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AOCS

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Departments and Information

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

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Calendar

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

April

April 4–8, 2009. The Future of Biofuels. Snowbird Resort, Snowbird, Utah, USA. Information: www.keystonesymposia.org/Meetings/ViewMeetings.cfm?MeetingID=1010.

April 5–10, 2009. 13th Annual Practical Short Course on Snack Foods Processing, Texas A&M University, College Station, USA. Information: http://foodprotein.tamu.edu/extrusion/scsnackfood.php.

April 6–8, 2009. Journees Chevreul 2009: Lipides Tropicaux: Applications, Production et Socio-Economie, Paris, France. Information: e-mail: afecg@fncg.fr; www.afecg.org.

April 6–8, 2009. Chemical & Bioengineering for Technical and Scientific Professionals Short Course, Harrah's Las Vegas, Las Vegas, Nevada, USA. Information: American Society of Mechanical Engineers; phone, 1-800-843-2763 (USA and Canada) or +1-973-882-1167; fax: +1-973-882-1717; e-mail: infocentral@asme.org; www.asme.org.

April 19–22, 2009. Alternative Fuels & Vehicles National Conference & Expo, Orlando, Florida, USA. Information: www.afv2009.com/index.html.

April 19–23, 2009. 9th Annual Practical Membrane/Filtration & Separations Technologies Short Course. Information: http://foodprotein.tamu.edu/separations/scmembrane.php.

April 20–21, 2009. CHI (Cambridge Healthtech Institute) 2nd Advanced Biofuels Development Summit, Marriott at Metro Center, Washington, DC, USA. Information: www.biofuels-summit.com.

April 21–22, 2009. 2009 OFI Middle East, InterContinental Citystars, Cairo, Egypt. Information: www.oilsandfatsinternational.com/publication.asp?pubid=28&nav=3&exid=147.

April 22–27, 2009. Complex Lipids in Biology: Signaling, Compartmentalization and Disease. Resort at Squaw Creek, Olympic Valley, California, USA. Information: www.keystonesymposia.org/Meetings/ViewMeetings.cfm?MeetingID=961.

April 27–29, 2009. Food Safety Summit: Expo & Conference, Washington DC Convention Center, Washington, DC, USA. Information: www.foodsafetysummit.com.

April 27–28, 2009. Algae World 2009, Van der Valk Hotel Ridderkerk, Rotterdam, Netherlands. Information: www.futureenergyevents.com/algae/attend.

May

May 2–3, 2009. Lipid Oxidation and Antioxidants Short Course, Rosen Shingle Creek, Orlando, Florida, USA. Information: e-mail: meetings@aocs.org.

May 2–3, 2009. 8th Edible Oils Refining Short Course, Rosen Shingle Creek, Orlando, Florida, USA. Information: e-mail: meetings@aocs.org.

May 2–4, 2009. National Cotton Products Association 113th Annual Meeting, El Dorado Hotel & Spa,

Index to advertisers

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

AOCS Meeting Watch

Celebrate AOCS' 100-year anniversary in Orlando!

May 3–6, 2009. 100th AOCS Annual Meeting & Expo, Rosen Shingle Creek, Orlando, Florida, USA.

May 2–3, 2009. Lipid Oxidation and Antioxidants Short Course, Rosen Shingle Creek, Orlando, Florida, USA. Information: e-mail: meetings@aocs.org.

May 2–3, 2009. 8th Edible Oils Refining Short Course, Rosen Shingle Creek, Orlando, Florida, USA. Information: e-mail: meetings@aocs.org.

May 3, 2009. New Tools for Surfactant and Polymer Characterization Short Course, Rosen Shingle Creek, Orlando, Florida, USA. Information: e-mail: meetings@aocs.org.

May 7–9, 2009. Feed Microscopy Short Course, Rosen Shingle Creek, Orlando, Florida, USA. Information: e-mail: meetings@aocs.org.

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

Sante Fe, New Mexico, USA. Information: www.cottonseed.com/calendar/default.asp.

May 3, 2009. New Tools for Surfactant and Polymer Characterization Short Course, Rosen Shingle Creek, Orlando, Florida, USA. Information: e-mail: meetings@aocs.org.

May 3–6, 2009. 100th AOCS Annual Meeting and Expo, Rosen Shingle Creek, Orlando, Florida, USA. Information: phone: +1-217-359-2344; fax: +1-217-351-8091; e-mail: meetings@aocs.org; http://Annual_Mtg.aocs.org.

May 3–7, 2009. TechConnect World Conference and Expo, George R. Brown Convention Center, Houston, Texas, USA. Information: www.techconnect.org/World2009.

May 3–7, 2009. Clean Technology 2009 Conference & Expo, George R. Brown Convention Center, Houston, Texas, USA. Information: www.csievents.org/Cleantech2009.

May 4–7, 2009. 22nd American Filtration and Separations Society Annual Technical Conference & Exhibition, Sheraton Hotel, Bloomington, Minnesota, USA. Information on short courses: www.afssociety.org/shortcourse; information on conference: www.afssociety.org/spring2009.

May 6–9, 2009. 17th European Congress on Obesity, RAI Exhibition and Convention Centre, Amsterdam, the Netherlands. Information: www.easo.org/eco2009.

May 7–9, 2009. Feed Microscopy Short Course, Rosen Shingle Creek, Orlando, Florida, USA. Information: e-mail: meetings@aocs.org.

May 10–11, 2009. Symposium on Phospholipids in Pharmaceutical Research, Conference Center, Technologiepark Heidelberg, Heidelberg, Germany. Information: www.phospholipids.net/index.php?option=com_content&task=view&id=46&Itemid=36.

May 10–13, 2009. Frontier Lipidology: Lipidomics in Health and Disease, Quality Hotel 11, Gothenburg, Sweden. Information: www.swepharm.se/templates/kurs/kurstillfalle.aspx?id=2836.

CORRECTION

The timeline accompanying the January 100 Years of AOCS article (*inform 20*:12–15, 2009) incorrectly stated that the first Ralph Potts Award was presented in 1993. It actually was presented in 1982 to Nikolas Sotirhos.

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AOCS

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An Indian perspective on vegetable oil supply and demand

The paper below represents excerpts from a talk entitled "Palm Oil Price Outlook 2009" presented by Dorab E. Mistry at the Indonesian Palm Oil Conference 2008 of GAPKI (Gabungan Pengusaha Kelapa Sawit Indonesia, the Association of Indonesian Palm Oil Producers) on December 4, 2008, at the Westin Resort, Nusa Dua, Bali, Indonesia.

Dorab E. Mistry

Ladies and Gentlemen: Today we gather for the Indonesian Palm Oil Conference and Price Outlook 2009 in a rather somber mood. The tragic events in my home city of Mumbai have cast a long shadow on everyone in this part of the world and on humanity at large. You in Indonesia and particularly in Bali have experienced similar tragedy and have bounced back very effectively. We are today united, in bad times as well as in good.

THE PALM OIL INDUSTRY

Firstly I heave a sigh of relief that the export tax levied by the Indonesian government has now become nil. However, it has inflicted serious damage on your oil palm industry and its repercussions will be felt for long. Export taxes distort economies, distort investment, and destroy a flourishing industry. They result in unreasonably high prices, they destroy demand, and they antagonize customers. The government of Indonesia has at last taken some hesitating steps toward encouraging the production and use of palm biodiesel. This is a step in the right direction. It needs to be backed up with a mechanism to make it commercially viable for blenders. Far too many governments are dragging their feet on biodiesel and waiting for someone else to foot the bill. Malaysia has at last set its house in order, and Indonesia needs to emulate that example.

SUPPLY AND DEMAND IN INDIA

The Indian government surprised everyone by levying a 20% import duty on crude degummed soya oil whilst leaving all other oils unchanged. It means that crude palm oil (CPO) continues to enjoy duty-free status whilst refined soya oil is taxed at 7.5%, a level much lower than the tax on crude soya oil.

TABLE 1. Production (000 metric tons) of vegetable oil in India, 2004–2009[a]

	2008/09 *Estimates*	2007/08 *Estimates*	2006/07 *Actual*	2005/06 *Actual*	2004/05 *Actual*
Soybean oil	1500	1500	1280	1140	900
Cottonseed oil	900	915	920	755	660
Groundnut oil	900	900	580	950	970
Sunflowerseed oil	500	550	580	620	470
Rapeseed oil	1850	1650	2150	2250	1570
Sesame seed oil	120	120	120	125	200
Coconut oil	390	380	380	400	400
Rice bran oil	760	720	680	660	610
Others	250	250	225	200	200
Total	6160	6985	6915	7100	5980

[a]Oil year November to October.

The higher import duty on soya oil has generally had a tonic effect on all vegetable oil prices in India (Table 1). However, soybean prices are still too low and farmers are extremely angry. Like their counterparts in Argentina, Indian soya farmers are not selling and preferring to wait. On the other hand, it also appears that India's rapeseed farmers are going to expand the area of rapeseed this year because they remember the very high prices of last year. Rapeseed acreage in India this year could be the second highest on record.

In anticipation of a rise in import duty, shipments of palm and soya oil into India ballooned during September and October. As a result, India's imports for the oil year November 2007 to October 2008 (Table 2) reached a record figure of 6.3 million metric tons (MMT). India begins the new oil year with record high stocks of vegetable oil

In 2007/08 India's per capita consumption increased slightly as a result of strong economic growth (Table 3). The cheaper price of CPO in the last quarter of 2007/08 appears to have stimulated consumption.

The scale of imports during 2008/09 will depend on the level of import duties. I expect the government to keep revising import duty levels as the year develops and various factors emerge. On balance, I expect import duties to rise as the plight of Indian farmers rises and can no longer be ignored by India's politicians who will soon be focusing on their own reelection prospects.

The supply and demand for vegetable oils in India for 2005–2009 are summarized in Table 4.

GLOBAL SCENARIO

In the last few weeks, world markets ranging from equities to commodities appear to have stabilized. There is a feeling that the world economy can be mended by the strong measures being undertaken by all countries in a united Herculean effort. I would love to share that view. My reservations are that the same breed of politicians who got us into this mess are still around and are now trying to get us out of it. In the process they are trying to rewrite the basic rules of economics. It will be salutary to remember that the hard economic news being released each day from almost every country is very grim. Even BRIC [Brazil, Russia, India, China] economies are reporting very poor figures.

Given the tough economic scenario, our focus should be on demand rather than on supply.

There is no doubt that farmers all over the world are cutting back on fertilizer use and are cutting corners wherever possible. However, we also know that in times of economic crisis, farmers usually plant on every available inch and acreage tends to expand. The only constraint on production could come from the weather gods. We have had almost 12 months of excellent weather in every part of the world and the time may be coming for that trend to change.

TABLE 2. Imports (000 metric tons) of vegetable oil to India, 2004–2009[a]

	2008/09	2007/08	2006/07	2005/06	2004/05
Soybean oil	300	750	1335	1770	2027
Palm oil	5255	5270	3665	3000	3169
Sunflowerseed oil	150	30	200	90	5
Laurics	200	200	200	240	145
Vanaspati	100	50	215	300	200
Total	6005	6300	5615	5400	5546

[a]Oil year November to October.

TABLE 3. Consumption (000 metric tons) of vegetable oils in India, 2003–2008[a]

	2007/08 *Estimates*	2006/07 *Actual*	2005/06 *Actual*	2004/05 *Actual*	2003/04 *Actual*
Soybean oil	2200	2550	2850	2700	1900
Cottonseed oil	900	900	720	660	520
Groundnut oil	880	580	1020	950	1100
Sunflowerseed oil	580	780	680	500	500
Rapeseed oil	1650	2150	2250	1420	1700
Sesame seed oil	120	120	160	200	200
Palm oil	4960	3925	3150	3436	3500
Laurics	600	600	450	450	500
Rice bran oil	720	680	650	600	600
Others	2225	225	350	350	200
Total	12835	12510	12280	11366	10820
Pop. mins[b]	1140	1120	1100	1080	1070
Per capita (kg)	11.26	11.17	11.16	10.52	10.15

[a]Oil year November to October.

[b]Pop. mins: Population in millions.

Soya

After having seen recent good rains in Argentina, we must be cautious about estimating soya crops in Brazil and Argentina. Our experience has been that slightly dry weather in the beginning of the season followed by improved rainfall usually gives excellent yields. Plants get a chance to develop deep root systems during the initial dry spell and these help enormously during the growing season.

On the demand side, the news is not good. Argentina is carrying record soybean stocks. Day by day we see US corn and soya meal losing market share to cheaper feed grains from other countries. India has joined the ranks of corn exporters, as I had forecast. Demand for soya meal is poor and the crush is falling. The world has too much wheat and a surplus of cheaper proteins than at any time in the last three years. Exchange rates in respect of the real and the peso are critical and so far they appear to be helping the bearish cause. Argentina also faces difficulty in marketing its biodiesel due to the recent restriction on "Splash & Dash" in the United States and the recent decision of the German government. We must also face the fact that usually, once the South American crops are past pollination, we see selling pressure in the Chicago Board of Trade. Therefore, overall there are more bearish factors than bullish ones as far as soya is concerned.

Rapeseed

It is now almost confirmed that the canola crop in Canada this year was 12.5 MMT. This comes on top of record crops in the Ukraine and a recovery in Australia. The good news is that China looks as if it will import a record high tonnage of canola seed, possibly as high as 1.5 MMT.

Sunflower Seed

For the next 6 to 8 weeks there will be no new fundamental factors for sunflower seed. The news of lower production from Argentina is already in the market. Therefore it is quite possible that sunflower oil will now steadily increase its premium over soya oil, and in Europe, it will steadily erase its discount.

Palm Oil

Recent reports suggest that November production of CPO in Indonesia as well as in Malaysia has been higher than expected. Therefore I shall repeat my remarks made earlier this month that it will be quite natural for us to see this year some under-reporting of CPO production in both countries. I continue to stress that real (as opposed to "reported") 2008 CPO production in Malaysia will be 18 MMT. By the same token, production in Indonesia will be 20 MMT.

We have seen in the last two months a great export push for palm. India was one of the targets of the push, for very good commercial reasons. We have also seen a push to other regions of the world, particularly the Middle East, the Red Sea, and the former Commonwealth of Independent States. It remains to be seen if this results in greater consumption or substitution by palm in place of more expensive oils or is just a case of shifting stocks. Time will tell, but producers have done an extremely good job to keep their visible stocks at origin under control. Management of visible stocks is a key ingredient of price support. The recent improvement in CPO prices as a result of this exercise is well deserved. It remains to be seen if this will form a process of bottoming out for palm oil prices or otherwise.

From December the biological cycle for palm will change and we shall see a slowdown in the rate of growth. This will be significant for the relationship between palm and soya oil. Palm is at a large discount to soya oil and has been able to capture markets. The time is now approaching when this discount will

TABLE 4. Supply and demand (000 metric tons) for vegetable oils in India, 2005–2009

	2005/06	2006/07	2007/08	2008/09
Opening stock	750	850	720	1025
Production	7100	6915	6985	7170
Imports	5400	5615	6300	6005
Consumption	12280	12510	12835	13100
Exports	100	120	175	200
Ending stock	850	750	1025	900

TABLE 5. Global incremental supply (000 metric tons) of vegetable oils, 2007–2009

	Oct. 2007–Sept. 2008	Oct. 2008–Sept. 2009
Soybean oil	+1800	+1200
Rapeseed oil	– 500	+1400
Sunflowerseed oil	–1000	+1600
Groundnut oil	+ 200	—
Cottonseed oili	—	—
Palm oil	+4500	+2500
Lauric oils	+ 450	+ 300
Total increase	+5450	+7000

There is no doubt that farmers all over the world are cutting back on fertilizer use and are cutting corners wherever possible. However, we also know that in times of economic crisis, farmers usually plant on every available inch and acreage tends to expand.

narrow. In my opinion, soya oil prices need to decline to regain market share.

With those remarks I shall proceed to analyze the supply-demand prospects for 2008/09. My method is to estimate how much additional supply will come into the market and to test that against additional demand. Global incremental supply is summarized in Table 5.

Let us now look at incremental demand. For 2007/08, total demand grew by just over 4 MMT. Food demand grew by about 3 MMT and biofuel demand by about 1.5 MMT. Food demand grew less than expected due to very high prices. For 2008/09, I expect food demand to grow by 3–4 MMT. Biofuel demand should grow at about 2.5 MMT in view of lower prices (Table 6).

TABLE 6. Global incremental supply (000 metric tons) of vegetable oils, 2007–2009

	Oct. 2007–Sept. 2008	Oct. 2008–Sept. 2009
Supply	+5450	+7000
Demand	+4000	+6000

Based on these figures, supply and demand for 2008/09 looks quite comfortable. However, there can be reductions in supply due to weather problems. It also remains to be seen if palm oil production will actually grow by 2.5 MMT or will slow down to a smaller increase. We shall form a better idea once we see the production figures for the December to February period.

Dorab E. Mistry is director of Godrej International Ltd., Mumbai, India. He may be contacted at dorab.mistry@godrejinternational.com.

1999–2008: AOCS' tale of two cities

Society survives trip to financial precipice

George Willhite

AOCS was on the move—literally. From 1944 to 1971, its first rented offices had been on the banks of the Chicago River. From 1971 until 1986, headquarters were in a leased building a few blocks from the University of Illinois campus in Champaign, Illinois. Since 1987, AOCS had occupied its own building in southwest Champaign. Now, AOCS was about to move twice during its tenth decade—moves made for dramatically different reasons.

It was to be AOCS' worst of times (Champaign). It was to be AOCS' best of times (Urbana).

AOCS' most critical financial crisis came during its tenth decade. Auditors warned AOCS president Michael Cox and vice president Tom Foglia in March 2002 that AOCS "had been bleeding financially for the previous three years," Foglia recalls. The auditors suggested AOCS prepare a dissolution plan in case the bleeding continued.

Four years later, AOCS recorded a yearly surplus of more than $700,000. Financial stability had returned.

But why had the financial crisis occurred?

- Accelerating consolidation
- Construction
- September 11, 2001

CONSOLIDATION

Consolidation in industries served by AOCS had been going on for decades.

The number of US oilseed processing plants had been decreasing steadily. In 1939, when cottonseed was king, there were 449 US cottonseed crushing plants. In 2002, there were fewer than 40 cottonseed crushing facilities among the 158 US oilseed processing plants. US Industrial Census data for 2007—to be released later in 2009—will provide the latest numbers.

A similar pattern has prevailed in the household and personal care products industries.

Accelerating consolidation means fewer domestic research facilities, fewer potential dues-paying members, fewer potential meeting participants, and fewer potential customers for AOCS' books and other offerings.

Industry suppliers, such as equipment manufacturers, began relying more on personal sales calls and trade show exhibits and less on advertising. For example, in the 1950s and 1960s, hexane advertisements appeared frequently in the *Journal of the American Oil Chemists' Society*. By 1975, hexane ads had disappeared. By the 1990s, with three firms representing more than 80% of US oilseed crushing capacity, industry suppliers relied more than ever on personal contacts to reach clients.

CONSTRUCTION

AOCS' Governing Board had decided in 1998 to construct a new building in anticipation of continued staff expansion. The expected growth was based on AOCS' experience over more than 10 years.

AOCS' ninth decade ended with a $450,000 surplus in 1998. The tenth decade began with a move to the new headquarters building at 2211 West Bradley Avenue in Champaign, dedicated with due pomp and ceremony on November 4, 1999. The building's nearly $3 million cost slightly exceeded the original budget. Proceeds from sale of the previous building, a fund drive that raised more than $300,000, and use of reserve funds covered more than 40% of the cost. A construction loan of about $1.7 million covered the rest.

The drawdown on reserves and the higher-than-anticipated mortgage put AOCS on a financial tightrope. By mid-2000 AOCS appeared headed for a yearly loss, but a late processing conference scheduled for Cancun, Mexico, was expected to bridge the difference. It didn't. Thus, 2001 began with a financial squeeze.

The 2001 AOCS Annual Meeting in Minneapolis was a financial success. An International Society for Fat Research (ISF)

meeting scheduled for mid-September in Berlin also was projected to do well.

SEPTEMBER 11, 2001

On September 11, 2001, AOCS staff members in Champaign were preparing to fly the next day to Berlin, Germany, for the Sunday, September 16 opening of the ISF meeting, where they were to be registrars and managers for the meeting.

They never got off the ground. Shortly after terrorists flew hijacked airliners into the World Trade Center towers and the Pentagon on September 11, all US domestic airports were closed. They remained closed for several days. There was no way the AOCS staff members could get to Berlin in time to be useful. The host society for the meeting, the Deutsche Gesellschaft für Fettwissenschaft (DGF—German Society for Fat Science) already had duplicate copies of the function sheets for the meeting (with logistical details of how rooms were to be set up, audio-visual requirements, etc.). DGF chief staff officer Frank Amoneit and his aides stepped in to replace AOCS staffers.

The long-term effects of the terrorist attacks—reduced international travel, decline in business activity for the next year and longer—would profoundly affect AOCS programs.

TOP: AOCS headquarters at 2211 West Bradley Avenue in Champaign, dedicated on November 4, 1999. BOTTOM: AOCS headquarters at 2710 South Boulder Drive, Urbana, fall 2006.

Fewer persons than anticipated attended three AOCS meetings later in 2001. Although each meeting had a slight financial surplus, the total was less than had been forecast to cover overhead and to help repay the mortgage. Attendance at 2002 meetings also was less than what had been projected when their budgets had been prepared.

The general business downturn following September 11 led to a decline in advertising income. When some AOCS staff members left their jobs, they were not replaced. Some staff members were let go to reduce costs.

It was the worst of times.

In November 2002, longtime AOCS chief staff executive Jim Lyon officially retired. Lyon had groomed Jean Wills, a staff member since 1988, as his successor and essentially had turned the reins over to her by early 2002. Following a nationwide search, the Governing Board formally hired Wills as AOCS executive vice president, the title for the chief staff executive since 1999.

Wills found herself with a financial mountain to climb. One staff member said about that time that the staff's goal was for the society to "hang on for the 100th (anniversary)."

AOCS Presidents

1999	Edward A. Emken
2000	Richard F. Wilson
2001	Michael Cox
2002	Thomas Foglia
2003	Mark Matlock
2004	Lawrence Johnson
2005	Michael Haas
2006	Howard Knapp
2007	Philip Bollheimer
2008	Casimir Akoh

BACK FROM THE BRINK

How did the financial situation get turned around?

AOCS 2001 President Michael Cox recalls that "the (Governing Board) had to take a strong hand in cost control and revenue generation to make up for the losses in membership and meeting attendance. I suspect that most members probably do not know how difficult this period was."

AOCS 2002 President Tom Foglia said the board took a tighter grip on financial reins. Hiring of Wills as executive vice president was "my crown and glory. I don't believe that any of the good things that have occurred at AOCS would have happened without Jean's leadership and dedication to AOCS."

She has infused new enthusiasm into staff members and volunteers, Foglia added.

Phil Bollheimer, treasurer during Foglia's term as president, began focusing on how AOCS could regain financial stability.

"It was during my presidency (2004) that AOCS finances reached a critical point," former AOCS President Larry Johnson recalled. An AOCS international conference in Chicago had been budgeted to provide a $175,000 surplus. It actually resulted in a $25,000 loss and "was the straw that broke the camel's back," Johnson recalled, adding that a detailed board study seemed to indicate AOCS could continue to lose $300,000 a year.

Timeline

1999 First AOCS Procter & Gamble, Synetix scholarships presented.

First AOCS Biotechnology, Health & Nutrition Division student awards presented; first Phospholipid Division award presented.

AOCS debuts home page on Internet.

