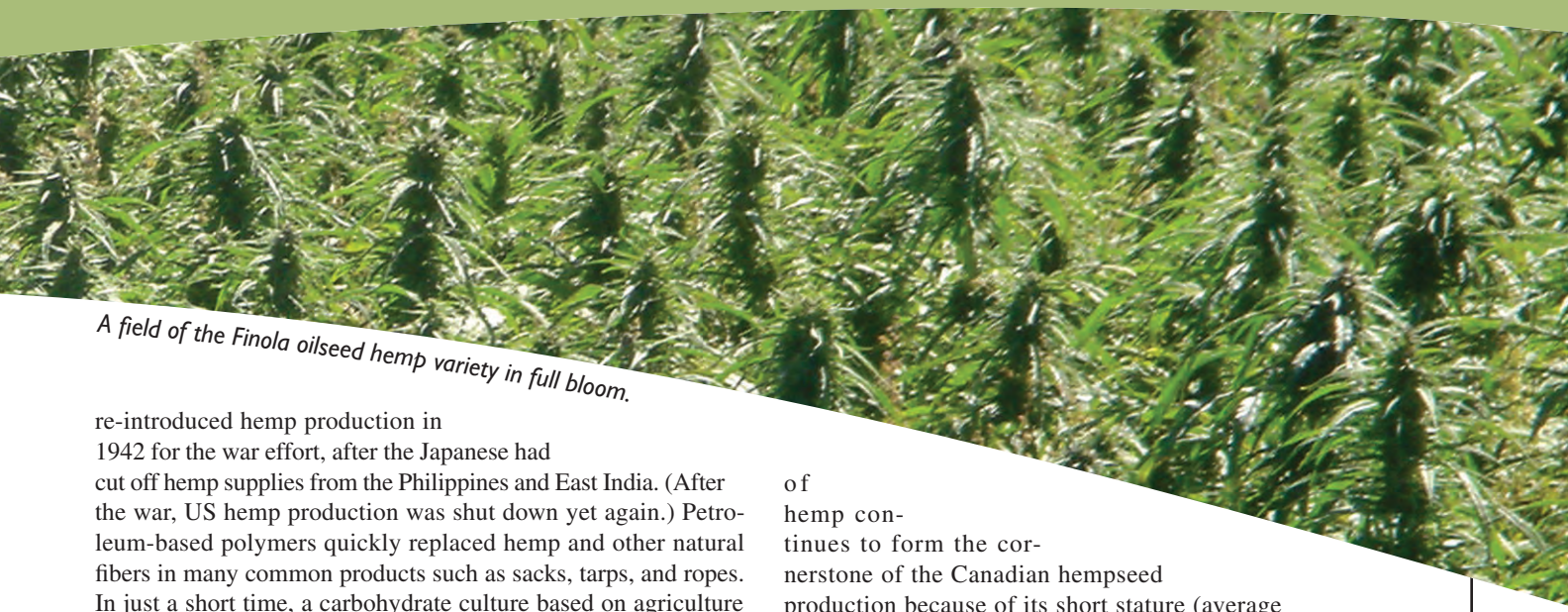
Unfortunately, when one reads the Latin words *Cannabis sativa* these days, the first thoughts that come to mind may not be of hemp, or its nutritious seed, or useful oil products, or even the durable outer bast (stem) fiber or the cellulose core from the stalk of this old-world plant. These lesser-known features of *Cannabis* were certainly well known to Carl Linneaus when he assigned its name in 1753. The words "canvas" and "cannabis," for example, both derive from similar-sounding words in Greek, Latin, and Arabic for the fabric and the plant from which it is made. The second part of the Linnean binomial, *sativa*, comes from the Latin word *sativus*, which means "sown" or "cultivated." *Cannabis sativa* is one of the oldest cultivated crops, and no other plants can provide such easily available food, oil, fiber, and even medicine. The largest obstacle that currently prevents hemp from fully participating in modern industrial agriculture is its botanical association with the drug cannabis. In fact, the production of THC (tetrahydrocannabinol) and other cannabinoids is under genetic control, so it would take an ambitious breeding project to convert a hemp variety into a drug variety, much like converting a dachshund into a Doberman pinscher. In other words, it would be much easier just to start with drug *Cannabis* seeds, if that were the objective.

OUR HISTORIC FOUNDATIONS WERE BUILT ON THE FIBERS OF HEMP

Ancient Asian mariners and more recent trans-Atlantic voyagers made good use of sturdy canvas sails made from hemp fiber. Fine linens were once made from both flax and hemp, as the fibers from the male hemp plants were well known to produce the finest linens. The oldest known paper from China was made from hemp, and many historical documents have been written and printed on paper made from hemp fibers. Even today, hemp fibers are found in such common products as tea bags, cigarette papers, and other specialty papers as well as paper currency.

The connection between *Cannabis* and its misuse as a drug gained official traction when the US Congress passed the Marihuana Tax Act on June 14,1937; the Act included no practical exemption for hemp production. By that time, the United States was already importing most of its hempseed and fiber from countries with cheaper labor, and the timber and paper industries in the United States were completely invested in the Kraft process for making newsprint. In 1937, commercial wild bird feed was primarily made from hempseed, and hempseed was also pressed for oil used in the manufacture of paints, varnishes, and other coatings. Industrial-scale hemp production mostly continued in the USSR (Union of Soviet Socialist Republics) and China until modern petroleum products slowly began to replace products previously made from hempseed oil and hemp fiber. At least in the days of the USSR, hempseed oil for human consumption was called "black oil," because of its high chlorophyll content, which was especially used by those who were too poor to afford butter. Hempseed appears as an ingredient in many spices and ethnic foods from Eastern Europe, India, and most parts of Asia. A fine tofu can be easily made from just hempseed, water, and heat.

The Marihuana Tax Act of 1937 had very little impact on the use of marijuana as a narcotic in the United States, if for no other reason than the Act did not penalize the possession or use of hemp, cannabis, or marijuana. It did, though, penalize persons dealing commercially in these products. Thus, the Act effectively brought all industrial hemp production in the United States to a grinding halt by the next year. Subsequently, the United States



A field of the Finola oilseed hemp variety in full bloom.

re-introduced hemp production in 1942 for the war effort, after the Japanese had cut off hemp supplies from the Philippines and East India. (After the war, US hemp production was shut down yet again.) Petroleum-based polymers quickly replaced hemp and other natural fibers in many common products such as sacks, tarps, and ropes. In just a short time, a carbohydrate culture based on agriculture quickly shifted into a culture dependent on petroleum-derived hydrocarbons. Since then, hempseed and hemp fiber production have been excluded from the technological developments enjoyed by other industrial crops. Nor have there been any advances in nutritional research pertaining to hempseed oil. This prohibition on hemp cultivation continues to this day in the United States, even as remarkable advances are being made with medical marijuana. The irony deepens when one realizes that the main psychoactive component of drug *Cannabis*, THC, has been available as a synthetic pharmaceutical in the United States as Marinol® (dronabinol) since 1972.

In Canada marijuana is already available to registered patients for medical purposes. After years of prohibition, hemp cultivation was cautiously restarted there under heavy licensing in 1998. With eager markets in both Canada and the United States, hempseed oil and other hempseed food products remain in high demand, and the area devoted to oilseed hemp cultivation in Canada has continued to expand accordingly during this time. The Finola oilseed variety of hemp continues to form the cornerstone of the Canadian hempseed production because of its short stature (average plant height: 1.5 m), which allows for mechanical harvesting by a grain combine, and because of its exceptionally high seed yield (over 2000 kg per hectare, under irrigation).

HEMPSEED AS AN EXCEPTIONAL FOOD AND OIL SOURCE

Hempseed is a rich source of easily digestible protein (*ca*. 20–25%) and highly unsaturated food oil (*ca*. 30–35%). The remainder consists of dietary fiber, mostly from the hull, various phytosterols, oil-soluble vitamins, and trace minerals (Table 1).

Aside from being extremely low in saturated fats, hempseed oil is interesting in other ways. For example, hempseed oil has a higher content of polyunsaturated fatty acids (PUFA) than most other industrial food oils (Table 2). This has been known for quite a long time, as the essential omega-6 linoleic acid (18:2n-6) was first identified in hempseed oil as "sativic acid" by German chemists in 1887. More recently, presence of omega-3 stearidonic acid

TABLE 1. *Typical nutritional compositions of hempseed products*

	Whole seed	Dehulled seed	Seed meal
Oil	36%	44%	11%
Protein	25	33	34
Carbohydrates	28	12	43
Moisture	6	5	5
Ash	5	6	7
Energy (KJ/100 g)	2,200	2,093	1,700
Total dietary fiber	28%	7%	43%
Digestible fiber	6	6	16
Nondigestible fiber	22	1	27

(SDA, 18:4n-3) has been detected in hempseed oil (Callaway *et al*., 1997).

Good amounts of the other essential fatty acid (EFA), α-linolenic acid (18:3n-3), and omega-6 γ-linolenic acid (GLA, 18:4n-6) are also found in this oil. Not only are both of the essential fatty acids (EFA) well represented in hempseed oil, but their direct human metabolic products, GLA and SDA, are too; the latter are not found in any other industrial oilseed crop. This is significant because both dietary EFA must compete for the enzymatic activity of Δ6 desaturase to produce GLA and SDA. As these two fatty acids are already in the oil, this enzymatic step can be bypassed, so they contribute more directly to the downstream production of other omega-6 and omega-3 metabolites.

Perhaps the really good news for consumers is that good-quality cold-pressed hempseed oil has an excellent taste that resembles walnuts and sunflower seeds. When the seeds are toasted, a savory umami flavor develops somewhere between that of bacon and fried prawns.

Moreover, the balance of EFA in hempseed is considerably more nearly optimal than in most other industrial food oils, in terms of having a relatively low omega-6 to omega-3 ratio. In this regard, hempseed oil is more like rapeseed oil (also known as canola oil), yet it is still much higher in polyunsaturates. Taken together, these factors at least partly explain a remarkable number of anecdotal benefits from consuming daily hempseed oil, for example, especially marked improvements in skin, hair, and nail quality, as these fatty acids are integral in cell membrane formation and functions at the molecular level. Studies at the University of Kuopio, Finland, have investigated some of the properties, and particularly the improvements in skin quality for patients that suffer from atopic dermatitis (i.e., eczema). Improvements in strength of both hair and nail thickness are also attributed to daily use of dietary hempseed oil.

The high level of PUFA in hempseed oil is certainly a plus for health, but a considerable drawback for deep frying, not only because there is an increased risk of peroxide and *trans* fat formation, but also because hempseed oil has a relatively low flash point and will burn well once it is ignited. Also, the shelf life of hempseed oil tends to be rather short, because this high level of unsaturation provides more opportunity for oxidation with atmospheric oxygen.

Ideally, as a food, hempseed oil is cold pressed from fresh, clean, good-quality seed and then stored in a cool, dark place before, during, and after processing. Unfortunately, much of the hempseed oil that is currently available in North America is distributed in plastic containers to reduce the costs of both production and shipping of this niche crop. Oil purchased in plastic is more susceptible to degradation with time. With a small amount of effort, the interested buyer will typically find hempseed oil in glass bottles on the European markets.

SUMMARY

To this day, the US government continues to define hemp as the stalks and fiber of the marijuana plant, and has decided not to

CONTINUED ON PAGE 185

TABLE 2. *Typical fatty acid profiles (%) of hemp and other seed oils*[a]

Seed	Palmitic acid	Stearic acid	Oleic acid	LA ratio	ALA	GLA	SDA	%PUFA	n-6/n-3
Oil hempseed[b]	5	2	9	56	22	4	2	84	2.5
Black currant	7	1	11	48	13	17	3	81	4.1
Flax (linseed)	6	3	15	15	61	0	0	76	0.2
Sunflower	5	11	22	63	<1	0	0	63	>100.0
Wheat germ	3	17	24	46	5	5	<1	56	10.2
Rapeseed	4	<1	60	23	13	0	0	36	1.8
Soy	10	4	23	55	8	0	0	63	6.9
Borage	12	5	17	42	0	24	0	66	>100.0
Corn	12	2	25	60	1	0	0	60	60.0
Olive	15	0	76	8	<1	0	0	8	>100.0

[a]LA = linoleic acid (18:2n-6); ALA = α-linolenic acid (18:3n-3); GLA = γ-linolenic acid (18:3n-6); SDA = stearidonic acid (18:4n-3); PUFA = polyunsaturated fatty acid; n-6/n-3 ratio = percentages of omega-6 fatty acids divided by omega-3 fatty acids.
[b]Cultivar Finola. Available through *Finola ky (Kuopio, Finland; www.finola.com)*.

Book of the Month

Featuring a Books Plus Product!

SAVE $25

AOCS PRESS

Gourmet and Health-Promoting Specialty Oils

AOCS Monograph Series on Oilseeds, Volume 3

Robert A. Moreau and Afaf Kamal-Eldin, Editors

2009. Hardbound. 595 pages. ISBN 978-1-893997-97-4.

Books Plus CD-ROM • Product code PKG-241

List: ~~$248~~ $223 • AOCS Member: ~~$198~~ $173

The third volume in the AOCS Press Monograph Series on Oilseeds is a unique blend of information focusing on edible oils. These oils contain either unique flavor components that have led to their being considered "gourmet oils," or contain unique health-promoting chemical components. Each chapter covers processing, edible and non-edible applications, lipids, health benefits, and more related to each type of oil.

To order:

www.aocs.org/store

Phone: +1-217-693-4803
Fax: +1-217-693-4847
Email: orders@aocs.org

Mention Promo Code BOM0310 when ordering to receive discount.

Offer expires April 16, 2010

AOCS "Books Plus" CD-ROMs let you access an entire book in a lightweight, portable, and completely searchable CD-ROM. Of course, in the **AOCS "Books Plus"** product the standard book is also included for your home, school, or office use.

CONTENTS

Dealing with the media: A cautionary tale

Catherine Watkins

Go to the Turner Classic Movies website and you will find this statement: "We have the following four movies starring Larry Johnson available."

Such words are not usually seen in conjunction with the name of an eminent food scientist such as Lawrence A. Johnson, a former AOCS president who is a professor and director of the Center for Crop Utilization Research at Iowa State University (ISU; Ames, USA). Johnson appears on the Turner site because of a roughly 20-second interview with him—edited down from two hours—in the 2008 documentary *Food, Inc.*

Johnson is no stranger to media appearances. He participated in the History Channel's *Modern Marvels* program on corn in 2007 and the Discovery Channel's *HowStuffWorks* program, also on corn, in 2008. He has given countless interviews for magazine and newspaper articles and has never before had a problem. And therein lies a cautionary tale.

For those who have not yet seen the movie, here is a quote from the media kit: "In *Food, Inc.*, filmmaker Robert Kenner lifts the veil on our nation's food industry, exposing the highly mechanized underbelly that's been hidden from the American consumer with the consent of our government's regulatory agencies, US Department of Agriculture, and Food and Drug Administration." The movie features lengthy interviews with well-known food activists such as Eric Schlosser (author of *Fast Food Nation*), Michael Pollan (author of *Food: An Eater's Manifesto*), and Stonyfield Farms' Gary Hirschberg. Together, they make a case against modern agribusiness, minus any dissenting opinions.

"I do not support the political positions that the movie advocates," says Johnson. "To be front and center in it is disappointing," he adds. "I worked my whole career to better the food industry, to better what is available to consumers, and to support sound science."

When the movie producers approached Johnson and ISU, however, the fact that the producers were not interested in balance or fairness was not clear. Taking two hours out of his busy schedule, Johnson spoke on camera about the marvels of food science.

"I talked about what wonderful things corn does for consumers and for the food industry," he said, adding that he could tell halfway through the interview that the result was not going to be positive. "I tried to educate them about today's consumers—that they are after convenience, diversity, and safety of the food supply. Those attributes really cannot be delivered without using food ingredients. And corn and soy are a wonderful source of food ingredients."

Johnson also objected to the producers' suggestion that the food industry limits consumer choice. "That just is not true, and I tried

Lawrence A. Johnson, a professor and director of the Center for Crop Utilization Research at Iowa State University (ISU; Ames, USA), is pictured in an ISU dry processing pilot plant. The 2,600-square-foot pilot plant is designed for the experimental processing and scale-up of industrial milling, cooking, dry separation, drying, and extrusion systems for grain processing and other industrial processes. Photo courtesy ISU/Bob Elbert.

to tell them that. The food industry reacts to what the marketplace wants."

In the end, the producers edited together several of Johnson's many comments, creating a sound bite that in itself is not damning to the industry but serves as a jumping off point for the film (see box on page 137).

"ISU and I continue to believe it is important to be transparent, to communicate, and to participate in discussions that are grounded in sound science," Johnson said. "This experience, however, shows that we have a lot of education to accomplish, especially when media events like *Food, Inc.* want to make an issue black and white, and if you disagree with how they've crafted their viewpoint, you're on the wrong side. People do need to make their own decisions, but I am hopeful they seek out unbiased, scientific sources.

"Too many people are too far away from the farm. Very few of them understand the food industry. We need to be more proactive in educating people about agriculture and the food supply," he continued.

Johnson is not the only party who feels ill-served by the movie's producers. Seed giant Monsanto Co. dedicates a portion of its website to refuting the idea—splashed across the movie screen in large type as ominous music plays—that the company declined to participate in the film.

Darren Wallis of the Monsanto public affairs department is the person who took the call from the producers requesting that Monsanto participate. Wallis writes in his blog (http://tinyurl.com/lxmaqd) about asking a number of questions of the producer: "Who would be in [the movie]? Who would present the opposing view? Who was funding the film? Would the film present balance and fairness or present one side of the story?"

Dealing with the media

Most journalists and documentarians are dedicated to providing fair and comprehensive accounts of events and issues. Case in point: Stephen Schneider, a climatologist at Stanford University who studies climate change, told *Nature* (*461*:848, 2009) that only twice out of the roughly 3,500 interviews he has given has he been "set up" by unethical journalists.

Twice is two times too many, however. The best way to avoid being used is to spot hidden agendas before you say "yes" to an interview. After all, interviews—once given—cannot easily be withdrawn. Trying to withdraw them can actually draw more media attention to a partisan project and your part in it. So do your homework, by using these tips, before agreeing to be interviewed.

BEFORE AGREEING TO THE INTERVIEW

1. Do not take cold calls. Understand the journalist's topic and slant first and call back before deadline. You may well not be the right expert for the interview.
2. Ask about starting assumptions and the proposed audience.
3. Research the previous work of the journalist and any companies behind the project. Look for a partisan or sensational tone. If you sense a lack of balance, do not accept the interview.
4. Ask if you can receive questions in advance. Many journalists prefer not to send questions in advance, choosing instead to have a more spontaneous interview. But there is no harm asking.

PREPARING FOR THE INTERVIEW

1. Prepare three to five talking points.
2. Practice being brief (think "sound bites").
3. Practice transitional bridges such as "what is important here is," or "the real issue is," or "that is a good question, but what is really important is . . . ."

DURING THE INTERVIEW

1. Do not say anything you do not want to have repeated. There is no such thing as "off the record."
2. Be concise and say "I don't know" if you don't know.
3. Do not speculate.
4. Stick to the topic.
5. If you are being quoted in a print piece, ask to have the quotes read back to you. (Do not ask to see the story before it goes to print.)
6. Double-check the journalist's understanding of the science during the interview.

AFTER THE INTERVIEW

1. Send written materials, if applicable, after the interview.
2. If your meaning was not conveyed accurately, let the reporter know (in a helpful, nondefensive way).
3. If the misstatement is serious, call or write a letter to the editor.
4. Keep a record of all your interviews. List the journalist's name, affiliation, phone number and/or email address, and story idea, along with your talking points. Rate your performance and try to do better next time.

From two hours to 20 seconds

Here is a transcript of Lawrence A. Johnson's comments, as presented in the movie Food, Inc. *There is one clear edit (identified); there may well be others.*

We are now engineering our foods. We know where to turn to for certain traits like mouthfeel and flavors, and we bring all of these pieces together and engineer new foods that [EDIT] don't stale in the refrigerator, don't develop rancidity. And, of course, the biggest advance in recent years was high-fructose corn syrup. You know, I would venture to guess if you go and look on the supermarket shelf, I'll bet you 90% of them would contain either a corn or soybean ingredient. And most of the time they would contain both.

Over several weeks of correspondence with the producer, Wallis never felt he had answers to those key questions. Even so, Monsanto invited the producer and a film crew to a trade show "to learn more about Monsanto, agriculture, and talk with farmers," Wallis notes in his blog. "They opted not to come to the show."

Tellingly, *inform* emailed the producers of *Food, Inc*. several times, asking for their response to Wallis' statements. The producers opted not to respond.

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

ISPL travels Down Under

Catherine Watkins

For more than 30 years, the International Symposium on Plant Lipids (ISPL) has promoted scientific cooperation among plant lipid researchers of different countries. The 19th ISPL, scheduled for July 11–16, 2010, is being organized by the Australasian Section of AOCS.

To be held at the Cairns Convention Centre in Cairns, Queensland, Australia, ISPL-2010 "will be placing a special spotlight on the potential major contributions that plant lipids can make to the emerging biobased economy," according to Allan Green, chair of the ISPL-2010 Organizing Committee and deputy chief, Commonwealth Scientific and Industrial Research Organisation (CSIRO) Plant Industry in Canberra.

Among the awards to be given at ISPL-2010 is the 9th Terry Galliard Award, which is given to a scientist who has contributed significantly to the field of plant lipid biochemistry. The award, consisting of a medal and the opportunity to present the Terry Galliard Lecture during the symposium, is given in honor of Terry Galliard, a distinguished plant lipid scientist who established the first ISPL conference in Norwich, Great Britain, in 1974.

Session topics and chairs at ISPL-2010 include the following:

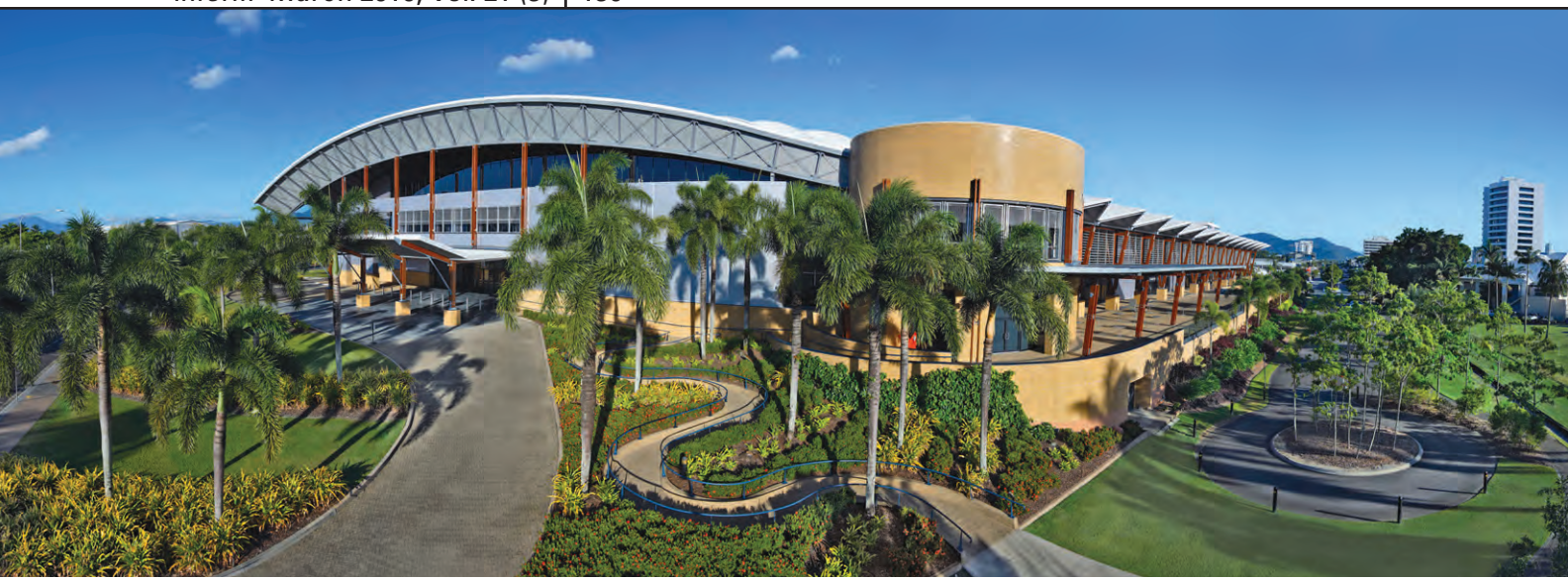
- Lipid biosynthesis and metabolic networks, and their role in seed development
  Chair: Ian Graham (University of York)
- Storage lipids (TAG synthesis and mobilization, sterols, wax esters, isoprenoids)
  Chair: Sten Stymne (Swedish University of Agricultural Sciences)
- Surface lipid structure and function (waxes, suberin, cutin)
  Chair: Ljerka Kunst (University of British Columbia)
- Lower plant lipids (algal/fungal and other microorganisms)
  Chair: Johnathan Napier (Rothamsted Research)
- Structure, function and synthesis of membrane lipids (glycolipids, sterols, and phospholipids)
  Chair: Peter Doermann (University of Bonn)
- Oxylipins—formation, function, and lipid oxidation
  Chair: Ted Farmer (Université de Lausanne)
- Fatty acid desaturation and modification
  Chair: John Shanklin (Brookhaven National Laboratory)
- Lipid trafficking and signaling (membrane dynamics, lipid rafts, PIPs, sphingolipids)
  Chair: Teun Munnick (University of Amsterdam)
- Bioinformatics for the lipidome
  Chair: Ivo Feussner (University of Göttingen)
- Lipid biotechnology and metabolic engineering
  Chair: John Dyer (US Department of Agriculture (USDA)–Agricultural Research Service (ARS) Arid Land Agricultural Research Center)
- Plant lipid feedstocks for industrial chemistry
  Chair: John Dyer (USDA–ARS Arid Land Agricultural Research Center)
- Plant oil biolubricants
  Chair: Sten Stymne (Swedish University of Agricultural Sciences)
- Plant and algal oil biofuels
  Chair: Sue Blackburn (CSIRO Marine and Atmospheric Research)
- Increasing plant oil productivity
  Chair: John Ohlrogge (Michigan State University)
- Metabolic engineering of fatty acid and oil biosynthetic pathways
  Chair: Surinder Singh (CSIRO Plant Industry)
- Agro-industrial challenges for genetically modified industrial plant oils
  Chair: John Oakeshott (CSIRO Crop Biofactories Initiative)

The Skyrail Rainforest Cableway takes visitors over the tropical rainforest canopy and deep into the forest near Cairns, Australia. Other possibilities for pre- or post-conference adventure include snorkeling at the Great Barrier Reef, white-river rafting on the Daintree River, and hiking through Wooroonooran National Park. Photo courtesy of the Cairns Convention Centre.

At a glance

- International Symposium on Plant Lipids (ISPL)
- July 11–16, 2010
- Cairns Convention Centre
- Cairns, Queensland, Australia
- www.ispl2010.org

For a fascinating history of the ISPL, see Hartmut K. Lichtenthaler's "Thirty Years of International Symposia on Plant Lipids" at http://tinyurl.com/ylskkde.



Surrounded by the Great Barrier Reef and ancient tropical rainforests, the Cairns Convention Centre is renowned for its environmentally friendly design. Photo courtesy of the Cairns Convention Centre.

Keynote speakers as of January 15, 2010, include Chris Dayton, Bunge; John Dyer, USDA-ARS; Ted Farmer, Université de Lausanne; Ian Graham, University of York; Reinhard Jetter, University of British Columbia; Jürgen Metzger, University of Oldenburg; Teun Munnick, University of Amsterdam; and Athina Zouni, Berlin Technical University.

Sponsors include CSIRO (Gold Level), Bunge North America (Silver Level), Nufarm Australia Ltd. (Silver Level), Arcadia Biosciences (Bronze Level), BASF Plant Science (Bronze Level), Pioneer Hybrid International Inc. (Bronze Level), Archer Daniels Midland Co. (Contributor), and Bayer Crop Sciences (Contributor). For information about becoming a sponsor, contact Connie Hilson at connieh@aocs.org.

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

Welcome New Members

AOCS Since 1909
Your Global Fats and Oils Connection

The AOCS is proud to welcome our newest members.*

*New and reinstated members joined from November 1, 2009 through January 31, 2010.