AOCS begins using a direct connection to Internet, eliminating previously used dial-up connections.

The Soap and Detergent Association added a $1,000 honorarium to the SDA Award presented annually at AOCS annual meetings since 1980.

2000 First AOCS Corporate Achievement Award, first AOCS Young Scientist Award presented; first Cognis scholarship given.

AOCS website undergoes major redesign.

US soap and detergent industry introduces tablet/sachet dosing for laundry products, cleaning wipes, and similar products.

Procter & Gamble introduces modified linear alkylbenzene with mono-methyl branching for hard-water tolerance, better detergency.

2001 First Food Structure Division Lifetime Achievement Award presented.

Terrorists crash commandeered aircraft in New York, Washington, DC, and Pennsylvania.

AOCS hires first web programmer.

AOCS Feed Microscopy Division's 1st Short Course in Fargo, North Dakota, highlighting animal hair and bone identification as it related to bovine spongiform encephalopathy (mad cow disease).

AOCS Surfactant and Detergent Division created graduate student travel award.

2002 Bunge acquires majority interest in Cereol SA (Central Soya Co. among subsidiaries).

First Surfactant and Detergent Division Student Travel award presented; first Schroepfer Medal awarded.

Hunt-Wesson Foods becomes part of ConAgra Foods-Diversified Food Products.

The board set to work to revise the AOCS business model, he said. "That effort was largely led by (AOCS) treasurer Steve Hill for whom I and AOCS are gratefully indebted. Steve categorized our products and services into three categories based on financial return, and we largely unloaded the lowest category and focused on building those that gave us a financial return."

Hill's predecessor as treasurer, Phil Bollheimer, had begun the push to turn AOCS around.

Mike Haas, who followed Johnson as AOCS president, notes that during his term the Governing Board (i) decided to sell the office building on Bradley Avenue, (ii) agreed to have Springer-Verlag publish AOCS' three technical journals—the *Journal of the American Oil Chemists' Society*, *Lipids*, and the *Journal of Surfactants and Detergents*, (iii) began a new AOCS Foundation campaign to upgrade the society's electronic communication capabilities, and (iv) decided AOCS needed a new business plan for all operations.

When the gavel was passed to Howard Knapp in 2006, Haas said, "We knew we had made our best decisions . . . but none of us knew if we had made the right decisions."

The decision to contract with Springer for journal publication was necessary because AOCS could not afford the computer technology necessary to showcase its products to an increasingly computer-savvy international market. Springer has that capability. AOCS volunteers and staff evaluate, edit, and handle all prepress work on submitted research articles, which are then transmitted electronically to Springer for publication. Springer paid AOCS for the publishing rights and pays an annual royalty to AOCS.

The AOCS operating budget tightened. Staff salaries were frozen briefly. All nonessential expenditures were banned. As used to be said about comedian Jack Benny, AOCS was "throwing nickels around like they were manhole covers."

Meeting attendance eventually began to rebound. As AOCS held some of its more attractive conferences (such as the Sixth World Conference on Detergents, October 9–12, 2006, in Montreux, Switzerland), the financial situation turned around.

While that conference was underway in Montreux, back in the United States AOCS headquarters was on the move. Computers, desks, chairs, files, computers, and other materials were hauled eight miles from northwest Champaign to southeast Urbana. Hundreds of boxes of files, journals, and books were moved into rented storage space.

TECHNICAL RESURGENCE

New directions for AOCS analytical methodology programs have contributed to AOCS' financial rebound.

Analytical methodology had been a key reason for the organization's founding in 1909. Whereas in the early 20th century AOCS analytical methods' concerns focused on the US cottonseed industry in the country's south, the scope for today's AOCS technical department is global.

For example, when a firm wants to introduce in Europe a genetically modified plant, the European Commission (EC) requires certified reference materials from seeds of leaves containing the new trait, along with certified reference materials from the conventional variety of the plant. Obtaining permission is a complicated process, but AOCS staffer Gina Clapper runs a program through which US life science firms developing such modified plants can obtain the required certificate of analysis in accordance with ISO (International Organization for Standards) and EC parameters.

There's no way to predict when life science firms will need such certificates, so the program is budgeted conservatively. Income may be high one year and low the next (if few firms have new plants to submit to the EC for approval). In one recent year, however, the program brought in $100,000 in unbudgeted income, Gloria Cook, AOCS senior director for finance and operations, noted.

One of the AOCS technical staff's first ventures into contract work was with the United Soybean Board (USB) to provide USB a quality control system for developing improved soybean varieties. USB needed expertise in how to measure fatty acids and amino acids in soybeans, explained AOCS Technical Services Director Richard Cantrill. The project involved providing guidance in such areas as performance testing and analytical methodology.

When the US Food and Drug Administration decided to require declaration of *trans* fatty acid content on food labels, the immediate challenge for every food firm was how to determine *trans* content. There were differing methods of differing cost that provided differing results. In 2003, prompted by requests from industry, the AOCS technical department convened a meeting on *trans* analytical methodology. Anticipated attendance was 70—more than 300 persons attended. The meeting resulted in an eventual agreement on *trans* analytical methodology.

US gasoline prices soared during the early 21st century, sparking rising interest in alternative fuels, including biodiesel, a blend of vegetable oil-based methyl esters with petroleum-based diesel fuel. Biodiesel producers want to know how to verify their product's quality. AOCS has been named convener of an ISO group to work out unresolved analytical issues relating to feedstock and methyl ester quality.

AOCS serves as host for several national and international standards-setting bodies. This involves circulating information and prodding the members to keep projects moving forward, as well as convening meetings when needed.

In past decades, AOCS liaisons with other standards-setting bodies such as the American National Standards Institute, Codex Alimentarius, etc. were maintained primarily through AOCS individual members who were active in both AOCS and the other organization. Such ties are now more formalized.

In addition to the standards-setting bodies, there are trade associations (National Oilseed Producers Association, National Cottonseed Products Association, the National Institute of Oilseed Products, American Fats and Oils Association, Institute of Shortening and Edible Oils, etc.) that rely on AOCS methodology to evaluate product quality and/or to identify potential arbitration chemists for such organizations.

A sixth edition of *Official Methods and Recommended Practices of the AOCS* is expected to be on display at the AOCS 2009 centennial meeting, AOCS Technical Services Director Richard Cantrill reports. "Dave (Berner, Cantrill's predecessor as AOCS technical director) and his crew did such a good job on the fourth edition, we haven't had to do too much work on methods," Cantrill said. The fifth edition—issued in 2005—was primarily a change in publication format, rather than major updates or revisions of individual methods. Approximately 1,500 copies of the fifth edition have been purchased worldwide, including electronic licenses (used by corporations with multiple analytical laboratories). Researchers also can purchase individual methods via the Internet.

The Laboratory Proficiency Program, successor to the check sample program begun by Frank Smalley during AOCS' first decade, is computerized. Participants receive their samples, do their

2003 First Analytical Division, Edible Applications Technology Division, Processing Division student awards presented.

First NOW Food Scholarship presented; first SDA Glycerin Innovation Award presented.

2004 First Health & Nutrition Division, S&D Division distinguished service awards, first Industrial Oils Division student awards presented.

First Lipid Oxidation Quality Service Award presented; first United Soybean Board Award presented.

AOCS Feed Microscopy Division presents its first short course to focus on the detection of prohibited animal products in feeds, in conjunction with a "Prohibited Materials in Feeds: Analytical Conference and Workshop" in Sacramento, California.

2005 Sustainability becomes emphasis in US cleaning products; Wal-Mart, now a key factor in products' successes or failures, introduces preferred ingredient program.

2006 AOCS moves to new headquarters in southeast Urbana.

AOCS begins posting podcasts with authors on its website.

First domestic case of bovine spongiform encephalopathy (mad cow disease) in United States.

2007 First AOCS Feed Microscopy Division International Short Course held in Québec City, Québec, Canada.

The Feed Microscopy Division broadens its scope and changes its name to become the Agricultural Microscopy Division of the AOCS.

2008 AOCS debuts social networking software for annual meeting registration and other purposes.

AOCS begins online education program.

analyses, and submit the results via the Internet (no paper forms, no postage, and no delays in the mail for submitting results).

ONLINE TRAINING

The latest AOCS 21st century enterprise, "eLearning," has moved the society's education programs onto the Internet.

The first modules—fats and oils processing, introduction to surfactants—cover basic information for newcomers to the fields or those seeking to review basic chemistry. By the end of 2009, AOCS expects to have four modules available, with module topics and numbers increasing each year.

The courses permit an individual to work individually at his or her own pace, without having to incur registration, housing, or travel expenses. The courses can be accessed via the "Meetings & Education" link at the AOCS home page (www.aocs.org).

MILESTONES

- John Cherry, director of the US Department of Agriculture's Eastern Regional Research Center, was named editor-in-chief of the *Journal of the American Oil Chemists' Society* for a five-year term in 2001. Richard Hartel succeeded him in 2006. Eric Murphy became the new editor-in-chief for *Lipids* in mid-2006, succeeding Howard Knapp, who had served as editor-in-chief since 1995. Knapp became AOCS president in 2006.
- Mark Bieber, AOCS secretary, suffered a fatal heart attack in April 2001 in Frankfurt, Germany, while on a business trip in Europe. Michael Haas was chosen to complete Bieber's term as secretary.
- During 2003, the International Oil Mill Superintendents Association contracted with AOCS to have AOCS publish its monthly publication, the *Oil Mill Gazetteer.*
- Tornados skipped around the Kansas City area on Sunday, May 4, 2003, the opening day of AOCS' annual meeting there. Warning sirens sent people scurrying to hotel basements, but there was no damage in the downtown area where the meeting was being held.
- In early 2008, Jean-Louis Salager of Venezuela was named editor-in-chief for the *Journal of Surfactants and Detergents*, replacing V. Mark Nace. Salager became the first AOCS journal editor from outside the United States. Nace had succeeded Michael Cox, the founding editor-in-chief, in 2004.
- In 2004, AOCS Publications Director Mary Lane retired, succeeded by Greg Reed. When Reed left a few years later, reor-

AOCS Meetings

1999	Orlando
2000	San Diego
2001	Minneapolis
2002	Montréal
2003	Kansas City
2004	Cincinnati
2005	Salt Lake City
2006	St. Louis
2007	Québec City
2008	Seattle

For further reading:

- From milking cows to tracing isotopes (profile of new AOCS President E.A. Emken), *INFORM 10*:511–523 (1999).
- Turning points (profile of new AOCS President Richard F. Wilson), *INFORM 11*:428–429 (2000).
- Michael F. Cox: an organized rockhound (2001 AOCS President), *INFORM 12*:443 (2001).
- AOCS' new president a perfectionist (except at golf) (profile of Thomas Foglia), *INFORM 13*:350 (2002).
- President Gadget (profile of Mark Matlock, 2003 AOCS president), *inform 14*:190 (2003).
- The nutty professor (profile of Larry Johnson, 2004 AOCS president), *inform 15*:214–216 (2004).
- Scout, guide, rifleman . . . president (profile of Mike Haas, 2005 AOCS president), *inform 16*:268 (2005).
- A father first (profile of Howard Knapp, 2006 AOCS president), *inform 17*:272 (2006).
- President's Profile: Phillip Bollheimer (2007 AOCS president), *inform 18*:437–439 (2007).
- President's profile: Casimir C. Akoh (2008 AOCS president), *inform 19*:223–224 (2008).
- Sometimes childhood dreams do come true (profile of Gary List), *INFORM 10*:598–600 (1999).
- A lifetime of oil research at the Northern Regional Research Laboratory (Gary List), *INFORM 13*:180–185 (2002).
- Would it make a difference? (Bill Lands' recollections), *INFORM 13*:342–349, 418–422 (2002).
- 40 years of research, teaching, and service (John Coniglio), *INFORM 11*:128–134 (2000).
- Michael F. Cox retires, *inform 18*:745 (2007).
- The Best of 52 years at the service of fats, oil, protein science, industry and consumer (Aldo Uzzan recollections), *INFORM 12*:797–804 (2001).
- Lecithin in chocolate—the historical start, *INFORM 12*:821–823 (2001).
- Historical perspectives on vegetable-oil based fuels, *INFORM 12*:1103–1107 (2001).
- Selling soap when demographics didn't rule, *INFORM 13*:144–148 (2002).
- Jim Lyon retiring as AOCS chief executive, *INFORM 13*:350–353 (2002).
- From nucleic acids to fatty acids and beyond . . . (Arnis Kuksis recollections), *INFORM 13*:642–645 (2002).
- Retirement profile: Tom Foglia (2002 AOCS president), *inform 18*:681 (2007).
- Giants of the past: Michel Eugene Chevreul (1786–1889), *inform 14*:564–565 (2003).
- Giants of the past: Ralph H. Potts (1900–1981), *inform 15*:168–169 (2004).
- Giants of the Past: Herbert Dutton 1914–2006, *inform 18*:291–292 (2007).
- Herbert J. Dutton: A tribute, *inform 17*:662–663 (2006).

AOCS International Meetings

1999	New Delhi (joint with Oil Technologists Association of India)
2000	Cancun, Mexico
2001	Berlin (ISF conference)
2002	San Jose, Costa Rica Barcelona Istanbul Bordeaux, France (ISF conference)
2003	Manta, Ecuador
2004	Cork, Ireland
2006	Istanbul Montreux, Switzerland
2007	Vienna
2008	Tokyo

ganization resulted in elimination of the publications director position.

The remaining geographic sections within the United States (Northeast and North Central) merged into a new USA section in 2008, a counterpart to the international/national AOCS sections around the world.

What lies in the future?

AOCS has moved far beyond whatever Felix Paquin and his colleagues envisioned when they met on May 20, 1909, in a Memphis, Tennessee, fairgrounds bar and decided to form a new organization for the single purpose of putting on paper how to properly evaluate cottonseed oil.

Maybe, in Orlando, some of Felix Paquin's successors will speculate on AOCS' future while sitting in a cool, comfortable bar.

That's only fitting.

Author's afterword: Grateful acknowledgment is made to A. Richard Baldwin, who (in the days before computers) compiled in 1952 a comprehensive index on what had been published in AOCS journals from 1917 through 1952. This was followed by an updated decennial index in 1962. In 1984–1985, when AOCS was marking its 75th anniversary, staff newswriter Barbara Fitch Haumann prepared a series of historical articles and kept copies of her source material. This series would not have been possible without the efforts of Dr. Baldwin and Ms. Haumann. Lucy Hawkins, executive secretary of AOCS in the post-World War II years, also began collecting AOCS' historical artifacts and remembrances of AOCS early leaders. These proved invaluable. Thanks also to the scores of other persons who provided information, photographs, and comments on AOCS' first one hundred years.

Next month: AOCS' centennial celebration

Articles from inform *volumes 13–20 (2002–2009) may be viewed at no charge by AOCS members through their member page at the AOCS website. Articles from* JAOCS *and its predecessor publications are available at no charge to current* JAOCS *subscribers via their AOCS member page. There is a fee for non-*JAOCS *subscribers to view such articles online.*

Frustrations about the omega-3 debate

Kelley Fitzpatrick

Food manufacturers seeking ways to improve the nutrient value of their products have recently been including omega-3 fatty acids. Two of the most popular sources of these are flaxseed oil and fish oil. Flax contains the omega-3 fatty acid α-linolenic acid (ALA: 9*c*12*c*15*c*-18:3). Fish oils are sources of the long-chain omega-3s eicosapentaenoic acid (EPA: 5*c*8*c*11*c*14*c*17*c*-20:5) and docosahexaenoic acid (DHA: 4*c*7*c*10*c*13*c*16*c*19*c*-22:6). Only by understanding the science supporting the full benefits of these fatty acids (ALA, EPA, and DHA) and the technology required to deliver a stable functional food can manufacturers deliver the best products to consumers.

What is the role of flax, and α-linolenic acid, in the omega-3 debate?

Image courtesy SaskFlax, Flax Council of Canada, FC2015 Inc.

Discussion of the positive attributes for the omega-3 fatty acid category as well as their increasing presence in the marketplace is being accompanied by unfortunate and often confusing messages about the health effects of the specific omega-3s; in particular, the physiological significance of ALA vs. fish oil-derived EPA and DHA. For the last few years, EPA and DHA have been in the spotlight for their health benefits. Recent headlines have warned consumers not to confuse these omega-3s with ALA. However, Aliza Stark, Michael Crawford, and Ram Reifen recently reviewed evidence (*Nutrition Reviews 66*:326–332, 2008) that ALA has an important place in a healthful diet.

According to this review, diets rich in the omega-6 essential fatty acid (EFA) linoleic acid (LA: 9*c*12*c*-18:6) reduce the conversion of ALA to the longer-chain omega-3 fatty acids EPA and DHA, whereas lower LA intakes are associated with reductions in the synthesis of the omega-6 arachidonic acid (AA: 5*c*8*c*11*c*14*c*-20:4). AA is the precursor of eicosanoids, several of which promote blood platelet aggregation, the clotting of blood within blood vessels (thrombosis), and inflammatory reactions.

High intakes of ALA, EPA, and DHA can also block ALA conversion, possibly by signaling that tissue levels of omega-3 fats are adequate and not (as some have claimed) that little will be converted no matter how much dietary ALA is available. Gender also affects conversion: Women of reproductive age reportedly convert ALA to EPA at 2.5 times the rate of healthy men.

ALA has several biologic effects, which together contribute to its positive health effects:

- ALA constitutes 75–80% of the total omega-3 fatty acids in breast milk, supporting its role in the growth and development of infants.
- ALA is required for maintaining the nervous system.
- ALA is the precursor of EPA and DHA. ALA-rich diets increase the ALA, EPA and total omega-3 fatty acid content of cell membrane phospholipids.
- ALA dampens inflammatory reactions by blocking the formation of compounds that promote inflammation, including omega-6-derived eicosanoids, cytokines, platelet-activating factor, and C-reactive protein. Inflammation is a feature of many chronic diseases such as heart disease, type 2 diabetes, metabolic syndrome, obesity, cancer, and Alzheimer's disease. ALA also interferes with the conversion of LA to AA—acting

as a "nutritional brake" to block the conversion of AA to its pro-inflammatory eicosanoids. The production of eicosanoids from AA in mononuclear cells decreased 30% in healthy men who consumed flax oil for four weeks.

Epidemiological studies and, increasingly, clinical work support the beneficial effects of ALA in minimizing the risk of heart disease and reducing inflammatory effects. ALA is the main, if not only, omega-3 in the diet of at least one billion vegetarians worldwide. Despite not consuming fish, vegetarians do not have a higher prevalence of chronic diseases than nonvegetarians.

It is unfortunate that the omega-3 debate—and those that choose to downplay the importance of ALA in the diet—has not focused on the omega-6 side of the metabolic equation. The typical North American diet is "deficient" in omega-3 fatty acids and overly rich in omega-6 fatty acids: The n-6/n-3 ratio may be as high as 17:1 in some Western diets. In the Women's Health Study, some women ate diets with a ratio of 33:1. The omega-6/omega-3 (n-6/n-3) ratio recommended by international nutrition agencies ranges from 4:1 to 10:1.

An imbalance in the n-6/n-3 ratio in tissues and blood can lead to the overproduction of pro-inflammatory eicosanoids, many of which are derived from AA. Excess eicosanoids, in turn, stimulate the release of inflammatory cytokines and acute-phase proteins. The end result is a low-grade chronic inflammation that contributes to health problems. Improving one's n-6/n-3 ratio can be achieved by decreasing the intake of omega-6 fats, increasing the intake of omega-3 fats or, most importantly, doing both.

The omega-3 industry can justifiably be accused of not clearly communicating the benefits of the family of omega-3s. For some who are promoting ALA, the use of "borrowed" science from the well-studied arena of the fish-based EFA has lead to confusion and to the understandably defensive position taken by several companies marketing long-chain EFA. But some of these latter companies have gone too far in minimizing the importance of ALA—even promoting the theory that, since Western diets contain an abundance of omega-6 fatty acids, the enzymes are not efficient in converting ALA and that, by implication, the consumption of ALA is useless.

The current intakes of EPA and DHA in North America (130–150 milligrams per day) are well below the levels recognized for optimal health. To bridge this "nutritional gap" will require increasing the intakes of all the omega-3s—ALA, EPA, and DHA—in whole foods, flax, fortified foods, and supplements and decreasing the intakes of omega-6s.

In September 2004, the US Food and Drug Administration approved a qualified health claim for reduced risk of coronary heart disease on conventional foods that contain EPA and DHA. This claim, however, does not extend to ALA—because ALA was not a part of the petition process.

The "magic bullet" approach to diet and nutrition has hurt the supplement industry. It would be a shame if the competitive nature of omega-3 marketers attempting to gain a stake in the mass market food industry leads us down a similar all-or-nothing pathway.

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Briefs

In October 2008, Japan released a proposal for voluntary carbon footprint labeling and will begin a pilot project in 2009, according to the US Department of Agriculture's (USDA) Foreign Agriculture Service (FAS). The proposal calls for a label that bears a numerical rating based on an estimate of CO_2 emissions created during the life of a product, from procurement of raw materials through production, distribution, use, and eventual disposal. More information about the project is available in FAS's GAIN Report No. JA9001 at www.fas.usda.gov/gainfiles/200901/146327006.pdf.

■■■

The US Soybean Export Council (St. Louis, Missouri, USA) has released a Soy Protein Concentrate Technical Bulletin for Aquaculture Feeds to inform aquaculture producers which types of soy protein concentrate (SPC) are most suitable for aquaculture feeds. The bulletin outlines how SPC is manufactured, provides current information on types of SPC available, and indicates the type of SPC most suitable for use in aquaculture. The bulletin is available at www.ussoyexports.org/resources/SPCforaquaculture.pdf.

■■■

Farmer cooperative Silver Fern Farms and Modena Investments, jointly owned by New Zealand tallow company Landmark and Italian rendering firm Societa Azionaria Prodotti Industrali, have created a new company called Farm Brands. Silver Fern Farms Chief Executive Keith Cooper told AllAboutFeeds.com that the new company was formed to boost the production and sales of meat and bone meal as well as tallow.

■■■

Swedish engineering group Alfa Laval was set to cut at least 1,000 employees globally as a result of a decline in market demand, according to AP-Technology.com, an online news source. Alfa Laval provides products and services related to heat transfer, separation, and fluid handling technologies. The cuts are expected to come during the first six months of 2009. ■

News & Noteworthy

Courtesy Cognis

India's edible oil deficit expected to grow

India's edible oil deficit is expected to grow by 73.5% by 2020 to more than 8.1 million metric tons (MMT) from the current 4.71 MMT, according to the Associated Chambers of Commerce and Industry of India (Assocham).

During the last two decades, the consumption of edible oils in the country has increased at a compounded annual growth rate of 4.25%, from 4.9 MMT in 1986/87 to 11.4 MMT in 2006/07, Assocham noted.

The report also pointed out that the yield of nonnative oilseeds such as soybean and sunflower is just half of the global average. The yield of traditional oilseeds is also well behind global average. In addition, expansion of groundnut (peanut) cultivation has been hindered by limited export demand for groundnut meal due to the prevalence of aflatoxin in the meal. Further, repetitive sowing of the groundnut crop in southern India has resulted in a deterioration of the soil and an increase in pest infestation, which has resulted in low yields and erratic production of groundnuts.

The Assocham report pointed to oil palm as having the greatest potential to raise the amount of edible oil produced per unit of land. It also noted that there is a need to boost the irrigation coverage of oilseed crops in the country to increase acreage and yield.

In related news from India, the Solvent Extractors' Association of India (SEA) expects oilseed production to remain stagnant during the 2008/09 marketing year at 26–27 MMT, which may lead to a rise in imports of more than 200,000 metric tons.

Report on China's rapeseed processing industry

China's rapeseed processing industry suffered severe losses in 2008 because of the plunge in the price of rapeseed oil, with over half of the country's rapeseed oil-related firms on the verge of bankruptcy, according to a report by the Xinhua News Agency.

The Xinhua report said that the price of domestic rapeseed oil sank from a high of 16,500 yuan/metric ton (about $2,413) in March 2008 to around 6,800 yuan/metric

ton (MT) in December 2008. In addition, the report noted that among 220 rapeseed processing companies in China, 208 incurred losses in 2008 and only 12 saw profits or reached the breakeven point.

Liang Hongxing, general manager of the Hubei Aoxing Cooking Oil Industry Co. was quoted as saying that many processing enterprises kept their production cost for rapeseed oil at about 12,000 yuan/MT, which is almost 4,000 yuan higher than the current market price.

Xinhua also said that the latest data released by China's General Administration of Customs showed that China imported just over 1 MMT of rapeseed from January to November 2008, up 25.8% over the same period the previous year. China's domestic output of rapeseed was estimated at 11.5 MMT in 2008, up 930,000 MT, or 8.8%, over 2007.

Defatted soy flour as filler substitute for rubber tires

US Department of Agriculture Agricultural Research Service (ARS) scientists Lei Jong and Jeffrey Byars are testing soy flour as a "green" filler for tires and other natural rubber products (*J. of App. Polym. Sci. 111*:2049–2055, 2009).

Current fillers generally are petroleum-based particles known as "carbon black." Manufacturers use them in rubber to improve tensile strength and wear resistance. However, Jong and Byars' research at the ARS Cereal Products and Food Science Research Unit of the National Center for Agricultural Utilization Research in Peoria, Illinois, USA, indicate that soy flour could serve as an alternative to carbon-black tire fillers.

The scientists use defatted soy flour that has been dispersed in water to form aggregates 10 microns in diameter (about 1/1000th of an inch). Then they add the aggregates to rubber latex and freeze-dry the mixture. This causes the aggregates to form a tight interconnecting network through the rubber.

To test the soy-based rubber, the researchers mold it into samples and subject them to shearing and other forces. Of particular interest is the "storage modulus," which measures the elasticity of a material. On average, the storage modulus scores of composites containing 30% soy flour are 20 times higher than filler-free rubber, but somewhat lower than those reinforced with carbon black.

High-oleic soybean close

The high-oleic soybean variety being developed by the Bunge DuPont Biotech Alliance is on-track for limited introduction in 2009 pending regulatory approvals, according to the United Soybean Board of St. Louis, Missouri, USA.

Based on 2008 harvest results, the high-oleic soybeans contain at least 80% oleic acid, significantly increasing the stability of the oil when used in frying and

food processing. In addition to delivering at least 80% oleic acid, the high-oleic soybean oil trait has consistently demonstrated a linolenic acid content of less than 3% and more than 20% less saturated fatty acid content than commodity soybean oil, USB said.

New project looks at oilseed resins

The industrial hemp plant is one of six identified by Department of Primary Industries (DPI) scientists in Queensland, Australia, as a source of natural resin to reduce the building industry's reliance on resins produced from fossil fuels.

After agronomic research, DPI scientists are looking at six species that show high potential for the extraction of oil for resin and that are currently not part of an existing oil production and refinery system, a report by the AAP Newswire noted. Research will continue into the suitability of *Cannabis sativa* (industrial hemp), *Calendula officinalis* (pot marigold), *Camelina sativa* (false flax), *Pongamia pinnata* (pongam tree), *Lesquerella fendleri* (desert mustard), and *Crambe abyssinica* (abyssinan mustard).

Project partners include DPI, the University of Southern Queensland, and Composites Pty Ltd. of Darlington Heights in Queensland.

Acquisitions/ mergers/spinoffs

Environmental Lubricants Manufacturing, Inc. (ELM: Cedar Rapids, Iowa, USA) has spun off its metalworking fluids technology to **Performance BioLubes** (PBL: Morton Grove, Illinois, USA). PBL was formed by the distributors of ELM metalworking fluid products and includes former ELM metalworking fluids manager Gene Tripp.

■■■

American Green Group, Inc. (New Haven, Connecticut, USA) announced that its wholly owned subsidiary, **Eco-Built Systems, LLC** , will acquire **Paradigm Polymers, Inc.** (Macon, Georgia, USA), a producer of soy-based spray foam insulation products. The transaction was expected to close in January 2009.

■■■

Frutarom of Haifa, Israel, has signed an agreement to acquire the assets and business of the UK-based company **Oxford Chemicals Ltd.** for $12 million, according to Frutarom. Both companies produce flavor and fragrance ingredients.

Commodities

CACAO

London cacao prices hit a 23-year high in January 2009, but could see a price drop in 2009, according to the **International Cocoa Organisation** (ICCO) of London. ICCO said that the economy's impact on chocolate consumption in the coming year is difficult to predict.

■■■

Archer Daniels Midland Co. (Decatur, Illinois, USA) is acquiring **Schokinag-Schokolade-Industrie Herrmann GmbH & Co. KG** (Mannheim, Germany), one of Europe's leading producers of chocolate and cocoa powder. The purchase is subject to approval by relevant antitrust authorities.

CANOLA/RAPESEED OIL

The *Balochistan Times*, a Pakistani newspaper, said in January that the area in Pakistan under cultivation for canola has increased from 8,000 acres (about 3,200 hectares) in 1995 to over 400,000 acres in 2008.

COCONUT

Engineering professor Walter Bradley and two students from Baylor University in Waco, Texas, USA, are using **coconut fibers** in place of petroleum-based synthetic polyester fibers to make compression-molded composites for automobile parts such as bed liners, floorboards, sun visors, and inside door covers. The team is working with Waco-based **Hobbs Bonded Fibers**, which supplies car parts to four major automotive companies, and other manufacturers. Bradley told the *Waco Tribune-Herald* newspaper that he hopes to have the coconut car parts in use by the second quarter of 2009.

■■■

Coconut oil exports from the Philippines are expected to reach at least 1 MMT in 2009, with both output and demand expected to recover, a senior government official recently told the *Manila Bulletin* newspaper. The country, the world's largest exporter of coconut oil, was planning to export 1 MMT in 2008, but officials said full-year shipments may only reach 850,000 MT, less than the 886,561 MT exported in 2007.

FISH OIL/MEAL

The **production of seafood through aquaculture** will probably remain the most rapidly increasing food production system worldwide through 2025, according to an assessment published in *BioScience* (59:27–38, 2009). The assessment, by James S. Diana of the University of Michigan at Ann Arbor (USA), notes that despite well-publicized concerns about some harmful effects of aquaculture, the technique may, when practiced well, be no more damaging to biodiversity than other food production systems. Moreover, it may be the only way to supply growing demand for seafood as the human population increases.

OLIVE OIL

A six-month trial designed to help olive growers identify the **best storage solution for extra virgin olive oil** is being conducted by the New South Wales (Australia) Department of Primary Industries in Wagga Wagga, under the direction of AOCS member and Principal Research Scientist Rod Mailer. "We will be testing 10 different collapsible bags and two rigid plastic containers, each with a 1,000-litre capacity," Mailer told the *Weekly Times* (Australia) newspaper.

PALM OIL

Palm oil producers in Nigeria spoke out in January 2009 against the Nigerian government's plan to lift the ban on the importation of palm oil and other related products, according to a report in the Africa News newsletter. Implementation of the plan would lead to wide-scale unemployment on palm oil plantations and accelerate urban-rural migration, the **Plantation Owners Forum of Nigeria** said.

SUNFLOWER

Cargill has introduced its nongenetically modified sunflower lecithin in the Americas, after the lecithin achieved GRAS status (Generally Recognized as Safe) from the US Food and Drug Administration. The sunflower lecithin was introduced first in November 2008 in Europe, the Middle East, Africa, and the Asia Pacific region, www.FoodNavigator-US.com said.

■■■

Based on data from *Oil World*, the United States is now the fifth-largest net importer of vegetable oils in the world. Palm oil imports have surged and are expected to increase by another 26% in 2009, the **National Sunflower Association** (NSA) noted in its weekly newsletter. In addition, NSA said that sunflowerseed plantings were down by 20% in Argentina; if dry conditions continue, average yields likely will decline as well.

■■■

After harvesting a record amount of sunflowerseed this year, Russia is setting new records for exports of sunflower oil, Institute for Agricultural Market Studies

(IKAR) General Director Dmitry Rylko told the Interfax News Agency. Sunflower oil exports totaled 142,000 MT in September–November 2008, which is significantly higher than the previous full-year record of 76,000 MT seen in 2006. Russia exported 52,000 MT of sunflower oil in 2007, Interfax said. The main importers of Russian sunflower oil are Kazakhstan, the Netherlands, Turkey, Spain, and Greece. Exporting companies include **Sun Products**, **Yug Rossii**, and **Aston**.

New ventures

Archer Daniels Midland Co. (ADM: Decatur, Illinois, USA) and **Aliança Da Terra**, an advocate for sustainable farming in Brazil, have initiated Doing it Right, a program to encourage Brazilian soy growers to adopt sustainable farming practices.

Doing it Right enlists growers as partners in the effort to ensure that each hectare of farmland achieves its maximum yield potential. The aim is to increase farmers' profitability while reducing the environmental impact of their operations and helping to ensure good working conditions for farm employees.

■■■

Thailand's **Saha Pathanapibul Plc**, a subsidiary of the **Saha Group**, has formed a strategic alliance with **Raisio**, the Finnish health products manufacturer, to introduce Raisio's cholesterol-lowering plant stanol product, Benecol, to the Thai market.

■■■

Medisyn Technologies Inc. (Minnetonka, Minnesota, USA) will work with **Kraft Foods Inc.** (Glenview, Illinois, USA) to develop functional foods. Medisyn, which was founded in 1999, uses a technology known as "forward engineering" to identify bioactive compounds. The technology involves a series of complex mathematical equations aimed at developing a "bioactive template" based on certain characteristics that distinguish the active properties of a compound from the inactive properties.

R&D

The whey protein β-lactoglobulin may spontaneously bind the omega-3 fatty acid docosahexaenoic acid (DHA) and offer nanoencapsulation potential for formulators, according to www.FoodNavigator.com. "Israeli researchers report that the whey protein may be a nano-vehicle for DHA, and nanocomplexes with pectin produced transparent dispersion with extended shelf-life for the ingredient," the online food news site reported. The research appeared in *Food Hydrocolloids* (*23*:1120–1126, 2009). ■

INSIDE AOCS

Purtle, Grime elected to lead AOCS

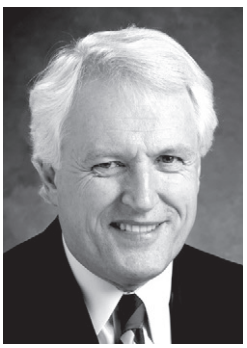
Ian Purtle, director, Process Solutions Technology Development Center and vice president, Cargill (Minneapolis, Minnesota, USA), was elected AOCS president in the 2009–2010 officer election. J. Keith Grime, president, JKG Consulting (Cincinnati, Ohio, USA), was elected vice president. Under AOCS by-laws, the vice president is also president-elect and runs unopposed for president the following year.

Timothy Kemper, president and CEO, Desmet Ballestra North America, Inc. (Marietta, Georgia, USA), was elected to a two-year term as treasurer.

The new officers will be installed May 5, 2009, during the 100th AOCS Annual Meeting & Expo in Orlando, Florida, USA.

Elected as AOCS Governing Board members-at-large were: Christopher L.G. Dayton, research scientist, Oil Center of Excellence, Bunge Ltd. (Bradley, Illinois, USA); Sevim Z. Erhan, center director, Eastern Regional Research Center (ERRC), North Atlantic Area, Agricultural Research Service (ARS), US Department of Agriculture (USDA; Wyndmoor, Pennsylvania, USA); William J. Hausmann, vice president of operations, Lou Ana Division, Ventura Foods, LLC (Opelousas, Louisiana, USA); and Andrew Proctor, professor, Department of Food Science, University of Arkansas (Fayetteville, USA).

Purtle



Grime

Continuing in their current terms as members of the Governing Board are: Steven E. Hill, director of cheese research and development, Kraft Foods (Glenview, Illinois, USA); Erich Dumelin, retired vice president, supply team strategy and technology foods, Unilever (Zürich, Switzerland); Thomas McKeon, research chemist and lead scientist, Crop Improvement and Utilization Research Unit, Western Regional Research Center, ARS, USDA (Albany, California, USA); Neil Widlak, director, strategic technology development, Archer Daniels Midland Co. (Decatur, Illinois, USA); and Alejandro Marangoni, professor and Canada research chair, Food and Soft Materials Science, University of Guelph (Ontario, Canada).

Robert Moreau, research chemist at ERRC, ARS, USDA, continues as Publications Steering Committee chairperson through May 2009; and Deland Myers, director, Great Plains Institute of Food Safety at North Dakota State University (Fargo, USA), continues as Education and Meetings Steering Committee chairperson through May 2011.

Ballots were e-mailed or mailed to eligible members in December 2008. Ballots received prior to the deadline were counted at AOCS Headquarters on February 19, 2009. AOCS member George Willhite was on hand to oversee the counting and verify the results.

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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 Articles of Incorporation; 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 _____

The Philippine National Oil Company-Alternative Fuels Corporation is planning mega jatropha nurseries in Nueva Ecija, Cagayan de Oror, Agusan del Sur, and General Santos City by 2010, and a biodiesel refinery with a 1 million metric ton capacity to be initiated in 2009. Local production of coconut methyl ester is estimated to satisfy the nation's requirement for biodiesel blend until 2011. At that time, jatropha plantations are expected to contribute feedstock for the required biofuel blend. When the mandate for biodiesel was implemented in 2007, the initial requirement was for a concentration of 1%, which calculated out to 78 million liters for the nation. By 2015 this will rise to 209 million liters.

■■■

Construction of a new plant being built by Dynamic Fuels, a joint venture between Tyson Foods (Springdale, Arkansas, USA) and Syntroleum Corporation (Tulsa, Oklahoma, USA), began in January with the pouring of concrete foundations. On completion, the Geismar, Louisiana, facility will use Syntroleum's Bio-Synfining™ technology to convert animal fats and greases provided by Tyson's meat-processing operations into ultra-clean renewable diesel and jet fuel. Startup is planned for early 2010.

■■■

The Federal Court in the Southern District of Florida, USA denied in January a joint motion from defendants Exxon, Chevron, Conoco Phillips, BP, and Shell to dismiss a lawsuit filed by three Florida residents contending that gasoline blended with ethanol may destroy fiberglass fuel tanks and tends to absorb water and phase-separate, which could damage all boats, whether they have a fiberglass tank or not. The oil companies argued that federal and Florida law preempted the proposed class action lawsuit. Denial of the motion to dismiss means the Court has allowed the plaintiffs to proceed with their lawsuit. One consequence of a decision favoring the plaintiffs would be a requirement that oil companies place a warning label on all pumps at all gas stations in Florida, notifying the public that use of gasoline blended with ethanol may be hazardous to their boats. ■

Biofuels News

BIODIESEL

Safflower oil for biodiesel

Nigeria-based Global Biofuels (Lagos) is developing plans to produce biodiesel from safflower oil. The intended market is power industries and electric power generators.

The company is presently building ethanol production facilities in nine Nigerian states, and anticipates beginning production by December 2009. Initial production is being scaled for 27 million liters of ethanol per year, and 30 million liters per year of biodiesel. This is equivalent to 3% of the total Nigerian transport fuel market for 2009.

Chemicals from glycerol

Scientists from South Korean universities, the state-run Korea Research Institute of Chemical Technology, and GS Caltex have collaborated to extract glycerol carbonate (GC) and 3-hydroxypropionic acid (3-HP) from glycerol by using "a special catalyst." The scientists calculate that production of these chemicals from by-product glycerol, remaining after biodiesel synthesis, can reduce biodiesel production costs by 15%.

GC is a solvent used for industrial and medical purposes; it could replace propylene carbonate. 3-HP is a water-soluble compound used in the industrial production of various chemicals such as acrylates.

A Korean official speculated that a fully optimized process for large-scale production could be completed by 2012.

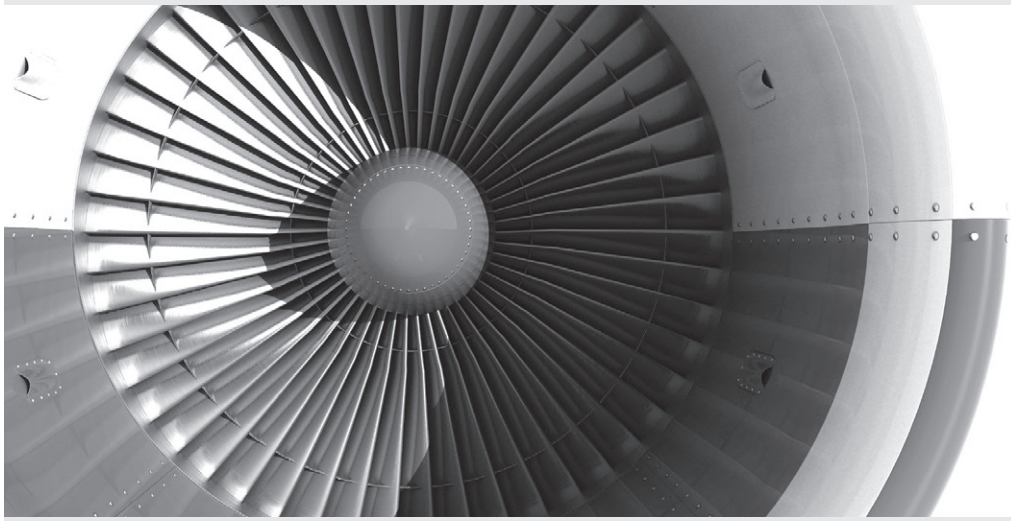
Cavitation Technologies accelerates reactions

Cavitation Technologies, Inc. (Chatsworth, California, USA) recently filed a patent for rapid modification of crude oil. According

to the company press release, cavitation in fluids provides superior mixing and may significantly accelerate rates of chemical reactions and processes. The company claims its process can accept vegetable oils containing less than 4.5% free fatty acids and increase the velocity of the continuous flow esterification reaction and the quality of the resultant biodiesel. Sodium methylate is the catalyst used, and the reaction can take place at ambient pressures and a low temperature (60°C). Operating and maintenance costs are low, according to the company.

Valcent lays off half its staff

Valcent Products Inc. (El Paso, Texas, USA) has been developing a vertical growth system for algae intended to serve as feedstock for biodiesel (see *inform 19*:432–437, 2008). In mid-January, 19 people, or about half of the company's staff, were laid off as part of cost-cutting and restructuring. The *El Paso Times* quoted Gerry Jardine, a member of the board of directors, as saying, "The general economic downturn has affected us like a lot of other companies, and we had to make some hard choices." He added, "We are not shutting down the company." No executive changes were made.



Airlines test aviation biofuel

On January 8, 2009, Continental Airlines became the first North American airline to test biofuels in one of its planes. One of its Boeing 737 airliners took off from Houston, Texas, operating one engine on a B50 (50% biodiesel, 50% Jet A) blend during a two-hour flight. UOP LLC (Des Plaines, Illinois, USA) created the biofuel for the flight, comprising 94% jatropha oil, provided by Terasol Energy (Texas, USA), and 6% algae oil, supplied by Sapphire Energy (San Diego, California, USA). Preliminary data indicated the engine performed as predicted. No problems were encountered during the flight.

UOP anticipates licensing its fuel technology by mid-2009, according to *Biofuels Digest*.

On January 30, Japan Airlines also tested a biofuel blend (50% traditional Jet A fuel, 50% biofuel) in a Boeing 747-300 aircraft powered by a Pratt & Whitney engine; 84% of the biofuel came from camelina seed oil, under 16% from jatropha oil, and under 1% from algal oil. Camelina was selected because the plant can grow in dry areas and at high latitudes; these characteristics make the plant less competitive with food crops and thus more sustainable. Sustainable Oils Inc. (Bozeman, Montana, USA) provided the camelina fuel, Terasol Energy the jatropha oil, and Sapphire Energy the algae oil.

German biodiesel plants face closure

Johannes Lackmann, chief executive of VDB (Verband der Deutschen Biokraftstoffindustrie), the lobbying association for German biofuel producers, told news agency Reuters that the government's decision to raise taxes on green fuels and to scale back a mandated increase in biofuel blending with fossil fuels would force closure of some of the country's biodiesel plants in 2009, particularly small- and medium-sized ones. He anticipated that increased taxes, which were to have taken effect January 1, would reduce demand for the fuel in Germany, and predicted that larger plants would be able to export their product to the European Union and eastern Europe.

There was uncertainty as to when the tax increase would actually take effect. The original increase was to be 6 eurocents per liter on January 1, 2009. However, in late 2008 the government yielded to industry protests that this increase was making biofuels too expensive in comparison with fossil fuels and cut the increase to 3 eurocents. As of January 19, the change had still not become law, leaving the question in limbo.

The government also cut the mandated biofuel percentage, originally set for 6.25% for 2009, to 5.25% in October 2008. The VDB estimated this change would reduce biodiesel demand for 2009 by 600,000 tons—equivalent to the output from six biodiesel plants. However, this change too had not been implemented by mid-January, leaving blending levels unclear.

Although passage of these changes by the German parliament was expected, with backdating to January 1, Lackmann told Reuters the uncertainty was contributing to declines in the German green fuel industry.

Biodiesel tested in Atlas rocket engine

In late January announcement was made that biodiesel had been used to power a Rocketdyne LR-101 engine. This engine had originally been designed for use on the General Dynamics/Convair Atlas missile. Liquid oxygen and B100 (i.e., 100% biodiesel) were compared with US Air Force-

supplied RP-1 grade kerosene. Based on a 6-second burn, B100 produced 820 lb (3.64 kN) of thrust compared with the RP-1's 840 lb. Flometrics (San Diego, California, USA), a fluid dynamics and product engineering specialist, suggested that the reduction in performance may have been caused by the larger droplet size associated with the more viscous B100.

Disneyland restaurants fuel Park's trains

Biodiesel created from waste oil discarded by Disneyland Park's various hotels and eateries is being used to fuel five trains in operation at the Park, located in Anaheim, California (USA).

Disneyland's first attempt to use biodiesel in the Park in 2007 failed when biodiesel from soybeans grown in the Midwestern United States developed storage problems. Also, the Park now prefers the idea of using waste oil in favor of soybean oil that could have been used for food. The *Orange County (California) Register* reported that, if the biodiesel made from waste oil is successful, the management of Disneyland plans to use the new biofuel in its Mark Twain paddlewheel steamboat ride and other on-site equipment.

Corn oil biodiesel claimed to outperform soybean biodiesel

The cold flow properties of NextDiesel™ branded corn oil-derived biodiesel are superior to those of biodiesel produced from soybean oil, according to manufacturer GreenShift Corporation (New York, USA). GreenShift extracts crude corn oil from distillers' grain, a co-product of ethanol production, through a patent-pending technology for conversion into biodiesel. The company says the cloud points of their NextDiesel range between –3°C and –5°C.

Philip Bollheimer, former AOCS president, is the director of process design for GreenShift.

The company estimates that 6.5 million gallons of crude corn oil could be extracted for every 100 million gallons of ethanol produced from corn.

Growing jatropha in California

Chevron is sponsoring a project with the University of California-Davis (USA) to develop *Jatropha curcas* as a crop for biodiesel in the state. Working with engineers, plant scientists, and geneticists, the three-year program will focus on plant domestication, yield improvements, and harvest optimization.