Habibollah Abbasi, University of Tehran
Slimane Aboulala, International Islamic University Malaysia
Daniel Acevedo, Quala
Sarai Agustin, Universidad de Sonora
Glen Akridge, Process Dynamics
Perla P. Alday, Universidad de Sonora
Laxman Alerja, Midwest Biofuel LLC
Jesse K. Alexander, Danisco USA Inc
Sisira Amarasekara, Supercarb Pvt Ltd
Rupesh Angoelal, Wilmar Edible Oils BV
Yasinda P. Ariyapperuma, Alba Oil
Sukhprit S. Arora, Guru Nanak Dev University
Ka Yeon Baek, KyungPook National University
Mukasa Bagonluri, University of Saskatchewan
David T. Balke, BioExx Specialty Proteins Ltd
Nandika P. Bandara, University of Alberta
Isam M. Bashier, North Carolina A&T State University
Louis M. Belott
Joan Bergstrom, Henkel
Cornelius Bessler, Henkel
Nikola Bilic, Pittsburg State University
Olivera Bilic, Pittsburg State University
Bulent Binbuga, ConAgra Foods
Jessica A. Blackford, University of Maryland
Ana K. Blanco, Universidad de Sonora
Nathaniel S. Bobbitt, University of Arkansas
Charles Brockmeyer, Buhler Inc
Kelli Brooks, Texas Technical University
Amy L. Brownschidle, Pennsylvania St University
Ricardo J. Brugnago, Universidade Federal Do Parana
Bjarne Buchert, Gerstenberg Schroder North America
Patizia Buldo, Aarhus University
Peta-Gaye Burnett, University of Saskatchewan
Sara K. Calaman, Pennsylvania State University
John P. Calvi, Unity Scientific LLC
Murphy C. Cameron, University of North Dakota
Ann Marie T. Canty, DeWolf Chemical
Dylan Carpenter, Texas Technical University
Marsha D. Carter, Knightsbridge Robertson Surrette
Chelsey L. Castrodale, University of Arkansas
Swetha Chamala, Texas Technical University
David G. Changaris, Ceela Naturals LLC
Phantipha Charoenthaikij, Kasetsart University
Aparna Chaudhary, Indian Institute of Technology
Hsiang Yun Chi, University of Saskatchewan
Maqsudur R. Chowdhury, Bangladesh Univ of Engrng/Tech
Dave L. Cole, Hormel Foods Corp LLC
Emily Collins, Texas Technical University
Lisa A. Colomina, Minntech Corp
Bernie E. Crowley, Delta American Fuel LLC
Sanja Cvitkusic, Pennsylvania State University
David R. Dain, Martek Biosciences Inc
Xiao Dan, University of Kentucky
Tasha Desai, Henkel
Keith Dominey, Waters Agri Labs Inc
William J. Downey, Vertellus Specialty Materials
Robert L. Duffin, BASF Catalysts LLC
Michael T. Elder, Novozymes North America Inc
Joel B. Ellamar, KyungPook National University
Sevcan Ersan, Istanbul Technical University
Luis A. Espinoza, Louisiana State University
Hrvoje D. Fabek, University of Guelph
Joseph J. Fanelli, Harcros Chemicals Inc
Kalgi Ganatra, Texas Technical University
Enrique Gil, Universidad de Sonora
Abraham T. Girgih, University of Manitoba
Nigel Glover, AarhusKarlshamns USA Inc
Fadjar Goembira, Kyoto University
Julide Gokce, Instanbul Technical University
Hyungseo Goo, Aekyung Industrial Co Ltd
Dana G. Gray, Oils of Aloha
John D. Guy, Bunge North America Inc
Martin Hajek, University of Pardubice
Kenneth T. Hartman, Pope Research & Consulting
Hajime Hatta, Kyoto Womens University
Mauricio Hernandez, University of Ibague
Anthony Hobbs, Inspectorate America Corp
Hiroaki Honda, Maruha Nichrio Holdings Inc
Andrea Houge, Covance Labs Inc
Alicia Howard, Texas Technical University
Feng-Lung Hsu, Lubrizol Advanced Materials Inc
Chau Ngoc Huynh, Kyoto Institute of Technology
Hamin Hwang, Stratas Foods LLC
David B. Johnston, USDA ARS ERRC
Sanjay S. Joshi, Galaxy Surfactants Ltd
Jean-Luc Joye, Rhodia Inc
Mohsen Jozi, Jahan Vegetable Oil Co
Alex L. Kahler, Biogenetic Services Inc
Shkelqim Karaj, University of Hohenheim
Thomas A. Katalinich, Cargill Inc
Agnieszka M. Kita, Wroclaw University of Enviro & Life Scis
Jaekwon Ko, Kosung Hi-Tech Co Ltd
Chik Boon Koh, Universiti Sains Malaysia
Ryan E. Kron, JohnsonDiversey Inc
Lana B. Kwan, University of Toronto
Tyre C. Lanier, North Carolina State University
Vincent C. F. Lau, Korea University
Emilie Lefebure, Universite de Liege
Wai Fun Leong, Universiti Putra Malaysia
Amanda Jane Lewis, London Metropolitan University
Zinan Li, Missouri University of Science & Tech
Markus Lipp, US Pharmacopeia
Muxin (Cindy) Liu, Melaleuca Inc
Jarupat Luecha, University of Illinois
Sunder Nurani Mahadevan, Godrej Consumer Products Ltd
Taiwo Makinde, University of Teesside
Sakunkhun Makkhun, University of Nottingham
Amir Malaki Nik, University of Guelph
Belen Marcos, Sepiol SA
Ravindra K. Mariwala, Liprogen
Guillermo Martinez Lechuga, International Bio-Genesis Inc
Laura Martinez, University of Stirling
Marc Maslanka, Henkel
Nasratun Masngut, Newcastle University
Bruna Mattioni, Universidade Federal de Santa Catarina
Andrew Messing, Thumb Oilseed Producers Coop
Marija Miladinovic
Kevin E. Mis Solval, Louisiana State University
Javeed Mohammad, Mississippi State University
Jonathan Mora Wong, Instituto Tecnologico de Veracruz
Mahsa Naghshineh, Universitit Putra Malaysia
Jose Gustavo Napolitano, GrainSolutions
Sahar Navidghasemizad, University of Alberta
Eleni Naziri, Aristotle University of Thessaloniki
Craigen R. Nes, Texas Tech University
Helen L. Ngo, USDA ARS ERRC
Jieyu Nie, University of Saskatchewan
Chamila K. Nimalaratne, University of Alberta
Chizaram Nwogwugwu, Texas Technical University
Pilar Olivares Carrillo, Universidad de Murcia
Robert M. Osborne, University of Birmingham
Aage Oterhals, Nofima Ingredients
Nur Ilyani Othman, Universiti Putra Malaysia
Asha Pant, University of Alberta
Sun-Young Park, KyungPook University
Kunal V. Patil, Institute of Chemical Tecnology
Peter A. Perrone, Martek Bioscience
Vasiliki Polychniatou, National Technical University of Athens
Jianing Pu, Louisiana State University
Dhivyalakshmi Rajasekar, University of Georgia
Govind P. Rao, Sugar Cane Research Station
Rosa E. Regalado, Palsgaard Inc
Anna-Jean Reid, Ascenta Health
Gary D. Reznik, Novus International
Alex Riesche, University of Illinois
Brittany Rosales, Texas Technical University
J. Michael Rose, ROAM Fluid Solutions
Amir H. Saberi, University Putra Malaysia
Jas K. Saggar, Princess Margaret Hospital
Shiro Saka, Kyoto University
Olalekan T. Salawudeen, Intl Islamic University Malaysia
Martin Schweizer, Burcon NutraScience Corp
Lonnie Sellers, Sessions Oil Mill Co
Yilmaz Senogul, Namik Kemal University
Bhavini D. Shah, University of Tennessee
Utkarsh M. Shah, University of Arkansas
Negin N. S. H. Sharafbafi, University of Guelph
Oyuna Sharav, University of Saskatchewan
Michael D. Shepherd, Martek Biosciences
Youn Young Shim, University of Saskatchewan
Alok Shiva, Texas Technical University
Francine Shuster, Noveon Consumer Specialties/Lubrizol
Surjit Singh, Guru Nanak Oil Mills
Thomas E. Snead, Elevance Renewable Sciences
Crystal Snyder, University of Alberta
Hye-Ran Son, KyungPook National University
Yongsheng Song, Engineering Research Associates
Ralph Staiert, Huvepharma Inc
Barbara Stefl, Cognis Corp
Hans H. Stein, University of Illinois
Hana Stritecka, University of Defence
Chris Sumner, Microbac Labs
Xin Sun, Ecolab
Jessica Swain, Church & Dwight Co Inc
Suzan H. Tami, Texas Technical University
Ashish Taneja, BASF Corp
Dongming Tang, Ocean Nutrition Canada Ltd
Teck Kim Tang, Universiti Putra Malaysia
Abbas Tavakolizadeh, Alia Golestan Food Industries
Fideline Laure L. Tchuenbou-Magaia, University of Birmingham
Sarah A. Teichert, University of Georgia
Chaiw Yee Teoh, Universiti Sains Malaysia
Bachir Tifour, North Carolina A&T State University
Tianjian Tong, Kansas State University
Marian Abbey D. C. Torres, De la Salle University
Linda S. Tufft, Hatfield Quality Meats
Cynthia Tyburczy, Cornell University
Nicola A. Uccella, IRESMO Foundation Group
Nausheel R. Unnadkat, Pennsylvania State University
Jim Vecchio, Oxford Instruments America
Michael Wadowski, University of Alberta
Udaya N. Wanasundara, POS Pilot Plant Corp
Jucieli Weber, Universidade Federal de Santa Catarina
Donald A. Welch, ConAgra Foods
Michael J. Williams, Air Products & Chemicals
Thomas J. Wilmanns, St Bernard Soap Co
Mike Wong, Henkel
Sheng Xin Xiao, Henan University of Technology
Yuan Xu, Technical University of Denmark
Zhiyong Yang, Aarhus University
Koichi Yasunaga, Kao Health & Nutrition LLC
Abu Yousuf, University of Naples Federico II
Wenlin Yu
Pilapa Yuennan, University of Guelph
Chee Liang Yung, Malaysian Palm Oil Board
Wan Yuting, Louisiana State University
Qian Zhang, Third Institute of Oceanography
Albert Lihong Zhou, Utah State University
Daniele C. Zulim-Botega, University of Guelph

To become a member of the AOCS, complete, sign, and fax back the membership application in this issue or contact us.

AOCS
Barb Semeraro
Area Manager, Membership
Phone: +1-217-693-4804
E-mail: barbs@aocs.org
Website: www.aocs.org

Corporate memberships are available!

Call today and find out how your company can become a vital part of the AOCS network.

AOCS CORPORATE MEMBER

News & Noteworthy

The assets of Asoyia Inc., the farmer- and employee-owned Iowa-based company that marketed 1% ulta-low-linolenic soybeans and soy oil, were turned over to Pilot Grove (Iowa, USA) Bank on December 15, 2009. Although formal bankruptcy proceedings apparently had not begun as of mid-February 2010, the failure of one of the few companies selling low-linolenic soy products raises questions about the health of the low-lin market in the United States. The April issue of *inform* will examine that issue in depth.

■■■

New standards for two DHA (docosahexaenoic acid) algal oils have been proposed for inclusion in the *Food Chemicals Codex* (FCC), a compendium of quality standards for food ingredients that is published by the US Pharmacopeial Convention (USP). The oils, which are often added to infant formula as well as a number of foods, are DHA algal oil, *Crypthecodinium* type, and DHA algal oil, *Schizochytrium* type.

To review the standards and provide scientific feedback, visit www.usp.org/fcc/forum (requires free registration). Comments will be accepted through March 31, 2010, and will be considered by USP's Food Ingredients Expert Committee; the final standards will be published on August 31, 2010.

■■■

In mid-January 2010, the European Food Safety Authority (EFSA) denied a request from Innoceutics, a Dutch plant sterol manufacturer, calling for the European Commission-approved, cholesterol-lowering health claim for plant sterols and stanols to be expanded to food supplements and other food categories. The EFSA health label claim that was written into EU law in October 2009 permits claims on spreads, mayonnaise, salad dressings, and dairy products, but not food supplements or any other food group. The most recent EFSA opinion is available at http://tinyurl.com/EFSAStanol.

■■■

The Monopolies and Price Commission of Kenya has in its 2009 annual

CONTINUED ON NEXT PAGE

China's crush capacity to expand

China's soybean crushing capacity will reach 100 million metric tons (MMT) by the end of 2010, according to the China National Grains and Oils Information Center and Asia Pulse Businesswire.

New crushing capacity may exceed 6 MMT in 2010 when several large processing projects come on stream. Currently capacity is approximately 90 MMT, with less than half being used, according to Asia Pulse.

In 2009, China's National Development and Reform Commission suggested curtailing the rapid expansion of soybean crush capacity as a way to foster healthy development of the domestic soybean processing industry. "However, the projects for processing non-genetically modified soybeans will still get support from the government," the Asia Pulse report quotes an expert with the Heilongjiang Soybean Association as saying.

China currently is the largest soybean importer in the world. It imported almost 43 MMT of soybeans in 2009, up 13.7% from the previous year. Its soy oil imports, however, dropped 7.5% to 9.6 MMT.

In related news, India has overtaken China as the world's largest importer of palm oil, according to the Solvent Extractors' Association of India (SEAI) and *Business Week* magazine.

SEAI said that India imported 7 MMT in 2009 (roughly 80% of it palm oil), adding that edible oil imports in December 2009 rose 6% to 761,835 metric tons. By contrast, China's imports increased 23% to a record 6.4 MMT last year, according to the National Grain & Oils Information Center, as reported by *Business Week*.

SEAI Executive Director B.V. Mehta told the magazine that the increase in Indian imports in 2009 was due to drought damage to the domestic oilseed crop and a lower import tax on refined oils.

New data on biobased transformer fluids

Joint research by EHV-Weidmann Industries Inc. and Cooper Power Systems provides new comparative data on biobased vs. petroleum-based insulating liquids used in high-voltage transformers.

report called for an in-depth investigation into "possible cartel activities" by edible oil manufacturers and distributors in the country. The price of edible oil in Kenya has increased by 50% over the past two years, according to a report by the *Business Daily* (Nairobi) newspaper.

■■■

Carolina Soy Products, LLC, of Warsaw, North Carolina, USA, has changed its name to Whole Harvest Foods, LLC. "The name change more accurately reflects the company's transition from a soy meal plant to the maker of expeller-pressed, hexane-free soy and canola cooking oils," the company said in a statement. All products and operational processes will remain unaltered. ■

The research, published in *IEEE Transactions on Dielectrics and Electrical Insulation* (*16*:1595–1603, 2009), reported test data showing an overall equivalency in the ability of both fluids to withstand voltage impulses from lightning strikes. The high-voltage testing series included a large range of distances (from 3 to 55 mm) across oil gaps and solid insulation surfaces. The test also included both partially uniform and essentially uniform electrical stress fields. The gap distances were selected because they represent the range commonly used in liquid-insulated transformer core/coil designs, according to co-author and AOCS member C. Patrick McShane, global technology

Courtesy of ComEd

Acquisitions/sales/mergers

The merger-in-the-making finally occurred when **Cadbury PLC** (Uxbridge, UK) accepted an $18.9 billion takeover bid from **Kraft Foods Inc.** (Northfield, Illinois, USA), up from a previous bid of $17.1 billion. The deal will make the combined entity the world's largest confectionary group, edging out **Mars-Wrigley**.

■■■

In late January 2010, **Bunge Ltd.** (White Plains, New York, USA) announced that it has agreed to sell its fertilizer nutrients business in Brazil to **Vale S.A.** for $3.8 billion in cash. The sale is expected to close by June 30, 2010. This divestiture includes Bunge's 42.3% interest in **Fertilizantes Fosfatados S.A.** (Fosfertil), as well as two wholly owned phosphate mines and related production facilities in Brazil. Bunge will retain its retail fertilizer business in Brazil, as well as its fertilizer joint venture in Morocco and its recently acquired fertilizer business in Argentina.

■■■

In mid-January 2010, **Bunge Europe**—the European operating arm of **Bunge Ltd.** (White Plains, New York, USA)—announced the sale of Bunge's 33.34% share of **Saipol SAS** to **Soprol**, effective December 23, 2009. Saipol is a French oilseed crusher, refiner, and bottler. It controls 100% of **Lesieur**, the French vegetable oil producer. Saipol was owned by Soprol (66.66%), a subsidiary of **Sofiprotéol**, the financial organization of the French vegetable oils and proteins sector, and Bunge (33.34%).Bunge said it will maintain its **Diester Industries International SAS** biodiesel joint venture with Sofiprotéol.

■■■

Ruchi Soya Industries, Ltd., a manufacturer of edible oils and soy foods, has made an equity investment in edible oil refiner **Gemini Edibles and Fats India Pvt., Ltd.** Both companies are based in India. According to *The Economic Times*, Ruchi Soya acquired a 50% stake in Gemini for INR450 million ($9.74 million).

Commodities

CACAO/CHOCOLATE

Kraft Foods Inc. (Northfield, Illinois, USA) said it has no plans to tinker with **Cadbury PLC**'s organic chocolate brand, **Green & Black**, after Kraft takes over Cadbury (Uxbridge, UK). Green & Black sources organic cacao from Belize.

■■■

Nestlé (Vevey, Switzerland) will provide up to 12 million cacao trees to farmers in the **Ivory Coast** over the next decade. The saplings are bred to resist black-pod disease, which has afflicted Ivorian plantings in recent years. These new plants should produce higher-quality cocoa, are resistant to disease and drought, and should exhibit 50–200% greater productivity, according to Reuters Africa. Ivory Coast supplies roughly 40% of the world's demand for cocoa.

CANOLA/RAPESEED OIL

Wilmar International Group Yihai Kerry Investments (Shanghai) and **Sibir**, a group of companies, said in January that they intend to form a joint venture for the production of rapeseed oil in Trans-Baikal (Siberia).

■■■

Burcon NutraScience Corp. (Vancouver, British Columbia, Canada) said in January 2010 that it has filed for GRAS (Generally Recognized as Safe) status for cruciferin-rich canola protein isolate Puratein® and napin-rich canola protein isolate Supertein™ as ingredients in a variety of food and beverage applications.

OLIVE OIL

A new website has been inaugurated by consulting firm Hamman Marketing Associates to promote Tunisian olive oil in the United States. The site, at **www.100percenttunisian.com**, provides information on olive oil and its health benefits, as well as a list of more than 50 olive oil producers in Tunisia, and links to websites where it is possible to pur-

manager–dielectric fluids, Cooper Power Systems, Waukesha, Wisconsin, USA.

"The report covers the most extensive testing of electrical impulse breakdown behavior of natural esters done to date," he noted. "The favorable impulse breakdown test results should lead to more applications for natural ester dielectric coolants in higher-voltage power class transformers."

Currently, there are approximately 300,000 installed natural ester fluid-filled transformers, McShane said. Of those, approximately 80% are in the United States and the rest are in 27 other countries, including Brazil, Scandinavia, and Spain.

USDA: Record 2009 crops

Last year's US soybean and corn crops set new records, according to the *Crop Production 2009 Summary* issued by the US Department of Agriculture's (USDA) National Agricultural Statistics Service.

Soybean production broke records for planted and harvested area as well as for yield and production. US farmers produced 3.36 billion bushels (about 91.6 MMT), higher by 13% than 2008 levels and 5% more than the previous record set in 2006. The average yield per acre was 44 bushels, up 0.9 bushels from the previous record set in 2005. Farmers nationwide planted a total of 77.5 million soybean acres (approximately 31.4 million hectares) and harvested 76.4 million acres in 2009, both up 2% from the previous record set in 2008.

Corn production reached 13.2 billion bushels, 1% above the 2007 record of 13 billion bushels, and 9% higher than 2008. Corn yields were the highest ever in 2009 at 165.2 bushels/acre, overtaking the previous record of 160.3 bushels/acre (104.1 kg/ha) set in 2004. Planted area, at 86.5 million acres, is the second highest since 1949, behind 2007's 93.5 million acres.

chase Tunisian olive oil. The creation of the website coincides with the start of a "100% Tunisian" campaign, which is a long-term project of the Tunisian Industrial Ministry to create a distribution network for the American market.

PALM OIL

GoldenVeroleum, a unit of Indonesia's **Sinar Mas**, apparently intends to invest $1.6 billion in Liberia's palm oil industry. According to a report by All Africa Global Media, the company announced plans to cultivate over 240,000 hectares of oil palm in Grand Kru, Sinoe, and Maryland Counties, hoping to produce more than 1 MMT of palm oil/year.

■■■

In January, delegations of government and business leaders from **Indonesia** and **Japan** discussed the development of six special economic zones in Indonesia to strengthen the strategic bilateral economic relationship between the two countries. The first project will connect areas in the eastern part of Sumatra Island and the northwestern part of Java Island to improve the palm oil, rubber, and coal industries, according to a report by Japan Economic Newswire.

SUNFLOWER OIL

Bunge Ukraine has introduced mayonnaise under the **Oleina** brand. As the company told Interfax-Ukraine, Oleina mayonnaise is produced by Donetsk-based **CJSC Slavoliya**.

"Bunge Ukraine has become a mayonnaise pioneer for several reasons: firstly, our sunflower oil business here is one of the most powerful among the company's European subdivisions, and secondly, the capacity of the domestic mayonnaise market is among Europe's highest—Ukrainians consume 180,000 MT of mayonnaise per year," a report by *Ukraine Business Weekly* quoted the company as saying.

■■■

Russia produced enough sunflowerseed during the 2008–2009 marketing year to "completely satisfy all domestic requirements in sunflower oil," according to the APK-Inform news agency. The current production of sunflower oil in Russia was estimated at 2–2.1 MMT, the report noted.

New ventures

Viterra Inc. (Regina, Saskatchewan, Canada) is building a full-service retail center in Sexsmith, Alberta, Canada. The center will be located on the same site as the high-throughput elevator that the company currently is constructing. The facility, approximately 25 kilometers north of Grand Prairie, will include a high-throughput fertilizer plant along with a 20,000-square-foot (about 1,900-square-meter) warehouse. Construction is expected to begin in the second quarter and is scheduled for completion in the fourth quarter of 2010.

■■■

On January 1, 2010, specialty chemicals supplier **Cognis** opened an affiliate office in Selangor, Malaysia. Cognis Malaysia Sdn. Bhd. is a wholly owned subsidiary of the Cognis Group.

R&D

Three rosemary extracts high in carnosic acid (25%, 60%, and 98%) inhibited oxidation of sunflower oil more effectively than common synthetic antioxidants such as BHT (butylated hydroxytoluene) and BHA (butylated hydroxyanisole) but less effectively than TBHQ (*tert*-butyl hydroquinone). These findings are from research led by Ying Zhang of the Northeast Forestry University in Harbin, People's Republic of China. The study appeared in *Food Chemistry* (*118*:656–662, 2010).

■■■

Microbia, Inc. (Lexington, Massachusetts, USA) announced in January 2010 that it has developed microbial strains that produce commercially significant levels of lycopene via fermentation—well in excess of five grams per liter. "This achievement clears the way for the initiation of safety studies, and first lycopene sales could occur as early as 2010," the company said in a statement. ■

Cotton production was down 3% from 2008, at 12.4 million 480-pound (lb) bales. Yield was estimated at 774 lb/acre for 2009, down 39 lb from 2008. Harvested area, at 7.69 million acres, was up 2% from 2008.

The complete report is available at http://tinyurl.com/y9u4h8c.

Olive oil in decline in Algeria

Olive oil prices will probably increase in Algeria, following a sharp decline in local production in the past year, according to the ANSAmed news service. Estimates by the Algerian Agricultural Ministry suggest that a liter of olive oil will soon cost between 450 and 550 dinars (about 4.4 and 5.4 euros) compared with 400 dinars last year.

Up until January 12, 2010, olive oil production reached about 14,400 metric tons (MT). By contrast, almost 60,000 MT of olive oil were produced during the 2008–2009 harvest year.

According to Algerian Agricultural Minister Rachid Benaissa, as quoted by ANSAmed, this decline in production is due to "climatic episodes," such as the strong rainfall that hit Algeria in 2009, but also poor management by farmers.

The lipid revolution

An article available online at the Lipidomics Gateway announces that "in 2009, more than 10,000 new structures were added to the LIPID MAPS Structure Database (http://tinyurl.com/LipidMapsDB; LMSD), nearly doubling its size." (The Lipidomics Gateway is a collaborative venture between Nature Publishing Group and the LIPID MAPS consortium.)

"Meanwhile, the *Journal of Lipid Research* celebrated its 50th anniversary with a special edition (www.jlr.org/collections/anniversary), including a major review of cholesterol and SREBP advances by Michael Brown and Joe Goldstein," the article continues. "The International Lipid Classification and Nomenclature Committee published its updated comprehensive classification system for lipids (http://tinyurl.com/ybdzzqq) to accommodate current knowledge and future expansion, and new identifiers for LMSD entries were introduced to allow cross referencing with other major biological databases. The May [introduction] of the Lipidomics Gateway reflected new confidence among lipid scientists, eager, and increasingly able, to share their knowledge."

What will 2010 bring?

Report on economic adulteration

The Grocery Manufacturers of America (GMA; Washington, DC, USA) has released a 28-page study on economic adulteration of foods and food ingredients. Entitled "Consumer Product Fraud—Detection and Deterrence: Strengthening Collaboration to Advance Brand Integrity and Product Safety," the study was conducted together with the A.T. Kearney research and consulting firm.

In brief, the report identifies the drivers of economic adulteration along with the structural weaknesses in the industry and government sectors that have inadvertently created opportunities for economic adulteration to thrive. The study is available at http://tinyurl.com/yaylv5c (pdf).

The study's release in late January coincided with Chinese state media reports that three new Chinese companies had been found to be selling melamine-containing food products. The products were made in March and April 2009, which was well after the melamine scandal in 2008 during which at least six Chinese infants died and many thousands more were sickened by melamine-containing milk products. See *inform 20*:563–565, 2009, for more on melamine analysis.

China ascends R&D summit

Is China emerging as a global center for scientific research?

The answer is a resounding "yes," according to *Chemical & Engineering News* Senior Editor Sophie L. Rovner. In late January 2010, Rovner reported that China in 2009 became the world leader in the number of chemistry patent applications published annually. China published 67,000 patent applications in 2009, compared with 52,000 for Japan and 41,000 for the United States. Publication of scientific papers originating in China increased faster than any other nation during the last 10 years. The output of papers with Chinese authors more than quadrupled—from 20,000 papers in 1998 to more than 112,000 in 2008. The publication of US scientific papers rose by barely 30% during that period.

In achieving this growth, scientists in China are embracing collaborators in the United States and other countries. It is becoming increasingly clear that the country is changing the "world map of research," with China conceivably at its center, the article suggests (see http://tinyurl.com/yb3k2gy). ■

Briefs

The January 14 issue of NavyTimes.com reported, "In September, the [US] Navy paid $424 per gallon for a batch of algae-based biofuel, as compared with $1.40 per gallon for standard petroleum fuels." The algae-derived fuel, for use in ships, is being grown by Solazyme (South San Francisco, California, USA). Solazyme has supplied the material it is manufacturing to an unnamed refiner for processing into fuel.

■■■

Novozymes, the Danish industrial enzymes company, was awarded a $28.4 million US tax credit to support a new plant in Blair, Nebraska. The credit is part of a $2.3 billion scheme by the Obama administration to support clean energy manufacturing projects. The company is investing up to $200 million in the plant, which it expects to complete by mid-2012. Its blending facility started up in November 2009 and has been shipping enzymes to customers globally for first- and second-generation bioethanol.

■■■

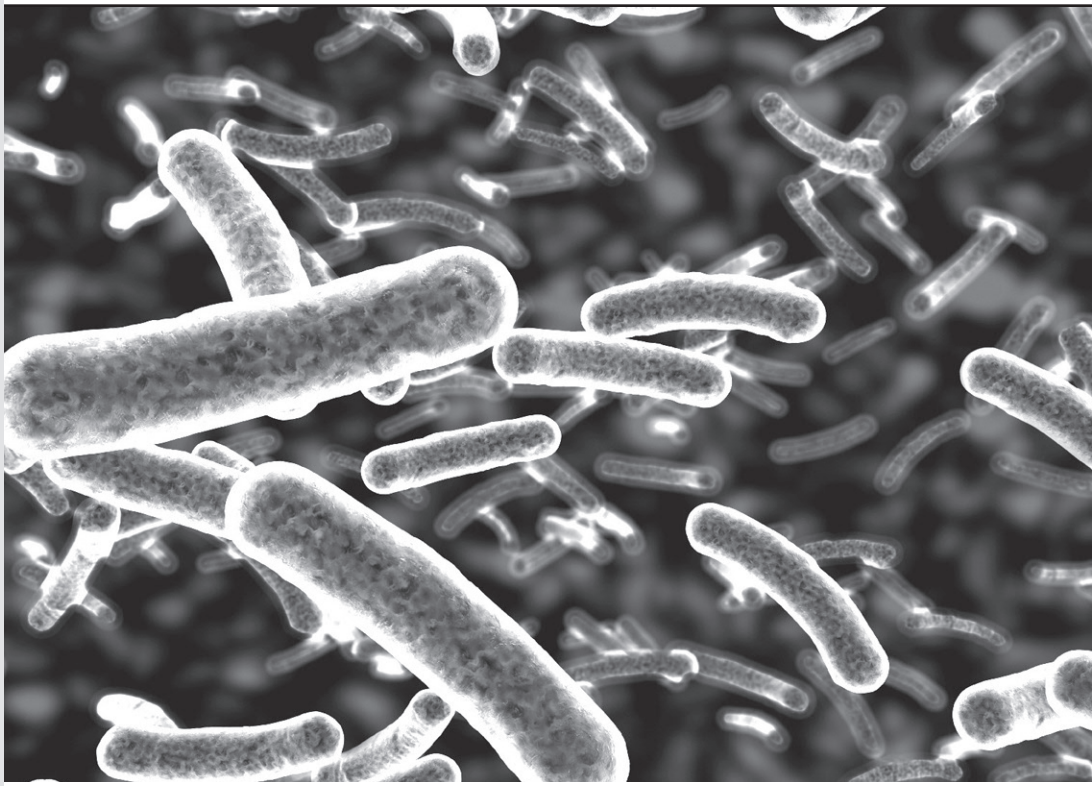
As of January 15, the state of Minnesota (USA) suspended enforcement of its 5% biodiesel requirement for fuel sold in the state until April; only ULSD1 (ultra-low-sulfur diesel-1) was affected, a blend of 5% biodiesel with pure kerosene. The more common ULSD2, which blends biodiesel with regular diesel and kerosene, was not affected by the ban. The state's Department of Commerce suspended enforcement because of extremely cold temperatures in the state, which can cause gelling of biodiesel and lead to clogged filters in trucks and other biodiesel-fueled vehicles.