The first year of the study is nearly complete. Points considered so far include (i) how to dispose of the plants' remnants after oil is extracted from the seed: fuel to power electricity generation and fertilizer manufacture are being considered; (ii) how to develop mechanical harvesting methods; (iii) how to determine the effect of growing environment and genetic diversity on seed yield; (iv) how to deal with seed toxicity; (v) how to identify whether jatropha will be invasive in California; and (vi) how to modify the plant genetically so that fruits mature simultaneously: this would make mechanical harvesting easier.

Image courtesy Disneyland Resort Press and Publicity.

School buses allegedly stall on biodiesel

Schools in the Bloomington School District (Minnesota, USA) were closed on January 16, when temperatures fell to –20°F (–29°C), because 12 of 109 buses stalled. The school district initially claimed that elements in the biodiesel fueling the buses had gelled, thus clogging the engine filters. (Starting in 2005, Minnesota mandated that all diesel fuel sold in the state must contain 2% biodiesel.)

However, Bill Walsh, communications director for the Minnesota Department of Commerce, said on January 22, "An independent investigation confirmed what we believed last week—when it gets to 20 degrees below zero in the Midwest, diesel engines have trouble operating unless they are properly maintained—whether or not they are using a biodiesel blend."

The MEG Corporation of Golden Valley, Minnesota, analyzed clogged filters taken from the stalled buses and reported, "It is our determination that paraffin wax dropout is the reason for the bus filters plugging." The wax originates in the ultra-low-sulfur diesel #2 portion of the blend, according to the report. Furthermore, MEG said, "We contacted the fuel supplier to determine if they had other customers having fuel-related issues. The fuel supplier, which supplies 15 school districts with over 1,000 buses in total, said that the

Bloomington-based bus company was the only fleet that was experiencing filter plugging issues."

New method for testing biodiesel stability

The US National Institute of Standards and Technology (NIST) announced in January a method to accelerate stability testing of biodiesel fuel made from soybeans and also identified additives that enhance stability at high temperatures. Both oxidation and heating can cause biodiesel to break down, adversely affecting performance. These two effects usually are analyzed separately, but NIST chemists developed a method to approximate both effects at once while also analyzing fluid composition.

NIST's "advanced distillation curve method accelerates and simplifies testing of biodiesels," according to T.J. Bruno and co-workers (Bruno, T.J., *et al*., *Energy & Fuels,* publication date[web] January 2, 2009. DOI: 10.1021/ef800740d). The method was used to demonstrate the effectiveness of three additives (1,2,3,4-tetrahydroquinoline, *trans*-decahydronaphthalene; and 1,2,3,4-tetrahydronaphthalene) in reducing oxidation of biodiesel at high temperatures, as would occur in aviation fuels. The chosen compounds helped neutralize free radicals formed at temperatures above 300°C.

GENERAL

Canada slow to publish fuel efficiency standards

In January 2008, Lawrence Cannon, who was federal transport minister for Canada at that time, promised to publish new fuel-efficiency standards for the nation by the end of 2008. These were to take effect with the 2011 model year for the auto industry. The Motor Vehicle Fuel Consumption Standards Act, which became law in late 2007,

required the federal government to give auto companies notice "before the end of the third year preceding that year" in which the standard comes into effect.

No standards had appeared as of January 2009, so now the earliest the government can compel Canadian car manufacturers to meet new fuel-efficiency standards would be the 2012 model year.

New US regulations regarding fuel efficiency standards are expected to become effective in 2011, however, and these are expected to have an effect on vehicles produced in Canada. One reason for the delay in establishing new Canadian standards was voiced by David Adams, the president of the Association of International Automobile Manufacturers of Canada, a lobbying group for Toyota, Honda, Nissan, and others. According to the Canwest News Service, he said, "With the change in administration in Washington, there's a wait-and-see attitude."

Chris Day, press secretary to Transport Minister John Baird, said in early January 2009 that Canada believes it is best to have one standard for North America, not one for each country or separate ones for states or provinces.

The US Department of Transportation had been expected to announce the US standard before the end of 2008, but did not do so.

Venture capital investment in US biofuels

In late January BiofuelsDigest.com released a summary of venture capital investment in US biofuels in 2008. This special report indicated at least $634.8 million had been committed, including $437 million for cellulosic ethanol, $130.5 million for microalgae, and $42 million for biobutanol. Range Fuels (Broomfield, Colorado; ethanol) had received $166 million by May 6, Sapphire Energy (San Diego, California; green crude from algae) $100 million by September 18, Amyris Technologies (Emeryville, California; renewable diesel) $61 million by August 15, Mascoma (Boston, Massachusetts; cellulosic ethanol) $61 million by May 6, and Coskata (Warrenville, Illinois; syngas to ethanol) $40 million by December 5. For further information see http://biofuelsdigest.com/blog2/2009/01/23/vc-investment-in-us-biofuels-reaches-6348-million-in-2008-a-biofuels-digest-special-report.

Carbon dating as tool for renewable carbon content

According to *Biofuels Digest*, Beta Analytic (Miami, Florida, USA) is experiencing an increase in requests for radiocarbon dating of fuels for the purpose of determining the amount of fossil fuels contained in blended fuels. The company bases its test on ASTM D 6866-08, Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis. The company is quoted as saying, "The method provides a percentage determination of fossil carbon content versus renewable biomass carbon content of a product or fuel blend."

ETHANOL

Ethanol from corn cobs

At its Scotland, South Dakota (USA) ethanol plant, Poet LLC successfully piloted during the fourth quarter of 2008 the production of ethanol from the corn cobs and fiber usually left behind in the fields at the end of harvest. The pilot-scale biorefinery is expected to produce 20,000 gallons (76,000 liters) of fuel annually starting in 2009. The Scotland plant is a precursor to a larger corn cobs-to-ethanol plant that Poet is scheduled to open in Emmetsburg, Iowa, USA, in 2011.

The Associated Press quoted Poet's Chief Executive Jeff Broin as saying that

processing corn cobs increases the ethanol yield of each bushel of corn by 11%, and the per acre yield by 27%.

VeraSun plans to auction ethanol plants

A Delaware (USA) bankruptcy court judge gave interim approval to VeraSun Energy Corporation, a producer of bioethanol, to auction seven of the eight US BioEnergy plants it purchased in 2008 by the end of March 2009. The eighth plant is backed by a different lender and thus is not part of the plan.

VeraSun (Sioux Falls, South Dakota, USA) filed for bankruptcy in October owing to high corn prices, weak ethanol prices, and its inability to raise enough financing (see *inform 19*:803–804, 2008).

In late January, Reuters news service reported that ethanol producer Poet LLC (Sioux Falls, South Dakota) was considering bidding on VeraSun's distilleries.

Jatropha possible source for both biodiesel and ethanol

Mission NewEnergy (formerly, Mission Biofuels) of Perth, Australia, announced the successful pilot-plant production of cellulosic ethanol from agricultural waste material, specifically jatropha plant waste, in late 2008. Mission has sponsored the planting of over 360,000 acres (146,000 hectares) of jatropha with the intent of processing the seeds for biodiesel. The ability to produce ethanol as well from jatropha waste will allow the company to achieve further value from its jatropha acreage. Before this announcement, few alternatives were available for further use of jatropha waste because of its toxicity.

A November 2008 company press release (accessible at www.missionnewenergy.com) said they are able to separate lignin fully from cellulose and hemi-cellulose, enabling complete hydrolysis of the separated components into C_5 and C_6 sugars, without using enzymes. Complete hydrolysis and formation of both C_5 and C_6 results in higher yields of fermentable sugars for alcohol production.

The pilot plant was set up in a joint venture with a scientific team in India. According to *BiofuelsDigest*, this is one of the first successful non-US cellulosic projects.

Verenium announces commercial cellulosic ethanol

Highlands County, Florida, USA, will be the site of Verenium Corporation's first commercial-scale cellulosic ethanol facility. The Cambridge, Massachusetts (USA)-based company announced its plans to convert renewable grasses to fuel in January 2009. Lykes Bros. Inc., a multi-generation Florida agribusiness, will provide the agricultural biomass for conversion to fuel.

The plant will be constructed on fallow land and is expected to produce up to 36 million gallons of cellulosic ethanol per year and provide about 140 full-time jobs once operations begin. Groundbreaking is planned for the second half of 2009, and fuel production is expected to start in 2011.

Complete genome of sorghum published

Scientists at the US Department of Energy (DOE) Joint Genome Institute (Walnut Creek, California, USA) and several partner institutions have published the sequence and analysis of the complete genome of sorghum, a major food and fodder plant with high potential as a bioenergy crop. The genome data will aid scientists in optimizing sorghum and other crops, not only for food and fodder use, but also for biofuels production. The comparative analysis of the sorghum genome appeared in the January 29 edition of the journal *Nature* (*457*:551–556, 2009).

Prized for its drought resistance and high productivity, sorghum is currently the second most prevalent biofuels crop in the United States, behind corn. Grain sorghum produces the same amount of ethanol per bushel as corn while using one-third less water. As the technology for producing "cellulosic" (whole plant fiber-based) biofuels matures, sorghum's rapid growth—rising from 8 to 15 feet (2.4–4.6 meters) tall in one season—is likely to make it desirable as a cellulosic biofuels "feedstock." ■

Health & Nutrition

Briefs

The fat cells of overweight people may respond differently to dietary changes than those of their slimmer peers, according to a small study from Dutch contract research firm TNO Quality of Life (near Utrecht, Netherlands).

Researchers led by Marjan van Erk developed an edible spread with a specific fatty acid composition and found that consumption of the spread changed the expression of genes that regulated energy metabolism and inflammation. Those changes were different between overweight and lean people, according to findings that appeared in *Genes & Nutrition* (*3*:127–137, 2008).

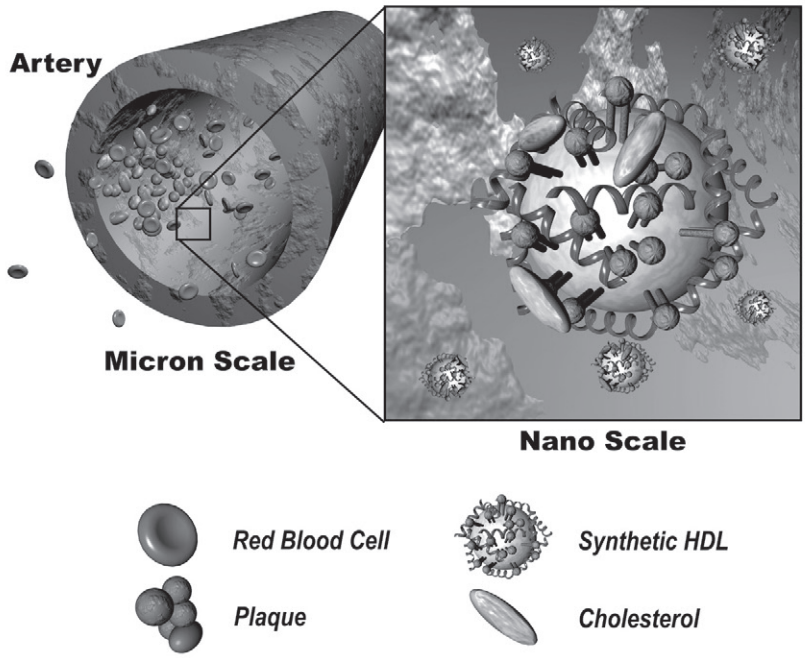
The scientists assigned 10 lean and 10 overweight men to consume either a specially designed spread or a control spread for nine days. Both spreads contained the same amount of fat (40 g), but the fat composition was different. The special spread contained higher levels of medium- and long-chain triglycerides, including lauric, myristic, palmitic, linolenic, and linoleic acids, as well as conjugated linoleic acid.

■■■

Worry over the dangers of peanut allergy has gone too far, according to Nicolas Christakis of the Harvard Medical School (Cambridge, Massachusetts, USA). Christakis recently wrote an editorial entitled "This allergies hysteria is just nuts" in the *British Medical Journal* (*337*:a2880, 2008). "The cycle of increasing anxiety, draconian measures, and an increasing prevalence of nut allergies must be broken," he said.

■■■

The United Kingdom has initiated its "Change4Life" campaign, which is intended to promote healthful eating patterns among UK citizens and encourage exercise in order to stem the country's spiraling obesity rates. Health Minister Ben Bradshaw was quoted by FoodNavigator.com as saying that the government would force food companies to play a part in changing eating habits, which could include limits on fat and sugar content. ■



The synthetic HDL, based upon gold nanoparticle scaffolds, binds cholesterol and can potentially eat away at cholesterol-containing plaques. Image courtesy of Weston Daniel, David Giljohann, and Michael Wiester, Mirkin Research Group.

Synthetic HDL created

Scientists at Northwestern University (Evanston, Illinois, USA) have created a promising new weapon—synthetic high-density lipoprotein (HDL), the "good" cholesterol—that could help fight chronically high cholesterol levels.

The researchers successfully designed synthetic HDL and have shown that their nanoparticle version is capable of irreversibly binding cholesterol. The synthetic HDL, based on gold nanoparticles, is similar in size to HDL and mimics HDL's general surface composition.

"We have designed and built a cholesterol sponge. The synthetic HDL features the basics of what a great cholesterol drug should be," said Chad A. Mirkin, George B. Rathmann professor of chemistry in Northwestern's Weinberg College of Arts and Sciences, and professor of medicine and professor of materials science and engineering. Mirkin and Shad Thaxton, assistant professor of urology in Northwestern's Feinberg School of Medicine, led the study.

"Drugs that lower the bad cholesterol—LDL, or low-density lipoprotein—are available, and you can lower LDL through your diet, but it is difficult to raise the good cholesterol, HDL," said Mirkin. "I have taken niacin to try and raise my HDL, but the side effects are bad so I stopped. We are hopeful that our synthetic HDL will one day help fill this gap in useful therapeutics."

In creating synthetic HDL, the researchers started with a gold nanoparticle as the core. They then layered on a lipid that attaches to the gold surface, then another lipid, and last a protein, called APOA1, the main protein component of naturally occurring HDL. The final high-density lipoprotein nanoparticles are each about 18 nanometers in diameter, a size similar to natural HDL.

"Cholesterol is essential to our cells, but chronic excess can lead to dangerous plaque formation in our arteries," said

Thaxton. "HDL transports cholesterol to the liver, which protects against atherosclerosis. Our hope is that, with further development, our synthetic form of HDL could be used to increase HDL levels and promote better health."

"HDL is a natural nanoparticle, and we've successfully mimicked it," said Mirkin, director of Northwestern's International Institute for Nanotechnology. "Gold is an ideal scaffolding material—its size and shape can be tailored, and it can be easily functionalized. Using gold nanoparticles, which are nontoxic, for synthetic HDL bodes well for the development of a new therapeutic."

The development of synthetic HDL is a result of a successful collaboration between scientists in Northwestern's department of chemistry and the Feinberg School. Bringing these two groups together, says Mirkin, should lead to major advances in translational research. Their next step is to further study the synthetic HDL in biologically relevant conditions and measure and evaluate the cholesterol-binding properties.

The study was published online ahead of press by the *Journal of the American Chemical Society* (doi: 10.1021/ja808856z).

Fat disrupts biological clock

Indulgence in a high-fat diet not only can lead to overweight because of excessive calorie intake but also can affect the balance of circadian rhythms commonly known as the 24-hour biological clock, Hebrew University of Jerusalem (Israel) researchers have shown.

The biological clock regulates the expression and/or activity of enzymes and hormones involved in metabolism, and disturbance of the clock can lead to such phenomena as hormone imbalance, obesity, psychological and sleep disorders, and cancer.

While light is the strongest factor affecting the circadian clock, Oren Froy and his colleagues at the Institute of Biochemistry, Food Science and Nutrition at the Hebrew University's Robert H. Smith Faculty of Agriculture, Food and Environment in Rehovot, have demonstrated in their experiments with laboratory mice that there is a cause-and-effect relationship between diet and biological clock imbalance.

To examine this thesis, Froy and his colleagues, Ph.D. student Maayan Barnea and Zecharia Madar, the Karl Bach professor of agricultural biochemistry, tested whether the clock controls the adiponectin signaling pathway in the liver and, if so, how fasting and a high-fat diet affect this control. Adiponectin is secreted from differentiated adipocytes (fat tissue) and is involved in glucose and lipid metabolism. It increases fatty acid oxidation and promotes insulin sensitivity, two highly important factors in maintaining proper metabolism.

The researchers fed mice either a low-fat or a high-fat diet, followed by a fasting day, then measured components of the adiponectin metabolic pathway at various levels of activity. In mice on the low-fat diet, the adiponectin signaling pathway components exhibited normal circadian rhythmicity. Fasting resulted in a phase advance. The high-fat diet resulted in a phase delay. Fasting raised and the high-fat diet reduced adenosine monophosphate-activated protein kinase (AMPK) levels. This protein is involved in fatty acid metabolism, which could be disrupted by the lower levels.

In their article, the researchers suggest that this high-fat diet could contribute to obesity, not only through its high caloric content, but also by disrupting the phases and daily rhythm of clock genes. They also contend that high fat-induced changes in the clock and the adiponectin signaling pathway may help explain the disruption of other clock-controlled systems associated with metabolic disorders, such as blood pressure levels and the sleep/wake cycle.

The study appeared in *Endocrinology* (*150*:161–168, 2009).

AHA: Eat more omega-6 fats

The American Heart Association (AHA: Dallas, Texas, USA) issued an advisory on January 26, 2009, regarding consumption of omega-6 fatty acids.

The group now recommends that persons consume at least 5–10% of calories from omega-6 fatty acids, and that the omega-6 fatty acids come from foods and not supplements, Further, AHA suggests that replacing saturated fats with polyunsaturated fatty acids (PUFA) may lower the risk for heart disease. Finally, the organization advises that higher intakes of omega-6 may improve insulin resistance, reduce diabetes risk, and lower blood pressure.

Most North Americans actually get enough omega-6 fatty acids in the foods they are currently eating, such as nuts, cooking oils, and salad dressings, the advisory reports. Recommended daily servings of omega-6 depend on physical activity level, age, and gender, but range from 12 to 22 grams/day.

AHA points out that there has been debate within the nutrition community regarding the benefits of omega-6 fatty

acids based on the belief that they may promote inflammation, thus increasing cardiovascular risk. "That idea is based more on assumptions and extrapolations than on hard data," said William Harris, lead author of the advisory and a research professor for the Sanford School of Medicine at the University of South Dakota (Vermillion, USA).

The linkage of omega-6 intake to inflammation stems from the fact that arachidonic acid (AA), which can be formed from linoleic acid (LA)—the main omega-6 fatty acid in foods, is involved in the early stages of inflammation. However, the advisory suggests that AA and LA also give rise to anti-inflammatory agents.

For example, omega-6 PUFA have anti-inflammatory properties in the cells that form the lining of blood vessels, suppressing the production of adhesion molecules, chemokines, and interleukins—all of which are key mediators of the atherosclerotic process. "Thus, it is incorrect to view the omega-6 fatty acids as 'pro-inflammatory,'" Harris explained. "Eating less LA will not lower tissue levels of AA (the usual rationale for reducing LA intakes) because the body tightly regulates the synthesis of AA from LA."

The advisory article also reviews a meta-analysis of randomized, controlled trials, and more than two dozen observational, cohort, case/control, and ecological reports.

Observational studies showed that people who ate the most omega-6 fatty acids usually had the least heart disease. Other studies examined blood levels of omega-6 in heart patients compared with healthy people and found that patients with heart disease had lower levels of omega-6 in their blood.

In controlled trials in which researchers randomly assigned people to consume diets containing high versus low levels of omega-6 and then recorded the number of heart attacks over several years, those assigned to the higher omega-6 diets had less heart disease.

A meta-analysis of several trials indicated that replacing saturated fats with PUFA lowered risk for heart disease events by 24%. "When saturated fat in the diet is replaced by omega-6 PUFA, the blood cholesterol levels go down," Harris said. "This may be part of the reason why higher omega-6 diets are heart-healthy.

The advisory appeared online ahead of print in *Circulation: Journal of the American Heart Association* (10.1161/CirculationAHA.108.191627).

Maslinic acid from olives inhibits cancer cell growth

Researchers from the Universities of Granada and of Barcelona in Spain have shown that treatment with maslinic acid [$C_{30}H_{48}O_4$: (2α,3β)-2,3-dihydroxy-Olean-12-en-28-oic acid], a triterpenoid compound isolated from olive-skin pomace, results in a significant inhibition of cell proliferation and causes apoptotic death in colon-cancer cells. Maslinic acid is a novel natural compound and it is able to induce apoptosis or programmed death in human HT29 colon-cancer cells via the intrinsic mitochondrial pathway. The scientists, who were led by F.E. Reyes-Zurita, suggest this could be a useful new therapeutic strategy for the treatment of colon carcinoma.

This study is the first to investigate the precise molecular mechanisms of the anti-tumoral and pro-apoptotic effects of maslinic acid against colon cancer. Chemopreventive agents of a natural origin, often a part of our daily diet, may provide a cheap, effective way of controlling such diseases as cancer of the colon. A wide range of studies in recent years has shown that triterpenoids hinder carcinogenesis by intervening in pathways such as carcinogen activation, DNA repair, cell cycle arrest, cell differentiation, and the induction of apoptosis in cancer cells.

Triterpenoids are present in a wide range of plants used in traditional medicine and known to have antitumoral properties. Low concentrations of maslinic acid are found in plants with medicinal properties, but its concentration in the waxy skin of olives may be as high as 80%.

The results of the study, which appeared in *Cancer Letters* (*273*:44–54, 2009) could contribute to the development of maslinic acid for use as cancer chemotherapeutic or chemopreventive agents.

For fats, longer may not necessarily be better

Researchers at the University of Kentucky (Louisville, USA) think they have uncovered why some dietary fats such as oleic acid are more prone to induce inflammation: Long-chain triglycerides promote increased intestinal absorption of pro-inflammatory bacterial molecules called lipopolysaccharides (LPS), according to the scientists.

Whereas short-chain dietary fats can be absorbed directly into the bloodstream from the intestines, long-chain fats need first to be packaged by the intestinal cells into particles known as chylomicrons (large complexes similar to high- and low-density lipoprotein cholesterol particles). Erik Eckhardt and colleagues wondered whether some unwanted LPS particles, routinely shed by the bacteria that inhabit the human gut, might also be sneaking into the chylomicrons.

Their hypothesis turned out to be correct; when they treated cultured human intestinal cells with oleic acid they observed significant secretion of LPS together with the chylomicron particles, a phenomenon that was not observed when the cells were treated with short-chain butyric acid. Similar results were found in mouse studies; high amounts of dietary oleic acid, but not butyric acid, promoted significant absorption of LPS into the blood and lymph nodes and subsequent expression of inflammatory genes.

Eckhardt and colleagues believe these findings may pave the way for future therapies for Crohn's disease and other inflammatory bowel disorders. In addition, they note that this study once again highlights the importance of the gut bacteria.

The study appeared in the *Journal of Lipid Research* (*50*:90–97, 2009). ■

Biotechnology News

Briefs

Bayer CropScience (Monheim, Germany) and the German Leibniz Institute of Plant Genetics and Crop Plant Research (IPK; Gatersleben) have entered into a research agreement to develop genetically modified (GM), high-yielding canola hybrids. Bayer CropScience's aim is to incorporate the innovations that are developed in Gatersleben, close to Magdeburg, into its InVigor® Canola seed business in North America, and to develop global oilseed rape products for markets in which there is high demand for healthful, high-quality oils.