■■■

Under the auspices of SwissAid, a 60-year-old nongovernmental organization that concentrates on the causes of poverty and underdevelopment, Justiça Ambiental and the União Nacional de Camponeses prepared a 51-page report entitled "Jatropha! A socio-economic pitfall for Mozam-

CONTINUED ON NEXT PAGE

Biofuels News



BIODIESEL

Engineered *E. coli* can make biodiesel

Using the tools of synthetic biology, a collaborative team of researchers at the US Department of Energy's Joint BioEnergy Institute (JBEI), the University of California at Berkeley, and LS9 (South San Francisco, California) has developed a microbe that can produce biodiesel directly from cellulosic biomass in a one-step process. This discovery enables the production of advanced hydrocarbon fuels and chemicals in a single fermentation process that does not require additional transformations. The results appeared in a paper entitled "Microbial Production of Fatty Acid-Derived Fuels and Chemicals from Plant Biomass" in *Nature 463*:559–562 (2010).

The three collaborating entities worked with *Escherichia coli*, a bacterium whose natural ability to synthesize fatty acids and notable amenability to genetic manipulation make it an ideal target for biofuels research. Eric Steen, one of the co-authors associated with JBEI, said, "Biosynthesis of microbial fatty acids produces fatty acids bound to a carrier protein, the accumulation of which inhibits the making of additional fatty acids. Normally, *E. coli* doesn't waste energy making excess fat, but by cleaving fatty acids from their carrier proteins, we're able to unlock the natural regulation and make an abundance of fatty acids that can be converted into a number of valuable products," for example, fatty acid esters. Steen added, "Further, we engineered our *E. coli* to no longer eat fatty acids or use them for energy."

The engineered *E. coli* secretes the biodiesel into the surrounding medium, meaning that cells do not need to be fractured to get the diesel out, thus saving on processing costs. And because biodiesel is insoluble in water, it floats to the top, where it can be collected, also saving on processing costs.

Jay Keasling, chief executive officer for JBEI and one of two corresponding authors for the article, commented, "Given that the costs of recovering biodiesel are nowhere near the costs required to distill ethanol, . . . our results can significantly contribute to the ultimate goal of producing scalable and

bique." The report, which appeared in August 2009, details many reasons why cultivation of jatropha as a biofuel feedstock is unsuited for the economy of Mozambique and its citizens, 87% of whom are subsistence farmers who produce 75% of the food they consume. The report may be accessed at www.swissaid.ch/global/PDF/entwicklungspolitik/agrotreibstoffe/Report_Jatropha_JA_and_UNAC.pdf

■■■

In January the China National Offshore Oil Corporation (CNOOC) started operation of its 60,000 metric tons per year biodiesel project in Hainan province. The feedstock is jatropha. CNOOC and Sinopec jointly developed the project. Hainan province is to adopt B5 biodiesel to build a greener Hainan Island, which is being developed into a national-level tourism destination. ■

cost-effective advanced biofuels and renewable chemicals."

After diverting fatty acid metabolism toward the production of fuels and other chemicals from glucose, the researchers engineered their new strain of *E. coli* to produce hemicellulases—enzymes that can ferment hemicelluloses, the complex sugars that are a major constituent of cellulosic biomass and a prime repository for the energy contained within plant cells walls. In all, the authors reported more than a dozen genetic modifications.

Steen added, "Engineering *E. coli* to produce hemicellulases enables the microbes to produce fuels directly from the biomass of plants that are not used as food for humans or feed for animals. . . . [B]iochemical processing of cellulosic biomass requires costly enzymes for sugar liberation. By giving the *E. coli* the capacity to ferment both cellulose and hemicellulose without the addition of expensive enzymes, we can improve the economics of cellulosic biofuels."

The next steps in this research program will involve maximizing the efficiency and the speed by which this engineered strain of *E. coli* can directly convert biomass into biodiesel, and maximizing the total amount of biodiesel that can be produced from a single fermentation.

Biodiesel implementation delayed in Malaysia

The New Straits Times Press reported at the end of January that Malaysia is still committed to selling biodiesel nationwide despite delays and high prices for feedstock palm oil. All petrol stations in the country were supposed to start dispensing B5 (5% biodiesel, 95% petrodiesel) on January 1. However, issues about the extra cost (4–5 sen per liter = $0.012–0.0147 per liter), attributable to the cost of transport and blending, have postponed implementation of the mandate.

Regarding the extra cost, Plantation Industries and Commodities Minister Bernard Dompok told a reporter for *The Malaysian Star*, "We don't know whether to pass it to consumers, petroleum companies or the government (to absorb it as subsidy)." He insisted B5 will occur in 2010, although in late 2009 the government was also considering substituting a B3 blend to replace the B5 blend.

Although 91 licenses for producing biodiesl have been approved, *The Malaysian Star* said only seven plants are in operation. Production volume is under 10% of the total installed capacity of the plants in operation.

Canada studies biodiesel quality, reliability

The Government of Canada's National Renewable Diesel Demonstration Initiative, Imperial Oil, and the Canadian Petroleum Products Institute (CPPI) funded a study on biodiesel product quality and reliability. The results, released in December 2009 (obtainable at www.cppi.ca), concluded that (i) long-term furnace operation and performance were negligibly impacted by fuel up to B10 (10% biodiesel + 90% petrodiesel), (ii) the deleterious effect of saturated monoglycerides in renewable diesel on operability of filters in fuel-handling systems was further confirmed, underscoring the need to limit their content to prevent potential field issues, and (iii) the long-term storage stability of renewable diesel fuel can be ensured by the use of commercially available oxidation control additives.

CPPI member companies are using the information generated to develop renewable diesel formulations that will help to ensure "fit for service" fuel products. The results of this work may be used to set renewable fuel specifications.

ETHANOL

Ethanol pipeline across the US Midwest

POET (Sioux Falls, South Dakota, USA) and Magellan Midstream Partners, LP (Tulsa, Oklahoma, USA) have formed a joint venture to assess the feasibility of a 1,800-mile (3,000 km) ethanol pipeline from ethanol production facilities in the Midwest to distribution outlets in the northeast United States, ending in Linden, New Jersey. Once the feasibility study is complete, the pipeline would be operational as early as 2014.

The consulting firm LECG predicts that the majority of the jobs created will be in the construction and transportation industries. More than 50,000 jobs will come from construction alone. The pipeline project would provide approximately 1,100 permanent jobs after construction is complete.

"Pipelines are the most cost efficient, safest and most reliable mode of transportation for liquid energy. Construction of a large-scale renewable fuel pipeline complements the national objective of creating quality jobs while increasing transportation efficiencies for the growing renewable fuels industry," said Mike Mears, chief operating officer for Magellan.

A loan guarantee with the US Department of Energy (DOE) is necessary for this project to become a reality. Congress is considering amendments to DOE's loan guarantee program to include large-scale renewable fuel pipeline projects.

When completed, the pipeline would transport 3.6 billion gallons a year through a 20-inch diameter pipe at a construction cost of $4 billion. In some areas, the ethanol pipeline could run alongside existing petroleum pipelines; in others, new paths would have to be established (http://green.autoblog.com/201%1/17/plans-for-1-800-mile-ethanol-pipeline-across-eastern-u-s-unveil/).

Iowa approves $5.25 million for POET's Project LIBERTY

The State of Iowa (USA) Department of Economic Development approved a final $5.25 million in assistance to POET's Project LIBERTY in January. The final approval brings Iowa's total contribution to the project to $20 million.

Project LIBERTY is a 25 million gallon (95 million liter) per year cellulosic ethanol plant in Emmetsburg, Iowa, that uses corncobs as feedstock. POET plans to begin construction this year on the plant, which will be co-located with POET's current grain-ethanol plant at the site. POET's pilot-scale plant in Scotland, South Dakota (see *inform 20*:154–155; 579–580, 2009), is already producing cellulosic ethanol from corncobs at a rate of approximately 20,000 gallons (76,000 liters) per year.

Cellulosic ethanol to fuel US power plant

Abengoa Bioenergy (Madrid, Spain, and St. Louis, Missouri, USA) and Mid-Kansas Electric Company LLC (Hugoton, Kansas, USA) have agreed to develop the first commercial-scale hybrid cellulosic ethanol and power plant in the United States. The electricity will be generated at the electric generation and cellulosic ethanol plant to be constructed in Stevens County, Kansas, and will use biomass from crop residue as a fuel source.

Cost of construction will be $500 million. The cellulosic ethanol facility will produce 15 million gallons (57 million liters) of ethanol per year and about 75 megawatts of electric power. The plant will use almost 2,500 tons (2,300 metric tons) of biomass daily to produce ethanol and electricity; corn stover will represent 76% of the feedstock; wheat straw, 15%; milo stubble, 5%; and switchgrass, 4%. It is estimated that the plant will consume 10–12% of the biomass within a 50-mile (80-km) radius of the plant and that it will take 300,000–350,000 acres (120,000–140,000 hectares) to meet the plant's biomass demand. Biomass will be harvested into package form, then transported via flatbed truck to the nearest satellite depot for storage, then to the facility. About 80% of the biomass will be stored before use; the other 20% will go straight from the field to the facility.

The bio-energy plant is expected to operate for 30–50 years.

JATROPHA

Jatropha vs. palm oil

Working out of Universiti Sains Malaysia, Pulau Pinang, K.T. Lee and coworkers performed a life-cycle assessment for the production of biodiesel from Malaysian palm

oil and from jatropha oil. Sustainability was calculated by assessing the cultivation of the crop, the oil extraction stage, and the biodiesel production stage. The scientists concluded that the land needed to produce 1 metric ton (MT) of jatropha biodiesel is 118% higher than for 1 MT of palm biodiesel. The ratio of energy output to energy input for palm biodiesel is 2.27; for jatropha biodiesel, the ratio is 1.92. Sequestration of CO_2 for the whole life-cycle chain of palm biodiesel is 20 times higher than for jatropha biodiesel. The authors conclude that palm oil is superior to jatropha oil as a feedstock for biodiesel (*Biofpr 3*:601–612, 2009; doi: 10.1002/bbb.182).

Doubts over jatropha in India

Oil extraction from jatropha seeds has been touted in India as an eco-friendly way to meet the country's growing energy needs. Promoters have said the plant grows on marginal and uncultivated land, where it does not compete with food crops, and that the plant grows without irrigation. The latter is especially attractive for drought-prone areas in the nation.

However, Sarachchandra Lele, a senior fellow with ATREE (Ashoka Trust for Research in Ecology and the Environment), which promotes sustainable development, said recently, "Some state governments are promoting its cultivation on regular agricultural land, where it will displace existing crops, including food crops." Furthermore, "We are basically subsidizing the urban elite's petrol consumption at the cost of rural livelihoods and food production."

ATREE reports their research shows jatropha production yields of less than one metric ton (MT) per hectare, considerably less than the 2.5–4 MT per hectare, after six years, predicted in 2007 by the state-run National Oilseeds and Vegetable Oils Development Board (www.novodboard.com).

According to the AFP news agency (January 27), the Indian government hopes to have 11 million hectares planted to jatropha by 2011. Subhas Patnaik, chief operating officer of Mission Biofuels, which currently owns about 130,000 hectares for jatropha plantations in India, argues that poor initial results will be overcome. "The whole challenge is how to get better yields from this crop and once you're able to prove that to the farmer . . . then definitely it is going to be a miracle crop."

GENERAL

On January 13, US Department of Energy Secretary Steven Chu announced the investment of nearly $80 million under the American Recovery and Reinvestment Act for advanced biofuels research and fueling infrastructure. The purpose is to support the development of a clean sustainable transportation sector.

Two cross-functional groups will seek to break down critical barriers to the commercialization of algae-based and other advanced biofuels, such as green aviation fuels, diesel, and gasoline that can be transported and sold using today's existing fueling infrastructure. The two consortia selected for funding are detailed in Table 1. The first, the National Alliance for Advanced Biofuels and Bioproducts, will receive $44 million to develop a systems approach for sustainable commercialization of algal gasoline, diesel,

and jet fuel and bioproducts. The second, the National Advanced Biofuels Consortium, will receive up to $34 million to research infrastructure-compatible, biomass-based hydrocarbon fuels.

ALGAE

Controversy regarding benefits of algae

The American Chemical Society journal *Environmental Science and Technology* published the article "Environmental Life Cycle Comparison of Algae to Other Bioenergy Feedstocks" (doi 10.1021/es902838n) on January 19. Corresponding author Andres F. Clarens of the Department of Civil and Environmental Engineering of the University of Virginia (Charlottesville, USA) and coworkers claim that algae production consumes more energy, has higher greenhouse gas emissions, and uses more water than other biofuel sources such as switchgrass, corn, and canola. In the Virginia life cycle analysis, algae performed favorably only in land use and eutrophication.

The authors suggested that cultivating algae near sources of nutrients—such as flue gas effluents for CO_2 and sewage treatment effluent for nitrogen—could lessen perceived disadvantages to algae as a feedstock for biofuel.

The Algal Biomass Organization (ABO) responded vigorously in a press release, as picked up by a number of news outlets (e.g., *The New York Times*), stating that Clarens and his colleagues used old, outdated data. In a written statement, Mary Rosenthal, executive director of the ABO, said, "We appreciate and support the interest in algae among the scientific community, and agree that examination of the life cycle impacts of algae for fuel processes is important." She added, "However, we expect such research to be based on current information, valid assumptions, and proven facts. Unfortunately, this report . . . use[s] decades-old data and errant assumptions of current production and refining technologies."

According to BiofuelsDigest.com (January 26), Tim Zenk, of Sapphire Energy (San Diego, California, USA) and Rosenthal pointed out that Clarens and co-workers

CONTINUED ON PAGE 188

TABLE 1. *Biofuels consortia announced by US Department of Energy (January 2010)*

Grantee (lead organization)	Description	Partners
ALGAL BIOFUELS CONSORTIUM		
National Alliance for Advanced Biofuels and Bioproducts[a] (NAABB) (Danforth Plant Science Center, St. Louis, Missouri)	Develop and demonstrate the science and technology necessary to significantly increase production of algal biomass and lipids, efficiently harvest and extract algae and algal products, and establish conversion routes to fuels and co-products. These activities will accelerate the ability to overcome several key barriers identified in the Algal Biofuels Roadmap, including feedstock supply (strain development and cultivation); feedstock logistcs (harvesting and extraction); and conversion (production of fuels and co-products)	Los Alamos National Laboratory, Pacific Northwest National Laboratory, University of Arizona, Brooklyn College, Colorado State University, New Mexico State University, Texas AgriLife Research–Texas A&M University System, University of California–Los Angeles, University of California–San Diego, University of Washington, Washington University in St. Louis, Washington State University, AXI, Catilin, Diversified Energy, Eldorado Biofuels, Genifuel, HR BioPetroleum, Inventure, Kai BioEnergy, Palmer Labs, Solix Biofuels, Targeted Growth, Terrabon, UOP
ADVANCED BIOFUELS CONSORTIUM		
National Advanced Biofuels Consortium[b] (NABC) (National Renewable Energy Laboratory, Golden, Colorado, and Pacific Northwest National Laboratory, Richland, Washington)	Develop and demonstrate the science and technology necessary to enable the biofuels industry to produce infrastructure-compatible biomass-based hydrocarbon fuels. The research and development strategy includes investigating six process options: fermentation, catalytic conversion, catalytic fast pyrolysis, hydropyrolysis, hydrothermal liquefaction, and low-cost one-step syngas to distillates. After technoeconomic evaluation of each option in the first year, one or possibly two process strategies will be downselected for more focused development in years 2–3.	National Renewable Energy Laboratory, Pacific Northwest National Laboratory, Albemarle Corporation, Amyris Technologies, Argonne National Laboratory, BP Products North America Inc., Catchlight Energy, LLC, Colorado School of Mines, Iowa State University, Los Alamos National Laboratory, Pall Corporation, RTI International, Tesoro Companies, Inc., University of California–Davis, UOP, Virent Energy Systems, Washington State University

[a]US Department of Energy grant: $44,036,473; non-federal cost share, $11,009,118.
[b]US Department of Energy grant: $33,818,814; non-federal cost share, $8,454,704.

2010

AOCS Since 1909
Your Global Fats and Oils Connection

MEMBERSHIP APPLICATION

10INF

Street Address: 2710 S. Boulder Drive, Urbana, IL 61802-6996 USA.
Mail Address: P.O. Box 17190, Urbana, IL 61803-7190 USA.
Phone: +1-217-359-2344; **Fax:** +1-217-351-8091; **Email:** membership@aocs.org; **Web:** www.aocs.org

Please print or type. All applicants must sign the Code of Ethics.

❑ Dr. ❑ Mr. ❑ Ms. ❑ Mrs. ❑ Prof.

Last Name/Family Name _____ First Name _____ Middle Initial _____

Firm/Institution _____

Position/Title _____

Business Address (Number, Street) _____

City, State/Province _____

Postal Code, Country _____ Year of Birth (optional) _____

Business Phone _____ Fax _____ Previously an AOCS student member? ❑ Yes ❑ No

Email _____ Expected Graduation Date _____

Invited to be a member by _____

MEMBERSHIP DUES

$ _____

	U.S./Non-U.S. Surface Mail	Non-U.S. Airmail
❑ Active	❑ $151	❑ $236
❑ Corporate	❑ $750	❑ $750
❑ Student*	❑ $ 0	❑ N/A

Membership dues include a monthly subscription to* inform. *Active membership is "individual" and is not transferable. Membership year is from January 1 through December 31, 2010.

*Complimentary student membership includes free access to online *inform* only. Student membership applies to full-time graduate students working no more than 50% time in professional work, excluding academic assistantships/fellowships. A professor must confirm these conditions every year, in writing.

OPTIONAL TECHNICAL PUBLICATIONS

$ _____

JAOCS	❑ $155
Lipids	❑ $155
Journal of Surfactants and Detergents	❑ $155

These prices apply only with membership and include print and online versions and shipping/handling.

inform—**Student member only, rate for print**

U.S./Non-U.S. Surface Mail	Non-U.S. Airmail
❑ $30	❑ $115

DIVISIONS AND SECTIONS DUES (Students may choose one free Division membership.)

$ _____

Divisions	Dues/Year	Divisions	Dues/Year	Sections	Dues/Year	Sections	Dues/Year
❑ Agricultural Microscopy	$12	❑ Industrial Oil Products	$15	❑ Asian	FREE	❑ India	$10
❑ Analytical	$15	❑ Lipid Oxidation and Quality	$10	❑ Australasian	$25	❑ Latin American	$15
❑ Biotechnology	$10	❑ Phospholipid	$20	❑ Canadian	$15	❑ USA	FREE
❑ Edible Applications	$15	❑ Processing	$10	❑ European	$10		
❑ Food Structure and Functionality	$20	❑ Protein and Co-Products	$10				
❑ Health and Nutrition	$15	❑ Surfactants and Detergents	$20				

MEMBERSHIP PRODUCTS

❑ Membership Certificate: $25 • ❑ AOCS Lapel Pin: $10 • ❑ Membership Certificate and AOCS Lapel Pin: $30 $ _____

PREFERRED METHOD OF PAYMENT

❑ Check or money order is enclosed, payable to the AOCS in U.S. funds drawn on a U.S. bank.
❑ Send bank transfers to: Busey Bank, 201 West Main Street, Urbana, Illinois 61801 USA. Account number 111150-836-1. Reference: Membership. Routing number 071102568. Fax bank transfer details and application to the AOCS.
❑ Send an invoice for payment. (Memberships are not active until payment is received.)
❑ I wish to pay by credit card: ❑ MasterCard ❑ Visa ❑ American Express ❑ Discover

TOTAL REMITTANCE
$ _____

Credit Card Account Number _____ Name as Printed on Card _____

Expiration Date _____ CSC _____ Signature _____

Dues are not deductible for charitable contributions for income tax purposes; however, dues may be considered ordinary and necessary business expenses.

AOCS: Your international forum for fats, oils, proteins, surfactants, and detergents.

This Code has been adopted by the AOCS to define the rules of professional conduct for its members. As a condition of membership, it shall be signed by each applicant.

AOCS Code of Ethics • Chemistry and its application by scientists, engineers, and technologists have for their prime objective the advancement of science and benefit of mankind. Accordingly, the Society expects each member: 1) to be familiar with the purpose and objectives of the Society as expressed in its Bylaws; to promote its aim actively; and to strive for self-improvement in said member's profession; 2) to present conduct that at all times reflects dignity upon the profession of chemistry and engineering; 3) to use every honorable means to elevate the standards of the profession and extend its sphere of usefulness; 4) to keep inviolate any confidence that may be entrusted to said member in such member's professional capacity; 5) to refuse participation in questionable enterprises and to refuse to engage in any occupation that is contrary to law or the public welfare; 6) to guard against unwarranted insinuations that reflect upon the character or integrity of other chemists and engineers.

I hereby subscribe to the above Code of Ethics. Signature of Applicant _____

Health & Nutrition

Briefs

A study from Oregon State University (Corvallis, USA) has found that chlorophyll and one of its derivatives, chlorophyllin, are effective in limiting the absorption of aflatoxin in humans. The fungus *Aspergillus,* which is a contaminant of grains including corn, peanuts, and soybeans, produces aflatoxin. This toxin is known to cause liver cancer—and can work in concert with other health concerns, such as hepatitis. Limits on aflatoxin in human foods are carefully regulated in many countries, but the carcinogen is often found in the food supplies of developing nations, especially those with poor storage facilities. The study appeared in *Cancer Prevention Research* (2:1015–1022, 2009).

■■■

A study that appeared in the *British Medical Journal* (doi:10.1136/bmj.b5500) and is said to be the largest of its kind to date adds to the evidence supporting the apparent health benefits of increased vitamin D ingestion. Using data from over half a million participants in the European Prospective Investigation into Cancer Study (EPIC), the researchers analyzed dietary and lifestyle information obtained from questionnaires and collected blood samples.

The EPIC data showed that blood levels of vitamin D below 50–75 nanomoles/liter were associated with an increased risk of colorectal cancer, whereas blood levels above this were not associated with any additional benefits. The association was significantly greater for colon cancer than rectal cancer, the researchers said.

■■■

The final report—all 789 pages of it—on the safety of soy infant formula from the US Center for the Evaluation of Risks to Human Reproduction was released on January 15, 2010. In brief: "The Expert Panel has minimal concern for adverse developmental effects in infants fed soy infant formula." The complete report (5.84 MB, pdf) is available at http://tinyurl.com/yawjvum. ■

α-Tocotrienol and brain protection

Blocking the function of an enzyme in the brain with α-tocotrienol can prevent nerve cells from dying after a stroke, new research suggests.

In a study using mouse brain cells, scientists found that the α-tocotrienol form of vitamin E stopped the enzyme from releasing the arachidonic acid (20:4n-6) that would eventually kill neurons.

"Our research suggests that the different forms of natural vitamin E have distinct functions. The relatively poorly studied tocotrienol form of natural vitamin E targets specific pathways to protect against neural cell death and rescues the brain after stroke injury," said Chandan Sen, professor and vice chair for research in The Ohio State University's Department of Surgery and senior author of the study.

"Here, we identify a novel target for tocotrienol that explains how neural cells are protected."

The research appeared online and is scheduled for later print publication in the *Journal of Neurochemistry* (doi:10.1111/j.1471-4159.2009.06550.x).

Vitamin E occurs naturally in eight different forms. The form of vitamin E in this study, α-tocotrienol or TCT, is not abundant in the American diet but is available as a nutritional supplement. It is a common component of a typical Southeast Asian diet, in large part because palm oil contains significant amounts.

Sen's lab discovered TCT's ability to protect the brain 10 years ago. But this current study offers the most specific details about how that protection works, said Sen, who is also a deputy director of Ohio State's Heart and Lung Research Institute.

"We have studied an enzyme that is present all the time, but one that is activated after a stroke in a way that causes neurodegeneration. We found that it can be put in check by very low levels of tocotrienol," he said. "So what we have here is a naturally derived nutrient, rather than a drug, that provides this beneficial impact."

The research team had linked TCT's effects to various substances that are activated in the brain after a stroke before they concluded that the enzyme could serve as an important therapeutic target. The enzyme is known as cytosolic calcium-dependent phospholipase A2, or cPLA2.

Following the trauma of blocked blood

flow associated with a stroke, an excessive amount of glutamate is released in the brain. Glutamate is a neurotransmitter that, in tiny amounts, has important roles in learning and memory. Too much of it triggers a sequence of reactions that leads to the death of brain cells, or neurons—the most damaging effects of a stroke.

Sen and colleagues used cells from the hippocampus region of developing mouse brains for the study. They introduced excess glutamate to the cells to mimic the brain's environment after a stroke.

With that extra glutamate present, the cPLA2 enzyme releases arachidonic acid (AA) into the brain. Under normal conditions, AA is housed within lipids that help maintain cell membrane stability. But when it is free-roaming, AA undergoes an enzymatic chemical reaction that makes it toxic—the final step before brain cells are poisoned in this environment and start to die. Activation of the cPLA2 enzyme is required to release the damaging AA in response to insult caused by high levels of glutamate.

Sen and colleagues introduced the TCT to the cells that had already been exposed to excess glutamate. The presence of the vitamin decreased the release of AA by 60% when compared to cells exposed to glutamate alone.

> "Our research suggests that the different forms of natural vitamin E have distinct functions. The relatively poorly studied tocotrienol form of natural vitamin E targets specific pathways to protect against neural cell death and rescues the brain after stroke injury."

Brain cells exposed to excess glutamate followed by TCT fared much better, too, compared to those exposed only to the damaging levels of glutamate. Cells treated with TCT were almost four times more likely to survive than were cells exposed to glutamate alone.

Although cPLA2 exists naturally in the body, blocking excessive function of this enzyme is not harmful, Sen explained. Studies have already determined that mice genetically altered so they cannot activate the enzyme achieve their normal life expectancy and carry a lower risk for stroke. Sen also noted that the level of TCT needed to achieve these effects is quite small—just 250 nanomolar—a concentration about 10 times lower than the average amount of TCT circulating in humans who consume the vitamin regularly.

"So you don't have to gobble up a lot of the nutrient to see these effects," Sen noted.

The study was co-authored by Savita Khanna, Sashwati Roy, and Cameron Rink of the Department of Surgery and Narasimham Parinandi and Sainath Kotha of the Department of Internal Medicine, all at Ohio State, and Douglas Bibus of the University of Minnesota. The National Institutes of Health supported the work.

For more information about tocotrienols, see *Tocotrienols: Vitamin E Beyond Tocopherols*, published jointly by AOCS Press and CRC Press (http://tinyurl.com/TocotrienolsBook) and edited by Ronald Ross Watson and Victor R. Preddy. Sen and co-authors Savita Khanna and Sashwati Roy provided a chapter in the book entitled "Tocotrienols as Natural Neuroprotective Vitamins."

Intelligence not influenced by DHA?

Infant intelligence is more likely to be shaped by family environment than by the amount of docosahexaenoic acid (DHA) fed to infants in breast milk and some fortified infant formulae, according to researchers from the University of Southampton in England.

In this study, scientists followed 241 children from birth until they reached four years of age to investigate the relationship between breastfeeding and the use of DHA-fortified formula in infancy and performance in tests of intelligence and other aspects of brain function.

The researchers, funded by the Medical Research Council (MRC) and the UK Foods Standards Agency, found that after they had taken account of the influence of mothers' intelligence and level of education, there was no relationship between the estimated total intake of DHA in infancy and a child's IQ.

Catharine Gale, from the University's MRC Epidemiology Resource Centre at Southampton General Hospital, led the study. She says: "This study helps to dispel some of the myths surrounding DHA. We do know that there are clear health benefits to breast feeding but DHA, which is naturally present in breast milk and added into some formulas, is not the secret ingredient that will turn your child into an Einstein.

"Children's IQ bears no relation to the levels of DHA they receive as babies. Factors in the home, such as the mother's intelligence and the quality of mental

stimulation the children receive, were the most important influences on their IQ."

DHA is found in high concentrations in the brain and accumulates during the brain's growing spurt, which occurs between the last trimester of pregnancy and the first year of life. Although this research has shown a child's IQ is not influenced by DHA, previous studies have shown that a lack of DHA during periods of rapid brain growth may lead to problems in brain development.

Researchers used data from the Southampton's Women's Survey at the University's School of Medicine, the largest project studying women's health and lifestyle ever carried out in the UK. The study appeared in *Archives of Disease in Childhood* (doi:10.1136/adc.2009.165050).

Omega-3s: Fountain of youth?

A five-year study published in the *Journal of American Medical Association* examined the effect of the long-chain omega-3 fatty acids EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid) on 608 outpatients with heart disease.

Ramin Farzaneh-Far of the San Francisco General Hospital (California, USA) and colleagues found that higher levels of EPA and DHA slowed down damage to the section of DNA contained in the telomeres. Longer telomeres are associated with health and youth. They have also been associated with a decrease in inflammation and other aging processes.

"What we're demonstrating is a potentially new link between omega-3 fatty acids and the aging process," Farzaneh-Far told *The Wall Street Journal* newspaper.

In further news about omega-3 fatty acids, researchers writing in BioMed Central's open access journal *Critical Care* (doi:10.1186/cc8844) investigated the effects of including fish oil in the normal nutrient solution for patients with sepsis and found a series of significant benefits.

Philip Calder, from the UK's University of Southampton, worked with a team of researchers to carry out the study in 23 patients with systemic inflammatory response syndrome, or sepsis, in Portugal's Hospital Padre Américo. Calder said: "Recently there has been increased interest in the fat and oil component of vein-delivered nutrition, with the realization that it not only supplies energy and essential building blocks, but may also provide bioactive fatty acids. Traditional solutions use soybean oil, which does not contain the omega-3 fatty acids contained in fish oil that act to reduce inflammatory responses. In fact, soybean oil is rich in omega-6 acids that may actually promote inflammation in an excessive or unbalanced supply."

Calder and his team found that the 13 patients in the fish oil group (who received a 50:40:10 [vol/vol/vol] mixture of medium-chain saturated fatty acids, soybean oil, and fish oil) had lower levels of inflammatory agents in their blood, were able to achieve better lung function, and left the hospital earlier than the 10 patients who received traditional nutrition (supplied as a 50:50 [vol/vol] mixture of medium-chain saturated fatty acids and soybean oil).

According to Calder, "This is the first study of this particular fish oil solution in septic patients in the intensive care unit. The positive results are important since they indicate that the use of such an emulsion in this group of patients will improve clinical outcomes, in comparison with the standard mix." ■

*inform*ation

Did you know that *inform* provides news updates on the AOCS homepage at www.aocs.org? As well as alerts on Twitter at www.twitter.com/theAOCS and Facebook at www.facebook.com/AOCSFan?

twitter™

In January, Monsanto Co. (St. Louis, Missouri, USA) confirmed that, after the patent on its Roundup Ready soybeans expires in 2014, it would not stand in the way of generic versions of its GM (genetically modified) seed developed by competitors. This statement came after Monsanto issued letters to farm associations and seed companies stating that it would allow farmers to continue using Roundup Ready I soybeans after the patent expiration (see *inform 21*:88, 2010). Some analysts speculated that the move was an attempt by the company to avoid a possible US antitrust case.

In related news, the company reported that Mexico had granted full regulatory approval for the importation of grain from three Monsanto Genuity™ corn traits: Genuity SmartStax™, Genuity VT Triple PRO™, and Genuity VT Double PRO™. Genuity SmartStax and Genuity VT Triple PRO already have regulatory authorizations in the United States, Canada, Japan, and Korea. Genuity VT Double PRO has full regulatory approval in the United States, Canada, and Japan. Monsanto said it anticipated approval in Korea for Genuity VT Double PRO during the 2010 growing season. The Genuity brand is Monsanto's system of multiple traits under one platform.

■■■

In late January, Agrimoney.com reported that Western Australia had joined three other Australian states—New South Wales, South Australia, and Victoria—in allowing its farmers to grow GM rapeseed (canola). Western Australia had previously imposed a six-year moratorium on the GM crop, but cleared use of Monsanto's Roundup Ready seed "after trials on 18 farms found that farmers and marketers could, in handling, keep GM and traditional crops separate."

In related news, Dow AgroSciences (Indianapolis, Indiana, USA) announced a new research alliance between the company and the Victorian government in February. While signing the research agreement with Dow in Melbourne, Victorian Premier John Brumby said it was a major step forward in expanding the scope and

Biotechnology News

Researchers identify "thermometer gene" for plants

Researchers from the John Innes Centre (Norwich, United Kingdom) believe they have pinpointed the way in which plants regulate their response to changes in temperature. The research, published in the journal *Cell* (*140*:136–147, 2010), found that plants have a built-in "thermometer gene" that they use to control their growth and development, a discovery that could lead to new ways of breeding crops that are more resistant to climate change. Some plant growth cycles are already being greatly affected by climate change, which is causing redistribution of species throughout the world and changes of traditional growth and flowering patterns.

A little background: Plants are extremely sensitive to temperature, which controls their growth, flowering, and fruiting cycles. They can sense temperature differences of only 1°C and are subject to many changes and extremes of temperature throughout the seasons, from night to day and from spring to winter. To decide when they need to grow and when they need to conserve energy, they sense the air temperature around them and control their growth accordingly. How they do this has always been a mystery.

Researchers S. Vinod Kumar and Philip Wigge studied all the genes in a variety of the plant *Arabidopsis* to find out which genes are turned on by warmer temperatures. They then connected one of these genes to a luminescence gene from another plant to create a plant that gives off light when the temperature rises. They did this to screen the plants for mutants that no longer sense temperature fluctuations. One mutant plant lost its ability to sense the correct temperature, giving off luminescence even when the temperature was cold.

"It was amazing to see the plants," said Kumar. "They grew like plants at high temperatures even when we turned the temperature right down."

The defect in this mutant plant allowed it to affect the way that a variant of a histone protein works. Histones are the structural proteins of chromosomes that bind to DNA, help give chromosomes their shape, and help control which genes are "switched on." When the histone was no longer incorporated

into plant DNA, the plant expressed all its genes as if the temperature were high even if it was not. This suggested to the research team that histone is the main temperature regulator of plants. The histone variant controls a gene that has helped plant species adapt to climate change by speeding up their flowering pattern.

"We may be able to use these genes to change how crops sense temperature," said Wigge. "If we can do that, then we may be able to breed crops that are resistant to climate change."

BASF, Embrapa GM soybeans get green light in Brazil

Embrapa, the Brazilian Organization for Agricultural Research, and BASF (Ludwigshafen, Germany) announced in February that their jointly developed herbicide-tolerant soybeans have been green-lighted by CTNBio. CTNBio, the Brazilian Biosafety Technical Commission, stated that the GM (genetically modified) soybeans meet the standards of the Biosafety law for the environment and agriculture, as well as human and animal health. This decision will allow BASF and Embrapa to bring the new production system with the brand name Cultivance® to Brazilian farmers. Both companies are now seeking the approval for this technology in key export markets such as China and the United States.

According to the two organizations, Cultivance is the first GM crop developed in Brazil, from laboratory to commercialization. The Cultivance Production System combines herbicide-tolerant soybean varieties with BASF's broad spectrum imidazolinone class of herbicides, tailored to regional conditions. The approval is the result of more than 10 years of cooperation between Embrapa and BASF.

"The approval of the Cultivance soybean…represents our country's competency in agricultural biotechnology. We are showing the world that we can deliver innovation. Embrapa adopts many technologies in research. We firmly believe that biotechnology, applied in accordance with the principles of sustainability, brings added value to society. It allows Brazilian farmers to have access to advanced technological alternatives, resulting in economical gains whilst being more efficient in maintaining natural resources," said Pedro Arraes, managing director of Embrapa.

The Cultivance Production System will be available in Brazil from the 2011–2012 season onwards. Additionally, the partner companies have expressed significant interest in developing this technology adjusted to local needs of neighboring countries in Latin America, including Argentina, Bolivia, and Paraguay. The partners are working to meet the requirements of the regulatory authorities in these countries and the approval could be obtained as early as two years after the Brazilian market introduction.

Report details biotech growth in 2009

In February, ISAAA (International Service for the Acquisition of Agri-biotech Applications) released a report (Brief 41-2009) examining GM use around the world during

scale of research Dow undertakes in Victoria. The move is expected to create 30 new Victorian agricultural biotech jobs, according to Brumby.

■■■

Reuters reported in February that a European Union (EU) scientific committee stalled in its decision to approve or deny import of three GM maize crops. Because of the stalemate, the applications for import will be forwarded to EU ministers for further consideration. Two of the GM maize types, 59122x1507xNK603 and 1507x59122, were jointly developed by subsidiaries of US chemical companies DuPont (Wilmington, Delaware) and Dow Chemical (Midland, Michigan). The third, MON88017x-MON810, was developed by Monsanto. A Dow spokesperson expressed the company's disappointment at the decision: "These products have been shown to be safe by regulatory bodies around the world, including the EFSA (Europe's food safety watchdog), and are urgently needed by EU livestock producers."

■■■

Syngenta (Basel, Switzerland) and Dow AgroSciences, a wholly owned subsidiary of The Dow Chemical Co., announced in January that Syngenta has granted Dow AgroSciences licenses to a number of VipCot™ cotton varieties, as well as access to its COT102 cotton transgenic event. Under the terms of the agreement, Dow AgroSciences will receive a global license to develop and commercialize stacked combinations of Syngenta's COT102 transgenic event with Dow AgroSciences' traits. The Vip3A technology will also be sold by Syngenta and its licensees in corn as the Agrisure Viptera™ trait, pending receipt of all remaining regulatory approvals.

Dow AgroSciences will also receive a license to a number of VipCot cotton varieties, stacked with glyphosate tolerance, for sale in the United States under its PhytoGen® cottonseed brand. Pending regulatory approvals, these varieties are expected to be available in 2012 and will offer cotton growers protection against cotton pests such as cotton bollworm (*Helioverpa zea*), tobacco budworm (*Heliothis virescens*), and armyworms (*Spodoptera*). ■

2009. In their 2008 report, ISAAA suggested that biotech crops "were poised for a new wave of growth" and much of the 2009 report details instances of this growth. Highlights include:

- In 2009, 14 million farmers planted 134 million hectares (330 million acres) of biotech crops in 25 countries, up from 13.3 million farmers and 125 million hectares (7%) in 2008. Notably, in 2009, 13 of the 14 million farmers, or 90%, were small and resource-poor farmers from developing countries.
- Trait hectares or "virtual hectares" reached 180 million hectares, up 14 million hectares from 2008. Eight of the 11 countries planting crops with stacked traits were developing nations.
- Brazil surpassed Argentina as the second largest grower of biotech crops globally. Its growth of 5.6 million hectares, to 21.4 million hectares (up 35% from 2008), was the highest absolute growth for any country in 2009.
- Burkina Faso's biotech cotton area rose from 8,500 hectares to 115,000 hectares, or from 2 to 29% of the country's total cotton area—the largest percentage growth on record (1,350%). Progress continued in the rest of Africa, with a 17% increase in South Africa and a 15% increase in Egypt.
- Bt cotton in India: 5.6 million farmers planted 8.4 million hectares in 2009, equivalent to a record 87% adoption rate.
- Costa Rica reported biotech crops for the first time in 2009, exclusively for the seed export market, whereas Japan began commercialization of a biotech blue rose.
- Six European countries planted 94,750 hectares of biotech crops in 2009, down from seven countries and 107,719 hectares in 2008, as Germany discontinued its planting. Spain planted 80% of all the Bt maize in the European Union in 2009 and maintained its record adoption rate of 22% from the previous year.
- The top eight countries, each growing more than 1 million hectares (ha), were: United States (64.0 million ha), Brazil (21.4 million ha), Argentina (21.3 million ha), India (8.4 million ha), Canada (8.2 million ha), China (3.7 million ha), Paraguay (2.2 million ha), and South Africa (2.1 million ha). The remaining countries included: Uruguay, Bolivia, Philippines, Australia, Burkina Faso, Spain, Mexico, Chile, Colombia, Honduras, Czech Republic, Portugal, Romania, Poland, Costa Rica, Egypt, and Slovakia.

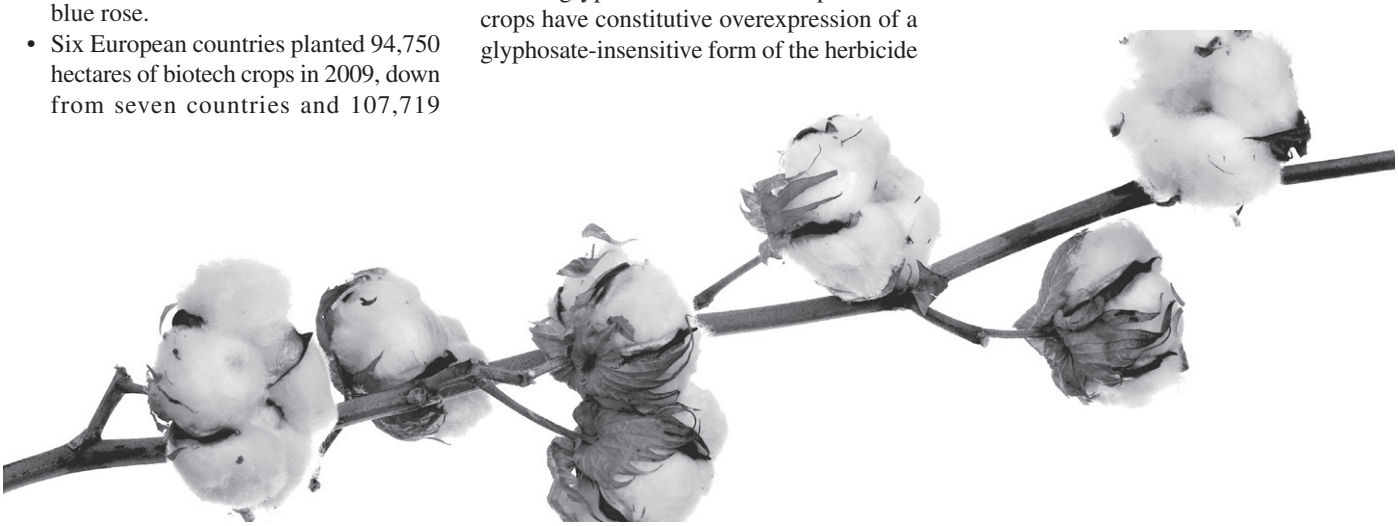
For more information, or to purchase the report, visit www.isaaa.org/resources/publications/briefs/41/executivesummary/default.asp.

Glyphosate use and weed resistance

A recent study suggests that certain weeds can develop resistance to the herbicide glyphosate used in conjunction with GM crops. The study, led by Todd Gains (University of Western Australia, Perth), examined the glyphosate resistance of Palmer's pigweed in GM cotton crops from Georgia (USA). In the abstract, the authors state:

"The herbicide glyphosate became widely used in the United States and other parts of the world after the commercialization of glyphosate-resistant crops. These crops have constitutive overexpression of a glyphosate-insensitive form of the herbicide target site gene, 5-enolpyruvylshikimate-3-phosphate synthase (EPSPS). Increased use of glyphosate over multiple years imposes selective genetic pressure on weed populations. We investigated recently discovered glyphosate-resistant *Amaranthus palmeri* populations from Georgia, in comparison with normally sensitive populations. EPSPS enzyme activity from resistant and susceptible plants was equally inhibited by glyphosate, which led us to use quantitative PCR to measure relative copy numbers of the EPSPS gene. Genomes of resistant plants contained from five-fold to more than 160-fold more copies of the EPSPS gene than did genomes of susceptible plants. Quantitative RT-PCR on cDNA revealed that EPSPS expression was positively correlated with genomic EPSPS relative copy number. Immunoblot analyses showed that increased EPSPS protein level also correlated with EPSPS genomic copy number. EPSPS gene amplification was heritable, correlated with resistance in pseudo-F_2 populations, and is proposed to be the molecular basis of glyphosate resistance. FISH revealed that EPSPS genes were present on every chromosome and, therefore, gene amplification was likely not caused by unequal chromosome crossing over. This occurrence of gene amplification as an herbicide resistance mechanism in a naturally occurring weed population is particularly significant because it could threaten the sustainable use of glyphosate-resistant crop technology."

The research was published ahead of print by the journal *Proceedings of the National Academy of Sciences* (doi: 10.1073/pnas.0906649107). ■



Surfactants, Detergents, & Personal Care News

Briefs

The Procter & Gamble Co. (P&G) is a believer in open innovation, or collaboration with experts outside the company. An Associated Press article (http://tinyurl.com/y98spul) details P&G's successes as well as ideas deemed unworkable. Included among the rejects are a brush for belly button lint and tiny electrostatic Swiffer® cleaning pads for cat paws.

■■■

Japan's Shiseido Co. has jumped to No. 4 in the cosmetics market behind L'Oréal, Procter & Gamble, and Unilever. How? By purchasing Bare Escentuals Inc., a California-based company, for $1.7 billion. Shiseido, already Japan's largest cosmetics company, expected the transaction to close in March 2010.

■■■

Consumers now have an online gateway for finding specific cleaning product companies' ingredient information at www.cleaning101.com/ingredientcentral. Created by The Soap and Detergent Association, the gateway describes where and how companies will provide information about the specific ingredients in their cleaning products.

■■■

Indonesia's PT Bakrie Sumatera Plantations told the Asia Pulse newswire in late January 2010 that it will provide Rp 1.1 trillion ($118.3 million) to expand its oleochemical business purchased from the Domba Mas Group. About Rp 560 billion will go toward finishing the construction of oleochemical plants and supporting facilities and the rest will be used for working capital, the newswire report said.

■■■

Paris-based pharmaceutical maker Sanofi-Aventis is buying US consumer health care company Chattem for about $1.9 billion. Chattem (Chattanooga, Tennessee, USA) makes and sells household and personal care products. Its brands include Selsun

CONTINUED ON NEXT PAGE

New SDA Board Chair Jane Hutterly delivers the news that SDA will change its name. Photo courtesy of SDA.

SDA to change name

Goodbye, SDA. Hello, ACI.

Big news was delivered by 2010 SDA Board Chair Jane Hutterly at the SDA Annual Meeting in Orlando, Florida, USA, in January. The news: The organization will change its name from The Soap and Detergent Association (SDA) to the American Cleaning Institute℠, effective June 2010.

"Since 1926, SDA has been a leader in demonstrating the safe, proper, and beneficial use of cleaning products," Hutterly said in a statement. Hutterly, who is executive vice president of worldwide corporate and environmental affairs at SC Johnson in Racine, Wisconsin, USA, added: "SDA's transformation to the American Cleaning Institute will make our information easier to access, more consumer friendly, and more relevant in the digital age."

Ernie Rosenberg, SDA president and chief executive officer, added: "Under the ACI banner, the Institute will still reflect our organization's vision—to enhance health and the quality of life through sustainable cleaning products and practices. The Institute will continue to support the sustainability of the cleaning products industry through research, education, outreach, and science-based advocacy."

SDA officials also said that the name change will better reflect the breadth of products the organization represents, which includes household and industrial and institutional cleaning products. While American Cleaning Institute will continue to maintain its expertise on global industry issues, the new name will allow the Institute to better communicate with key US stakeholders, including consumers, NGOs (non-gov-

american cleaning institute℠
for better living

Blue dandruff shampoo and Gold Bond skin-care products.

■■■

L'Oréal (Clichy, France) has purchased two US distributors of professional hair salon products through its professional products distribution operation, SalonCentric. The acquisition of family-owned distributors Maly's Midwest and Marshall's Salon Services is part of a continuing effort by L'Oréal USA to continue to extend its network, which now covers 80% of the geographical territory of the United States, the company said in a news release. ■

ernmental organizations), lawmakers, and regulators.

Following the announcement on Thursday, January 28, the new board chair said that the name change will help support the industry's goal of strategic outreach to consumers. "The goal of the American Cleaning Institute is to build its brand identity as the authority in cleaning for homes and workplaces to the constituent groups it serves: consumers, governments, NGOs, and other key stakeholders."

Hutterly's goal as board chair is to lead this transition, with the understanding that her job will be on several levels, including her role at SC Johnson, within the overall industry, and at SDA/ACI. Hutterly believes her company gains value from her involvement with SDA as a volunteer and officer, and describes the member companies of SDA as "very responsible and interested in bringing forth the best they possibly can for cleanliness."

Incoming AOCS president Keith Grime, formerly vice president of corporate research and development for The Procter & Gamble Co. (Cincinnati, Ohio, USA), an SDA member company, commented that the soap and detergent industry continues to invest heavily in innovation for the future. Such innovations include developing more concentrated products that require less water to produce and that work in cold water, thereby saving energy. "The industry has a huge impact on global hygiene and the quality of life of the general population," Grime said.

The soap and detergent industry has experienced consolidation over the past 12 years, he noted, and it has been affected by the same economic issues that have affected business in general, such as the current recession. In addition to the complexity of managing through these challenges, the industry has been scrutinized for its use of chemicals and the effect of those chemicals on the environment, he said.

Zero-*trans* oils create cleaning problem

Talk about niche marketing: Ecolab Inc. has begun selling an industrial and institutional cleaner specifically targeted to food manufacturers who have switched to zero-*trans* oils.

In the words of the St. Paul, Minnesota, USA-based company: "The patent-pending program cut the cleaning time in half during initial testing and is the first product of its kind to address the emerging issue of cleaning difficult zero-*trans* fat oil versus traditional oils for food manufacturers."

Details about the formulation of the new product—known as Exelerate® ZTF—are sketchy. Although Ecolab declined an interview for this news item, the company told AP-Foodtechnology.com that Exelerate was developed for potato, snack food, bakery, and meat/poultry processing plants. Apparently, some of the less stable *trans*-free oils undergo more polymerization during processing, as compared with partially hydrogenated soybean oil, thereby creating a varnish-like coating on equipment.

Industry sources confirm that increased polymerization of zero-*trans* oils has been a difficulty for some food manufacturers. In particular, oils high in C18:2 (low-linolenic soybean and corn oil) are problematic. Oils low in 18:2 and high in 18:1 do not appear to pose the same problem. Nor, apparently, does expeller-pressed, physically refined soybean oil.

P&G takes retail sales online

The Procter & Gamble Co. (P&G; Cincinnati, Ohio, USA) has begun testing an online store for its consumer products.

The new P&G "eStore" will be owned and operated by PFSweb Inc., an e-commerce service provider based in Plano, Texas, USA. Online sales of bulky items such as diapers or laundry detergent traditionally have been low, in part because of the cost of shipping. Online sales accounted for about $500 million, or 0.6%, of P&G's fiscal year 2009 sales of $79 billion, according to the Reuters news agency.

Only US shoppers will be able to buy the products, a P&G news release said, adding that the initial test will involve 5,000 consumers, with full-scale sales expected to begin in the second quarter of 2010.

Unilever faces down Facebook campaign

The headlines in two British newspapers were unequivocal. According to them, consumer products giant Unilever was abandoning its new formula for Pears Traditional Soap—the 221-year-old soap that was the world's first registered brand—after a Facebook campaign by lovers of the old formula.

The newspaper reports added that the number of ingredients had tripled, from eight in old Pears to 24 in the new Pears soap. At a time when consumer perception of all things "natural" is running at a high, such a move was bound to garner complaints. Further, the scent of the new formulation was deemed to be too strong and previous claims that the soap was hypoallergenic and noncomedogenic [does not cause acne] were gone from the package. Which had also changed, and not for the better, Facebook comments insisted.

Was this an updated case of New Coke vs. Old Coke? Not exactly.

At the time the newspaper articles were written, the Facebook group (Bring Back the Original Pears Soap) had only 31 members, according to founder Janice Hallowell, who has used original Pears soap for more than 50 years. "It would be naive of me to think that such a small group would have such an effect on a global product," she noted in an email to *inform*.

"I would assume that many people had realized the change in formula and contacted Unilever directly to raise their concerns, which probably made them have a re-think. As far as I'm aware, Unilever have no plans to revert back to the original recipe, for all sorts of reasons."

After the erroneous press reports, Unilever clarified the situation. Hindustan Unilever, which manufactures the soap, said that

sales of the product actually had increased after the reformulation. The company also admitted that some consumers found the new perfume a bit much and so the company would work to deliver "a scent that more closely resembles the product our consumers are familiar with while retaining all the benefits that the new formulation delivers," the company told CosmeticsDesign-Europe.com.

Unilever noted that changes had been made to the manufacturing process to make it less energy intensive. Further, the apparent rise from eight to 24 ingredients was a false perception. In actuality, only "key ingredients" had been listed on the package previously.

EC ingredient review

Two cosmetic ingredients are being reviewed by the Scientific Committee on Consumer Safety (SCCS) of the European Commission: chloroacetamide and dichloromethane. After the consultation, whose comment period expired on January 31, the committee will decide whether to modify the EC's Cosmetics Directive (2003/15/EC).

Currently, the Cosmetics Directive classifies dichloromethane as a category 3 carcinogen, while chloroacetamide is classified as a category 3 mutagenic or reproductive toxin. Because of ambiguity in the classification within the regulation, the EC decided to re-evaluate the safety of both substances through the consultation process, both public and with the SCCS.

In other European regulatory news, the Council of the EU has asked the European Commission to look at whether current legislation adequately assesses the risks from exposure to multiple chemicals from different sources.

NSF organic standard debuts

As of January 2010, manufacturers can certify their products to the NSF/ANSI 305 standard for organic personal care and beauty products.

The "Contains Organic Ingredients" seal gives manufacturers an alternative to the US Department of Agriculture's organic seal, which requires 95% organic ingredients. Processing time for certification should run about two–three months, according to www.CosmeticsDesign.com. For more information, visit http://tinyurl.com/ybb5jrn.

SD&PC patents

RINSE-OFF PRODUCTS

Barreleiro, P., *et al.*, Henkel AG & Co. KGaA, WO2010/003843, January 14, 2010

The present invention relates to the use of surfactant-containing rinse-off products, which contain at least one film former and at least one beneficial substance selected from UV filter substances and tanning agents, for cleaning the skin and simultaneously providing a beneficial effect on the skin.

STAIN ABSORPTION RESISTANCE

Serobian, A.K., The Clorox Co., US7645333, January 12, 2010

The present invention relates to an aqueous-based silicone protectant composition and method for treating various solid surfaces including, but not limited to, fiber-based products, leather, or other soft or hard surfaces to impart water and stain repellency. The protectant composition comprises an MQ resin, a polyorganosiloxane fluid, a silicone solvent, and water. The aqueous silicone-based protectant composition is hydrophobic and substantially free of surfactants. The protectant composition can be applied directly or indirectly to a solid surface using various application devices including, but not limited to, spray, aerosol, wipes, sponges, and pads.

SURFACTANT BLEND

Sun, J.S., Akzo Nobel N.V., WO2010/003889, January 14, 2010

The present invention teaches a surfactant blend composition of at least one nonionic alkoxylate and at least one sugar-based surfactant, and its use as an adjuvant for pesticides. The pesticidal composition employing the surfactant blend composition of the invention realizes an efficacy that is unexpectedly superior to similar pesticidal compositions that employ only the individual surfactant components. The composition of the present invention is useful as a tank side additive, or as a component in herbicidal formulations. In addition, the compositions of the present invention are useful as adjuvants for other pesticides, such as, fungicides, insecticides, plant growth regulators, acaracides and the like.

TOOTH HEALTH AND APPEARANCE

Baig, A.A., *et al.*, The Procter & Gamble Co., WO2010/004361, January 14, 2010

Disclosed are oral care compositions comprising selected surface-active organophosphate compounds and methods of use to provide protection of teeth from erosion caused by the action of chemicals, such as harsh abrasives and acids. The surface-active organophosphate compounds are substantive to teeth, the phosphate groups binding the calcium in teeth and thus preventing loss of calcium from dissolution when contacted with acids. The organophosphate compound may also deposit a protective surface coating that prevents contact of teeth with erosive challenges. Selected organophosphate compounds contain one or more phosphate groups and are combined in the oral care composition with one or more of a fluoride ion agent, an antimicrobial agent preferably selected from quaternary ammonium compounds and polyvalent metal salts, an anticalculus agent and additional surfactant, to provide benefits including superior anti-erosion, anticaries, antiplaque, and anti-staining as demonstrated by enhanced fluoride uptake, remineralization, resistance to acid demineralization and antimicrobial activities, resulting in improved overall tooth health, structural integrity, and appearance.

SUBTILASES

Borchert, M., and P. Nielsen, Novozymes A/S, US7642080, January 5, 2010

The present invention relates to novel subtilases from wild-type strains, especially the strains ZI344, EP655, P203, EP63, ZI120, ZI130, ZI1342, and ZI140, and to methods of construction and production of these proteases. Further, the present invention relates to use of the claimed subtilases in detergents, such as a laundry detergent or an automatic dishwashing detergent.

HAIR-CONDITIONING AGENTS

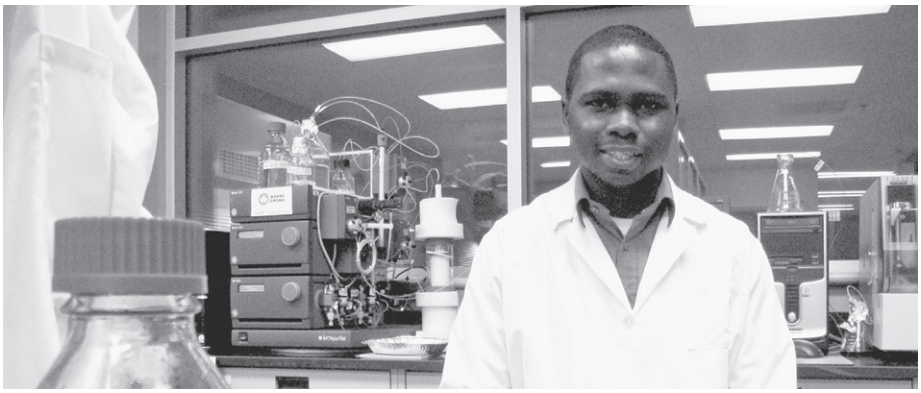
Krueger, M., and D. Goddinger, Henkel AG & Co. KGaA, WO2010/000645, January 7, 2010

The invention relates to cosmetic preparations, especially hair-conditioning agents, which contain at least one imidazoline

CONTINUED ON PAGE 188

Meet Chibuike Udenigwe

AOCS Honored Students tend to get recognition—for their work ethic, their innovative scientific approach, their diligence and leadership in a given field. And AOCS Honored Student Chibuike Udenigwe is no different. Currently at the University of Manitoba (Winnipeg, Canada), his track record speaks for itself: He has been a recipient of, among others, the prestigious NSERC (Natural Sciences and Engineering Research Council of Canada) Alexander Graham Bell Canada Graduate Scholarship, a Canadian Institute of Food Science and Technology Graduate Student Scholarship, an Institute of Food Technologists Graduate Student Scholarship, and the Manitoba Health Research Council Studentship. As he looks forward to the completion of his Ph.D. in August 2010, *inform* took a moment to delve a bit deeper into Udenigwe's professional and personal interests.