■■■

Reed Business Information reported on February 21 that GM corn had been detected in wild varieties of the plant in Mexico. Reports Reed: "In 2001, when biologists David Quist and Ignacio Chapela reported finding transgenes from GM corn in traditional varieties in Oaxaca, Mexico, they faced a barrage of criticism over their techniques. *Nature*, which had published the research, eventually disowned their paper, while a second study by different researchers failed to back up their findings." A more recent study, though, seems to vindicate their claims. Elena Alvarez-Buylla and colleagues at the National Autonomous University (Mexico City) reported that they found transgenes "in about 1% of nearly 2000 samples they took from the region." See *Molecular Ecology (18*:750–761, 2009) for more on the findings.

■■■

Scientists from the US Department of Energy (DOE) Joint Genome Institute (JGI; Lawrence Berkeley National Laboratory, California) and the University of California, San Diego (USA) have developed a set of molecular tools that provide important insight into the complex genomes of multicellular organisms. The strategy could clarify the long-standing mystery of the role played by vast stretches of DNA sequence that do not code for the functional units—genes—that nevertheless may have a powerful reg-

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Courtesy Fernando Weberich

Report forecasts continued GM growth

An additional 1.3 million farmers planted 10.7 million new hectares (ha) of biotech crops in three new countries in 2008, according to the International Service for the Acquisition of Agri-Biotech Applications (ISAAA) brief, entitled *Global Status of Commercialized Biotech/GM Crops 2008*, that was released mid-February. The ISAAA also forecast that genetically modified (GM) crops were "poised for a second wave of strong adoption that will drive sustained global growth through the end of the second decade of commercialization, 2006 to 2015." ISAAA has been tracking global biotech crop adoption trends since 1996.

The annual report found that 13.3 million farmers in a record 25 countries planted 125 million ha of GM crops last year, the sixth-largest growth spurt in 13 years of reporting. The 2 billionth cumulative acre of biotech crops also was planted in 2008, just three years after the first billionth acre, a milestone that had required a decade to reach, according to ISAAA.

"Future growth prospects are encouraging," said Clive James, chairman and founder of ISAAA and author of the report. "The positive experiences in…new regional footholds in south, north, and west Africa will help lead the way for neighboring countries to learn by example. Additionally, political leaders globally are increasingly viewing biotech-enhanced crops as a key part of the solution to critical social issues of food security and sustainability."

James pointed out that G-8 leaders in 2008 for the first time recognized the significance of genetically engineered (GE) crops and called to "accelerate research and development and increase access to new agricultural technologies to boost agriculture production."

The UK's Independent Online (www.independent.co.uk), though, cited "biotech opponents" who doubted the report's claims.

"GM crops are all about feeding biotech giants, not the world's poor," said Nnimmo Bassey, head of Friends of the Earth International. "GM seeds and the pesticides used with them are much too expensive for Africa's small farmers. Those who promote this technology in developing countries are completely out of touch with reality."

James cited a number of indicators to support his forecast for increasing GM use:

- Bolivia, the ninth biotech country in Latin America and the eighth-largest global producer of soybeans, planted 600,000 ha of herbicide-tolerant soy in 2008;
- there was a sharp growth in trait hectares or "virtual hectares" with 10 countries reporting 22 million addi-

tional ha of biotech crops with more than one biotech trait. The ISAAA report predicted that the use of so-called "stacked traits" would drive this number even higher in the future;

- a new biotech crop, herbicide-tolerant sugar beet, was planted in the United States and Canada for the first time in 2008. Nearly 258,000 ha or 59% of the US crop was planted to the herbicide-tolerant variety, the "highest launch adoption level ever" according to ISAAA;
- Brazil and Australia planted new biotech crops previously approved in other countries. Brazil, the world's third-largest maize (corn) producer, planted up to 1.3 million ha of Bt maize in 2008, while Australia grew herbicide-tolerant canola for the first time;
- while France did not plant biotech crops in 2008, the seven other EU (European Union) countries increased their planting 21% to again total more than 100,000 ha, a milestone reached for the first time in 2007. The seven EU countries in order of biotech hectarage of Bt maize were Spain, Czech Republic, Romania, Portugal, Germany, Poland, and Slovakia.

Reuters reported that this last statistic had been called into question by "green" groups who continue to express opposition to the use of GM crops.

"The biotech industry is inflating the figures in an attempt to convince the media and politicians that GM crops are a success," Reuters quoted Helen Holder, GMO campaign coordinator at Friends of the Earth Europe, as saying. Another group, GM Freeze, claimed that ISAAA had "massaged the data on GM crops."

ISAAA's James responded by saying that the statistics were compiled from "multiple estimates…taken from public and private sources."

For more information or the executive summary, visit www.isaaa.org.

EU fails to reach consensus over GM bans

On February 17, Reuters reported that a meeting of EU experts was unable to reach a consensus in the case of French and Greek bans on GM maize. Both France and Greece have put the brakes on the growth of MON 810 maize (developed by Monsanto Co., St. Louis, Missouri, USA) in their own countries, citing questions of science and safety over the crop's growth and consumption.

"The [biotech experts'] committee failed to reach a qualified majority in favor or against the two proposals. For this reason the decision will be referred to the council of [EU] ministers," the European Commission (EC) said in a statement. Reuters reported that, if EU ministers fail to come to a decision in three months' time, then the EC will be tasked with final say in the matter.

The news came just days after a French food safety agency, AFSSA (Agence Française de Sécurité Sanitaire des Aliments), stated that it believed the GM maize did not pose any health risk to either humans or animals. French Prime Minister François Fillon refused to lift his country's ban, despite the news.

"The decision to suspend the growing (of maize) was taken as a precaution due to the potential environmental risks associated with a contamination of non-GMO crops…. France is maintaining the suspension while it awaits a (European) Commission decision, which it will respect," he said at a press conference.

PUBLIC OPINION

Polls across the EU have offered conflicting views of the opinions held by both European consumers and farmers concerning the use of GM crops. In France, polls have tended to show opposition, or at least skepticism; in these polls, the lack of "convincing" evidence for the safety of GM crops has been cited.

BUSINESS.scotsman.com, though, cited a UK survey from the National Farm Research Unit: 45% of farmers favored the use of GM crops; 39% listed themselves in the "don't know" category; and 15% expressed definite opposition.

"European farmers are increasingly interested in using new technologies to meet the multiple challenges of feeding a growing population whilst minimizing the impact on the environment," the website quoted James Ede, of the National Farmers' Union of England and Wales, as saying.

"European ministers…have the opportunity to vote and end the 11-year moratorium on new biotech cultivation and to lift unscientific bans in member states. Europe's leaders should respond to the demands of their farmers and offer them

ulatory influence. DOE bioenergy researchers have an interest in identifying these regulatory regions in plants, where proteins interact with DNA and exert control over gene expression and development, so that plants used as biomass "feedstocks" can be optimized for biofuels production.

"From the Human Genome Project we have a good idea where in the genome the protein-coding genes are located, but these constitute only about 2% of the human genome; the remaining 98% are non-coding sequence whose function is largely unknown," said Len Pennacchio, DOE JGI Genomic Technologies department head. "Our approach employs next generation sequencing technology to find regulatory regions, the 'switches' on a genome-wide scale, and much more cost effectively. It's the next layer of knowledge that's been missing."

Using what is called ChIP-Sequencing or ChIP-Seq, chromatin immunoprecipitation (ChIP) is combined with massively parallel DNA sequencing to identify binding sites of DNA-associated proteins. Traditionally, researchers have relied on evolution to guide them to non-coding sequences that are likely to have a function—such as enhancing the expression of genes. Via the public genome databases, they would align the entire human genome code with that of other vertebrate species (e.g., other mammals, birds, frogs, fish) and then look for sequences that are conserved in evolution.

■■■

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and the Department of Biotechnology (DBT), government of India, announced in early February that they had launched a project for establishing a Platform for Translational Research on Transgenic Crops (PTTC). The DBT-funded Platform is a $6.2 million project whose goal will be to translate transgenic technology and harness its products to meet the needs of agricultural growth and serve as a facility of reference to strengthen national, regional, and international linkages in transgenic R&D, exchange of materials and information, as well

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as support training, consultation, and technology commercialization. The parties involved hope that the PTTC will provide an opportunity for public sector research institutes and private sector biotechnology companies to work together for translating transgenic research into products.

■■■

On February 9, Sense About Science, a charitable trust based in London, UK, unveiled its *Making Sense of GM* guide. Sense About Science hopes the guide will "respond to the public's questions and misconceptions." On its website, Sense About Science points out that there "have been more Google searches on genetically modified crops in the past two years in the UK than anywhere else in the world. While there have been over a trillion GM meals consumed and nearly 120 million hectares of GM crops grown, hardly any of that was in Europe, still less in the UK." The guide covers a wide range of topics, including: the limitations of older selective breeding techniques that GM was developed to overcome; advances in molecular breeding since 2000; and the societal context for improvement in plants, ranging from increasing demands on yield to concern over environmental impact. Download the report at: www.senseaboutscience.org.uk/PDF/MakingSenseofGM.pdf.

■■■

Syngenta (Basel, Switzerland) announced on February 10 that it has agreed to an eight-year research collaboration with Anhui Rice Research Institute (ARRI) of Anhui Academy of Agricultural Sciences in China. The collaborative program is centered around conducting laboratory and field tests of novel gene functions and will focus on drought tolerance and nitrogen utilization optimization in key crops such as corn and soybeans. ARRI will work closely with Syngenta's new biotech research and technology center in Beijing, which was opened in October 2008. ■

the freedom to choose the same tools available to their competitors around the world," he concluded.

Foodnavigator.com reported on February 11 that Terry Leahy, chief executive for Tesco, a UK-based grocery and retail chain, made comments that "signaled that the retailer is willing to back GM foods." Leahy cited changing attitudes in consumers, a "growing appreciation" that GM products would be key to answering the world's food shortages, and "still clearer scientific evidence."

In related news, *The Earth Times* reported that the European Court of Justice ruled on February 17 that EU "member states cannot cover up the location of sites where genetically modified organisms (GMO) have been released, even if they fear that the information could provoke public disorder." The court ruled that potential cases of public disturbance or vandalism "cannot constitute reasons capable of restricting access to the information." Knowledge of the location of GM trials in the EU has been used by anti-GM activists to disrupt or vandalize certain GM sites.

Turning plants into plastic?

More than 20 million tons of plastic are placed in US landfills each year. Results from a new University of Missouri (MU: Columbia, USA) study suggest that some of the largely petroleum-based plastic may soon be replaced by a nonpolluting, renewable plastic made from plants. Reducing the carbon footprint, this "green" alternative may also provide an additional cash crop for farmers.

"Making plastics from plants is not a new idea," said Brian Mooney, research assistant professor of biochemistry with the MU Interdisciplinary Plant Group. "Plastics made from plant starch and soy protein have been used as an alternative to petroleum-based plastics for a while. What is relatively new—and exciting—is the idea of using plants to actually grow plastics."

By using a number of modern molecular techniques, scientists are able to introduce three bacterial enzymes into the model plant *Arabidopsis thaliana*. When combined with two enzymes from the plant, an organic polymer is produced. The polymer, polyhydroxybutyrate-*co*-polyhydroxyvalerate, or PHBV, is a flexible and moldable plastic that can be used to produce a wide range of products, such as grocery bags, soda bottles, disposable razors, and flatware. When discarded, the plastic is degraded into water and carbon dioxide by bacteria in the soil.

"Of the two plant enzymes that supply the chemical precursors for PHBV, one is produced in the mitochondria. Recently, we've successfully modified plants so that this enzyme is diverted to the chloroplast, which has been defined as the best place in the plant to produce PHBV," said Mooney. "We also confirmed that a stable, functional complex is formed."

These advances potentially remove two of the remaining technological hurdles lim-

Courtesy Huhtamaki

iting the ability of companies to turn acres of plants into plastic factories. The next step, said Mooney, is to see whether the technique works in "real" plants, such as switchgrass. Mooney, along with Douglas Randall, professor of biochemistry at MU, has already initiated conversations with scientists at the Donald Danforth Plant Science Center (St. Louis, Missouri) and the Cambridge, Massachusetts-based, environmental tech company Metabolix Inc.

Metabolix and the Danforth Center were recently awarded a $1.14 million grant from the Missouri Technology Corporation to develop a "double-crop" that would produce both a bioplastic and an oil for biodiesel refineries. Metabolix has already successfully produced one form of biodegradable plastic in switchgrass, but with an unacceptably low yield.

India overtakes Canada in GM plantings

On February 19, Sify Business News (http://sify.com/finance) reported that India had surpassed Canada in GM crop plantings, becoming the fourth-largest in the world. Statistics from the International Service for the Acquisition of Agri-Biotech Application (ISAAA) were cited, showing that India's 2008 GM planting had reached 7.6 million ha. The top three in this category were the United States (62.5 million ha), Argentina (21 million ha), and Brazil (15.8 million ha). Canada stood at fifth.

"The 7.6 million ha of Bt cotton in India last year represents 82% of its total area under the crop, the largest proportion in the world. This is higher than corresponding 68% ratio for China (3.8 million ha out of the total 5.7 million ha)," ISAAA Chairman Clive James was quoted as saying.

"This is approximately the same high level of adoption for biotech cotton in the mature cotton markets of the United States and Australia," he added. ■

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Eric K. Dombrowski, Stonehill College
Dustan Dowd, Kerry Ingredients
Lourens M. Du Plessis, Protein Research Foundation
Sushhilkumar A. Dubal, University Inst of Chemical Tech
Jean-Luc Dubois, Arkema Inc
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Sander Geelen, Geelen Counterflow
Hwee Yoong (Felicia) Gok, University of Saskatchewan
Jacob Golbitz, Soyatech/Highquest Partners
Florian Graichen, Ian Wark Labs
Ashley Groteluesch en, Procter & Gamble Chemicals
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Elina Hishamuddin, Malaysian Palm Oil Board
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Ivan Hsu, AarhusKarlshamn USA Inc
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Virginus O. Iheyinwa, AarhusKarlshamn USA Inc
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Gurleen K. Sandhu, North Dakota State University
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AOCS CORPORATE MEMBER

Global specialty chemicals supplier Cognis (Monheim, Germany) recently signed an agreement to sell its Botanicals Extracts Business to Burgundy Botanical Extracts Iberia, S.A. (hereafter, Burgundy). Cognis said it sold the Botanicals Extracts Business in order to streamline its portfolio in businesses that offer critical mass and bring competitive synergies in its key markets. The new owner is Burgundy, a company specializing in the botanical extract business using solvent extraction, headquartered in Reyssouze, near Lyon in France. The company is owned by Cristal Union Group and Holding Financière Maconnaise (HFM).

The Botanicals Extracts Business focuses on the production of botanical extracts for pharmaceuticals, dietary supplements, and cosmetics, and operates two production sites in Spain. Its main products—licorice derivatives, phytopharmaceuticals, and dry and liquid herbal extracts for the dietary supplements and cosmetic industries—are supplied to customers around the world. Under the agreement Cognis will continue production and distribution of certain botanical products for the cosmetics industry and will retain ownership of its Plantalin range, comprised of selected plant extracts designed for functional food and beverage applications. Burgundy Botanical Extracts will distribute the Plantalin range to the pharmaceuticals and dietary supplements industry in the European Union.

■■■

Scientists at the Gladstone Institutes of Cardiovascular Disease (University of California-San Francisco, USA) have found that an enzyme associated with the synthesis of fat in the body is also an element in healthy skin and hair. The enzyme is acyl CoA:diacylglycerol acyltransferase 1 or DGAT1. Mice that lack DGAT1 have many interesting characteristics. For example, they are lean, resistant to diet-induced obesity, are more sensitive to insulin and leptin, and have abnormalities in mammary gland development and skin. When Gladstone researchers in the laboratory of Robert V. Farese Jr. used genetic engineering to delete the

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S&D News

Lawsuit claims manufacturers flouting disclosure law

A group calling itself a nonprofit, public-interest law firm says that US companies manufacturing household cleaners are refusing to follow a New York state law requiring them to disclose the chemical ingredients in their products and the "health risks they pose."

Oakland, California-based Earthjustice recently filed a lawsuit against manufacturers Procter & Gamble (Cincinnati, Ohio), Colgate-Palmolive (New York, New York), Church & Dwight (Princeton, New Jersey), and Reckitt-Benckiser (Parsippany, New Jersey) on behalf of a coalition of state and national groups, including: Women's Voices for the Earth, Environmental Advocates of New York, New York Public Interest Research Group, Riverkeeper, Sierra Club, and American Lung Association in New York.

Earthjustice said in a press release that the first-of-its-kind case could have national implications: "Independent studies into chemicals contained in cleaning products continue to find health effects ranging from asthma to hormone disruption. But ingredient disclosure requirements are virtually nonexistent in the United States."

The group says that the exception to the requirements is a long-forgotten New York state law that requires household and commercial cleaner companies selling their products in New York to file semi-annual reports with the state listing the chemicals contained in their products and describing any company research on these chemicals' health and environmental effects.

Earthjustice noted that in the three decades since the 1976 law was passed, companies have failed to file a single report. In the third quarter of 2008, environmental and public health advocates said they sent letters to more than a dozen companies asking them to comply with the law, and the companies that have been targeted in the lawsuit each ignored or refused this request. Earthjustice noted that several companies complied with the request, filing reports with the state for the first time.

"Sierra Club is working through the courts and with the industry on efforts to fill in the gaps where the public still doesn't have the information it needs to make smart consumer decisions," said Tom Neltner, co-chair of Sierra Club's Toxics Committee. "This New York law can protect consumers by allowing a government agency such as the New York Department of Environmental Conservation to review confidential business information."

enzyme in mice, they found that lack of DGAT1 caused levels of retinoic acid (RA) to be greatly increased in skin and resulted in the loss of hair. Their findings were reported in The *Journal of Biological Chemistry* (*284*:4292–4299, 2009).

"For some time, we have been studying the enzymes that make triglycerides," said Farese, senior investigator and senior author on the study. "We found that one of these enzymes is a major regulator of retinoic acid actions in the skin."

RA, which comes from vitamin A (retinol), has been used to treat skin disorders, such as acne and psoriasis, and certain cancers, but it is fairly toxic and must be carefully controlled. In mice without DGAT1, the skin was very sensitive to retinol. The loss of DGAT1 also caused alopecia, or hair loss. Both of these effects could be prevented by depriving the mice of a source of retinol in their diet. It turns out that DGAT1 can convert retinol to a relatively inert storage form. Without DGAT1, this ability is lost, and any excess retinol in the skin can be converted to RA.

■■■

Huntsman Corp. (Salt Lake City, Utah, USA) and Zavod Sintanolov (Nizhny Novgorod, Russia) have announced that they have signed a cooperation agreement by which both companies "will share know-how, expertise, and resources to develop the Russian market for surfactants." According to the agreement, the Performance Products division of Huntsman will market and sell 50% of the anionic and amphoteric surfactants manufactured in Zavod Sintanolov's newly commissioned plant in St. Petersburg. Customers will include multinational detergent and personal care product manufacturers operating in the Russian Federation. The terms of the deal and plant's capacity were not disclosed.

■■■

Specialty chemical producer Rhodia (Paris, France) has completed its acquisition of the McIntyre Group Ltd., after receiving regulatory authorizations. McIntyre is a privately held manufacturer of specialty surfactants, based near Chicago, Illinois, USA. The acquisition is aimed at reinforcing Rhodia's Novecare's product range for

CONTINUED ON NEXT PAGE

Earthjustice made special note of alkylphenol ethoxylates in its comments: "Independent research has also documented troubling hormone-disrupting qualities of alkylphenol ethoxylates (APEs)—commonly found in detergents, disinfectants, stain removers, and floor cleaners. Some breakdown products of these man-made chemicals can mimic the hormone estrogen and, when released into the environment, are toxic to aquatic wildlife. In laboratory studies, they cause breast cancer cells to proliferate, alter cells in the placenta, and cause reproductive abnormalities. This raises concerns about whether they may increase the risk of breast cancer, miscarriages, and reproductive damage in humans."

Laura Haight, senior environmental associate with the New York Public Interest Research Group, said, "Manufacturers of household cleaning products have a responsibility to inform consumers and state regulators about chemicals in their products that may endanger human health or the environment. This is not only common sense; here in New York, it's the law."

INDUSTRY RESPONSE

The Soap and Detergent Association (SDA; Washington, DC, USA)) responded by arguing that the lawsuit was unfounded, lacked legal standing, and was not supported by state law. SDA went on to say that the challenge ignores efforts by industry to offer more information than ever before about cleaning products and their ingredients. The association expressed disappointment that activist groups, led by Earthjustice, are using an "arcane" New York state regulation as a way to "disparage cleaning product formulators whose products are used safely and effectively by millions of people every single day."

SDA said that the groups' attempts to force disclosure of ingredient information under New York State law are not supported by state regulation.

"We believe that the activists are misinterpreting state law and that their threats are counterproductive," said Michelle Radecki, SDA's general counsel. "The cleaning product industry [has] already unveiled a voluntary program that will provide more meaningful information on ingredients, in a more consistent, easy-to-understand format, that will help consumers make informed decisions about the products they use in and around their homes."

The Consumer Product Ingredient Communication Initiative was unveiled in November 2008 by SDA, the Consumer Specialty Products Association, and the Canadian Consumer Specialty Products Association. The initiative provides different means to inform consumers about the ingredients in products: on the product label; on the manufacturers', distributors', or importers' websites; through a toll-free telephone number; or through some other nonelectronic means.

"The cleaning product industry's ingredient communication initiative goes beyond any law on the books in providing meaningful information to consumers," added Radecki.

SDA stated that responsible manufacturers ensure their products go through comprehensive, extensive risk assessments, and also review scientific developments and monitor product use data that may affect the safety assessment process. SDA said that "an incredible amount" of research and development goes on before products ever hit the shelves, not to mention that the products must meet federal and state quality and safety regulations.

Researchers identify surfactant that could prevent HIV transmission

Researchers at the University of Minnesota (Minneapolis, USA) say they have identified a compound that can prevent transmission of the primate version of HIV (human immunodeficiency virus), called SIV (simian immunodeficiency virus).

Ashley Haase and Pat Schlievert, principal and co-investigator, respectively, in the Department of Microbiology, researched glycerol monolaurate (GML), a naturally occurring compound that the US Food and Drug Administration (FDA) recognizes as safe. GML is a surfactant and is widely used as an anti-microbial and anti-inflammatory agent in food and cosmetics.

After exposure to SIV, the researchers found that the primates' natural defense system was activated, rushing immune cells (T-cells) to the scene of the infection. The virus then hijacks these T-cells to expand infection locally and spread it throughout the body. Schlievert's team figured that GML could shut down the cells that essen-

tially call in the immune system's T-cells. That prevents the virus from spreading.

"So even though it sounds counter-intuitive, halting the body's natural defense system might actually prevent transmission and rapid spread of the infection," Haase said.

They examined GML because, in 1992, Schlievert began using it to combat toxic shock syndrome, a potentially lethal bacterial infection. In recent years, research has shown GML is active against a variety of toxins and microbes and inhibits cytokines and chemokines, small molecules that play key roles in triggering the body's defense system.

Haase said that much work remained to be done before planning clinical trials in humans, including additional testing in other animals and developing dosing and delivery methods that will make it more likely that women will use GML to prevent HIV. Longer-term follow-up studies are also needed into infections that were not apparent in the acute stage of infection, but manifested months later.