Q. How did you become interested in your current line of research?
A. In 2007, during my M.Sc. study in natural products chemistry, I developed an interest in the health benefits of food components and also in the study of how the structure of these food components affects their physiological functions. Then, I approached Dr. Rotimi Aluko (AOCS member, Protein and Co-Products Division Chair) to discuss my newfound interests, and he accepted me as a Ph.D. student in his lab to work on the potential use of bioactive peptides in human health and disease prevention. He has been a source of inspiration, and joining his research group provided me the opportunity to learn a lot of research, communication, and leadership skills.

Q. What are your first memories of having an interest in science?
A. As a child, I do not remember exactly how old I was, I always wondered how medical doctors managed to diagnose and cure diseases; then, I decided I was going to be a doctor. In my junior secondary school (grades 7–9), my Introductory Technology teacher was passionate about teaching science. This inspired me to join the junior engineering, technology, and science club where we designed and constructed several small electronic appliances; at some point I thought I would have made a great engineer!

Q. You won the 2008 Dr. Elizabeth Feniak Award for Excellence in Technical Writing—could you tell us a bit about the work you did for this award?
A. This is a national annual writing competition award organized by the Canadian Home Economics Foundation (CHEF) for the best original paper reviewing recent research or new developments in one of the areas within home economics. The winning paper for the graduate category was titled "Resveratrol, a Polyphenolic Stilbene Component of Red Wines and Peanuts—Potential in Anticancer and Anti-inflammatory Therapy." I wrote this paper as a part of the Phytochemical Nutrition and Metabolism graduate course in the fall of 2007 and was later encouraged by the course instructor, Dr. Peter Jones, to submit it for the competition. This paper was later published in *Nutrition Reviews* in August 2008.

Q. What are you hoping to do after you complete your Ph.D. work?
A. I hope to obtain a postdoctoral fellowship and subsequently (possibly) an academic position, in the area of functional foods and nutraceuticals, to further explore the health benefits of food components

Q. Do you have any humorous stories from the lab or classroom?
A. Well, I do not know whether to call it humorous or not. When I completed my undergraduate research project at the University of Nigeria, the students working with my supervisor (Dr. Lewis Ezeogu) were referred to as "Lewis lab rats." Dr. Lewis, as we called him, inspired us to work hard and taught me the fundamentals of conducting original research. I remember we always spent the night in the lab working on our projects; I am yet to recover from this nocturnal trait!

Q. Do you have any hobbies? Special talents? Non-research-related activities
A. I hope to devote more time for hobbies. I like to play soccer and ping-pong, and I love singing, especially worship songs.

Q. Is there any information on your family you would like to share?
A. I recently got married to Ogochukwu, also a student at the University of Manitoba. My family (Dad, Mom, and younger brother) lives and works in Enugu, Nigeria; I actually came to Canada in 2005 for graduate studies and look forward to a successful career here.

Q. Is there any other information you would like to mention?
A. I am grateful to AOCS for the Honored Student Award; it provided an opportunity for me to network with peers and also to meet the world's finest researchers in oil and oilseed chemistry. ■

People News/ Inside AOCS

Joe Jobe (left), chief executive officer of the National Biodiesel Board (NBB), presented the NBB Industry Partnership Eye on Biodiesel Award to the American Oil Chemists' Society and AOCS' Gina Clapper. Michael Haas, former president of AOCS, received the award on behalf of AOCS, and Clapper accepted her award for her work in coordinating the development and approval of new biodiesel test methods. Ed Hegland (far right), chairman of the NBB, joined in congratulating AOCS and Clapper.

AOCS and Clapper receive NBB award

The **American Oil Chemists' Society (AOCS)** and AOCS Technical Specialist **Gina Clapper** received the National Biodiesel Board's (NBB) 2010 "Eye on Biodiesel" Industry Partnership Award at the NBB Annual Conference & Expo held February 7–10 in Grapevine, Texas, USA. Clapper has been instrumental in coordinating the development and approval of new AOCS biodiesel test methods that help the industry to provide high-quality biodiesel that meets ASTM standards at a lower cost to consumers. Clapper also has taken leadership roles within International Organization for Standardization (ISO) activities and the Biodiesel Expert Panel of AOCS.

In keeping with its mission to be a forum to promote the exchange of ideas, information, and experience, AOCS has provided numerous opportunities for those in the biodiesel field to share knowledge, including two international congresses on biodiesel (2007 and 2009); publications, including *The Biodiesel Handbook* and *Building a Successful Biodiesel Business*; short courses; and technical sessions at the AOCS Annual Meeting & Expo.

Campbell to Receive 2010 Chemical Industry Medal

The Society of Chemical Industry (SCI), America Section, will award the SCI Chemical Industry Medal to **Michael E. Campbell**, chairman, president, and chief

In Memoriam

VINCENT A. ZIBOH

Vincent Azubike Ziboh, Professor Emeritus of Dermatology and Biochemistry, University of California–Davis, passed away in Missouri City, Texas, USA, on December 10, 2009.

Born April 21, 1929, in Nigeria, Ziboh received a bachelor's degree in chemistry from Doane College in Crete, Nebraska, USA, and his Ph.D in biochemistry from Saint Louis University in Missouri, under the direction of E.A. Doisy (who received the Nobel Prize in Physiology or Medicine in 1943). During this period, he met and married his sweetheart and lifelong partner, Doris.

Following receipt of his doctorate, Ziboh returned to Nigeria for a short period where he served on the faculty at the University of Ibadan in Ibadan, Nigeria. He later returned to the United States where he served on the faculty of the Department of Biochemistry at the University of Miami in Florida. In 1981, he moved to the University of California–Davis, where he was on the faculties of Dermatology and Biochemistry until his retirement in 2006. During his tenure, Ziboh contributed extensively to the fields of biochemistry, nutrition, and lipid research. He was co-editor, with Y.-S. Huang, of the AOCS Press book *γ-Linolenic Acid: Recent Advances in Biotechnology and Clinical Applications* (2001). He was a recipient of many awards and recognitions and was a member of several scientific and medical associations, including the American Oil Chemists' Society, which he joined in 1974. In addition, he was an outstanding athlete and an avid tennis player.

Robert S. Chapkin, who is with the Program in Integrative Nutrition and Complex Diseases, Center for Environmental & Rural Health, Texas A&M University, College Station, USA, wrote the following about Ziboh's influence on his life: "I had the honor of training in Vince's lab as a Nutrition & Physiological Chemistry Ph.D. candidate at the University of California–Davis. It was a thrill to be part of his seminal research program focusing on the impact of dietary lipids on skin phospholipid biochemistry and eicosanoid metabolism. Exciting collaborations allowed lab members to probe the impact of nutrition on a number of inflammatory disorders associated with autoimmune diseases of the skin.

CONTINUED ON NEXT PAGE

"During my four years in the Ziboh lab, I was taught to think critically, rigorously design experiments, and how to prioritize and test hypotheses. He also instructed me regarding how to embrace criticism and extract knowledge from others. Dr. Ziboh was a luminary figure, a scrupulous mentor, and a true gentleman. He was a unique scientist without affectations and was always considerate of others."

Bruce Holub, who is Professor Emeritus, Department of Nutritional Sciences, University of Guelph, Ontario, Canada, also conducted research with Ziboh. He commented: "I was most fortunate early in my career to spend my sabbatical leave in the laboratory of Dr. Vincent Ziboh in the Department of Dermatology at the University of Miami School of Medicine. At that time, Vince was conducting leading research showing the excessive production of thromboxane A_2 in blood platelets from diabetic subjects and also engaging in highly innovative research on the potential anti-inflammatory effects of γ-linolenic acid and its derivatives in the skin. He was a most creative scientist who developed the required methodologies and protocols to pursue his hypotheses via *in vitro* and *in vivo* experimentation. His mentoring and generous support to myself and colleagues worldwide with whom he collaborated, including his journal publications, will remain as part of his lasting legacy amongst the scientific community. As a person, the 'gentle' in 'gentleman' is part of what made him a special gift to us all."

Ziboh is survived by his wife Doris, two daughters, and a son.

CHARLES R. NORRIS

Charles R. Norris died September 29, 2009, in Jackson, Mississippi, USA, after a period of declining health. He had been a member of AOCS since 1964.

Norris was born in Arkansas, but spent most of his growing-up years in Magee, Mississippi. He received his higher education at Copiah-Lincoln Community College and Memphis State University (Tennessee, USA). Norris was an agricultural chemist, and spent his professional life involved in aspects of the analysis of fats and oils. He served Barrow-Agee and Peabody Laboratories before co-founding Mid-Continent Laboratories (offices in Jackson and Greenwood, Mississippi; Memphis, Tennessee) with Donald Britton in 1977. He retired from Mid-Continent in 2008.

AOCS regularly recognized Norris' skills as a fats and oils chemist, certifying him through

executive officer of Arch Chemicals, Inc., Norwalk, Connecticut, USA. He will be presented with the medal on March 10, 2010.

The SCI Chemical Industry Medal is presented to people whose leadership, foresight, and contributions to applied chemistry have been—to a considerable degree—responsible for the growth of that industry. Campbell has led Arch Chemicals since it was spun off from Olin in February 1999. Arch and its subsidiaries produce biocides, water products, wood protection products, personal care ingredients, and coatings.

SDA presents award to Stepan

The Soap and Detergent Association (SDA) presented its Elva Walker Spillane Distinguished Service Award to **F. Quinn Stepan**, the chairman of Stepan Company's Board of Directors, on January 27 at the organization's annual meeting. The award recognizes extensive or exceptional service to SDA and the exercise of outstanding leadership with the association.

Stepan has worked for the company founded by his father, Alfred C. Stepan Jr., since 1961, serving in various executive leadership roles. Since 1961, Stepan Company, which is based in Northfield, Illinois, USA, has grown to a $1.5 billion enterprise, with 1,500 employees and 14 manufacturing facilities around the world. Stepan Company is a merchant producer of surfactants used in detergents, shampoos, lotions, toothpastes, and cosmetics.

Beckmann assumes new role at BASF

Since January 1, 2010, **Stefan Beckmann** has been head of the Care Chemicals and Formulators Europe unit at BASF (Ludwigshafen, Germany). He succeeded Friedrich Seitz, who took charge of BASF's Competence Center Chemicals Research & Engineering. Beckmann joined BASF in 1992.

Butcher appointed president and COO of Pilot Chemical

Pamela R. Butcher was appointed president and chief operating officer of Pilot Chemical Company (Cincinnati, Ohio, USA) in January. Her responsibilities include the supervision and direction of all functions and operations within Pilot. Butcher comes to Pilot after a 29-year career with The Dow Chemical Company where she held a range of executive leadership positions in business management, marketing and sales, and innovation and development.

Pilot Chemical Company is a global producer of specialty surfactants for a variety of industries including personal care, household and institutional, emulsion polymerization, oil field, lubricant, and agriculture. ■

Exhibitor List for the 101st AOCS Annual Meeting & Expo

(as of February 1, 2010; for more information visit http://www.aocs.org/meetings/annual_mtg/index.cfm)

ABB Analytical
Agmet
Akzo Nobel
American Emu Association
Anderson International Corp.
ANKOM Technology
Artisan Industries, Inc.
BASF Catalysts LLC
Blackmer
Bruker
Buhler, Inc.
Caravan Ingredients
Cincinnati USA Convention & Visitors Bureau
Cognis Corp. – QTA
Croll Reynolds
Crown Iron Works
Danisco USA, Inc.
Desmet
Dionex
Dulcette Technologies
French Oil Mill Machinery Co.

GEA Westfalia Separator
Genencor a Danisco division
Gerstenberg Schröder North America, Inc.
Graham Corporation
Harburg-Freudenberger Maschinenbau GmbH
InCon Processing LLC
Kalsec Inc.
Koerting Hannover AG
Leem Filtration, Inc.
Leica Microsystems
Mahle Industrial Filtration USA, Inc.
Malaysian Palm Oil Board
Metrohm USA
Mikrolab Aarhus A/S
Myers Vacuum Distillation Division

CONTINUED ON PAGE 173

the Smalley Check Sample Program. He received the Doughtie Award for Cottonseed Analysis from AOCS a number of times, most recently in 2003. Within AOCS, Norris served regularly on the Laboratory Proficiency Working Committee and Program Committee, and the Smalley Committee.

Outside of work, Norris was a life-long member of the fraternal and service organization known as the Loyal Order of the Moose, holding leadership offices in the Louisiana Moose Assoc. He also served as a tax advisor for H&R Block.

Norris is survived by his wife of 47 years, Wynn Lowry Norris, three daughters, and three grandchildren.

SYDNEY HAROLD SHAPIRO

Sydney H. Shapiro, who joined AOCS in 1960, died in Highland Park, Illinois, USA, on December 7, 2009, at the age of 92.

Shapiro spent his professional life in chemistry, receiving a BS in chemistry from Brown University (Providence, Rhode Island, USA) in 1939 and an MS from the University of Illinois, Urbana-Champaign (USA) in 1940. He also conducted chemistry research at the University of Wisconsin-Madison (USA) before joining Armour & Co. as a laboratory chemist in 1942.

He stayed with the company for the rest of his working life, as it evolved from Armour & Co. to Armour Industrial Chemicals to Akzona to Akzo Nobel. Shapiro served as a research chemist, a section head, assistant research director, director of quality control and customer service, and director of technical service.

During his career Shapiro published journal articles and contributed chapters to compendia on topics related to his work. He held 11 US patents and 8 patents outside the United States for inventions regarding secondary and tertiary amines, fatty acids, deodorization of quaternary ammonium nitrates, antistatic diamines, automobile rinsing formulations, and polyol esters.

Shapiro was held in very high esteem within his company, according to AOCS member J. Fred Gadberry, who is presently a senior scientist with Akzo Nobel Chemicals. He said in December, "Syd was very important as a mentor to me in my early years with Akzo Nobel . . . . He will be missed."

Shapiro is survived by four children and eleven grandchildren. His wife Ruth predeceased him. ■

Book Review

Gourmet and Health-Promoting Specialty Oils
Robert A. Moreau and Afaf Kamal-Eldin (eds.)
AOCS Press, 2009, 610 pages, $165 (nonmembers), $132 (members)
ISBN 978-1-893997-97-4

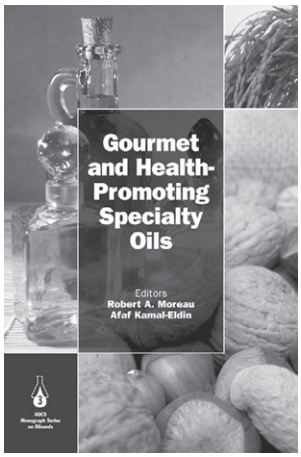
Jane Whittinghill

Robert A. Moreau and Afaf Kamal-Eldin have edited an outstanding book covering a wide variety of topics on the different gourmet and health-promoting oils. The book consists of 21 chapters spanning 587 pages and is extremely well presented, making it an easy read for oil experts, oil manufacturers, scientists, nutritionists, students, and dieticians. *Gourmet and Health-Promoting Specialty Oils* is informative, can be used as a desk reference for the general audience, and is a good find for those interested in the incorporation of gourmet and specialty oils into functional foods or in their daily diet.

The editors introduce us to the term "gourmet" and distinguish specialty oils from commodity oils by discussing the characteristics that authenticate or set these oils apart from others. The text uses language that is easy and enjoyable to follow, introducing each chapter with a fundamental explanation of the source, history, and composition of the oil.

Each chapter discusses one of 33 oils or oil groups considered to have beneficial health effects. The chapters are laid out in an easy-to-read format, providing information relating to trade standards, extraction techniques, processing, composition, health benefits, oxidative stability, edible and nonedible applications, and the like. Many of the chapters cover select clinical studies conducted on components that confer certain health benefits. The authors have done a great job in giving a clear picture of comparative efficacies of these clinical studies, pointing out the shortcomings of some of them and what precautions to take when interpreting the results. The presence of beneficial minor components in the oils is well tabulated with comparisons among different scientific research work on component structural forms, relative concentrations, and function.

The first two chapters of *Gourmet and Health-Promoting Specialty Oils* introduce us to the "fruit" oils, olive and avocado, which are important for both culinary and cosmetic uses. The two chapters discuss the processing steps, oxidative stability, applications, health benefits, toxic compounds, chemical composition, and the minor components in these oils that are responsible for the color, flavor, and aroma characteristics. Chapter 3, co-authored by Afaf Kamal-Eldin and Robert A. Moreau, focuses on tree nut oils and covers almonds, Brazil nuts, cashews, hazelnuts, macadamia, pecans, pine, pistachio, and walnuts. Chapters 4 through 12 and chapter



18 are all dedicated to gourmet and specialty seed oils. Chapter 13 discusses wheat germ oil, a specialty oil containing high levels of vitamin E and a good source of phytosterols, carotenoids, and omega-3 fatty acids. Rice bran oil, one of the most underutilized health-promoting vegetable oils, is discussed in chapter 14, and chapter 15 is dedicated to corn kernel and fiber oils. Chapters 16 and 17 discuss oat and barley oils, respectively; both are relatively stable oils. These two oils are excellent sources of antioxidants, e.g., tocotrienols, and have been shown to lower cholesterol, among other beneficial effects, as discussed by the authors. Algal oil, developed from microalgae to meet the high demand for omega-3 fatty acids, is discussed in chapter 19.

What specialty oil book would be complete without fish oil? Chapter 20 covers extraction, differences in fish oil and oil from sea mammals, oxidative stability, and health effects and toxicity. Chapter 21 completes the book, with discussions on butter, butter oil, and ghee, their flavor impact in foods, and the protective effects of components present in these oils.

The authors present well-researched topics that clearly explain the benefits of the oils while providing information on allergenicity. Their in-depth research on the origin, history, and regulatory issues surrounding some important specialty oils is commendable. Each chapter includes an extensive list of references, and the comprehensive index provided at the end of the book makes it easy to find important topics.

Overall, *Gourmet and Health-Promoting Specialty Oils* provides the reader with a good understanding of the nature of gourmet and specialty oils and their importance to health. The color illustrations in the book are clear and help to enhance the reader's understanding of these oils. This well-written and -edited text will serve as a great read for the general audience as well as a reliable reference source for food scientists, oil experts, students, dieticians, and nutritionists. I would highly recommend owning a copy of this book.

Jane Whittinghill has been a senior research investigator at Solae, LLC (St. Louis, Missouri, USA) since 2007. She holds a Ph.D. in food science and human nutrition (lipid chemistry) from the University of Illinois at Urbana-Champaign. She can be reached at jwhittin@solae.com.

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

Patents

Published Patents

Method for purification of glycerol from biodiesel production

Banavali, R., *et al.*, Rohm and Haas Co., May 19, 2009, US7534923B2

A method for purification of crude glycerol, especially crude glycerol derived from biodiesel production using alkaline catalysts. The method comprises combining the crude glycerol with acid, separating a glycerol layer, and treating the glycerol layer to decolorize it.

Liquid developer and image forming apparatus

Akioka, K., and K. Ikuma, Seiko Epson Corp., US7595140, September 29, 2009

A liquid developer includes toner particles formed of a resin material and a coloring agent, and an insulation liquid in which the toner particles are dispersed. The insulation liquid contains oil obtained by transesterification of soybean oil and at least one of semidrying oil and nondrying oil. It is preferred that the insulation liquid further contains fatty acid monoester. Further it is preferred that the amount of the fatty acid monoester contained in the insulation liquid be in the range of 5 to 50 wt%.

Non-flour-containing baked and related food compositions

Bellar, W., Bellar, W., US7595081, September 29, 2009

Non-flour-containing baked and related food compositions are made with egg protein and soy protein isolate stabilized with a hydrocolloid component. Fats and oils may be added without collapsing the matrix of egg protein and soy protein isolate. The food compositions may be used by [those with celiac disease] and are sufficiently low in net carbohydrates as to be useful in diet programs requiring a low level of carbohydrates for weight loss.

Repulpable corrugated boxboard

Berube, S., Le Groupe Recherche I.D. Inc., US7595115, September 29, 2009

A coating composition for the linerboard of corrugated paperboard provides water and grease resistance but is water vapor permeable and thus permits a different mode of manufacture of corrugated paperboard when aqueous adhesives are employed in the assembly of the linerboards and corrugated medium. In particular the linerboards may be coated with the coating composition prior to assembly of the corrugated paperboard because the water vapor-permeable coating permits escape of the water of the aqueous adhesive during drying of the assembled components of the corrugated paperboard. The coating composition employs a styrene-acrylate copolymer and a C_{14}–C_{18} fatty acid complex of a metal ion having an oxidation state of at least 3, such as chromium.

Vegetable oil-based coating and method for application

Kurth, T.M., *et al.*, Urethane Soy Systems Co., US7595094, September 29, 2009

A method for manufacturing a carpet material that typically includes applying a coating to a substrate where the coating includes the reaction product of a B-side that includes an esterified vegetable oil-based polyol and a catalyst and an A-side that includes an isocyanate and the reaction product of a B-side that includes a vegetable oil-based polyol and a catalyst and an A-side that includes an isocyanate. The polyols may optionally be blown, oxylated, and/or neutralized.

Biodegradable detergent concentrate for medical instruments and equipment

McRae, A.K., *et al.*, American Sterilizer Co., US7597766, October 6, 2009

An aqueous concentrated neutral detergent composition for use in cleaning medical instruments and metal components, having scale control and corrosion inhibition properties when diluted to about 1/40 ounce per gallon to about 1/10 ounce per gallon in potable water. In addition, the concentrate may be applied directly to metal surfaces such as stainless steel to remove rust and other stains without causing any additional corrosion or other damage to the metal surface.

Two-part curing high-durable polyurethane elastomer composition

Fukuda, K., *et al.*, Nihon Gosei Kako Co., US7598336, October 6, 2009

A two-part curing high-durable polyurethane elastomer composition having excellent heat resistance and wet heat resistance and excellent workability such that a viscosity after two-part mixing is suitable for casting workability that comprises (i) a polyisocyanate component and (ii) an active hydrogen-containing compound comprising (A) a polyol having a hydroxyl value of from 25 to 55 obtained by reacting a castor oil fatty acid 12-hydroxystearic acid or a condensate of their fatty acids with a polyol (X) having a molecular weight of from 400 to 1,500 and (B) a polyol having a hydroxyl value of from 100 to 500 obtained by ring-opening an epoxidized fatty acid ester with a polyhydric alcohol.

Triglyceride-based lubricant

Graiver, D., *et al.*, US7601677, October 13, 2009

A method for lubrication by supplying a liquid lubricant to moving metal parts more than 50% by weight of the liquid lubricant being a triglyceride vegetable oil having a saturated fatty acid content of less than 9% by weight of the triglyceride vegetable oil

and a polyunsaturated fatty acid content of more than 70% by weight of the triglyceride vegetable oil, the triglyceride vegetable oil having an American Petroleum Institute Thermo-Oxidation Engine Oil Simulation Test rod residue weight of less than 35 milligrams and a pour point of less than –20°C.

Process for the production of structured lipid mixtures

Schoerken, U., *et al*., Cognis IP Management GmbH, US7604966, October 20, 2009

The invention relates to structured oils in which each fatty acid is one of: (i) linear saturated acyl groups containing 6 to 12 carbon atoms or (ii) the acyl group of conjugated linoleic acid (CLA) and/or an omega-3 or omega-6 fatty acid (OF) with the proviso that the quantity of CLA acyl groups amounts to 3 to 50 mol% and the quantity of OF acyl groups to 5 to 25 mol% based on the quantity of acyl groups. The mixtures are preferably made by subjecting a mixture of component (a) a medium-chain triglyceride; and component (b) a CLA, an OF, a TG-CLA (TG-OF) or a mixture thereof to enzymatic transesterification in the presence of a vegetable, marine, or microbial oil.

Food supplemented with a carnitine, suitable for stimulating the biosynthesis of polyunsaturated fatty acids from the saturated fatty acids contained in the food

Cavazza, C., Sigma Tau Industrie Farmaceutiche Riunite SpA, US7608289, October 27, 2009

A food selected from the group comprising milk and dairy products derived from milk, comprising a carnitine in an effective amount to stimulate, through the natural fatty acid metabolic processes that take place in a consumer of said food, the synthesis of polyunsaturated fatty acids from the saturated fatty acids originally contained in the food.

Hand cleansing formulation

Grasha, P.B., and N.P. Joyce, Deb IP Ltd., US7612027, November 3, 2009

This invention provides heavy-duty cleansers with a high level of biodegradability and little or no ecotoxicity with a high level of efficiency and a maximum skin tolerance and no systemic toxicity. In the broadest aspect of the invention there is provided a cleansing formulation comprising 5 to 10% of one or more methylesters of vegetable saturated and/or unsaturated fatty acids that may be from several natural sources including sunflowerseed oil, soybean oil, rapeseed oil, or coconut oil. The formulation includes between about 10 to 30% of one or more surfactants and a preferred combination of surfactants that includes at least one ethoxylated fatty alcohol, one alkyl polyoxyethylene glycol, one alkanolamide, and one polymeric quaternary ammonium salt.

Frying fats and oils

Cain, F.W., *et al*., Loders Croklaan USA LLC, US7611744, November 3, 2009

Compositions suitable for use as a frying fat or oil may be derived from palm oil by a process comprising interesterification and comprise triglycerides. The compositions may have a content of saturated fatty acids having from 12 to 24 carbon atoms (SAFA) of at least 53% by weight and a content of unsaturated fatty acids having 18 carbon atoms of less than 47% by weight. The compositions may be used to prepare fried foods such as doughnuts.

Enzymatic production of peracids using perhydrolytic enzymes

DiCosimo, R., *et al*., E.I. duPont de Nemours, US7612030, November 3, 2009

A process is provided to produce a concentrated aqueous peracid solution *in situ* using at least one enzyme having perhydrolase activity in the presence of hydrogen peroxide (at a concentration of at least 500 mM) under neutral to acidic reaction conditions from suitable carboxylic acid esters (including glycerides) and/or amides substrates. The concentrated peracid solution produced is sufficient for use in a variety of disinfection and/or bleaching applications.

Production of fatty acid alkyl esters

Haas, M., *et al.,* US Department of Agriculture, US7612221, November 3, 2009

The present invention relates to a method for producing fatty acid alkyl esters involving transesterifying a feedstock containing lipid-linked fatty acids with an alcohol and an alkaline catalyst to form fatty acid alkyl esters. The feedstock has not been previously treated to release the lipid components of said feedstock or the feedstock has been previously treated to release lipid components and the feedstock contains residual lipids (e.g., less than about 30% of the original content of lipids).

Degassing compositions for curable coatings

Galgani, K., *et al*., Troy Corp., US7615585, November 10, 2009

Non-yellowing degassing compositions that enhance degassing in powder coatings and other film-forming curable coatings are disclosed. The non-yellowing compositions contain degassing agents including a plurality of unfused aromatic rings and at least one functional group selected from ketals, carbamates, carbonates, and carboxylic acid esters. The degassing agents resist decomposition and discoloration and are relatively stable at resin-curing conditions and [*sic*]. The degassing agents may be synergistically combined with other materials such as fatty acid amide-containing waxes to produce new and surprisingly effective degassing compositions suitable for use in powder coatings. Curable compositions that utilize the new degassing compositions are also disclosed.

Aldehyde and alcohol compositions derived from seed oils

Lysenko, Z., *et al*., Dow Global Technologies Inc., US7615658, November 10, 2009

An aldehyde composition derived by hydroformylation of a transesterified seed oil and containing a mixture of formyl-substituted fatty acids or fatty acid esters having the following composition by weight: greater than about 10 to less than about 95% monoformyl, greater than about 1 to less than about 65% diformyl, and greater than about 0.1 to less than about 10% triformyl-substituted fatty acids or fatty acid esters and having a diformyl to triformyl weight ratio of greater than about 5:1; preferably greater than about 3 to less than about 20% saturates; and preferably greater than about 1 to less than about 20% unsaturates. An alcohol composition derived by hydrogenation of the aforementioned aldehyde composition containing a mixture of hydroxymethyl-substituted fatty acids or fatty acid esters having the following composition by weight: greater than about 10 to less than about 95% monoalcohol [mono(hydroxymethyl)], greater than about 1 to less than about 65% diol [di(hydroxymethyl)], greater than about 0.1 to less than about 10% triol tri(hydroxymethyl)-substituted fatty acids or fatty acid esters; preferably greater than about 3 to less than about 35% saturates; and preferably less than about 10% unsaturates. The alcohol composition can be converted into an oligomeric polyol for use in the manufacture of polyurethane slab stock flexible foam.

Plastic implant impregnated with a degradation protector

Kunze, A., and M. Wimmer, Rush University Medical Center, US7615075, November 10, 2009

A plastic implant device for a mammal that contains a rare earth metal compound tracer and a method for detecting degradation such as wear of the implanted device are disclosed. The tracer can also be present with a separate antioxidant or the tracer compound can be the salt of a C_6–C_{22} unsaturated carboxylic acid. The rare earth metal compound tracer is released when the prosthetic is worn down or otherwise degraded in the mammalian body in which it was implanted. The presence and amount of released tracer present in a body fluid or tissue sample measured and is proportional to the degree of degradation of the implant.

Stencil printing ink

Hayashi, Y., *et al*., Riso Kagaku Corp., US7615252, November 10, 2009

There are disclosed a stencil printing ink having an ink thread-forming length when a 15 mm diameter chrome steel ball is pulled out of the ink at 150 mm/s of 30 mm or longer at 23°C; and a stencil printing ink comprising a water-based ink comprising an unsaturated straight-chain carboxylic acid-based water-soluble polymer.

Articles comprising transparent/translucent polymer composition

Soerens, D.A., *et al*., Kimberly Clark Worldwide Inc., US7619131, November 17, 2009

The present invention provides a translucent absorbent composite having a substrate with a light transmittance of at least about 60% and a flexible superabsorbent binder polymer composition applied to the substrate. The polymer composition may be prepared from the reaction product of a monomer solution including at least 15% by mass monoethylenically unsaturated monomer selected from carboxylic acid, carboxylic acid salts, sulfonic acid, sulfonic acid salts, phosphoric acid, or phosphoric acid salts; an acrylate or methacrylate ester that contains an alkoxysilane functionality; a copolymerizable hydrophilic glycol containing an ester monomer; an initiator system; and a neutralizing agent. The unsaturated monomer is neutralized to at least 25 mol% and the flexible superabsorbent binder polymer composition has a residual monoethylenically unsaturated monomer content of less than about 1,000 ppm. The absorbent composite has a light transmittance of at least 45%. Also provided are absorbent articles containing the absorbent composite.

Carboxylic acid esters of zosteric acid for prevention of biofouling

Elder, S.T., *et al*., Ciba Specialty Chemicals Corp., US7618697, November 17, 2009

Carboxylic acid ester derivatives of zosteric acid are effective in preventing biofouling and are readily formulated into coatings or films. Coating or film compositions of the esters and methods for their application are provided that reduce the dissolution of the esters into water or loss to the environment. The zosteric acid esters of the invention appear to function by preventing adhesion of an organism to a surface rather than by acute toxic activity rendering said compositions more environmentally acceptable.

Device for processing an edible product

Steiner, U., *et al*., Buehler AG, US7618251, November 17, 2009

The invention relates to a device for processing an edible product in the form a viscous to pasty mass (1) especially an edible product based on a fat mass, such as chocolate, or based on water, such as ice cream. Said device comprises a dosing unit (2) for the dosed delivery of a specific volume of the mass (1) to shaping units (13). The movement of the displacement element (6) determining the dosage volume is performed via servo drive (9) while an inlet (4) and an outlet (5) are closed and opened via servo drive or pneumatic drive, respectively. Preferably the displacement element is embodied as a combined lifting/rotating plunger (6) that can perform a linear movement for a suctioning lift and a dosing lift while being able to perform a rotary movement for opening and closing the inlet (4) and the outlet (5), i.e., a valve function.

High-protein, low-carbohydrate dough and bread products, and method for making same

Anfinsen, J., Techcom Group LLC, US7618667, November 17, 2009

A dough composition for making a high-protein, low-carbohydrate bread, the dough containing at least 5% vital wheat gluten, a hydrolyzed wheat protein having a degree of hydrolysis from about 0.5 to 50%, a moisture-managing agent, a fungal protease enzyme, a carbohydrate component consisting of digestible carbohydrate material and non-digestible carbohydrate material, and water. A milk protein or soy protein hydrocolloid can be used as the moisture-managing agent to improve the shelf life of the resulting bread. A dough conditioner is used to improve the machinability of the dough composition especially at less intense mixing conditions. The invention also includes a process for making the dough composition using high-shear mixing equipment. The invention includes also the bread made from the dough composition and from the dough-making process.

Modified cottonseed oil

Green, A., *et al*., Commonwealth Scientific and Industrial Research Organization, US7619105, November 17, 2009

The present invention provides novel gene constructs and methods for the production of transgenic cotton plants that produce oils having a range of desirable attributes including improved oil quality and modified fatty acid composition.

Process for preparing unsaturated organosilicon compounds

Bauer, A., and J. Pfeiffer, Wacker Chemie AG, US7619108, November 17, 2009

Unsaturated organosilicon compounds are prepared by the reaction of a halo-functional organosilicon compound with a salt of an unsaturated carboxylic acid in the presence of a tertiary phosphine.

Process for producing biodiesel or fatty acid esters from multiple triglyceride feedstocks

Clements, L., Renewable Products Dev. Lab. Inc., US7619104, November 17, 2009

Processes and systems for producing biodiesel or fatty acid esters from multiple triglyceride feedstocks are described herein.

Fatty acid desaturases from fungi

Ursin, V.M., *et al*., Monsanto Technology LLC, US7622632, November 24, 2009

The invention relates generally to methods and compositions concerning fungal desaturase enzymes that modulate the number and location of double bonds in long-chain polyunsaturated fatty acids (LC-PUFA). In particular the invention relates to methods and compositions for improving omega-3 fatty acid profiles in plant products and parts using desaturase enzymes and nucleic acids encoding for such enzymes. In particular embodiments the desaturase enzymes are fungal Δ15 desaturases. Also provided are improved canola oil compositions having stearidonic acid and maintaining beneficial oleic acid content.

trans-Free non-hydrogenated hard structural fat and non-hydrogenated hard palm oil fraction component

Ullanoormadam, S.R., Premium Vegetable Oils Sdn Bhd, US7618670, November 17, 2009

A *trans*-free non-hydrogenated high-C_{16}-type palm fat suitable for the manufacture of *trans*-free non-hydrogenated hard structural fat that is suitable for use in the manufacture of low saturated fatty acid poly-/monounsaturated margarine and spreads and shortening and fat blends incorporating such hard structural fat. The structural fat is made from selectively fractionated non-hydrogenated high-melting palm oil fraction with a C_{16} fatty acid residue of at least 70%, which is subjected to chemical random interesterification using alkaline metal catalyst such as sodium methoxide/sodium methylate with a dry-fractionated non-hydrogenated hard palm kernel stearin fraction. The structural fat that is produced has high yield ratios that can be economically and commercially incorporated in the oil blends for the manufacture of *trans*-free margarine/spreads/shortening as well as other plastic water-in-oil emulsions. Also described is a process for the manufacturing [of] such structural fat as well as hard palm fraction including process for the manufacture of extra-hard *trans*-free structural fat by panning and pressing of above structural fat.

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

Olefin production through pyrolysis of triacylglycerols

Šmidrkal, J., *et al.*, *Lipid Technol. 21*:220–223, 2009.

Triacylglycerols (in Europe, particularly rapeseed oil) are the favored raw materials for production of methyl esters to be used as biodiesel. Another possibility is pyrolysis of triacyglycerols to low-molecular-weight alkenes and other hydrocarbons. During thermal decomposition under conditions matching those of gas-oil steam cracking (short residence time, temperature over 800°C) we found the same compounds (mainly ethylene and propylene) as those from classic mineral oil fraction pyrolysis.

A new analytical method for the quantification of glycidol fatty acid esters in edible oils

Masukawa, Y., *et al.*, *J. Oleo Sci. 59*:81–88, 2010.

A novel method to quantify glycidol fatty acid esters (GE), supposed to be present as processing contaminants in edible oils, has been developed in combination with double solid-phase extraction (SPE) and LC–MS (liquid chromatography–mass spectrometry) measurements. The analytes were five species of synthetic GE: glycidol palmitic, stearic, oleic, linoleic, and linolenic acid esters. The use of selected ion monitoring in a positive ion mode of atmospheric chemical ionization–MS with reversed-phase gradient LC provided a limit of quantification of 0.0045–0.012 µg/mL for the standard GE, which enables the detection of GE in microgram ranges per gram of edible oil. Using the double SPE procedure—first in reversed-phase and then in normal-phase—allowed removal of large amounts of co-existing acylglycerols in the oils, which improved the robustness and stability of the method in sequential runs of LC–MS measurements. When the method was used to quantify GE in three commercial sources of edible oils, the recovery percentage ranged from 71.3% to 94.6% (average 79.4%) with a relative standard deviation of 2.9–12.1% for the two oils containing triacylglycerols as major components, and ranged from 90.8% to 105.1% (average 97.2%) with a relative standard deviation of 2.1–12.0% for the other, diacylglycerol-rich oil. Although the accuracy and precision of the method may not yet be sufficient, it is useful for determining trace levels of GE and will be helpful for the quality control of edible oils.

Single-step purification of different lipases from *Staphylococcus warneri*

Volpato, G., *et al.*, *J. Chromatogr. A 1217*:473–478, 2010.

Three different lipases from the crude extract of *Staphylococcus warneri* have been purified by specific lipase–lipase interactions using different lipases (TLL, RML, PFL, BTL2) covalently attached to a solid support as an adsorption matrix. BTL2 immobilized on glyoxyl-DTT adsorbed selectively only a 30 kDa lipase from the crude extract, which was desorbed by adding 0.1% Triton® X-100. Using glyoxyl-PFL as matrix, two new lipases (28 and 40 kDa) were adsorbed, and completely pure 40 kDa lipase was obtained after desorption using 0.01% Triton, whereas 28 kDa lipase was desorbed after the incubation of the lipase matrix with 3% detergent. When using other matrixes such as glyoxyl-TLL or glyoxyl-RML, different lipases were adsorbed. This methodology could be a very efficient and useful method to purify several lipases from crude extracts from different sources.

Production of docosahexaenoic acid (DHA)-enriched bacon

Meadus, W.J., *et al.*, *J. Agric. Food Chem. 58*:465–472, 2010.

North American consumers interested in improving their health through diet perceive red meat as a source of too much saturated and unhealthy fat in the diet. The purpose of this trial was to produce bacon enriched with the long-chain omega-3 fatty acid, docosahexaenoic acid (DHA). In this 25-day study, pigs were fed a standard finisher diet of canola, pea, corn, and barley, mixed with DHA, added in the form of algal biomass. Bacon content of DHA was increased to 97 mg/100 g when 1 g of DHA was added to a kilogram of feed. The pigs fed the highest diet level of algal biomass, containing 0.29% DHA, produced bacon with ~3.4 mg of DHA/g and 1.2% of the fat as omega-3 fatty acids. Feed to gain was significantly improved, and carcass quality was unaffected. However, problems of off-odors and off-flavors were reported in the bacon from the taste panel survey. Polyunsaturated fat and potential unsaturated fat oxidation as indicated by malonaldehyde levels were significantly higher in the pigs fed the higher concentrations of DHA.

The function of very long-chain polyunsaturated fatty acids in the pineal gland

Catalá, A., *Biochim. Biophys. Acta–Mol. Cell Biol. Lipids 1801*:95–99, 2010.

The mammalian pineal gland is a prominent secretory organ with a high metabolic activity. Melatonin (N-acetyl-5-methoxytryptamine), the main secretory product of the pineal gland, efficiently scavenges both the hydroxyl and peroxyl radicals counteracting lipid peroxidation in biological membranes. Approximately 25% of the total fatty acids present in the rat pineal lipids are represented by arachidonic acid (20:4n-6) and docosahexaenoic acid (22:6n-3). These very long-chain polyunsaturated fatty acids play important roles in the pineal gland. In addition to the production of melatonin, the mammalian pineal gland is able to convert these polyunsaturated fatty acids into bioactive lipid mediators. Lipoxygenation is the principal lipoxygenase (LOX) activity observed in the rat pineal gland. Lipoxygenation in the pineal gland is exceptional because no other brain regions express significant LOX activities under normal physiological conditions. The rat pineal gland expresses both 12- and 15-LOX activities, producing 12- and 15-hydroperoxyeicosatetraenoic acid (12- and 15-HpETE) from arachidonic acid and 14- and 17-hydroxydocosahexaenoic acid (14- and 17-HdoHE) from docosahexaenoic acid, respectively. The rat pineal also produces hepoxilins via LOX pathways. The hepoxilins are bioactive epoxy-hydroxy products of the arachidonic acid metabolism via the 12S-LOX pathway. The two key pineal biochemical functions, lipoxygenation and melatonin synthesis, may be synergistically regulated by the status of n-3 essential fatty acids.

Two methods for the separation of monounsaturated octadecenoic acid isomers

Villegas, C., *et al.*, *J. Chromatogr. A 1217*:775–784, 2010.

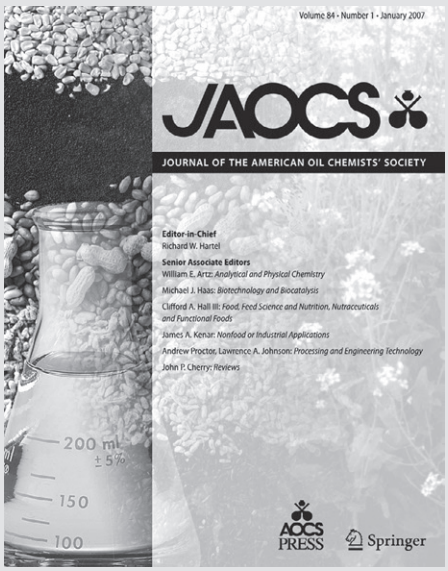
The identification and quantification of complex mixtures of *cis*- and *trans*-octadecenoic (18:1) fatty acid isomers present a major challenge for conventional one-dimensional GC/FID [gas chromatography/flame-ionization detection] analysis of their methyl esters. We have compared the use of two methods to achieve optimized separations of positional and geometrical octadecenoic fatty acid isomers—comprehensive two-dimensional GC (GC × GC), and silver ion high-performance liquid chromatography interfaced to atmospheric pressure photoionization (APPI)–mass spectrometry (MS). Nine isomers of octadecenoic acid methyl ester were well separated on a single silver ion column with a mobile phase of 0.018% acetonitrile and 0.18% isopropanol in hexane. Reproducible retention times were obtained with relative standard deviations of around 1% over 5 injections. The extra selectivity and reproducibility afforded by APPI–MS, together with the wide separation of *cis* and *trans* isomers by silver ion chromatography, resulted in a promising method for measurement of octadecenoic acid FAME. The GC × GC separation was performed using various column combinations, and optimal separation was obtained by coupling an ionic liquid column (Supelco SLB-IL100 [1,9-di(3-vinyl-imidazolium) nonane bis(trifluoromethyl) sulfonyl imidate]) in the first dimension with a SGE BPX50 (50% phenyl polysilphenylene-siloxane) in the second dimension. These methods have been applied to the analysis of octadecenoic acid in milk and beef fat.

The serum fatty acids myristic acid and linoleic acid are better predictors of serum cholesterol concentrations when measured as molecular percentages rather than as absolute concentrations

Bradbury, K.E., *et al.*, *Am. J. Clin. Nutr. 91*:398–405, 2010.

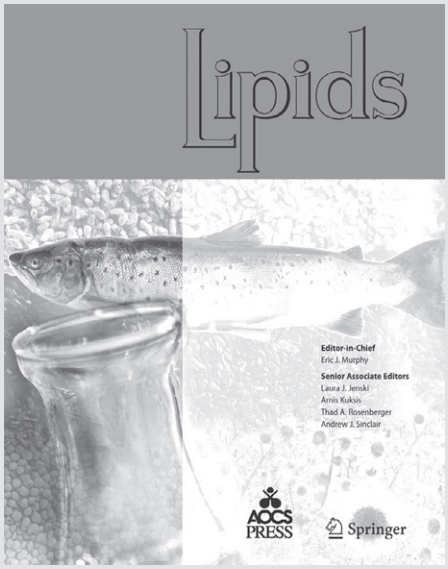
The use of serum fatty acid biomarkers in nutritional epidemiology is increasingly

AOCS Journals



Journal of the American Oil Chemists' Society (February)

- High pressure micronization of tristearate, Mandžuka, Z., M. Škerget, and Ž. Knez
- A modified amino acid analysis using PITC derivatization for soybeans with accurate determination of cysteine and half-cystine, Kwanyuen, P., and J.W. Burton
- Effect of cooling rate on the structural and moisture barrier properties of high and low melting point fats, Bourlieu, C., V. Guillard, M. Ferreira, H. Powell, B. Vallès-Pàmies, S. Guilbert, and N. Gontard
- Determination of sinapic acid derivatives in canola extracts using high-performance liquid chromatography, Khattab, R., M. Eskin, M. Aliani, and U. Thiyam
- Seasonal variation of chemical composition and antioxidant activity of essential oil from *Pistacia atlantica* Desf. leaves, Gourine, N., M. Yousfi, I. Bombarda, B. Nadjemi, and E. Gaydou
- *Oenocarpus bataua* Mart. (Arecaceae): Rediscovering a source of high oleic vegetable oil from Amazonia, Montúfar, R., A. Laffargue, J.-C. Pintaud, S. Hamon, S. Avallone, and S. Dussert
- Effect of feed fat by-products with *trans* fatty acids and heated oil on cholesterol and oxycholesterols in chicken, Ubhayasekera, S.J.K.A., A. Tres, R. Codony, and P.C. Dutta
- Human milk fat substitute from butterfat: production by enzymatic interesterification and evaluation of oxidative stability, Sørensen, A.-D.M., X. Xu, L. Zhang, J.B. Kristensen, and C. Jacobsen
- Non-evaporative solvent recovery step in deacidification of used frying oil as biodiesel feedstock by methanol extraction, Tunc, M.F., H. Gurbuz, and S.Z. Türkay
- Characterization of oil precipitate and oil extracted from condensed corn distillers solubles, Majoni, S., and T. Wang
- Analysis of sterol glycosides in biodiesel and biodiesel precipitates, Wang, H., H. Tang, S. Salley, and K.Y.S. Ng
- Recycling of aqueous supernatants in soybean oleosome isolation, Kapchie, V.N., L.T. Towa, C. Hauck, and P.A. Murphy
- Cholesterol removal from squid liver oil by crosslinked β-cyclodextrin, Lee, J.E., M.H. Seo, Y.H. Chang, and H.-S. Kwak



Lipids (February)

- High dietary fat exacerbates weight gain and obesity in female liver fatty acid binding protein gene-ablated

mice, Atshaves, B.P., A.L. McIntosh, S.M. Storey, K.K. Landrock, A.B. Kier, and F. Schroeder

- Rapid development of fasting-induced hepatic lipidosis in the American mink (*Neovison vison*): Effects of food deprivation and re-alimentation on body fat depots, tissue fatty acid profiles, hematology and endocrinology, Rouvinen-Watt, K., A.-M. Mustonen, R. Conway, C. Pal, L. Harris, S. Saarela, U. Strandberg, and P. Nieminen
- Serum phospholipid transfer protein activity after a high fat meal in patients with insulin-treated type 2 diabetes, Schlitt, A., B. Schwaab, K. Fingscheidt, K.J. Lackner, G.H. Heine, A. Vogt, M. Buerke, L. Maegdefessel, U. Raaz, K. Werdan, and X.-C. Jiang
- Fatty acid composition of plasma, erythrocytes, and adipose: Their correlations and effects of age and sex, Ogura, T., H. Takada, M. Okuno, H. Kitade, T. Matsuura, M. Kwon, S. Arita, K. Hamazaki, M. Itomura, and T. Hamazaki
- *DGAT1*, *DGAT2* and *PDAT* expression in seeds and other tissues of epoxy and hydroxy fatty acid accumulating plants, Li, R., K. Yu, and D.F. Hildebrand
- Facile and stereoselective synthesis of (*Z*)-15-octadecenoic acid and (*Z*)-16-nonadecenoic acid: Monounsaturated omega-3 fatty acids, Rawling, T., C.C. Duke, P.H. Cui, and M. Murray
- Possible biosynthetic pathways for all *cis*-3,6,9,12,15,19,22,25,28-hentriacontanonaene in bacteria, Sugihara, S., R. Hori, H. Nakanowatari, Y. Takada, I. Yumoto, N. Morita, Y. Yano, K. Watanabe, and H. Okuyama
- Isolation and characterization of a stress-dependent plastidial Δ^{12} fatty acid desaturase from the Antarctic microalga *Chlorella vulgaris* NJ-7, Lu, Y., X. Chi, Z. Li, Q. Yang, F. Li, S. Liu, Q. Gan, and S. Qin
- Chemical structure of *Bacteriovorax stolpii* lipid A, Beck, S., F.D. Müller, E. Strauch, L. Brecker, and M.W. Linscheid
- An improved method for determining medium- and long-chain FAMEs using gas chromatography, Xu, Z., K. Harvey, T. Pavlina, G. Dutot, G. Zaloga, and R. Siddiqui

common; however, there is an absence of scientific evidence to substantiate whether the measurement of fatty acids as molecular percentages (which is the conventional approach) or as absolute concentrations is more informative. To advance understanding about this fundamental concept, we examined the ability of serum myristic acid and linoleic acid, expressed as molecular percentages or as concentrations, to predict dietary fat and serum cholesterol concentrations. A cross-sectional analysis of a population-based survey of New Zealand adults ($n = 2{,}732$) was undertaken. The association of myristic and linoleic acids in serum cholesterol ester and phospholipid with dietary fat or serum cholesterol was assessed. Intake of saturated fat, dairy fat, and polyunsaturated fat was predicted similarly with the use of both units of measurement. After adjustment for confounders, mean total cholesterol decreased by 0.18 mmol/L from the lowest to the highest quintile of serum cholesteryl-linoleate as a molecular percentage ($P = 0.027$). In contrast, mean total cholesterol increased by 1.09 mmol/L from the lowest to the highest quintile of serum cholesteryl-linoleate concentration ($P < 0.001$). The molecular percentage and concentration of serum cholesteryl-myristate were positively associated with total cholesterol ($P < 0.001$). Results for serum phospholipid fatty acids were similar. Serum myristic acid and linoleic acid measured as molecular percentages, but not as concentrations, predict serum total cholesterol in a manner that distinguishes between the differential cholesterolemic effects of dietary saturated and polyunsaturated fats.

Quantification of branched chain fatty acids in polar and neutral lipids of cheese and fish samples

Hauff, S., and W. Vetter, *J. Agric. Food Chem. 58*:707–712, 2010.

Branched-chain fatty acids (*iso*- and *anteiso*-fatty acids) are common minor compounds of the lipids found in dairy products and fish (<1–3%) and major fatty acids of Gram-positive bacteria. Their presence in food has been associated with bacterial sources. Bacterial lipids usually consist of polar lipids and virtually no triacylglycerides whereas food lipids are predominantly composed of triacylglycerides. In this study, we examined the difference in the *iso*- or *anteiso*-fatty acid content and composition of neutral and polar lipids in fish and cheese samples. Neutral lipids (triacylglycerides) were separated from the polar lipids (phospholipids) by means of solid-phase extraction (SPE). Deuterium-labeled internal standards were used to verify the successful performance of the accelerated solvent extraction and particularly the SPE. The separated lipid fractions were transformed into their corresponding fatty acid methyl esters, and the concentrations of seven *iso*- and *anteiso*-fatty acids were determined by means of gas chromatography coupled to electron ionization mass spectrometry operated in the selected ion monitoring mode (GC/EI-MS-SIM). No co-elutions of branched-chain fatty acids with other fatty acids were obtained on the medium polar column used for quantification. The branched-chain fatty acid content of 17 cheese and 7 fish samples ranged between 0.2% and 1.9% in polar lipids and between 0.1% and 1.7% in neutral lipids. The concentration of total branched-chain fatty acids in fish was 2–10 times lower than that found in cheeses, and the relative distribution of *iso*-17:0 and *iso*-15:0 increased compared to their *anteiso* homologs. Although branched-chain fatty acids in polar lipids of cheese constituted only ~1% of the content in total lipids, their contribution in fish was significantly higher (6% to >30%).

Determination of tocopherols and tocotrienols in vegetable oils by nanoliquid chromatography with ultraviolet–visible detection using a silica monolithic column

Cerretani, L., *et al.*, *J. Agric. Food Chem. 58*:757–761, 2010.

A method for the determination of tocopherols and tocotrienols in vegetable oils by nanoliquid chromatography with ultraviolet-visible detection has been developed. The separation of tocopherols was optimized in terms of mobile phase composition on the basis of the best compromise between efficiency, resolution, and analysis time. The optimal conditions were achieved using a C18 silica monolithic column (150 mm × 0.1 mm) with an isocratic elution of acetonitrile/methanol/water (acidified with 0.2% acetic acid) at a flow rate of 0.5 µL

min^{-1}, giving a total analysis time below 18 min. The method has been applied to the quantification of tocopherols and tocotrienols present in several vegetable oils with different botanical origins.

Optimization of pressurized liquid extraction of carotenoids and chlorophylls from *Chlorella vulgaris*

Cha, K.H., *et al*., *J. Agric. Food Chem. 58*:793–797, 2010.

Pressurized liquid extraction (PLE) was applied to the extraction of carotenoids and chlorophylls from the green microalga *Chlorella vulgaris*. Four extraction techniques—maceration (MAC), Soxhlet extraction (SOX), ultrasound-assisted extraction (UAE), and PLE—were compared; and both the extraction temperature (50, 105, and 160°C) and the extraction time (8, 19, and 30 min), which are the two main factors for PLE, were optimized with a central composite design to obtain the highest extraction efficiency. The extraction solvent (90% ethanol/water) could adequately extract the functional components from *C. vulgaris*. PLE showed higher extraction efficiencies than MAC, SOX, and UAE. Temperature was the key parameter having the strongest influence on the extraction of carotenoids and chlorophylls from *Chlorella*. In addition, high heat treatment (>110°C) by PLE minimized the formation of pheophorbide *a*, a harmful chlorophyll derivative. These results indicate that PLE may be a useful extraction method for the simultaneous extraction of carotenoids and chlorophylls from *C. vulgaris*.

Castor oil as a renewable resource for the chemical industry

Mutlu, H., and M.A.R. Meier, *Eur. J. Lipid Sci. Technol. 112*:10–30, 2010.

Castor oil is, like many other plant oils, a very valuable renewable resource for the chemical industry. This review article provides an overview on this specialty oil, covering its production and properties. More importantly, the preparation, properties, and major application possibilities of chemical derivatives of castor oil are highlighted. Our discussion focuses on application possibilities of castor oil and its derivatives for the synthesis of renewable monomers and polymers. An overview of recent developments in this field is provided and selected examples are discussed in detail, including the preparation and characterization of castor oil-derived polyurethanes, polyesters and polyamides

The refinement of renewable resources: New important derivatives of fatty acids and glycerol

Behr, A., and J.P. Gomes, *Eur. J. Lipid Sci. Technol. 112*:31–50, 2010.

During the last years, the industrial significance of renewable resources has highly increased. The ever-growing use of fossil resources for energy consumption, polymers, fine chemicals and pharmaceuticals and the therefore steadily increasing prices favor the substitution of oil and gas by renewable resources. Here, products of catalytic functionalizations of vegetable fats and oils such as rapeseed oil, sunflower oil, palm oil, or coconut oil especially play a decisive role. The present article gives a survey of several important catalytic functionalizations of fatty compounds and glycerol resulting in attractive new products. With their emerging properties, they could find a rapid introduction into the chemical market. Particularly the functionalizations *via* heterogeneous and homogeneous catalysis, such as additions, reductions, oxidations, and metathesis reactions, will be presented.

2-Propanol in the mobile phase reduces the time of analysis of CLA isomers by silver ion-HPLC

Kuhnt, K., *et al*., *J. Chromatogr. B 878*:88–91, 2010.

Individual isomers of octadecadienoic acid (C18:2) with conjugated double bonds (conjugated linoleic acids: CLA) exert different biological activities. Their distribution in food and tissues differs. Therefore, the separation of the various positional and geometric isomers is important. The time of analysis using silver ion–high-performance liquid chromatography can extend up to 90 min. The aim of this study was to reduce this time. The time of analysis was reduced from *ca*. 90 min onto 45 to 35 min, respectively, by the addition of 0.05% or 0.1% (v/v) 2-propanol to the mobile phase [acetonitrile (0.1%, v/v) and diethyl ether (0.5%, v/v) in *n*-hexane]. There was no effect on resolution of the 17 individual CLA isomers of the CLA mixture. Regarding the lowest coefficient of variation and an adequate baseline separation, the use of 0.05% 2-propanol in the mobile phase is recommended, without any disadvantages and adverse effects on the service life of columns. In conclusion, adding 0.05% or 0.1% 2-propanol to the mobile phase shortens the time of analysis of CLA isomers, saves solvents, and reduces costs.

Plant sphingolipids: Decoding the enigma of the Sphinx

Pata, M.O., *et al*., *New Phytol. 185*:611–630, 2010.