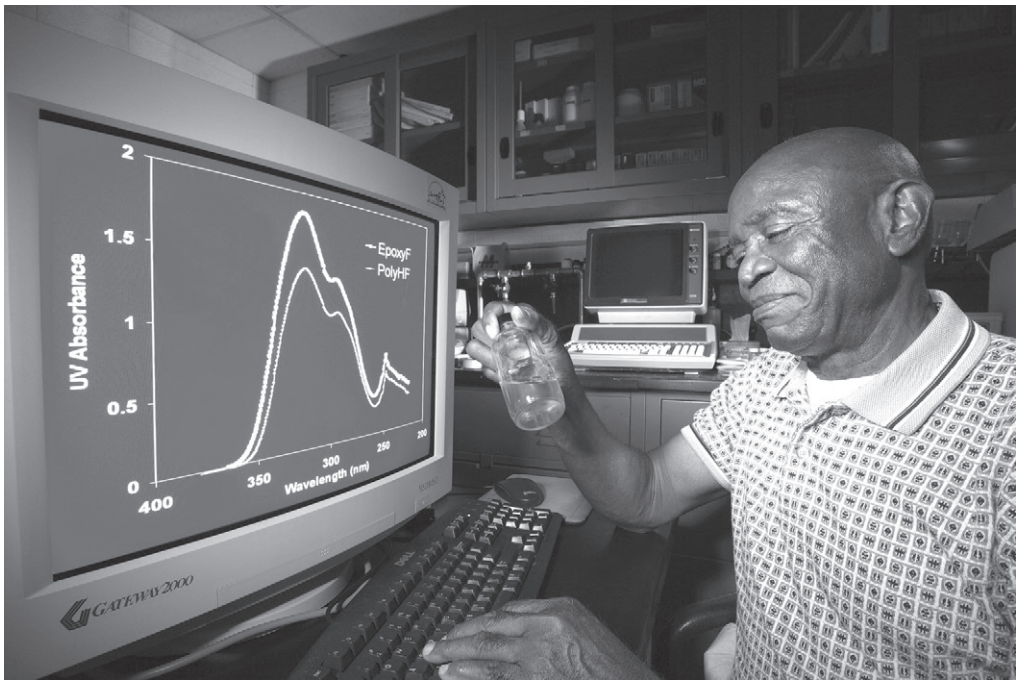
"GML is exceptionally inexpensive, is widely used in foods and cosmetics, and is easy to formulate in many ways," Schlievert said. "The compound has been demonstrated *in vitro* to inhibit the growth of nearly all sexually transmitted disease microorganisms."

The research was published in the March 4, 2009, online edition of *Nature* (doi: 10.1038/nature07831).

Milkweed oil tapped for sunscreen and other products

Common milkweed is the only food source of monarch butterfly caterpillars. But for some farmers, the plant is also a valuable source of floss that can be harvested for use as a hypoallergenic filler for high-end pillows, comforters, and jacket linings.

Floss, though, is not the only usable portion of milkweed. Unsaturated oil in the plant's seed also has potential as a base material for sunscreen, cosmetics, and skin- and hair-care products, including moisturizers and conditioners. That is the conclusion US Department of Agriculture Agricultural Research Service (ARS) chemist Rogers Harry-O'Kuru drew after analyzing the oil's waxes and assorted fatty acids.



Milkweed oil has potential use in sunscreens because it can protect skin from two types of ultraviolet (UV) radiation. Chemist Rogers E. Harry-O'Kuru studies UV radiation absorbance spectra of modified milkweed oils. Photo courtesy of Peggy Greb.

In studies at the ARS National Center for Agricultural Utilization Research in Peoria, Illinois, Harry-O'Kuru devised a procedure for using zinc chloride to catalyze the conversion of milkweed oil's triglycerides into ultraviolet (UV)-light-absorbing compounds called cinnamic acid derivatives.

In tests at the center's New Crops and Processing Technology Research Unit, the derivatives absorbed UV in the range of 260–360 nanometers—wavelengths that can damage skin. Additionally, the milkweed-oil derivatives accomplished this at concentrations of 1–5%, a range far below that approved for today's topical skin formulations, many of which use chemical fillers or sun blocks.

Harry-O'Kuru's milkweed-oil-based sunscreen also contains natural antioxidants such as tocopherols, which are often added to cosmetics as skin-nourishing ingredients. The sunscreen's unique combination of fats and waxes may also qualify it as biodegradable and help keep it from washing off during a swim. Its current form is a clear liquid, but gels, creams, sticks, and aerosol sprays are also possible, according to Harry-O'Kuru.

Besides skin- and hair-care products, the UV-absorbent base material he has devised could also be tailored for use in epoxies, paints, and other industrial applications. ARS has patented Harry-O'Kuru's base material and is seeking an industrial partner to develop the technology further.

personal cleansing and extending its offering for hair care, as well as home, institutional, and industrial cleaning markets.

■■■

Agilent Technologies (Santa Clara, California, USA) and Protein Discovery Inc. (Knoxville, Tennessee, USA) have announced their distribution agreement for PPS Silent Surfactant, a specialized reagent from Protein Discovery used to prepare biological samples for mass spectrometry analysis. The exclusive agreement encompasses aspects of sales, marketing, and support for PPS Silent Surfactant. PPS Silent Surfactant is an acid-cleavable, zwitterionic detergent that helps researchers produce high-quality mass spectra from biological samples. The companies claim that the patented reagent is particularly useful for solubilizing hydrophobic proteins for extraction and preparative digestion. ■

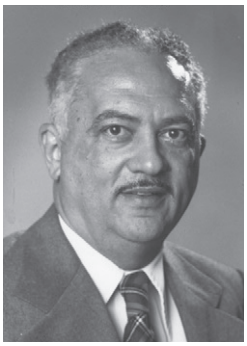
People News/ Inside AOCS

In Memoriam

Arnold Morrison Gavin

Arnold M. Gavin, vice president of AOCS in 1985 and president in 1986, died in Minnesota Lake, Minnesota, USA, on December 12, 2008, at the age of 86.

Gavin was born in Chicago, Illinois, in 1922, and earned a bachelor's degree in chemical engineering from the Illinois Institute of Technology (Chicago) in 1947, with a detour through the US Army Chemical Warfare Service during World War II. His first job out of college involved vanilla extraction, but he soon switched to working for Wilson & Co., meat packers, also in Chicago. There he learned early on about standard analytical methods used in the fats and oils industry by following the AOCS Book of Methods.



During his time with Wilson & Co., the sale of colored margarine became legal, and the company's marketing people demanded a yellow margarine immediately. Gavin was instrumental in positioning Wilson & Co. to be the first margarine manufacturer with colored margarine in US grocery stores.

After Wilson & Co., Gavin worked with Armour & Co. (meatpackers), then Podbilniak Inc. of Chicago (oil processing equipment). He returned to the shortening business in 1957, and in 1959 became project manager for Engineering Management Inc. (subsequently known as EMI Corporation) in Des Plaines, Illinois. EMI was involved with the construction of solvent extraction plants and the design and supply of equipment to manufacture soy proteins. The company was well known for its flash desolventizing systems.

Gavin worked for an outgrowth of Swift International in Buenos Aires, Argentina, from 1963 to 1965 but then returned to EMI, where he worked until retiring in 1986. During that time he was involved with building palm oil refineries in Malaysia and the Far East, and solvent extraction plants, soy protein plants, oil-refining systems, and fatty acid plants for clients in eastern Asia, Mexico, South America, Europe, and Haiti. He continued his relations with EMI during retirement from his Phoenix, Arizona, home.

Within months of joining Wilson & Co., Gavin became a member of AOCS. He took on responsibilities in the organization, and was named general chairman of the Annual Meeting & Expo held in Chicago

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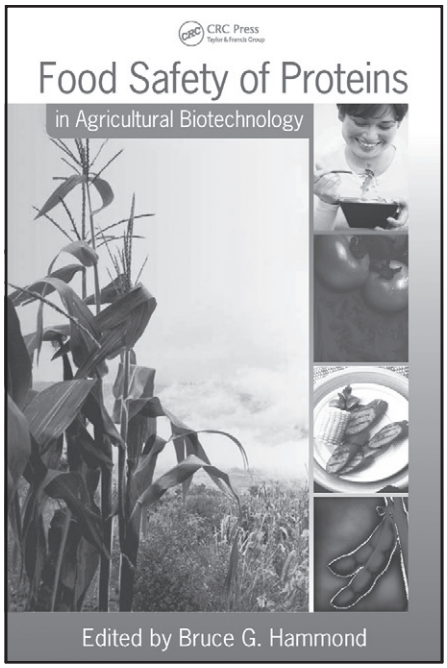
Book Review

Food Safety of Proteins in Agricultural Biotechnology
Bruce G. Hammond (ed.)
CRC Press/Taylor & Francis, 2008
298 pages
ISBN 9780781700801



Anakalo Shitandi

In this book, various experts discuss the safety of food proteins and agricultural biotechnology. Its 11 chapters provide a balanced and organized discussion of the safety of food proteins and biotechnology and how protein safety could be assessed. While the book may not be suitable for beginners, it would be a good resource for those who intend to do food protein safety assessment and for those who are interested in expanding their knowledge of the subject. The issues raised in the book are addressed in a practical and illuminating manner.

The first chapter is an introduction to protein structure and function in plants and animals. It provides an effective background to proteins in terms of the amino acid sequence, protein functionality, synthesis, and degradation.

The second chapter discusses the mode of action of bacterial protein toxins and seeks to clarify the role of conformational changes in the life cycle of a protein toxin. In chapters 3 and 4, the focus is on safety assessment and environmental impact of insect-protected Bt crops.

Chapter 5 discusses the safety assessment of microbial enzymes used in food processing. This chapter is rather brief, and the information presented is primarily of a general nature. Perhaps the contributor could consider increasing the scientific content in future editions.

Chapters 6 and 7 focus on the safety assessment of protein pharmaceuticals. I find these chapters balanced, informative, and well organized. They underscore the substantial progress that has been made in safety assessment. They also provide a regulatory overview of biological therapeutic products and classify the various types of studies. In addition, they provide alternative approaches for food and drug safety assessment. The overview in Chapter 7 on the assessment of bovine somatotropin in the dairy industry is particularly appropriate and well done.

Chapters 8 and 9 provide a more practical discussion of protein assessment for allergenicity and methods for the estimation of protein intake in food, although the rationale including chapter 9 in a book on safety assessment was unclear. The author provides information on general aspects of dietary assessment that does not seem to be closely related to the rest of the book. Perhaps Chapter 9 could be reworked in future versions so that it is linked to safety assessment studies that involve dietary intake.

Chapter 10 provides useful and interesting case studies from an industrial perspective of proteins used in agricultural biotechnology. However, the cases were not discussed in sufficient detail to see how they might fit into the larger picture of safety assessment. This could perhaps be addressed in future versions.

In Chapter 11, the text considers the strategy that could be used for safety assessment that would allow for current and future needs. This is a useful chapter, which is thoughtfully arranged and very practical in scope.

The book includes an alphabetical index with the key words/terms and specific page references. Perhaps the editors could consider including an appendix in future editions that would describe protein safety assessment models as well as an appendix with a glossary of terms, definitions, and acronyms. These additions would be of particular interest to those in academia studying safety assessment.

Anakalo Shitandi holds a Ph.D. in food science with a focus on food safety from the Swedish University of Agriculture in Uppsala, Sweden. He currently is a senior lecturer and researcher at Egerton University in Kenya. He can be reached at anakalos@gmail.com.

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in 1983. Robert Hastert, president of AOCS in 1987 and a fellow employee with Gavin at Wilson & Co., remarked, "In my opinion, the tremendous success of the Chicago meeting propelled him to election as president of the Society" in 1986. Hastert especially remembers the 1983 meeting for its Roaring '20s Chicago-style party, held on the final evening of the meeting, at which Woody Herman and his Thundering Herd Band provided the music.

Gavin also served as general chairman for the 1988 AOCS Annual Meeting & Expo, held in Phoenix, Arizona, USA. Hastert commented that Gavin had a "forceful personality" and a "commanding way of getting things done." According to Hastert, when Gavin agreed to do something, he would do it right.

James Lyon, who was executive vice president of AOCS at the time Gavin was an officer, commented on his relationship with him: "When he considered a situation to be business, Arnold was always very direct, frequently gruff. Some people only saw him in that light. On the other hand, Arnold was a good and loyal friend who treated his employees very well and who loved and generously supported AOCS. I experienced both sides of Arnold, and over the years he and his wife Jo became close friends with me and my family. He was a real Teddy bear."

Gavin is survived by Joan, his wife of 43 years, and several nieces and nephews.

Patents

Published Patents

High unsaponifiables and methods of using the same

Copeland, L., *et al.*, International Flora Technologies Ltd., 10/14/2008, US7435424B1

Materials with high levels of unsaponifiable matter, such as extracts from plants, result in hydrolysates with unique properties. The very properties that are sought in the traditional saponification of natural oils are a result of low levels of unsaponifiables. These properties include high levels of aqueous surfactant activity, water solubility or ready water dispersibility, activity as foaming agents, and the like. The very objective of traditional saponification processes is to increase the water solubility and surfactant activity of naturally occurring materials. It has been found that the application of a hydrolysis process to materials, particularly materials with a high level of unsaponifiables (e.g., at least 6% by total weight of the material), produces a product with properties significantly different from those products resulting from the conventional saponification of materials with less than 6% by weight of unsaponifiables. The resulting hydrolysates from the practice of the present invention are substantive, resisting both physical and aqueous-based removal from skin and hair; exhibit a very unique surfactant property; and are not foaming agents with water. Hydrolysates according to the present invention may thus be used to enhance the performance of cosmetics and pharmaceuticals. These hydrolysates are bioactive agents and alternative natural carrying agents for topical application of materials, particularly for application of materials to the skin or hair of subjects, and provide a substantive support for the materials carried.

Fat composition

Hashizume, K., *et al.*, Adeka Corp., 10/14/2008, US7435441B2

A fat composition having a fat phase which, when completely melted at 70°C and subsequently held at 0°C for 30 minutes, and then at 5°C for 7 days, gives beta-form fat crystals of a two-chain-length structure. Even when produced without special temperature control, the fat composition contains stable crystals, is soft at low temperatures, and has a wide plasticity range and satisfactory stability with no change in consistency with time. It is especially suitable for use as a roll-in fat composition.

Membrane fractions of 1,2-*sn*-diacylglycerol-enriched cells

Marechal, E., *et al.*, Commissariat à l'Energie Atomique, 10/14/2008, US7435583B2

The invention concerns membrane fractions of cells containing a recombinant monogalactosyldiacylglycerol (MGDG) synthase and enriched with 1,2-*sn*-diacylglycerol, their preparation method, their use for screening molecules inducing MGDG synthase activity, and a method for screening molecules inducing MGDG synthase activity using said membrane fractions.

Oil-in-water emulsions and a method of producing

Langer, D., *et al.*, Lubrizol Corp., 10/14/2008, US7435707B2

The invention relates to a novel emulsified composition containing (i) major amount of an aqueous phase, (ii) a minor amount of an organic phase, (iii) a thickener, and (iv) a minor but effective amount of at least one emulsifier to emulsify the aqueous and organic phase resulting in a water-in-oil emulsified composition, in particular emulsified greases and emulsified coatings. Further, the present invention provides a process for making the emulsified composition.

High-oleic high-stearic plants, seeds and oils

Martinez-Force, E., *et al.*, Consejo Superior de Investigaciones Científicas, 10/14/2008, US7435839B2

The invention relates to plant seeds that contain an oil having an oleic acid content of more than 40 wt% and a stearic acid content of more than 12 wt% based on the total fatty acid content of said oil, and wherein a maximum of 10 wt% of the fatty acid groups in the *sn*-2 position of the TAG molecules constituting the oil are saturated fatty acid groups. The invention also relates to plants that can be grown from the seeds, oil that can be extracted from the seeds, and to methods for obtaining the seeds, plants, and oil.

Method for preparing alicyclic carboxylic acids and their esters

Grass, M., *et al.*, Oxeno Olefinchemie GmbH, 10/14/2008, US7435848B2

A method for the continuous preparation of an alicyclic carboxylic acid or an ester of the alicyclic carboxylic acid. A plastic that incorporates the alicyclic carboxylic acid or an ester of the alicyclic carboxylic acid. An article made of a plastic that incorporates the alicyclic carboxylic acid or an ester of the alicyclic carboxylic acid. A liquid that incorporates the alicycic carboxylic acid or an ester of the alicyclic carboxylic acid.

Soybean oil-based metalworking fluids

King, J., and Canter, N., United Soybean Board, 10/21/2008, US7439212B2

The inventive composition comprises compatible combinations of vegetable oils and polar nonchlorine phosphorus-based extreme pressure additives, the composition being either (i) a working-strength straight oil or (ii) a soluble oil concentrate dilutable to a working-strength soluble oil, the composition when at working strength effectively lubricating metal parts during high-performance metalworking, and providing environmental and safety advantages.

Patent Applications

Rapid fatty acid assay for use in pulp pitch control

Jiang, C., *et al.*,, Enzymatic Deinking Technologies, LLC, 10/2/2008, US20080236770A1

Methods are provided for determining the surface fatty acid (FA) content in a wood pulp or whitewater sample. The methods comprise reacting free fatty acids (FFA) that are present on the surface of the wood pulp fibers in the sample or in the whitewater with one or more reagents to form a measurable species, and determining the FA content from the quantitative measurement of the measurable species. The method is useful as a quick, portable, accurate, and low-cost assay for assessing the FA content present at various sample points in pulp and paper mills. The method for determining the FFA content can be conducted in a batch process (e.g., where samples are collected periodically and the test is conducted offline). Alternatively, the method for determining the FFA content can be conducted in a continuous or semicontinuous process (e.g., online sampling/analysis).

Vegetable oil based construction materials

Forth, J., and Zoorob, S., University of Leeds, 10/9/2008, US20080245269A1

The present invention provides a composition for use in the production of a construction element, said composition comprising a vegetable oil and a graded aggregate having a maximum aggregate particle size of around 15 mm and/or an aggregate porosity of greater than 5%. Construction elements produced using the composition are described. There is further provided a structural element comprising at least partially cured vegetable oil and an aggregate. A method for producing a construction element is provided comprising mixing partially cured vegetable oil with an aggregate and then further curing said vegetable oil within said mixture.

System and method for using vegetable oil as fuel for diesel engines

Triska, J., c/o Stites & Harbison, PLLC, 10/9/2008, US20080245350A1

A system and method for using vegetable oil as fuel for a diesel engine includes: A diesel fuel tank; a vegetable oil fuel tank, a supply fuel valve for switching a supply fuel output port between a diesel fuel input port and a vegetable oil fuel input port; an overflow fuel valve for switching an overflow fuel input port between a vegetable oil fuel output port and a diesel fuel output port; a fuel selector switch; and an electronic block controller. The electronic block controller is for, in response to a user changing the fuel selector switch from diesel fuel to vegetable oil fuel, waiting a predetermined amount of time to allow the vegetable oil fuel to flush the diesel fuel to the overflow fuel valve, and then setting the overflow fuel valve to direct overflow vegetable oil fuel to the vegetable oil fuel tank. Cross-contamination of the fuel tanks is avoided.

Improved process for the production of derivatives of saturated carboxylic acids

Bastioli, C., *et al.*, Novamont S.p.A., 10/9/2008, US20080245995A1

A process for the production of saturated carboxylic acids and their derivatives comprising the steps of: (a) reacting a derivative of an unsaturated fatty acid with an oxidizing compound in the presence of a catalyst capable of catalyzing the reaction of oxidation of the double olefinic bond of the derivative of the unsaturated fatty acid so as to obtain as intermediate product of reaction a vicinal diol; and (b) reacting said intermediate compound with oxygen, or a compound containing oxygen, in the presence of a catalyst capable of catalyzing the reaction of oxidation of the hydroxyl groups of the vicinal diol to carboxylic groups, characterized in that both of the steps (a) and (b) are carried out in the absence of added organic solvent and in that the water/diol ratio in the reaction of step (b) is less than 1:1.

Chocolate composition

Bruse, F., *et al.*, Cargill Inc., 10/9/2008, US20080248186A1

A chocolate composition having a fat phase, characterized in that said fat phase: has a slip melting point of at least 27.5°C, preferably of between 30 and 37°C; and comprises both modified and unmodified fats, wherein said modified fats comprise an interesterified fat consisting of interesterified cocoa butter.

Mixture containing fatty acid glycerides

Schoerken, U., *et al.*, c/o Synnestvedt & Lechner LLP, 10/9/2008, US20080248187A1

A mixture containing fatty acid glycerides that has a high percentage content of polyunsaturated fatty acid (PUFA) acyl groups and a low percentage content of saturated fatty acid acyl groups is described. A process that enables the PUFA acyl groups in a mixture containing fatty acid glycerides (for example, a fish oil) to be enriched and, at the same time, the content of saturated fatty acid acyl groups to be maintained at a low content is described. The process is a hydrolytic process or an alcoholysis in which the fatty acid acyl groups to be enriched are hydrolytically or alcoholytically released from the fatty acid glycerides slowly, if at all, the process being carried out in the presence of a lipase.

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.

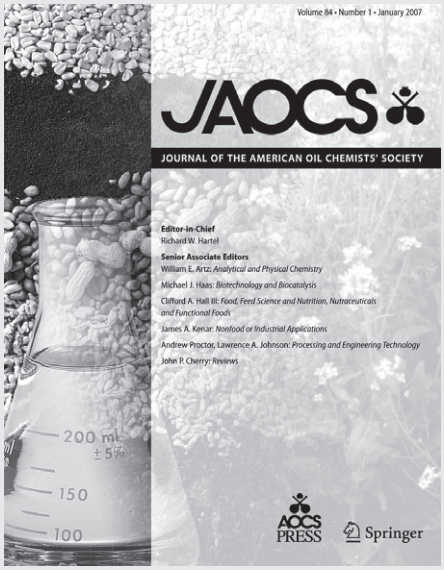
Extracts & Distillates

Lubricant base stock potential of chemically modified vegetable oils

Erhan, S.Z., B.K. Sharma, Z. Liu, and A. Adhvaryu, *J. Agric. Food Chem. 56*:8919–8925, 2008.

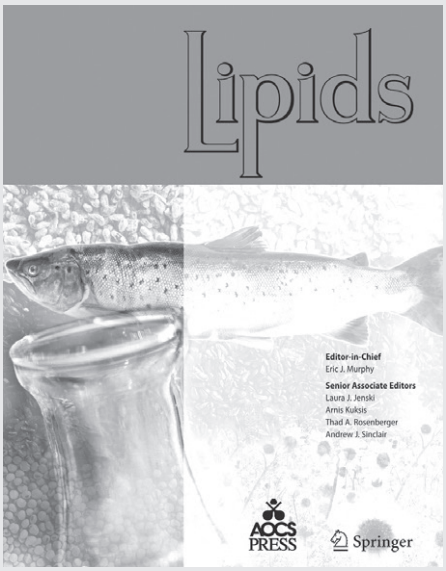
The environment must be protected against pollution caused by lubricants based on petroleum oils. The pollution problem is so severe that approximately 50% of all lubricants sold worldwide end up in the environment via volatilization, spills, or total loss applications. This threat to the environment can be avoided by preventing undesirable losses, reclaiming and recycling mineral oil lubricants, or using environmentally friendly lubricants. Vegetable oils are recognized as rapidly biodegradable and are thus promising candidates as base fluids in environmentally friendly lubricants. Lubricants based on vegetable oils display excellent tribological properties, high viscosity indices, and high flash points. To compete with mineral-oil-based lubricants, some of their inherent disadvantages, such as poor resistance to oxidation and low-temperature stability, must be corrected. One way to address these problems is chemical modification of vegetable oils at the sites of unsaturation. After a one-step chemical modification, chemically modified soybean oil derivatives were studied for thermo-oxidative stability using pressurized differential scanning calorimetry and a thin-film micro-oxidation test; low-temperature fluid properties, using pour-point measurements; and friction-wear properties using four-ball and ball-on-disk configurations. The lubricants formulated with chemically modified soybean oil derivatives exhibited superior low-temperature flow properties, improved thermo-oxidative stability, and better friction and wear properties. The chemically modified soybean oil derivatives having diester substitution at the sites of unsaturation have potential in the formulation of industrial lubricants.