Sphingolipids are a ubiquitous class of lipids present in a variety of organisms including eukaryotes and bacteria. In the last two decades, research has focused on characterizing the individual species of this complex family of lipids, which has led to a new field of research called "sphingolipidomics." There are at least 500 (and perhaps thousands of) different molecular species of sphingolipids in cells, and in *Arabidopsis* alone it has been reported that there are at least 168 different sphingolipids. Plant sphingolipids can be divided into four classes: glycosyl inositol phosphoceramides, glycosylceramides, ceramides, and free long-chain bases. Numerous enzymes involved in plant sphingolipid metabolism have now been cloned and characterized, and, in general, there is broad conservation in the way in which sphingolipids are metabolized in animals, yeast, and plants. Here, we review the diversity of sphingolipids reported in the literature, some of the recent advances in our understanding of sphingolipid metabolism in plants, and the physiological roles that sphingolipids and sphingolipid metabolites play in plant physiology. ■

EXHIBITOR LIST FOR THE 101ST AOCS ANNUAL MEETING & EXPO (CONTINUED FROM PAGE 163)

Nealanders International, Inc.
Novozymes
Oil-Dri Corporation of America
optek-Danulat, Inc.
Oxford Instruments
Pattyn Packing Lines
Perten Instruments
POS Pilot Plant
RJ Blaze
Rudolph Research Analytical
Sharplex Filters (India) Pvt Ltd
Solex Thermal Science, Inc.

Springer
Surface Chemists of Florida, Inc.
Supercritical Fluid Technologies, Inc.
TMC Industries Inc.
The Chemithon Corp.
The Tintometer Limited
Thermo Scientific
Tramco
Unity Scientific, LLC
Verenium Corporation
Wacker

Biobased lubricants: Gearing up for a green world

The technical and political barriers that once slowed the use of bio-lubes in the U.S. and Europe are steadily being solved.

Jean Van Rensselar

At 10:45 a.m. on Jan. 28, 1969, Union Oil workers were trying to pull the drilling tube out of an ocean well near Santa Barbara, Calif. Even though the tube was obviously stuck, they kept pulling. Suddenly gas and dirt from 3,000 feet below the waterline spewed violently into the air, splattering everything and everyone with grease.

The workers somehow managed to plug the well but not the oil and gas leak. In fact, the sea was actually bubbling as far as 800 feet away from the platform because the oil pressure had slashed five long tears through the ocean floor. Before the leak was completely stopped, more than three million gallons of crude oil flooded into the environment.

For weeks afterward, birds rendered flightless by the oil slowly died on the beaches. The waves were so thick with oil that they broke on shore without making a sound. Thirty miles of pristine beaches were contaminated with thick sludge, and hundreds of ocean miles were topped with an ugly rainbow black sheen. And all of this was on the national news.

As horrific as this accident was, not all of the consequences were dire. In the aftermath of the disaster, the environmental movement and the concept of biodegradability were born.

In the decades that followed, researchers hoping to bring biodegradable products to market encountered a number of hurdles—significantly performance and price. The same issues persist with biobased lubricants.

The good news is that biobased lubricant researchers are beginning to resolve performance problems in a way that's cost competitive with mineral-based and synthetic lubricants.

BACKGROUND

The University of Northern Iowa Ag-Based Industrial Lubricants Research Center (UNI-NABL) has licensed 30 formulated lubricants, greases and base oils made from high oleic (genetically modified) soybeans.

Products currently available from soybean oils include:

- Tractor transmission hydraulic fluid
- Industrial hydraulic fluids for process and machinery applications
- Metalworking oils and coolants
- Food-grade hydraulic fluids
- Chainsaw bar oil
- Gear lubes
- Compressor oil
- Transformer and transmission line cooling fluids
- Greases including automotive, machinery, rail curve, track and food grade.

Currently biobased lubricants are operational in a limited number of environmentally-sensitive applications such as in transformers, building elevators and machinery used in or near forests, agricultural land and waterways.

BIOBASED DEFINITIONS

There are three types of lubricant basestocks:

- Petroleum or mineral-based (referred to as mineral-based here)
- Synthetic
- Biobased—derived from renewable plant or animal sources.

The generally accepted definition of biobased lubricants is that they're formulated with renewable and biodegradable basestocks. It's worth noting that some definitions only consider biodegradability.

The generally accepted definition of biobased lubricants is that they're formulated with renewable and biodegradable basestocks.

To be biobased, lubricants don't have to be composed entirely of unaltered vegetable oil; rather, the base materials just need to be renewable. This means fatty acids qualify, as do natural vegetable oils that are treated to produce a modified product.

KEY CONCEPTS

- The advantages of biobased lubricants include biodegradability, superior lubricity, higher flash/fire points, high VI, basestock renewability and domestic agricultural support.
- Disadvantages include poor oxidative stability and poor low-temperature performance.
- The future of biobased lubricants depends on overcoming the disadvantages while being price competitive with mineral-based and synthetic lubricants.

SOYBEANS AND RAPESEEDS

Researchers are currently working with a handful of plants—soybeans, rapeseeds, canola, palm oil trees, sunflowers and safflowers.

In the U.S. soybeans are by far the most widely researched and tested for a number of reasons, most notably that the plants are abundantly available. In Europe, where biobased lubricants are already in widespread use, rapeseed is abundant and the most common basestock. While products formulated from soybeans and rapeseeds are about equal as far as lubricant properties go, soybeans are widely grown for human consumption while rapeseed is not, and this creates some issues. Rapeseed has the advantage of producing more oil per unit of land area than many other oil sources.

Canola is a rapeseed hybrid that was initially created in Canada. Canola—the word is a hybrid of Canadian oilseed, low acid—was used by the Manitoba government to label the seed during its experimental stages and is now a trademarked name for rapeseed with low levels of erucic acid and glucosinolate.

Biobased lubricants have been used in Europe for more than 20 years, mostly because of regulations and mandates that necessitated the use of biodegradables. But despite the long-term use, biobased lubricants represent only about 1% of total European lubricants[1] (see sidebar The European Market).

Biodegradable soy-based hydraulic fluid has been used to operate the elevator system in the Statue of Liberty since Nov. 14, 2002.

CURRENT STATE

STLE (Society of Tribologists and Lubrication Engineers)-member Brajendra Sharma, a visiting research chemist in the Bio-Oil Research Unit of the National Center for Agricultural Utilization Research (NCAUR) operated by USDA's Agricultural Research Service (ARS) in Peoria, Ill., is very encouraged by progress in biobased lubricant research.

"We have already commercialized two successful technologies in our lab," he said "One is

a biodegradable soy-based hydraulic fluid that has been used to operate the elevator system in the Statue of Liberty since Nov. 14, 2002. The other technology is soy-based hot rolling lubricants that are being used by a large aluminum manufacturing company (Alcoa) for hot flat-rolling operations. The company produces aluminum sheets for everything from beer cans to aircraft wing panels for hot flat-rolling operations."

In tests, the soy-based hydraulic fluid worked as well as or better than the mineral oil products, particularly in terms of lubricity, biodegradability and reduced flammability.[2,3]

At Penn State University, STLE-member Joseph Perez, senior research scientist for the chemical engineering department's tribology group, has been implementing and overseeing the use of biobased lubricants and biofuels in the university's farm equipment since 2003.

Brajendra Sharma uses a standard four-ball test method to measure friction and wear properties of vegetable oil-based lubricants.

In 2003, the university converted all 200 pieces of farm equipment to make them compatible with biodegradable hydraulic fluids. The fluid is a TMP or PE-type base fluid made from vegetable oil. The same vehicles also have been running on biodiesel fuel since 2003. The university, which generates about 20,000 gallons of waste cooking oil a year, is in the process of making its own biodiesel fuel from waste cooking oil.

"The lubricant in use has better oxidation stability than soybean or canola oils," Perez says. "The equipment has been running on one version since 2003 without any problems. The bio-lubricants are as good as or better than the petroleum products we were using prior to that. We do a lot of testing to ensure equivalent performance."

Perez added that they actually saw a reduction of operating temperatures in hydraulic fluid systems in some pieces of equipment.

"All of our farm equipment people like the biodiesel fuel because it reduces emissions," Perez says, "and since we're using waste cooking oil as our basestock, a side benefit is that it smells great."

Two years ago, Perez and his team assisted a vegetable oil company, Bunge North America, in modifying an existing soy-based hydraulic fluid to meet state groundwater requirements. This allowed the university to use biodegradable hydraulic fluids in some 35 campus elevators.

In the U.S. soybeans are by far the most widely researched and tested for a number of reasons, most notably that the plants are abundantly available.

Penn State is typical of a number of institutions in the U.S. that are actively looking for ways to green their facilities, services and products. But it's a balancing act between the advantages and disadvantages of biobased products.

BUILDING ON ADVANTAGES

The most obvious advantage of biobased lubricants is biodegradability, but there are several others that allow these lubricants to compete with or exceed the standards set by mineral-based and synthetic lubricants.

Less toxic. About 50% of all used oil ends up in the environment. Mineral-based and synthetic lubricants don't degrade well, creating an environmental liability.

Biobased is not the same as biodegradable. Just because something is biobased does not necessarily mean it's biodegradable. Nearly all biobased lubricants are biodegradable—meaning microorganisms can break them down into innocuous carbon dioxide. In the case of a spill, non-toxic and biodegradable biobased lubricants require less remediation and create less damage. All of this also applies to biobased lubricants made from conventional or genetically modified crops, but most of this does not apply to lubricants that contain non-biobased components.

Spill remediation. Another benefit is the significantly lower cost for spill remediation. For example, the Pennsylvania Department of Environmental Protection (DEP) requires complete cleanup of all oil spills. Since Penn State has a large agricultural department, they have more than 3,000 acres of farmland to maintain. And since

Biobased lubricants enter the consumer market. (Courtesy of Environmental Lubricants Manufacturing, Inc.)

The European Market: An interview with Boris Zhmud

Boris Zhmud

Europe has been leading the biobased lubricant market for 20 years. Experts expect that by 2010 18% of all lubricants used in Europe will be biobased. But not all European biobased lubricants are completely plant-based. Surprisingly, in some countries the bio designation only requires 50% renewable content. This means bio-labeled lubricants can (and some do) contain synthetic esters and petroleum oils.

STLE-member Boris Zhmud is the research and development manager for E-ION in Brussels, Belgium. Following is a brief interview about the state of biobased lubricants in Europe.

Q: Why has Europe been so quick to use biobased lubricants?
Zhmud: In Europe the use of biobased products in past decades has been spurred by regulatory mandates. Some previous technical developments carried out during wartime and shortage situations (mostly during the Second World War and the Caribbean oil crisis) also factored into this.

Q: What is the status of biobased lubricant use in Europe?
Zhmud: The market for biobased lubricants is driven by a combination of economic factors that include the high price of mineral oil, tax incentives to promote bio-based products, the cost of recycling and penalties applied in case of accidental release. There are also performance requirements and environmental regulations requiring biodegradability and low-toxicity in sensitive areas.

Now biobased products are being successfully applied in metalworking and industrial lubricants, greases, tractor oils and hydraulic fluids. The use of biobased automotive lubricants is so far very limited because of performance issues. However, some biobased products proved to be highly efficient as lubricity additives in formulations of fuel-economy engine oils and transmission fluids.

Q: Are you using any genetically modified plants for lubricants?
Zhmud: Almost certainly, although there is no official data available. In any case, the genotype of the biological source does not change the chemical structures of individual molecules—only their relative abundance. Therefore, in my opinion, use of genetically modified plants is a viable option for production of biobased fuels and lubricants.

Q: What are you working on right now?
Zhmud: We are working on the commercial-ization of Elektrionized™ vegetable oils as lubricity additives for lubricants. Biobased lubricating and fatty oil-like additives produced by Elektrionization from vegetable feedstocks have unique tribological properties. In combination with modern synthetic and severely hydro-processed mineral-base oils, Elektrionized vegetable oils create a solid foundation for formulating top-quality lubricants.

Q: Where do you see the European market for biobased lubricants in five years?
Zhmud: As the economy recovers, technology advances and public awareness grows, more benefits of biodegradable lubes and greases will be recognized, and the market will see more biobased products. ■

they regularly perform research on that land, they were spending a lot of money to clean up hydraulic oil spills.

According to Perez, "Now we can basically just dig it up and put it in a landfill. We are spending far less money on remediation."

Superior lubricity. Biobased lubricants have a higher lubricity and therefore a much lower coefficient of friction compared to mineral-based lubricants. Enhanced lubricity reduces friction and wear, which reduces the necessity for many additives, including those for antiwear and extreme pressure.

While, for most applications, biobased lubricants may be more expensive to purchase, the extra expense can often be offset by the energy savings of higher lubricity. This is especially true in high-temperature applications.

High VI. The lower an oil's viscosity index (VI), the more change in viscosity occurs at both low and high temperatures. So lubricants with a high VI remain relatively stable over a wide range of temperatures.

Vegetable oils have higher VIs than comparable mineral-based oils (high VI mineral-based oils are available but are more expensive). While basic mineral-based oils have a VI of 90 to 120, the VI range for equivalent viscosity vegetable oils is 200 to 250.

Safer. The flash point of soybean oil is 326°C, while the flash point of mineral oil is 200°C. This reduces fire hazards in many applications including foundries, metalworking and even in building elevators. STLE-member Lou Honary, University of Northern Iowa professor and director of the UNI-NABL Center, found a way to make them even safer—and better. He and his colleagues developed a way to process biobased greases using microwaves.

"The efficiency of using microwave heating for the reaction process allows us to create vegetable oil-based greases that will be more oxidatively stable and cost less," he explains. "Microwave energy uniformly heats the entire product and, due to their polar nature, vegetable oils absorb microwave energy very effectively. This was a huge, huge discovery for us."

Renewable and farmer friendly. Increasing dependence on international oil sources, the declining rate of production from older domestic oil fields and the decreasing rate of newly discovered oil reserves is sparking interest in alternatives. In addition, specialty crops such as high oleic soybeans grown for biofuels and bio-lubricants are potentially more profitable for farmers.

DEALING WITH DISADVANTAGES

While there are some misconceptions about biobased lubricants (see sidebar Biobased misconceptions), there are significant challenges—namely poor oxidation stability and poor low temperature properties. Those two major performance issues are effectively preventing widespread use.

Oxidative instability. One of the most important properties of lubricating oils and hydraulic fluids is oxidation stability. Oils with low oxidative stability oxidize rapidly at elevated temperatures in the presence of water.

When oil oxidizes it undergoes a complex chemical reaction, producing acid and sludge that polymerizes to a plastic consistency. Sludge may settle in critical areas of the equipment and interfere with the lubrication and cooling functions of the fluid. The oxidized oil also corrodes equipment.

There are several fatty acids present in vegetable oil, but only oleic, linoleic and linolenic have the potential for positive or negative impact. The poor oxidation stability of soybean oil occurs because of the presence of double and triple bonds in these fatty acids evidenced by higher amounts of linoleic (having two double bonds) and linolenic (having three double bonds) structures.

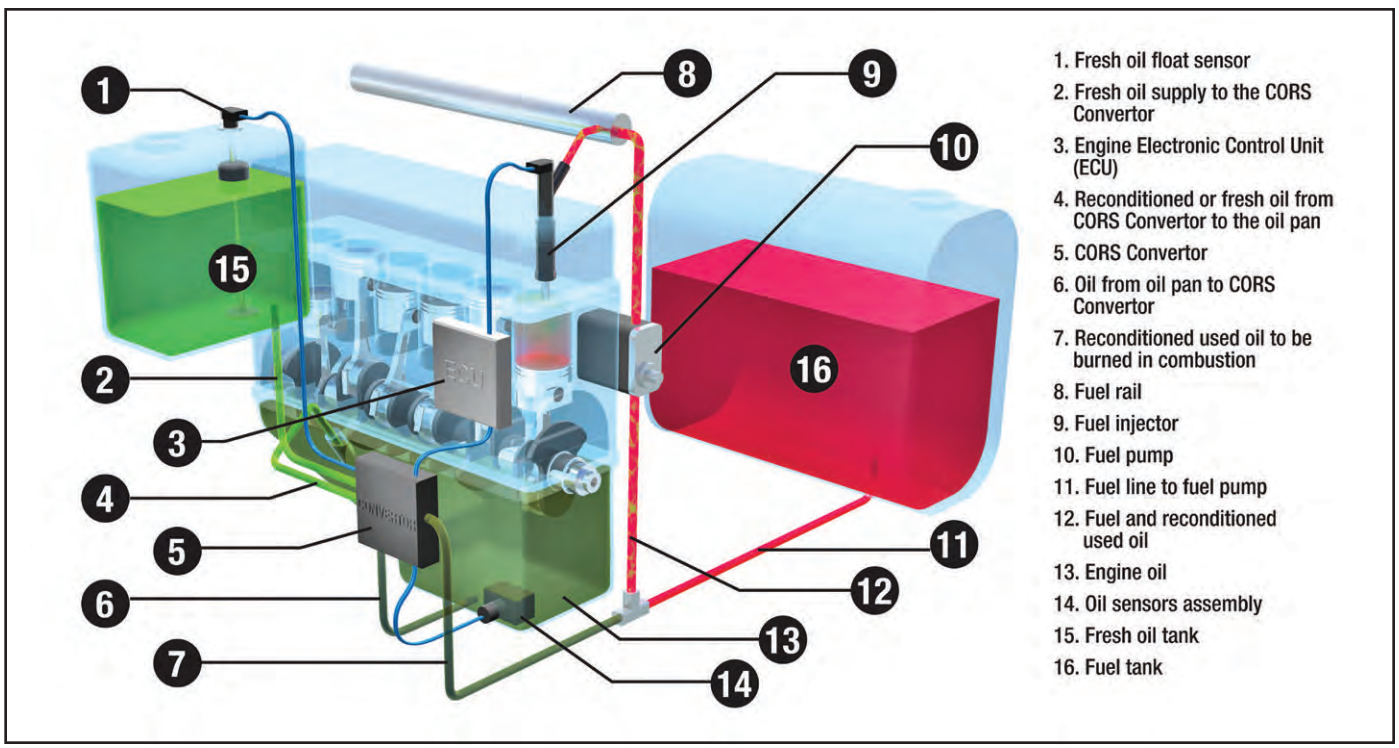


Illustration of the Continuous Oil Recycling System (CORS) as proposed by the UNI-NABL Center.

Biobased misconceptions

Lou Honary

Lou Honary, director of University of Northern Iowa Ag-Based Industrial Lubricants Research Center, clears up the following three misconceptions about bio-lubricants.

1. Lubricants biodegrade in the machinery. Biodegradable doesn't mean the lubricants will biodegrade in the application. In order for anything to biodegrade, microorganisms that are capable of breaking the lubricant down need to be present. These microorganisms exist naturally in soil but not in machinery. Honary explains, "For example, we have oil from 12 years ago sitting in a pie pan, and it still has full liquidity with no sign of oxidation. We've monitored hydraulic oils in machines for thousands of hours and we've not seen any biodegradation."
2. If you mix plant- and mineral-based products, they'll coagulate and plug up the machinery. Research and real-world use shows that this is not the case. Even with hydraulic oil made of 50% plant-based and 50% mineral-based oils, there is no congealing.
3. Using genetically modified soybeans reduces the lubricant's biodegradability. Tests show that vegetable oils, regardless of their fatty acid content, biodegrade at about the same rate. All chemically and genetically modified oils tested at UNI-NABL have shown the same levels of biodegradability.

Genetic plant modification, chemical modification and chemical additives all can increase oxidation stability, increasing cost at the same time.

High pour point. Pour point is the lowest temperature at which a fluid will flow, while cloud point is the temperature at which dissolved solids are no longer completely soluble, precipitating as a second phase that gives the fluid a cloudy appearance. In the petroleum industry, cloud point refers to the temperature below which wax in diesel (or biowax in biodiesels) looks cloudy. The presence of solidified waxes thickens the oil and clogs fuel filters and injectors in engines. The wax also accumulates on cold surfaces (e.g., tubings or heat exchanger fouling) and forms an emulsion with water. The low-temperature fluidity of unmodified biobased lubricants is inferior to mineral-based and synthetic lubricants.

The pour point of mineral-based lubricants ranges from –18°C to –30°C; canola and rapeseed oil are around –9°C while unmodified soybean lubricant is about –2°C and modified vegetable-based lubricants have pour points as low as –40°C.

The soybean pour point problem can be solved with chemical additives or blending with other fluids such as synthetic oils with lower pour points. The key to success is retaining as much of the lubricant's biodegradability as possible while keeping the cost down.

Price. Many biobased products are priced to compete with mid- to high-performance mineral oil products. But higher-priced products still can be justified for use in many applications where biodegradability, lubricity, viscosity and fire safety are especially important (see sidebar: Price comparison between bio- and mineral-based lubricants).

"We can synthesize a vegetable oil-based lubricant that is price competitive with synthetic lubricants," Sharma says. "Our current

research target is to make lubricants for various applications by modifying the vegetable oil structure so that we can improve some of its disadvantages and still compete with synthetic-based oils."

Difficult to recycle. There's disagreement as to just how recyclable biobased lubricants are. Some, like Sharma, say that once the oil is used it's hard to restore to its original state—and recycling is even more challenging if it's mixed with mineral or synthetic fluids. Others disagree and see no reason why mixed fluids can't be processed and used again. Despite some efforts to recycle biobased lubricants, it's currently not profitable.

Because 50% or more of all lubricants are expelled into the air or ground during normal use, the environmental advantage of biobased lubricants is the biodegradability of the exhaust and leakage and not their recyclability or ultimate disposal.

MARKETS

The National Petrochemical Refiners Association reports that the annual production of lubricants in the U.S. is about 2.5 billion gallons. Hydraulic oils make up about 216 million gallons.

Biobased lubricant markets have the most potential where:

- The application is total loss.
- The application is indoors where low pour point isn't an issue.
- The application is in an environmentally-sensitive area where leakage and spill risk make biodegradability extremely important.
- The application is in equipment that processes or operates near food.
- The purchase is required (i.e., because of federal regulations).

Hydraulic fluids in environmentally-sensitive areas. Hydraulic biobased lubricants are currently being used in equipment operating in areas such as parks, farms, waterways and golf courses. Most biobased lubricant manufacturers are aware of this market potential and currently have and/or are developing products that serve areas most vulnerable to spills and lost-in-use applications.

Transformer fluids. In the early 1990s, Honary and others developed a soybean-based transformer fluid in response to a disastrous oil spill at an Iowa electric plant surrounded by agricultural land. Since then, utilities have eagerly embraced the environmentally friendly lubricant, and the market in that area remains strong. The United Soybean Board reports that future sales in that area are promising.

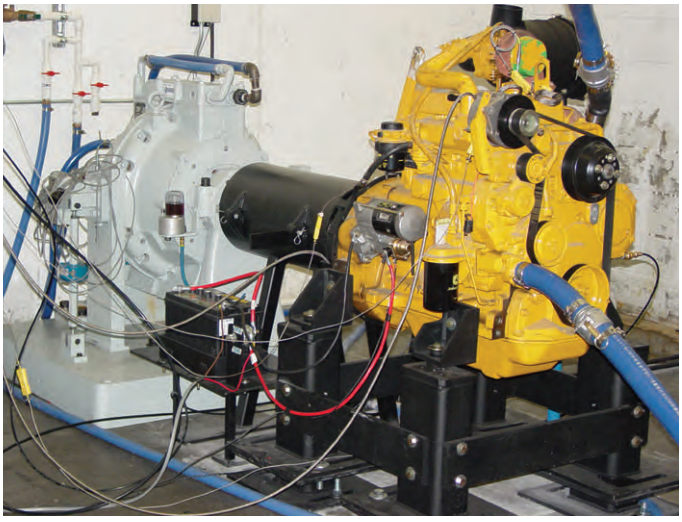
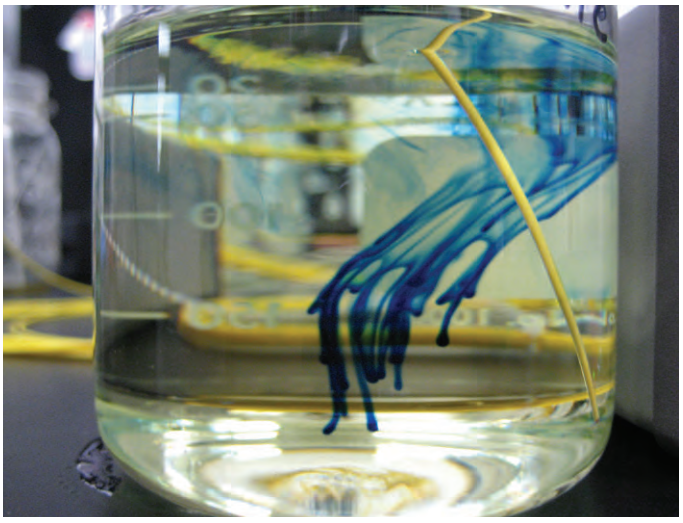


Photo of the Continuous Oil Recycling System (CORS) as proposed by the UNI-NABL Center.



Hot plate heating of vegetable oils showing uniform movement of fluids from bottom to the top due to convection.

MWFs. In cooperation with the USDA and Alcoa, Sharma and colleagues developed the biobased rolling mill oil mentioned earlier, which Alcoa is currently using in four global aluminum rolling mill operations. The company also has expanded biobased fluid use into mold release and metal-cutting operations. Other biobased metalworking lubricant application successes make this a promising market.

Elevator hydraulic fluids. There are about 800,000 elevators operating in the U.S. and Canada, and about 75% are hydraulic vs. electric. Because most elevator fluids are used indoors, pour point is not an issue but price is. Currently the biobased version sells for about $15 a gallon, while the mineral oil version is about $9.50 a gallon. Despite this, some universities and hospitals have made the conversion, and the United Soybean Board believes this is a potentially strong market. Honary says the application provides for better fire safety, but due to the presence of moisture in the elevator reservoir environment, special formulations are needed to prevent sludge buildup and odor.

Food industries. Because 95% of vegetable-based hydraulic oil is actually edible, food manufacturing and service applications are perfect for biobased lubricants—especially since incidental contact with food is less of a problem. Since most of the processing is done indoors, there's little concern about cold temperature performance, which is one of the shortcomings of biobased oil.

Railroad lubricants. Many railroad lubricants such as gauge-face greases are lost-in-use, meaning they eventually leak or drain completely into the environment. So this is a salient application for a biodegradable product. According to Honary, biobased gauge-face greases are currently on the market and rail companies are buying.

Bar and chain oil. Bar and chain oil is another lost-in-use application involving external lubrication of the chainsaw's bar and chain. Given that nearly all chainsaws are used outdoors and most are

used in environmentally-sensitive areas such as forests and farmland, this is a small but potentially profitable market. Bar and chain biobased lubricants are available, but the price is higher than their mineral-based counterparts.

Although crankcase oils are by far the largest segment of the lubricants market, stringent performance requirements, especially the need for oxidative stability, have kept biobased lubricants out of this market. But one company recently developed biodegradable G-Oil 5W-30 motor oil that received the American Petroleum Institute's seal of approval.

PRICE COMPARISONS BETWEEN BIO- AND MINERAL-BASED LUBRICANTS

The current price comparison between biobased and conventional lubricants is as follows:[4]

- Hydraulic tractor fluid: biobased 1.5–2 times more.
- Food-grade hydraulic fluid: biobased 1–1.5 times more.
- Industrial hydraulic fluid: biobased 1–2 times more.
- Chainsaw bar lubricants: biobased 1–1.5 times more.
- Multipurpose truck grease: prices are equal.
- Soy- and cotton oil-based greases: biobased 1–1.5 times more.
- Rail curve grease: biobased 0.9 less cost–1.2 times more.
- Metalworking fluids: biobased 1–1.5 times more.
- Gear lube: biobased 1.5–2 times more.
- Retail soy lubes: biobased 1–1.2 times more.

POLITICAL ISSUES

As European bio-lubricant providers know too well, the political climate can interfere with successfully bringing biobased products to market. The two issues that resurface regularly are food vs. fuel and genetic modification.

Because of the demand for biodiesel, there is not enough arable land in the U.S. to allow the biobased lubricant market to supplant the mineral- and synthetic-based lubricant market. In addition, some countries are dependent on soybeans for food.

One hectare of land will yield 446 liters of soybean oil every year, which will lubricate one piece of heavy equipment for about six months. Experts figure that in order to meet U.S. demand alone, soybeans would have to grow on 248 million hectares of land. Right now in total, there are only 190 million hectares of farmable land.5

Genetically modified crops have been blamed for everything from the dwindling monarch butterfly population to human allergies. Because biotechnology is both a political and scientific issue in Europe, some genetically modified products have been under review for more than six years—the review process in Canada, Japan and the U.S. is closer to six to nine months.[6]

THE FUTURE

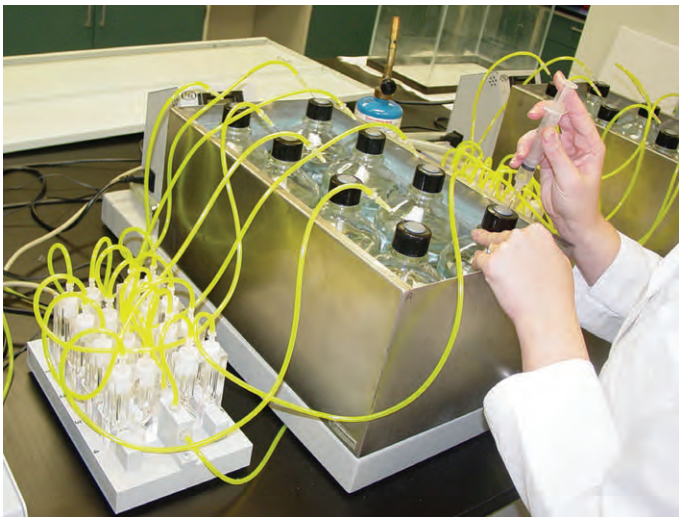
At UNI-NABL, Honary and his team are working on several new processes and products.

In addition to the microwave-based grease processing technology, they are also improving the chemistry of vegetable oil-based greases.

"We are now narrowing down our grease-making process to making soap with one specific fatty acid," Honary explains. "When a vegetable oil which is made of several fatty acids is reacted with, say, lithium hydroxide, the resulting grease includes several soaps mixed together, each with a different melting point. By reacting the

The environmental advantage of biobased lubricants is the biodegradability of the exhaust and leakage and not their recyclability or ultimate disposal.

Samples of biobased engine oils taken from diesel engine tests at the UNI-NABL Center.



Preparation of samples and reference materials for 28-day biodegradability test, according to OECD 301F standard tests.

lithium hydroxide with one specific fatty acid like oleic acid, the grease would be uniformly made as lithium oleate. This provides more predictability in the performance of the product at extreme temperatures and a more uniform overall performance."

UNI-NABL is also trying to overcome problems associated with the presence of glycerin in the vegetable oil in its natural form. Glycerin in the oil could impact the performance of the product by absorbing water moisture and impact cold flowability or high-temperature emulsification.

UNI-NABL also is working on a new concept for the use of vegetable oils as diesel engine oil. The oil's residency in the crankcase is reduced by burning small quantities of the engine oil along with the diesel fuel and replacing the oil in the crankcase with fresh vegetable oil. This concept is referred to as the Continuous Oil Recycling System.

Right now, there is no coordinated research program. Many lubricant companies are small and don't have much research capability.

"Already we can make a very good lubricant basestock," Perez says. "One of the key things we need to resolve is getting the vegetable oils into wider use. It's a slow-growing market. There is a lot of collaboration going on, but there is also competition. The funding for research in these areas is not as high as it was at one time."

Experts expect that, since the U.S. government is such a large purchaser of lubricants and fluids, once regulations and programs promoting the use of biodegradable products are fully in place and enforced, they will significantly increase biobased lubricant sales.

The biobased industrial products market will be driven by cost, performance, availability of resources and legislation. As the increasing demand on agricultural resources from the food and energy sectors continues to drive research in the area of alternative and economical feedstocks, prospects for biobased materials are good.

CONNECT ON THE WEB

The USDA established a list of bio-preferred products, which is available at http://www.catalog.biopreferred.gov.

The United Soybean Board publishes a user guide and checklist of considerations for changing over to biobased lubricants. To download the user guide and checklist, log on to http://www.soybiobased.org/lifecyclechecklist.

Jean Van Rensselar heads her own communications firm, Smart PR Communications, in Naperville, Ill. You can contact her at Jean@SmartPRcommunications.com

This article originally appeared in TLT *and is reprinted with permission.*

REFERENCES

1. Source: Rolf Luther of Fuchs Oil, Europe. As reported in Bio-Based Lubricants – A Market Opportunity Study Update, United Soybean Board, Nov. 2008.
2. Suszkiw, Jan, Statue of Liberty Goes Green With Soy-Based Elevator Fluid. Oct. 2004. Agricultural Research. Available at: http://www.ars.usda.gov/is/pr/2004/041019.htm.
3. Suszkiw, Jan, Biodegradable Lube for Metalworking Operations. May 2006. Agricultural Research. Available at: http://www.ars.usda.gov/is/pr/2006/060508.htm.
4. Honary, Lou, Biobased Greases and Lubricants: From Research to Commercialization. Biomass R&D Technical Advisory Committee, National Ag-Based Lubricants (NABL) Center, University of Northern Iowa., 2007. Available at: www.bdisolutions.com/Site Docs/.../P4_BRDAC27-2007.pdf.
5. Ing, Adam, Biobased Lubricants: A Viability Study, 2009. Available at: www.journals.isss.org/index.php/proceedings53rd/article/view/1236/446.
6. U.S. Mission to the European Union, Foreign Agricultural Service, Aug. 27, 2009. Available at: www.useu.be/agri/usda.html.

What to do about sustainability: Applying the green imperative

Ready to go beyond green? Here's a roadmap to get you started on your journey

Darrin C. Duber-Smith

Although not recession proof as economists understand the term, the natural and organic personal care market continues to significantly outpace the overall personal care industry as consumers shift preferences toward products that they perceive as more healthful and better for the environment than many of the offerings that have dominated the landscape for decades. In fact, recent data suggest that while sales of traditional personal care products struggled to remain level with previous years' results, sales of green personal care products actually posted double-digit gains.

The reality of whether naturally derived and processed ingredients are actually more healthful or better for the environment is not as important as the public perception of this idea as largely true. This attitude is pervasive not only among an increasing number of consumers, but also among media and government bodies. Indeed more regulation is on the way, and a number of the ingredients currently in use will eventually become either forbidden or strictly regulated. Add to this mix some pressure from NGOs, competitors, and supply chain partners who will both encourage and push you to become more sustainable, or "greener."

Need more proof that green is here to stay? Consider the mayhem that channel leader Wal-Mart created in its supply chain to institutionalize vendor environmental requirements. Meanwhile, the European Union and California are both working toward more cosmetic regulation. Clorox has introduced a natural line of cleaning products. The landscape has shifted. Regardless of where your company is in addressing this issue, there are several initiatives to consider:

- Develop an ongoing sustainability plan for continual improvement;
- Begin adding natural and certified organic ingredients in stages; and
- Communicate in a transparent and truthful manner

SUSTAINABILITY: THE GREEN IMPERATIVE

Whether you use the terms green, socially responsible, environmentally friendly, or sustainability to describe your efforts, the meaning is really the same. Sustainability, the most current and all-encompassing term, can be defined as meeting corporate objectives and consumer needs in a way that demonstrates continual improvement toward minimizing negative impact on people and the natural environment. Thus, businesses have redirected strategies toward health or the environment—or better yet, a combination of the two.

Most of the available literature is focused on the "why" of sustainability in business, but there has been little written on the "how." First, consider the why:

Target Marketing: A sustainable marketing strategy, with products that are properly positioned, will address the growing target

market for goods that are green, natural, etc., which is well over 50% of the population.

Sustainability of Resources: Ensuring the availability of resources to continue to make and sell goods is another imperative that suppliers and manufacturers must embrace. For example, cutting down all of the trees in a forest will not help the shareholders of paper companies, let alone everyone else.

Lowered Costs/Increased Efficiency: There are countless ways to save money and increase efficiency so that marketers can enhance the bottom line and stave off the narrowing of margins that occurs in every industry as it reaches the maturity stage of the life cycle.

Product Differentiation and Competitive Advantage: Every marketer knows that in the hyper-competitive world of ingredients and products, notably in personal care/cosmetics, it is crucial to maintain advantages over competitive and substitute offerings.

Competitive and Supply Chain Pressures: When competitive organizations and their products adopt sustainable business models and green positioning, it often pressures other companies to follow suit, especially in the case of market leaders. Wal-Mart and its recent environmental and social initiatives illustrate how powerful supply chain members can force companies around the world to adopt more favorable social and environmental policies.

Regulation and Risk: Regulations at all levels of government are rising rapidly, so organizations must not only remain in compliance but also stay proactive with regard to impending legislation. This practice reduces shareholder risk.

Other Stakeholder Demands: Activist shareholders, NGOs, the financial sector, and the media all work independently and sometimes in concert to ensure that companies are cognizant of their impact on people and the environment.

Brand Reputation: Astute marketers know that a brand's reputation is of paramount importance, and being sustainable enhances that reputation among the majority of consumers.

Global Market Forces: Global concerns about climate change, looming energy problems, and a recent growing backlash against globalization along with many others factors all point toward the necessity in addressing sustainability issues.

Customer Loyalty: A brand's attitude toward sustainability is just one of the many variables that factor into the decision-making processes of the majority of consumers.

Employee Morale: A wide body of research points to the fact that adopting a more sustainable business model actually enhances employee morale.

The Ethical Imperative: This concept is simple. It is not ethical to degrade the environment and the people in it in the name of commerce. Embracing sustainability is simply the right thing to do, and stakeholders are sensitive to it.

A careful examination of the above reasons for building a sustainability model into your business and marketing strategy reveals that all can lead to those magic words, "Return on Investment."

How do you boost ROI? One manner of looking at this important business model and marketing strategy revolves around two primary concepts: Front End Sustainability and Back End Sustainability. If processes are to meet sustainability objectives, measures must be taken regarding:

Front End—Reducing, managing and eventually eliminating pollution throughout the product development process.

Back End—Re-designing systems so that resources are recovered to be re-used, reconditioned, and/or recycled so that the resources used can be recovered and avoid terminal disposal.

Application of this concept involves an all-encompassing environmentally- and socially-friendly approach that follows the product from its inception all the way to disposal by the end-user.

The days of choosing from a "green buffet" are rapidly coming to an end. Competitors, a growing consumer environmental and social awareness, rapidly increasing government regulations, the often-coercive influence of socially or environmentally oriented NGOs, the media in all of its splendor, and influential supply chain partners increasingly demand that organizations perform environmental and social audits and develop comprehensive plans for continuous improvement in a number of areas.

Sustainability efforts should be woven into every aspect of the organization for optimal competitive advantage. Shallow efforts at positioning products, let alone entire organizations, fall on increasingly deaf ears and, more importantly, open the organization up to the growing backlash against "greenwashing," a kind of puffery that is rapidly gaining scrutiny among stakeholders too.

In order to achieve true transparency, the best way to utilize a green marketing strategy is for the sustainability audit and plan to be available on a company's website. It must be updated annually with measurable objectives for improvement in the following areas:

- The nature of raw materials and composition of products offered;
- The nature, consumption and recapture of energy;
- The use of water;
- Impact on land and biodiversity;
- Reduction and recovery of emissions, effluents and waste;
- Distribution issues such as packaging and transportation;
- Cause related involvement; and
- Human resources and vendor partner policies.

Commitments to any of these areas can be easily assimilated into a product's brand identity and crafted into a message that incorporates a concern for people and the environment.

GET NATURAL AND ORGANIC

Unfortunately for a number of organizations, many synthetic materials (such as pthalates, DEA and parabens) are in danger of becoming stigmatized, heavily regulated, or even outlawed altogether. California's Green Chemistry Initiative, as well as a number of European efforts, have ignited a regulatory juggernaut. Fortunately, there are thousands of natural ingredients available from hundreds of suppliers worldwide. Natural ingredient availability may no longer be a major issue, but attempting to find steady supplies of certified organic ingredients is a more difficult task. Begin by removing controversial ingredients, which can be identified through conducting a brief internet search. Incorporate natural ingredients at a level that exceeds more than 70% of the total formulation. If you can source certified organic ingredients cost-effectively, then include those as well. Though regulations are not yet in place, you can conservatively make a natural claim such as "Made with Natural Ingredients" and can asterisk any certified organic ingredient as such.

On a second reformulation, strive for 100% natural ingredients, but be satisfied with 95% or higher so that an overall claim of "natural" can be safely made. Continue to replace any synthetic (and

natural ingredients for that matter) with certified organic ingredients when feasible. Chemically speaking, natural and organic ingredients will behave in the same way but both will behave differently than the synthetic counterparts they are intended to replace.

Once 70% of the product is certified organic, you are able to make claims such as "made with organic ingredients." When a product contains 95% organic content, a claim of "organic" can be made. "USDA Certified Organic" is the ultimate goal because this third party certification is regulated by the U.S. Department of Agriculture.

BE HONEST AND DILIGENT

In addition to complete transparency with regard to your annually updated sustainability plan, all marketing communications must be truthful and non-misleading. Exaggerated claims, half-hearted attempts at environmental stewardship and social responsibility, as well as outright falsehoods will only expose your company to risk. In no way can you achieve a sustainable competitive advantage through engaging in such behavior in this age of information availability and viral communication.

The process of sustainability auditing, planning and implementation is not much different than efficiency programs such as Total Quality Management, Six Sigma and Zero Defect. In contrast, sustainability programs can be relatively easy to institute and maintain. More difficult is the task of reformulation, but the industry is replete with success stories—larger brands such as Burt's Bees and Aveda; established companies such as Jason and Aubrey Organics; and small market players like Pangea have all successfully traveled the reformulation route. These examples serve as case studies and as inspiration for navigating the road ahead.

Since 2000, Darrin C. Duber-Smith has been president of Green Marketing, Inc., a Colorado-based strategic planning firm offering marketing planning, marketing plan implementation and other consulting services to companies in all stages of growth. He has almost 20 years of specialized expertise in the natural and sustainable products industry and has been a visiting assistant professor of marketing at the Metropolitan State College School of Business in Denver, Colorado, USA, since 2003. He can be reached via email at Success@GreenMarketing.net. Reprinted with permission from Happi *(for more information, visit www.Happi.com).*

HEMPSEED OIL IN A NUTSHELL (CONTINUED FROM PAGE 132)

recognize any of the varieties that are extremely low in drug content. An analogous situation exists for poppy seed, which is legal in the United States; the seed always contains some measurable amount of morphine, but these amounts are not of sufficient concentration for drug purposes.

Due to the burden of *Cannabis* prohibition, there has been very little development or innovation in hemp or hempseed production during the last 70 years, and almost no research on hempseed nutrition since its incorporation into Chinese medicine thousands of years ago. It is, in essence, an orphan crop when we consider the present situation of food production in Europe and North America. While this situation began to change with the reintroduction of hemp to Canadian agriculture in 1998, the subsidy scheme for hemp in the European Union continues to favor the production of hemp fiber and not hempseed. What few results we now have from hempseed research tend to contradict the politically narrow horizon that the United States has offered the world. Fortunately, hempseed oil and other hempseed food products are legally available in the United States, either from the shelves of some natural food stores or when ordered directly online from Canada. Viable hempseed, however, remains illegal in the United States.

Leaving political rhetoric aside, there is plenty of convincing scientific evidence to show that hempseed is one of the most nutritious products that can be produced by modern industrial agriculture. As a grain, it fits into the mechanized infrastructure without retooling. Apparently, the only remaining change that needs to be made is to convince US policymakers that hemp is not dangerous.

J.C. Callaway is chief executive officer of Finola ky (Kuopio, Finland; www.finola.com). Contact him via email at callaway@finola.com.

*inform*ation

FOR FURTHER READING:

- Callaway, J.C., T. Tennilä, and D.W. Pate, Occurrence of "omega-3" stearidonic acid (*cis*-6,9,12,15-octadecatetraenoic acid) in hemp (*Cannabis sativa* L.) seed, *Journal of the International Hemp Association 3*:61–63 (1997).
- Callaway, J.C., U. Schwab, I. Harvimaa, P. Halonen, O. Mykkänen, P. Hyvönen, and T. Järvinen, Efficacy of dietary hempseed oil in patients with atopic dermatitis, *Journal of Dermatological Treatment 16*:87–94 (2005).
- Callaway, J.C., Hempseed as a nutritional resource: An overview, *Euphytica 140*:65–72 (2004).

For more information about hempseed oil, see the "Hempseed Oil" chapter by J.C. Callaway and David W. Pate in the *Gourmet and Health-Promoting Specialty Oils* monograph, published by AOCS Press. Edited by Robert A. Moreau and Afaf Kamal-Eldin, *Gourmet and Health-Promoting Specialty Oils* is the third volume in the AOCS Monograph Series on Oilseeds. Learn more at http://tinyurl.com/gourmet-oils-aocs. See a review of the book on page 164.

Castor oil-based chemicals

Dhananjay D. Zope

Castor oil is obtained from seeds of *Ricinus communis* L., a member of the Euphorbiaceae. India enjoys supremacy as far as production and export of castor oil is concerned and contributed 64% of the entire global production in 2005–2006 (Fig. 1). Production of castor oil originated in the tropical belt of India and Africa. On a commercial scale it is cultivated in 30 countries, but the major castor oil-growing regions are India, China, Brazil, Thailand, Ethiopia, Mexico, and the Philippines. Worldwide demand for castor oil from the industrial sector is estimated at about 220,000 metric tons per annum.

Although castor is a poisonous plant (both seeds/beans and leaves), it is an important nonedible oilseed crop. Castor oil is obtained by pressing the seeds, followed by solvent extraction of the pressed cake. Castor oil is somewhat unique because of its content of ricinoleic acid (12-hydroxy-*cis*-9-octadecenoic acid), a hydroxy fatty acid that constitutes about 90% of the total fatty acids of the oil. Castor oil is also distinguished from other vegetable oils by its high specific gravity, thickness, and hydroxyl value.

Fruit of castor bean plant.

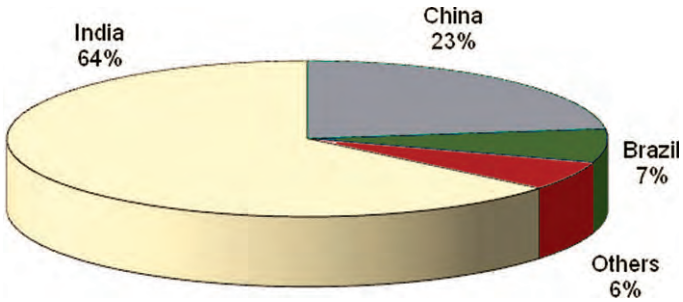


FIG. 1. *World production of castor oil.*

Ricinoleic acid, the active component of castor oil, is responsible for many of its desirable properties. This light-colored liquid is obtained by the hydrolysis of castor oil (Scheme 1). Ricinoleic acid is effective in preventing the growth of numerous viruses, bacteria, yeasts, and molds. It is successful as a topical treatment for ringworm, keratoses, skin inflammation, abrasions, fungal infections of finger- and toenails, acne, and chronic pruritus (itching).

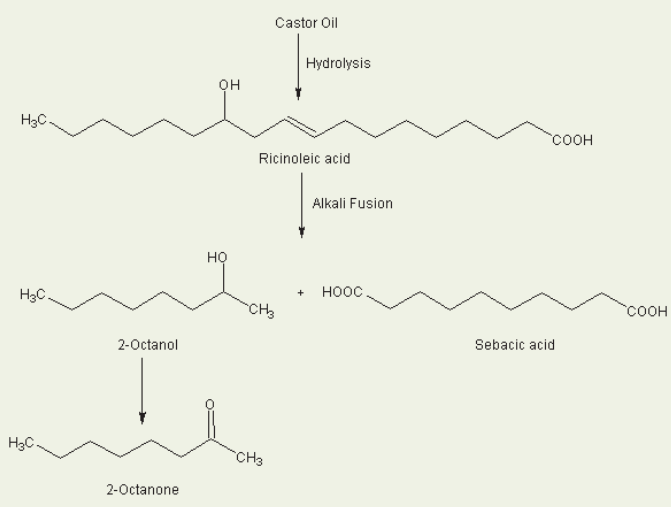
Macrolactones and polyesters can be derived from ricinoleic acid. Poly(anhydrides) obtained from ricinoleic acid are hydrolytically degradable polymers that are used as a vehicle for controlled delivery of drugs. These poly(anhydrides) are biodegradable and can be synthesized in the laboratory.

Ricinoleic acid has three functionalities and, via its ester, double bond and hydroxyl group, can be processed in many different ways (Schemes 1, 2) to give 2-octanol, sebacic acid, heptaldehyde, and undecylenic acid. These compounds may be used as they are or as raw materials to produce a number of perfumery and flavor chemicals (Table 1).

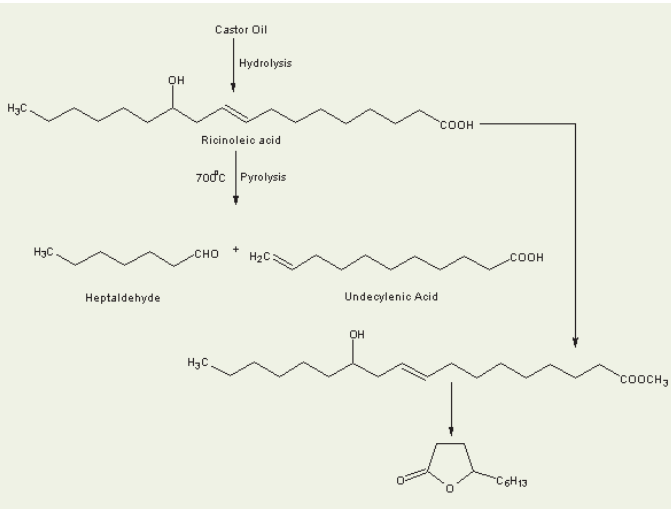
OTHER USES OF CASTOR OIL

Castor oil finds applications in nylon, plasticizers, soaps, lubricants, rubber treatment, and also serves as a replacement for mineral oil. Other applications of castor oil and its derivatives are these:

- Foods: castor oil esters, viscosity-reducing agents, conjugated fatty acids, medium-chain triglycerides
- Cosmetics: castor oil, castor oil esters, castor wax, emulsifiers, undecylenic acid, deodorants, medium-chain triglycerides
- Pharmaceuticals: castor oil, glycerine, hydrogenated castor oil, undecylenic acid, zinc undecylenate, calcium undecylenate, enanthic (heptanoic acid) anhydride
- Textiles: surfactants, pigment wetting agents, auxiliaries
- Paper: defoamers, waxes, waterproofing agents
- Rubber and plastics: polyols, coupling agents, plasticizers, processing aids, nylon-11
- Electronics and telecommunications: castor oil, castor oil esters, polyurethane systems, polyamide resins, polyols, waxes for



SCHEME 1



SCHEME 2

application to cables to prevent stickiness under high-heat conditions, capacitor fluids

- Paints, inks and adhesives: castor oil, glycerine, dehydrated castor oil (DCO), DCO fatty acids, polyols, alkyd resins, polyamides, wetting and dispersing agents, water-thinnable resins
- Lubricants: castor oil esters, hydrogenated castor oil, ricinoleic acid, 12-hydroxystearic acid, methoxy-12-hydroxystearate, heptanoic acid, sebacic acid, polyol esters, hydroxyamide waxes, metallic salts
- Castor oil meal (castor oil cake) also can be used as manure in agriculture.

TABLE 1. *Aroma chemicals derived from castor oil*

From heptaldehyde
- Heptaldehyde (heavy fatty note)
- Heptanonitrile (fatty note)
- 3-Nonenoic acid (green note)
- γ-Nonalactone (coconut note)
- 2-Methylene heptanonitrile (heavy fatty note)
- Cyclohexenone derivatives of heptanal (fruity, floral, herbal)
- Tetrahydrofuran derivatives of heptanal (jasmine, floral, fatty)
- δ-Dodecalactone (butter flavor)
- Acetal of 2-nonenal (coffee flavor)
- α-Amyl cinnamic aldehyde (jasmine)
- Methyl dihydrojasmonate (hedione; jasmine, floral)
- Fleuramone (2-heptyl-1-cyclopentanone,floral, jasmine)
- Dihydrojasmone (floral, jasmine)
- Tetradihydrojasmone (floral, jasmine)

From sebacic acid
- Ethyl sebacate

From undecylenic acid
- γ-Undecalactone
- Dihydroisojasmone
- Methyl nonyl acetaldehyde
- Undecanal
- Undecanol
- Undecylenic aldehyde
- Undecylenic alcohol
- Cervolide
- Cyclopentadecanolide
- Ether lactone (musk odor)
- Ozonil
- Methyl and ethyl esters of undecylenic acid

From 2-octanol
- 2-Octanol (floral, rosy)
- 2-Octanone (herbal, citrus)
- Dihydrojasmone (floral, jasmine)
- 4-Hexyl-4-methylbutyrolactone
- Oxime of 2-octanone (green)
- Esters of 2-octanol (fruity)

REFERENCES:

1. Patnekar, S.G., Perfumery synthetics from fatty oils, *Journal of the Flavour and Fragrance Association of India 3*:12–18 (1981).
2. Anon., Market research plan for castor oil and derivatives, *Chemical Weekly–Bombay 53*(15):199–214 (2007).
3. Zope, D.D., S.G. Patnekar, and V.K. Kanetkar, Synthesis of specialty perfumery and flavor molecules from castor and coconut oil, presented at the American Oil Chemists' Society 99th Annual Meeting & Expo, Seattle, Washington, USA, May 18–21, 2008.
4. Zope, D.D., R.N. Yelapure, and J.G. Tongaonkar, Castor oil based perfumery chemicals, presented at the 8th International Seminar on Soaps, Cosmetics, Detergents and Toiletries (SCODET), Nehru Center, Worli, Mumbai, India, October 2007.

Dhananjay D. Zope was affiliated with the Perfumery and Flavour Technology Center, Dyestuff Department, Institute of Chemical Technology, University of Mumbai, India. He is presently with the Institut National de la Recherche Agronomique (INRA), France. He may be contacted by telephone: 00 33 380693403, fax: 0033 380693227, email: Dhananjay.Zope@dijon.inra.fr

CALENDAR (CONTINUED FROM PAGE 127)

tion: telephone: +1-817-297-4668 or email: paukert.linda@sbcglobal.net.

June 14–17, 2010. International Fuel Ethanol Workshop & Expo, America's Center, St. Louis, Missouri, USA. Information: www.fuelethanolworkshop.com.

June 15–17, 2009. International Probiotic Conference 2010, Kosice, Slovakia. Information: www.probiotic-conference.net.

June 17–18, 2010. CosmeticBusiness 2010, M.O.C. (Münchener Order Center), Munich, Germany. Information: www.cosmetic-business.com/en/tradefair.

June 19–24, 2010. HPLC 2010: 35th International Symposium on High Performance Liquid Phase Separations and Related Techniques, The Hynes Convention Center, Boston, Massachusetts, USA. Information: www.casss.org/displayconvention.cfm?conventionnbr=6136.

June 20–25, 2010. Lipoprotein Metabolism, Gordon Research Conference, Waterville Valley Resort, Waterville Valley, New Hampshire, USA. Information: www.gordonresearchconferences.org/programs.aspx?year=2010&program=lipopro.

June 21–23, 2010. 14th Annual Green Chemistry & Engineering Conference, Washington, DC, USA. Information: www.gcande.org.

June 21–26, 2010. Eukaryotic Lipids; Treasure of Regulatory Information, Spetses, Greece. Information: g.vanmeer@uu.nl.

June 23–24, 2010. Symposium on Breeding for Disease Resistance, Krasnodar, Russian Federation. Information: www.isa.cetiom.fr/event.htm.

June 27–30, 2010. World Congress on Industrial Biotechnology and Bioprocessing, Washington, DC, USA. Information: www.bio.org/events.

June 27–July 2, 2010. Tribology, Gordon Research Conference, Colby College, Waterville, Maine, USA. Information: www.gordonresearchconferences.org/programs.aspx?year=2010&program=tribology.

JULY

July 6–8, 2010. China Soybean Expo 2010, Harbin International Conference Exhibition and Sports Center, Heilogjiang Province, China. Information: www.chinasoybeanexpo.com/en.

July 8–9, 2010. AgriGenomics World Conference, Conrad Brussels Hotel, Brussels, Belgium. Information: www.selectbiosciences.com/conferences/AGWC2010.

July 11–16, 2010. 19th International Symposium on Plant Lipids, Cairns Convention Centre, Cairns, Australia. Information: www.ispl2010.org.

July 17–21, 2010. Institute of Food Technologists' Annual Meeting and Expo, McCormick Place, Chicago, Illinois, USA. Information: www.ift.org.

July 18–20, 2010. Food Processing Suppliers Association Process Expo, McCormick Place, Chicago, Illinois, USA. Information: www.fpsa.org.

AUGUST

August 1–6, 2010. 19th World Congress of Soil Science, Brisbane, Australia. Information: www.19WCSS.org.au.

August 22–26, 2010. 240th American Chemical Society Autumn Meeting, Boston, Massachusetts, USA. Information: www.acs.org. ■

SD&PC NEWS (CONTINUED FROM PAGE 159)

derivative with at least two long fatty groups and at least one further cationic surfactant.

SUNSCREEN

Polonka, J., and J.B. Bartolone, Hindustan Unilever Ltd., Unilever N.V., and Unilever PLC, WO2010/000584, January 7, 2010

A cosmetic water-in-oil emulsion composition is provided [that] includes composite particles of a sunscreen agent and a condensation polymerized polyamide binder, an emulsifying silicone surfactant sufficient to form the water-in-oil emulsion, an oil phase, and a water phase. The composition exhibits relatively high SPF (sun protection factor) photoprotection while maintaining excellent soft focus properties that hide skin imperfections. ■

BIOFUELS NEWS (CONTINUED FROM PAGE 149)

based their conclusions largely on data published in 1998 in "A Look Back at the US Department of Energy's Aquatic Species Program: Biodiesel from Algae" (Report #NREL/TP-580-24190). This report summarized data collected from the early 1970s through 1996.

The ABO questioned assumptions that the researchers made about algae growth systems in common use today. Open-pond systems of 1998 are considerably different from those in use now (Torrey, M., Survey of commercial developments of microalgae as biodiesel feedstock, in *Single Cell Oils*, 2nd edn., AOCS Press, in press). The authors also assumed that algal growth systems would require algae farmers to purchase CO_2 and fertilizer, and use fresh, potable water. These assumptions do not correspond with industry practice today, according to the ABO.

Stephen Mayfield, director of the San Diego Center for Algae Biotechnology, said in the ABO press release, "The truth is that the algae industry is already well beyond the obvious improvements these authors suggest, and as we add . . . new efficiencies algae will become much more environmentally beneficial." ■