AOCS Journals



Journal of the American Oil Chemists' Society (February)

- Detection of adulteration in Iranian olive oils using instrumental (GC, NMR, DSC) methods, Jafari, M., M. Kadivar, and J. Keramat
- Using theoretical correction factors for quantitative analysis of sterols and sterol concentrates, Costin, C.D., S.L. Hansen, and D.P. Chambers
- Utilization of olive-pomace oil for enzymatic production of cocoa butter-like fat, Çiftçi, O.N., S. Fadıloğlu, and F. Göğüş
- Enzymatic synthesis of structured triacylglycerols containing CLA isomers starting from *sn*-1,3-diacylglycerols, Maurelli, S., F. Blasi, L. Cossignani, A. Bosi, M.S. Simonetti, and P. Damiani
- Chemical composition of Turkish olive oil—Ayvalik, Andjelkovic, M., S. Acun, V. Van Hoed, R. Verhé, and J. Van Camp
- Antioxidative properties of *Curcuma longa* leaf extract in accelerated oxidation and deep frying studies, Nor, F.M., S. Mohamed, N.A. Idris, and R. Ismail
- Degradation and nutritional quality changes of oil during frying, Aladedunye, F.A., and R. Przybylski
- Conversion of extracted oil cake fibers into bioethanol including DDGS, canola, sunflower, sesame, soy, and peanut for integrated biodiesel processing, Balan, V., C.A. Rogers, S.P.S. Chundawat, L. da Costa Sousa, P.J. Slininger, R. Gupta, and B.E. Dale
- Studying the influence of alumina catalysts doped with tin and zinc oxides in the soybean oil pyrolysis reaction, Quirino, R.L., A.P. Tavares, A.C. Peres, J.C. Rubim, and P.A.Z. Suarez
- Removal and degradation of phorbol esters during pre-treatment and transesterification of *Jatropha curcas* oil, Makkar, H., J. Maes, W. De Greyt, and K. Becker
- Purification of soybean phosphatidylcholine using D113-III ion exchange macroporous resin packed column chromatography, Liu, Y., L. Shan, and X. Wang
- Sunflower lecithin: Application of a fractionation process with absolute ethanol, Cabezas, D.M., B.W.K. Diehl, and M.C. Tomás
- Phospholipid composition of *Jatropha curcas* seed lipids, Rao, K.S., P.P. Chakrabarti, B.V.S.K. Rao, and R.B.N. Prasad



Lipids (February)

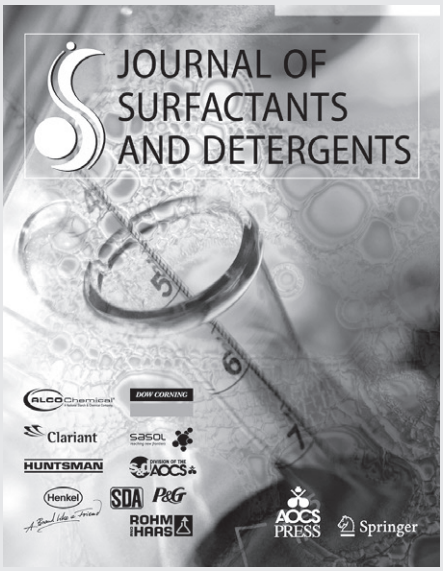
- Diversity of the enzymatic activity in the lipoxygenase gene family of *Arabidopsis thaliana*, Bannenberg, G., M. Martínez, M. Hamberg, and C. Castresana
- The depressive effects of 5,8,11-eicosatrienoic acid (20:3n-9) on osteoblasts,

Hamazaki, T., N. Suzuki, R. Widyowati, T. Miyahara, S. Kadota, H. Ochiai, and K. Hamazaki

- The antiproliferative effect of EPA in HL60 cells is mediated by alterations in calcium homeostasis, Slagsvold, J.E., C.H.H. Pettersen, T. Follestad, H.E. Krokan, and S.A. Schønberg
- Atorvastatin decreases stearoyl-CoA desaturase gene expression in THP-1 macrophages incubated with oxidized LDL, Martín-Fuentes, P., A.L. García-Otín, L. Calvo, D. Gómez-Coronado, F. Civeira, and A. Cenarro
- Effect of a seaweed extract on fatty acid accumulation and glycerol-3-phosphate dehydrogenase activity in 3T3-L1 adipocytes, He, M.L., Y. Wang, J.S. You, P.S. Mir, and T.A. McAllister
- Dietary marine-derived tocopherol has a higher biological availability in mice relative to alpha-tocopherol, Gotoh, N., H. Watanabe, T. Oka, D. Mashimo, N. Noguchi, K. Hata, and S. Wada
- Radical scavenging activity of lipophilized products from lipase-catalyzed transesterification of triolein with cinnamic and ferulic acids, Choo, W.-S., and E.J. Birch
- Phytosterol-enriched yogurt increases LDL affinity and reduces CD36 expression in polygenic hypercholesterolemia, Ruiu, G., S. Pinach, F. Veglia, R. Gambino, S. Marena, B. Uberti, N. Alemanno, D. Burt, G. Pagano, and M. Cassader
- Effect of diacylglycerol on postprandial serum triacylglycerol concentration: A meta-analysis, Xu, T., X. Li, X. Ma, Z. Zhang, T. Zhang, and D. Li
- Determination of triacylglycerols in butterfat by normal-phase HPLC and electrospray–tandem mass spectrometry, Kalo, P., A. Kemppinen, and V. Ollilainen

Journal of Surfactants and Detergents (Issue 1)

- The synthesis of oleic acid polyglycol ester catalyzed by solid super acid, Luo, X.-m., L.-f. Ren, X.-l. Zhang, and T.-t. Qiang



- The HLD-NAC model for mixtures of ionic and nonionic surfactants, Acosta, E.J., and A.S. Bhakta
- Analysis of linear alkylbenzene sulfonate in waste water and sludge by high performance liquid chromatography: An exercise of validation, Bengoechea, C., and A.S. Cantarero
- Influence of sodium ions on micelles of surfactin-C_{16} in solution, Li, Y., R.-Q. Ye, and B.-Z. Mu
- Quantitative monitoring of the amidation reaction between coconut oil and diethanolamine by attenuated total reflectance Fourier transform infrared spectrometry, Khanmohammadi, M., M.H. Kojidi, A.B. Garmarudi, A. Ashuri, and M. Soleymani
- Adsorption of aroma chemicals on cotton fabric in different aqueous environments, Obendorf, S.K., H. Liu, K. Tan, M.J. Leonard, T.J. Young, and M.J. Incorvia
- Drawbacks of surfactant presence on the dissolution and mechanical properties of detergent tablets: How to control interfaces by surfactant localization, Chantraine, F., M. Viana, C. Pouget, N. Brielles, O. Mondain-Monval, P. Branlard, G. Rubinstenn, and D. Chulia
- Partitioning and localization of fragrances in surfactant mixed micelles, Fischer, E., W. Fieber, C. Navarro, H. Sommer, D. Benczédi, M.I. Velazco, and M. Schönhoff

Characterization of cod liver oil by spectroscopic techniques. New approaches for the determination of compositional parameters, acyl groups, and cholesterol from ^{1}H nuclear magnetic resonance and Fourier transform infrared spectral data

Guillén, M.D., I. Carton, E. Goicoechea, and P.S. Uriarte, *J. Agric. Food Chem. 56*:9072–9079, 2008.

Six samples of cod liver oil were studied using Fourier transform infrared (FTIR) spectroscopy and ^{1}H nuclear magnetic resonance (^{1}H-NMR). These techniques provide information simply and rapidly about the global features of the cod liver oil main components, showing their potential as routine techniques for evaluating certain parameters of the quality of the cod liver oil. FTIR spectroscopy provides information about the molar percentage of polyunsaturated acyl groups in the sample and also about the ratio between unsaturated and saturated structures. ^{1}H-NMR provides information about the proportions or concentrations of certain acyl groups and also of some minor compounds such as cholesterol. Both techniques are simple and fast. New approaches are presented to evaluate the molar proportions or concentrations of some acyl groups such as the molar percentages of ω-3, docosahexaenoic, and eicosapentaenoic acyl groups; furthermore, some novel approaches for evaluating the molar percentages of unsaturated and saturated acyl groups are also given. Results obtained from both spectroscopic techniques are in total agreement.

Automated solid-phase extraction for concentration and clean-up of female steroid hormones prior to liquid chromatography–electrospray ionization–tandem mass spectrometry: An approach to lipidomics

Sánchez, B.Á., F.P. Capote, J.R. Jiménez, and M.D. Luque de Castro, *J. Chromatogr. A 1207*:46–54, 2008.

CONTINUED ON NEXT PAGE

A method for determination of free and glucuronide-conjugated female steroid hormones in urine at the pg mL^{-1} level is here presented. For this purpose, a dual approach with or without β-glucuronidase hydrolysis has been developed to succeed in this analysis. The target analytes were two progestogens—progesterone and pregnenolone—and three endogenous estrogens—estradiol, estriol, and estrone. Separation and detection were carried out by liquid chromatography, electrospray ionization, and tandem mass spectrometry (LC–ESI–MS–MS) with a triple quadrupole (qQq) mass detector. The determination step was optimized by multiple reaction monitoring for highly selective identification and sensitive quantification of female hormones in a complex sample such as human urine.

As these compounds are present in urine at very low concentration (ng mL^{-1} level), a preconcentration and cleanup step by solid-phase extraction was automatically carried out prior to the chromatographic step to improve the sensitivity of the method. This sample pretreatment was performed using a lab-on-valve (LOV) manifold, which provided preconcentration factors ranging from 59.1 to 72.3 for 10 mL urine. The detection and quantification limits were in the ranges of 1.8–18 pg and 6–61 pg on-column, respectively, with precision values from 1.93 to 10.99%, expressed as relative standard deviation. These results enable us to conclude that the LOV–LC–qQq approach is suitable for determination of lipidomic profiles of the main female steroid hormones in a difficult matrix such as human urine. The method potentially can be applied to clinical and other metabolomic areas.

Optimization of solid fat content and crystal properties of a *trans*-free structured lipid by blending with palm midfraction

Lumor, S.E., B.H. Kim, and C.C. Akoh, *J. Agric. Food Chem. 56*:9294–9298, 2008.

The optimization of solid fat content (SFC) and crystal properties of *trans*-free structured lipids (SL) synthesized by incorporating stearic acid into canola oil was investigated. The SL were blended with varying amounts of palm midfraction (PMF). The SFC and crystal polymorphism were improved. The addition of sucrose stearate (S-170), sorbitan tristearate (STS), and distilled monoglycerides (DMG) to one of the blends, SL40/PMF (70:30, w/w), did not improve crystal polymorphism but had significant effects on crystal morphology. The emulsifiers significantly delayed crystal growth, resulting in smaller crystal sizes as compared with the control. They were unable to inhibit the formation of granular crystals (30–140 µm), which are undesirable in margarine, after 4 weeks of storage at 0°C. Blends treated with S-170 and STS showed many small evenly distributed crystals interspersed with large crystal aggregates (after 4 weeks of storage), whereas the blend treated with DMG and the control showed irregularly shaped globular crystals, also interspersed with large crystal aggregates. However, these crystal aggregates were not observed upon visual and physical examination and may therefore not affect the sensory properties of the finished products negatively.

Home use of vegetable oils, markers of systemic inflammation, and endothelial dysfunction among women

Esmaillzadeh, A., and L. Azadbakht, *Am. J. Clin. Nutr. 88*:913–921, 2008.

Most of the knowledge about adverse health effects of *trans* fats has been derived mainly from studies done in Western populations of European or American origins; few data are available in the understudied region of the Middle East. We assessed the association between consumption of partially hydrogenated vegetable oils (PHVOs) and non-hydrogenated (HVOs) and circulating concentrations of inflammatory markers among Tehrani women aged 40–60 yr. Usual dietary intakes among 486 apparently healthy women were assessed with a food-frequency questionnaire. PHVOs (commonly used for cooking in Iran) were considered as PHVOs category. Sunflower oil, corn oil, canola oil, soybean oil, and olive oil were defined as non-HVOs. Anthropometric measurements were done, and fasting blood samples were taken to measure inflammatory markers. The energy-adjusted daily intakes (mean ± SD) of PHVOs and non-HVOs were 23 ± 11 and 22 ± 10 g/d, respectively. After control for potential confounders, women in the highest quintile of PHVO intake had higher plasma concentrations of C-reactive protein (CRP; percentage difference from lowest quintile: 45%; *P* for trend: <0.01), tumor necrosis factor-α (TNF-α; 66%; *P* for trend: <0.01), interleukin-6 (72%; *P* for trend: <0.05), and soluble intercellular adhesion molecule-1 (sICAM-1; 22%; *P* for trend: <0.01) than did women in the lowest quintile. In contrast, higher consumption of non-HVOs was associated with lower circulating concentrations of CRP (percentage difference between top and bottom quintiles: –23%; *P* for trend: 0.05), TNF-α (–29%; *P* for trend: <0.01), serum amyloid A (–24%; *P* for trend: <0.01), and sICAM-1 (–19%; *P* for trend: <0.05). Adjustment for body mass index, fasting plasma glucose, and lipid profiles slightly attenuated the associations in some cases. Higher intakes of PHVOs are associated with elevated concentrations of inflammatory biomarkers, whereas higher intakes of non-HVOs are associated with lower plasma concentrations of these biomarkers.

Identification and significance of sterols in MSW landfill leachate

Zhang, C., Y. Wang, and S. Qi, *J. Chromatogr. B 874*:1–6, 2008.

The sterol content of leachate from two different landfills (labeled as landfill J and landfill R, respectively) at Wuhan, central China, was examined by gas chromatography/mass spectrometry (GC/MS). About 20 types of sterols were identified according to the mass spectra of their TMS (trimethylsilyl derivative) ethers and their eluting order. Three types of indices of sterols, namely, the ratio of 5b/(5b + 5a) stanol, the ratio of coprostanol/epicoprostanol, and the ratio of coprostanol/cholesterol, were used to

assess and cross-validate sterol sources. The results showed that landfill R suffered fecal pollution whereas there were complex sterol sources in landfill J. The ratios of cholesterol/(cholesterol + cholestanol) were 0.24 in landfill R and 0.32 in landfill J, indicating cholesterol reduction in both landfills. C_{29} sterols made up 58% of total sterols in landfill J leachate. The sources for the landfill leachate included not only allochthonous domestic wastes, but biodegradation products of autochthonous wastes in the landfills.

Thematic Review Series: Glycerolipids. DGAT enzymes and triacylglycerol biosynthesis

Yen, C.-L.E., S.J. Stone, S. Koliwad, C. Harris, and R.V. Farese Jr., *J. Lipid Res. 49*:2283–2301, 2008.

Triacylglycerols (triglycerides; TGs) are the major storage molecules of metabolic energy and fatty acids (FAs) in most living organisms. Excessive accumulation of TGs, however, is associated with human diseases, such as obesity, diabetes mellitus, and steatohepatitis. The final and the only committed step in the biosynthesis of TGs is catalyzed by acyl-CoA:diacylglycerol acyltransferase (DGAT) enzymes. The genes encoding two DGAT enzymes, DGAT1 and DGAT2, were identified in the past decade; and the use of molecular tools, including mice deficient in either enzyme, has shed light on their functions.

Although DGAT enzymes are involved in TG synthesis, they have distinct protein sequences and differ in their biochemical, cellular, and physiological functions. Both enzymes may be useful as therapeutic targets for diseases. Here we review the current knowledge of DGAT enzymes, focusing on new advances since the cloning of their genes, including possible roles in human health and diseases.

trans-C18:1 isomers in cheeses enriched in unsaturated fatty acids and manufactured with different milk fat globule sizes

Briard-Bion, V., P. Juaneda, R. Richoux, E. Guichard, and C. Lopez, *J. Agric. Food Chem. 56*:9374–9382, 2008.

Increasing the knowledge of dietary fat composition, mainly the minor components, will improve the nutritional value of foods and their labeling. In this study, we examined the *trans*-octadecenoic acid (C18:1) composition of Emmental cheeses enriched in unsaturated fatty acids (FA) and manufactured with milks produced by cows selected to produce small and large fat globules. The FA composition of the milks was not significantly ($P > 0.05$) different from the FA composition of the corresponding Emmental cheeses. Increasing the unsaturated FA content of the cheeses using dietary manipulations led to an increase in the *trans*-C18:1 and changed their isomeric profiles. In milk fat produced with the linseed-enriched diet, the *trans*-10 C18:1 concentration was greater than *trans*-11 C18:1 (vaccenic acid), which is classically the major *trans*-C18:1 in milk fat.

The content in *trans*-C18:1 and more particularly in *trans*-10 C18:1 was negatively correlated with the size of fat globules (r^2 = 0. 82 and 0.87, respectively) and related to milk fat depression. The *trans*-C18:1 content was negatively correlated with the saturated FA (slope = −0.35; r^2 = 0.81) and positively correlated with the unsaturated (slope = 0.29; r^2 = 0.85) and monounsaturated (slope = 0.32; r^2 = 0.81) FA. In focusing on the health-related considerations of fat in food products, further nutritional studies are needed to elucidate the role of *trans*-C18:1 isomers.

Lipophilic extracts from banana fruit residues: A source of valuable phytosterols

Oliveira, L., C.S.R. Freire, A.J.D. Silvestre, and N. Cordeiro, *J. Agric. Food Chem. 56*:9520–9524, 2008.

The chemical composition of the lipophilic extracts of unripe pulp and peel of banana fruit 'Dwarf Cavendish' was studied by gas chromatography–mass spectrometry (GC–MS). Fatty acids, sterols, and steryl esters are the major families of lipophilic components present in banana tissues, followed by diacylglycerols, steryl glucosides, long-chain fatty alcohols, and aromatic compounds. Fatty acids are more abundant in the banana pulp (29–90% of the total amount of lipophilic extract), with linoleic, linolenic, and oleic acids as the major compounds of this family. In banana peel, sterols represent about 49–71% of the lipophilic extract with two triterpenic ketones (31-norcyclolaudenone and cycloeucalenone) as the major components. The detection of high amounts of steryl esters (469–2,4405 mg/kg) and diacylglycerols (119–878 mg/kg), mainly present in the banana peel extract, explains the increase in the abundance of fatty acids and sterols after alkaline hydrolysis. Several steryl glucosides were also found in significant amounts (273–888 mg/kg), particularly in banana pulp (888 mg/kg). The high content of sterols (and their derivatives) in the 'Dwarf Cavendish' fruit can open new strategies for the valorization of the banana residues as a potential source of high-value phytochemicals with nutraceutical and functional food additive applications.

Enzyme-assisted aqueous extraction of oil and protein from canola (*Brassica napus* L.) seeds

Latif, S., L.L. Diosady, and F. Anwar, *Eur. J. Lipid Sci. Technol. 110*:887–892, 2008.

The emphasis of this study was to investigate the effect of enzymes on aqueous extraction of canola (*Brassica napus* L.) seed oil and protein. Four enzymes, Protex 7L, Multifect Pectinase FE, Multifect CX 13L, and Natuzyme, were tested for their effectiveness in releasing oil and protein during aqueous extraction. The enzyme-extracted oil content of canola seeds (22.2–26.0%) was significantly ($P < 0.05$) higher than that of the control (without enzyme) (16.48%). An appreciable amount of protein (3.5–5.9%) originally present in the seed was extracted into the aqueous and creamy phases during aqueous extraction of oil. The physicochemical properties of oils extracted from canola seed by conventional solvent extraction, and aqueous extraction, with or without enzyme addition were compared.

Significant ($P < 0.05$) differences were observed in free fatty acid content, specific extinctions at 232 and 270 nm, peroxide value, color (1-inch cell), and concentration of tocopherols (α, γ, and δ). However, no significant variation ($P < 0.05$) was observed in iodine value, refractive index (40°C), density (24°C), saponification value, unsaponifiable matter, and fatty acid composition. A better oil quality was obtained with aqueous extraction (with and without enzyme) than with solvent extraction. Although the enzymes enhanced the oil extraction, the oil yield was still significantly ($P < 0.05$) lower than that obtained by solvent (hexane) extraction. ■

Wordsmithing on the web

Joe Endres

A "wordsmith" is defined as an expert in the use of words. Are you one? Or would you like to have the tools to act like one? There are several websites that can assist you in being a wordsmith, including dictionary.com, YourDictionary at www.yourdictionary.com, TheFreeDictionary at www.thefreedictionary.com, alphaDictionary at www.alphadictionary.com, and CoolDictionary at www.cooldictionary.com. These sites will give you a definition for the word you seek, as well as providing proper spelling, alternatives to the word, and in some cases, even its pronunciation. Use of these websites is generally free.

One of the more interesting writing utilities that I have found is a one-click dictionary, thesaurus, and reference program for Windows called WordWeb at www.wordweb.info.

It was developed by Antony Lewis of Cambridge, United Kingdom. The utility is easily accessible from Microsoft Office and just about any other Windows program. The program does not work with either the Mac or Linux operating systems at this time.

The utility program comes in a free, but scaled-down version (WordWeb), as well as a full feature version (WordWeb Pro) priced at $29. To use the utility you simply hold down the Ctrl key and right click on the word in your word processing document, e-mail, webpage, or other doc-

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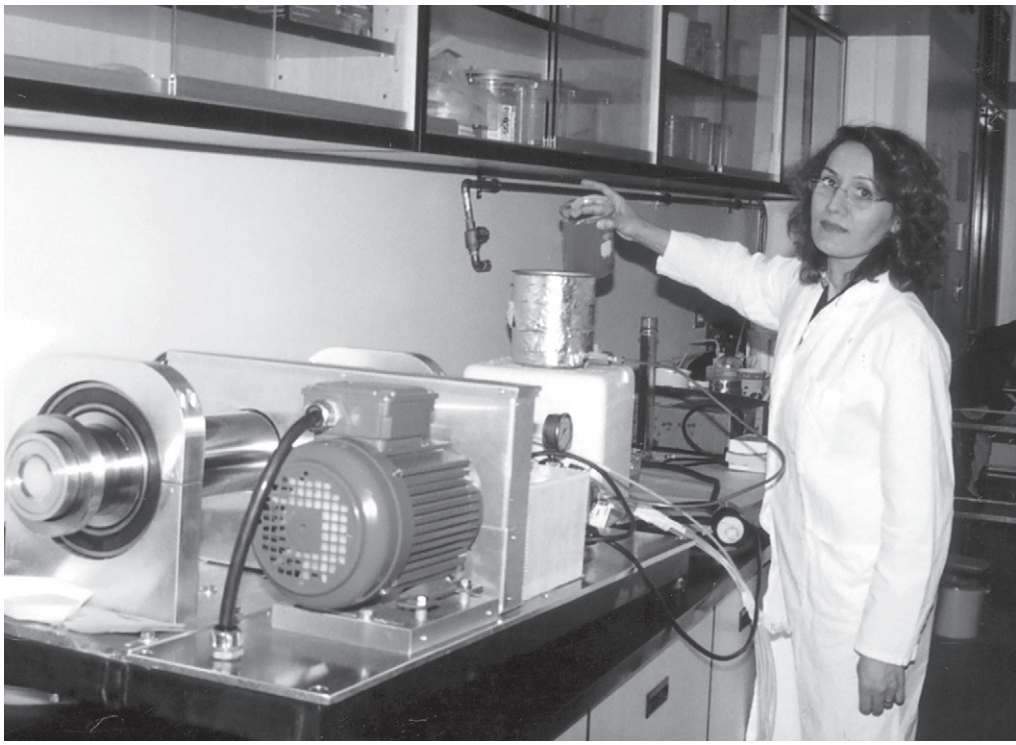

Meet Fatemah (Farnaz) Maleky

"The main objective of my work," said 2008 Honored Student Fatemah (Farnaz) Maleky, "is to study the effects of laminar shear and crystalline orientation at the nanostructural level on oil migration, water vapor permeability, and mechanical strength of fat crystal networks."

Maleky, who is a Ph.D. candidate under AOCS member Alejandro Marangoni at the University of Guelph in Ontario, Canada, hopes to earn her doctorate in 2010. A native of Iran, Maleky received her M.S. degree in food science from the University of Guelph in 2007, also under Marangoni's supervision.

"Based on some basic scientific ideas that we provided her," Marangoni said, "she single-handedly designed and built a novel laminar shear machine to be used for nanostructuring crystallizing fats. The first prototype of the machine has worked extremely well, and we have been able to crystallize cocoa butter where all crystallites are crystallographically oriented in the same direction. This affects the mechanical strength of the material and will permit the manufacture of cocoa butter or chocolate laminates of enhanced mechanical strength with interesting functional properties."

Maleky *et al.* applied for a patent on the laminar shear crystallizer in March 2007.

"The capacity of a fat crystal network to trap oil and moisture is one of its important properties," she explained. "In many confectionery products, a chocolate layer is usually in direct contact with a fat-based cream that contains large amounts of highly mobile oil. This oil has a tendency to migrate into the chocolate layer, leading to bloom formation and softening of the chocolate, as well as hardening of the cream layer. Maleky *et al.* hypothe-

sized that the unsteady-state diffusivity of moisture through the coatings could be estimated from the diffusivity of water through the continuous fat phase. Therefore, predicting the moisture diffusivity through a chocolate-flavored coating is important," Maleky said.

Recent work has focused on measuring oil migration into chocolate, and very little work, if any, has been directed toward defining the structural factors in a fat that influence the ability of a fat crystal network to bind liquid oil, she noted. On the other hand, some studies found a relationship among water vapor permeability, fat crystal structure, and solid fat content. But the effect of laminar shear and crystalline orientation on these phenomena had not yet been studied.

"I plan to develop an understanding of the nanostructure of food materials under shear in this continuous process. In addition, I plan to share this machine with several laboratories to study the nanostructure of proteins and carbohydrates, especially starch and gelatin," Maleky concluded. ■

ument. In some programs you cannot use the mouse in this manner but need to double click on the word to highlight it, and then press the WordWeb hot key. A window opens that shows you definitions of the word as well as synonyms. Click on "replace," and the program replaces the word with the synonym of your choice.

Various tabs are available that provide considerable information about the word, such as a list of the type of things or actions the word represents and its components. The program will jog your memory or jump-start your creativity.

Additionally, you can click on the program's "Wikipedia" tab to read your word's encyclopedia entry, if one exists. Or you can click on the "WordWeb Outline" tab to read more about what the word represents from other web research sites, or have the word translated into different languages. If you would like to know how a word is pronounced, click on the microphone icon and you will hear the word pronounced. This can be helpful when giving speeches or in conversation. Both the free and pay versions of the program can be customized for speakers in different regions of the worlds.

The utility can also be downloaded from CNET's download.com, majorgeeks.com, and several other third-party sites. The WordWeb database is drawn from Princeton University's WordNet project, which includes the programmer's additions and corrections. WordWeb is an alternative to other utilities offering similar opportunities. If you try it, let me know how it works for you.

OTHER RECOMMENDED SITES

I recommend that you look at the American Palm Oil webpage at: www.americanpalmoil.com. The website is a professionally constructed site, easy to navigate, and full of information on the cultivation of the palm plant, manufacture of palm oil, the nutritional aspects of palm oil, and the multiple uses for this oil.

Joe Endres is a regular contributor to inform *and may be contacted by e-mail at jgendres@embarqmail.com or by phone at +1-260-625-3616.*

Raw material sources for the long-chain omega-3 market: Trends and sustainability. Part 1.

Anthony P. Bimbo

Editor's note: This paper is an update of a presentation delivered at the 99th AOCS Annual Meeting & Expo in Seattle, Washington, USA, May 19, 2008.

The scientific and popular press is awash in headlines and articles depicting the impending collapse of the global wild fisheries. Headlines such as "Oceans in Peril," "Ocean Life Fading, What Can Be Done?" "The Fishing Catastrophe and What We Can Do About It," "SOS for Fading Ocean Life," "Tuvalu About to Disappear into the Ocean," "SOS for Fading Ocean Life," and "Ocean Time Bomb" are just a few examples. In more recent times, attention is being paid to the pelagic fisheries with such headlines as "Eating Smelly Fish Could Save Endangered Species," "Most Fish Goes into Animal Feed," "Our Oceans Overfished to Feed Pigs," and "Pets Eating into Fish Stocks." One report has indicated that the oceans will be empty by 2048.

The common link in all these headlines is the notion that the ocean fish stocks are being depleted owing to overfishing. When the industry and responsible government entities responded, saying that the "industrial fish species" are not being overfished and are useful in feeding animals and farmed fish that are consumed in the human diet, the emphasis moved to the concept that these fish are being wasted on animals when they could be used for human consumption. The fact is that these industrial fish are classified as industrial because they are small, oily, and very bony. These characteristics make it technologically very difficult (but not impossible) to convert them to food use. It becomes an issue of economics, because once the oil and bones are removed, there is very little of the mass left.

The effect of all these headlines is to create not only misconceptions in the marketplace but also concerns among consumers about the availability of fishmeal and fish oil. Since the aquaculture market consumes a major portion of the world's production of fish oil and half of the world's production of fishmeal, their concerns are routinely addressed with industry publications and at conferences. But what about the nutraceutical or omega-3 market? Will there be enough fish oil to meet their current and future needs? The purpose of this paper is to alleviate those fears or at least put the situation into perspective.

GLOBAL FISHERIES INFORMATION

Between 1950 and 1970 global landings of fish and crustaceans grew at about 12% per year. Between 1970 and 1990 global landings increased about 2% per year. Between 1990 and 2006, the most current available data, global landings increased about 0.78% per year. Actually, since about 1990, the global landings of fish and crustaceans have been flat. Aquaculture production was relatively flat over the period 1950–1980, but between 1980 and 2006, it increased about 13.5% per year. However, even the growth in aquaculture seems to have slowed to 7.1% between 1995 and 2005 and

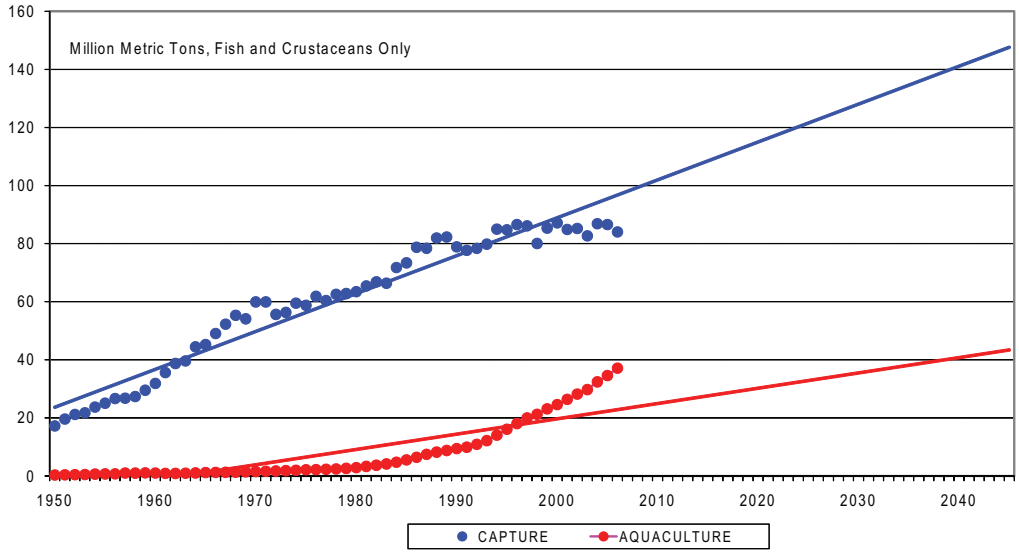

FIG. 1. *Global fisheries capture vs. aquaculture production 1950–2045 projected. Source: FAO (Food and Agriculture Organization), 2008.*

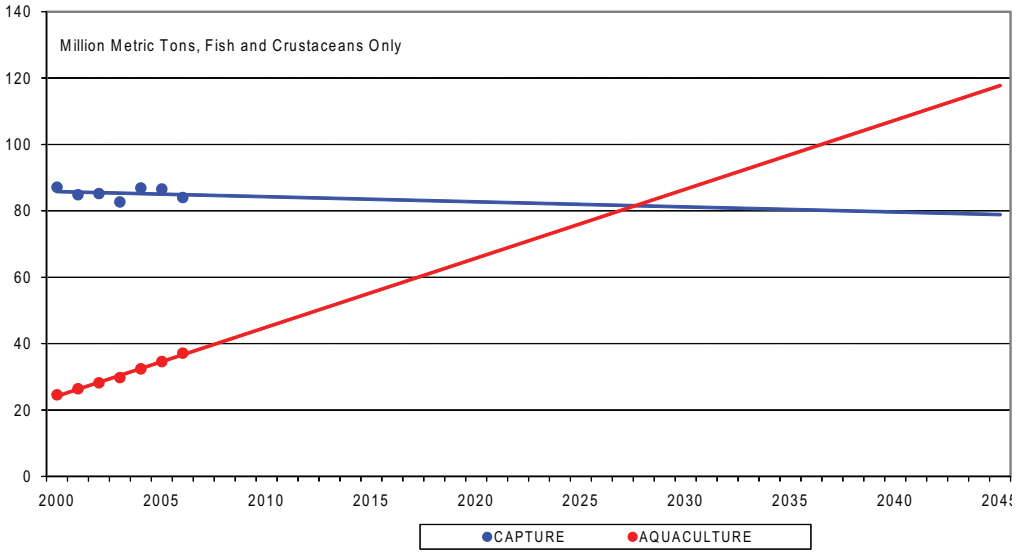

FIG. 2. *Global fisheries vs. aquaculture production 2000–2045 projected. Source: FAO, 2008.*

to 6.1% between 2004 and 2006. For this paper, only fish and crustaceans have been included in the figures (mammals, plants, and mollusks have been ignored). This growth is shown in Figure 1.

Depending on what you wish to portray, you can run trend lines of the global wild catch and aquaculture production and have them cross anywhere from 2020 to 2040, at somewhere between 80 and 100 million metric tons (MMT). If nothing else, the data show that, by assuming trends continue as they are now, eventually the aquaculture and global landings line will cross. If we use Figure 1 as one extreme (the trends never cross), then Figure 2 is the opposite extreme.

The market composition for the global fish catch comprises (i) fish sold fresh, frozen, cured, and canned on the edible side, (ii) other (primarily pet food and bait), and (iii) for reduction to fishmeal and oil. The data clearly show that the volume of fish sold frozen, cured, and canned has been decreasing, whereas the amount of fish sold fresh has been increasing. The fish used for reduction to fishmeal and oil has also been decreasing and now accounts for about 20% of the total fish landed. The explanation for the reduction in fish sold canned, cured, and frozen is that, as third world countries develop, their populations require more animal and fish protein, thus the locally caught fish are consumed at home rather than processed. The market distribution for the global fish catch is shown in Figure 3.

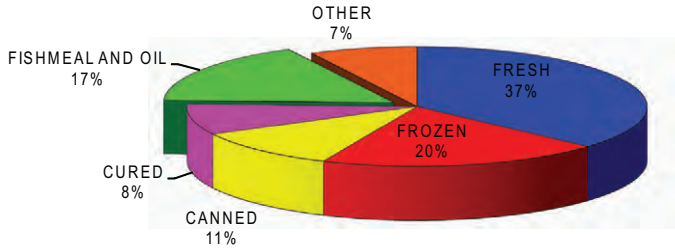

FIG. 3. *Market distribution of the world fish catch, five-year average. Source: USDC (US Department of Commerce) 2008.*

A number of fish species are caught specifically for the production of fishmeal and oil, but from the perspective of the omega-3 market, only the oil from anchovy, jack mackerel, and Atlantic menhaden are suitable, with the menhaden being borderline. Other fish species are caught for edible purposes and the cuttings or by-products converted to fishmeal and oil. In this group only the oil from sardine/pilchard, tuna, and hoki (Blue Grenadier) are suitable for the omega-3 market. It has been estimated that about 83% of the production of fishmeal and oil comes from whole fish and 17% from cuttings and by-products (FIN [Fishmeal Information Network], 2008). The species suitable for omega-3 oil (both whole fish and cuttings) account for about 17 million metric tons (MMT) or 52% of the overall 33 MMT. Salmon, both wild and farmed, is marginal at best for the omega-3 market even though several companies sell the oil for this purpose. In salmon, the total overall omega-3 content is low, and depending on what is fed to the farmed salmon, it can be lower than the wild species, especially if high levels of vegetable oils are used in the feed. The extreme situation, of course, is catfish and tilapia, which have negligible levels of the omega-3 fatty acids because fish oil is not used in their feeds, yet they are sometimes marketed

CONTINUED ON NEXT PAGE

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For further reading:

- FIN 2008, The Fishmeal Information Network. http://www.gafta.com/fin/pdfs/managedstocks/SustainableStocks.pdf
- Bimbo, Anthony P., Fish Meal and Oil, in *Marine & Freshwater Products Handbook*, edited by Roy E. Martin, Emily Paine Carter, George J. Flick, Jr., and Lynn M. Davis, Technomic Publishing Co. Inc., Lancaster, Pennsylvania, USA, 2000, pp. 541–581.
- FAO 2008, Collation, analysis and dissemination of global and regional fishery statistics. FI Programme Websites, FAO Fishery Information, Data and Statistics Unit (FAO-FIDI), FAO–Rome Available via FIGIS from: http://www.fao.org/figis/servlet/static?dom=org&xml=FIDI_STAT_org.xml
- USDC 2008, Fisheries of the United States 2007, *Current Fisheries Statistics No. 2007*, Silver Spring, Maryland, USA, p. 103.
- *Oil World Annual 2008*, ed. Thomas Mielke, ISTA Mielke GmbH, Hamburg, Germany. http: www.oilworld.de.
- *Oil World Annuals 1980–2007*, ed. Thomas Mielke, ISTA Mielke GmbH, Hamburg, Germany. http: www.oilworld.de.

as omega-3 rich products. Salmon oil is in desperate need of real-time fatty acid profile analyses of commercial batches to determine how it fits into the omega 3 scheme.

The individual omega-3 fatty acids in the major groups of commercially available fish oils are compared in Table 1. The values in Table 1 are averages and subject to seasonal variations in composition, fish catch, available food, and others. Therefore, I usually suggest that even though oils below the red line might seem marginal or completely unacceptable, producers should still test these oils over the season (monthly or by batch if that is possible) to determine whether there are times when these oils might have unusual fatty acid profiles. The table gives ranges for the principal omega-3 fatty acids in anchovy, jack mackerel, and hoki, which support the fact that these oils do vary. Pollock, Norway pout, and wild salmon are other examples where there might be individual batches of oil that are much higher in omega-3 than the norm. Some of the literature data indicate that there might be marked differences in the fatty acid composition of the oil depending on whether it comes from the liver or the depot fat. A gas chromatograph in the processing plant could pay big dividends if it were able to identify high omega-3 batches over the processing season.

Whether it is whole fish caught specifically for fishmeal and oil production or cuttings from the edible fisheries, the raw material is generally processed in the same way. The fish are cooked and pressed to remove the liquids (oil and water), the solids are dried, and the liquid is separated into oil and water. The water phase is concentrated by evaporation, and the concentrate is added back to the fish solids prior to drying. Bimbo (2000) has thoroughly discussed the process.

Another category of raw materials that can be used for omega-3 oil production includes krill, single-cell organisms such as marine algae, and genetically modified oilseed crops. These will be addressed in Part 2 of this paper (scheduled for April 2009).

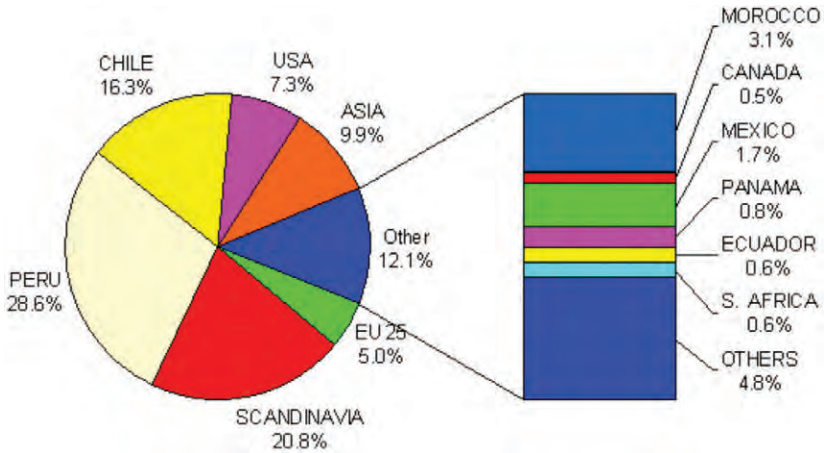

FIG. 4. *Global fish oil production, five-year average. Source: ISTA Mielke GmbH, Hamburg, Internet: www.oilworld.de.*

GLOBAL FISH OIL INFORMATION

Although fish oil is produced in more than 30 countries, six groups account for almost all of the fish oil production. For this paper, I have removed Denmark and Sweden from the EU (European Union)-27 category and included them in the Scandinavian group. Global fish oil production is shown in Figure 4.

The structure of the fish oil market has been evolving since the late 1980s when the issue of *trans* fatty acids began to take root. Over time, the major market for fish oil—hydrogenation for the baking and margarine industry—began to erode until it was replaced by the current major market, aquaculture. In the late 1980s, hydrogenation represented more than 70% of the global fish oil market, whereas aquaculture was less than 20%. Today hydrogenation represents about 10% and aquaculture is about 85% of the global fish oil market. This can be seen in Figure 5.

The omega-3 market is generally small and only began to develop in the mid-1990s. Today it represents about 10% of the global crude fish oil production. If there was a major supply interruption (for example, another major El Niño event) then the market that could afford to pay the higher premium for the omega-3 oils would get the oil. That market would be the nutraceutical market, not aquaculture.

Look for part two of this article in the April issue of inform.

Anthony P. Bimbo is a consultant on marine oils, working out of Kilmarnock, Virginia, USA. He may be contacted by e-mail at apbimbo@verizon.net.

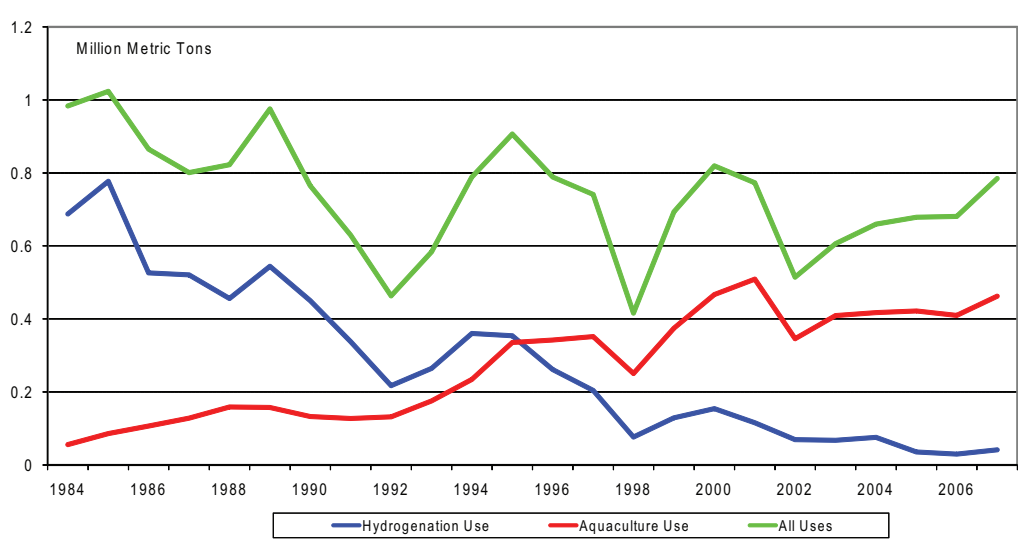

FIG. 5. *Fish oil imports into selected countries based on market use. Source: ISTA Mielke GmbH, Hamburg, Internet: www.oilworld.de.*

TABLE 1. Omega-3 fatty acids in commercial fish oils[a]

	Total fatty acids (%)						
Species	C18:3	C18:4	C20:5	C22:5	C22:6	EPA + DHA	Total omega-3
Anchovy	1	2	22	2	9	31	36
Jack mackerel	1	2	7–10	3	12–19	19–29	25–35
Atlantic menhaden	1	3	14	3	12	26	33
Tuna spp.	1	1	6	2	22	28	32
Sardine/pilchard	1	3	16	2	9	25	31
Hoki	0	0	5–7	2	10–37	15–44	17–46
Sand eel	1	5	11	1	11	22	29
Gulf menhaden	2	3	13	3	8	21	29
Norway pout	1	3	9	1	14	23	28
Salmon, wild	2	1	8	4	11	19	26
Salmon, farmed	1	3	9	2	11	18	24
Pollock		2	16		4	20	22
Mackerel	1	4	7	1	8	15	21
Herring	2	3	6	1	6	12	18

[a] Oils below the red line may be marginal or unacceptable.

Abbreviations: DHA, docosahexaenoic acid; EPA, eicosapentaenoic acid.

Source: Bimbo, A., personal information, 2008.

The changing face of technology at the AOCS Annual Meeting & Expo

In the post-Internet age, the world is a decidedly different place than it was in 1909 when nine oil analysts created AOCS. Just how different will be apparent at the 100th AOCS Annual Meeting & Expo (AM&E), May 3–6, 2009, at Rosen Shingle Creek in Orlando, Florida, USA. There, the changing face of technology will be featured as attendees will be able to use social networking software to make new connections as well as finding out about AOCS' eLearning (see sidebar) opportunities.

When AOCS was formed, the primary need of the new group was to create uniform methods for oil analysis. After a century of growth and the advent of globalization, another essential has surfaced: the need for connection. Whether it is a student needing to connect with potential employers, a researcher wanting to brainstorm, or a product manager searching for new customers and solutions, all AOCS members need to develop connections with like-minded people.

The number of persons connected to the Internet has grown from around 100 million in the late 1990s to more than 1 billion currently, with 3 billion expected by the end of the next decade. Along with the exponential growth in the number of people connected to the Internet has come the social networking phenomenon in evidence on sites such as MySpace and Facebook. Now AOCS members and meeting attendees have the opportunity to participate in their own social networking site—AOCS Connect, the social network for fats and oils professionals.

Social networking is fast becoming an essential tool for connecting with professional contacts, for making new contacts, and for collaborating with colleagues around the world. The technology links individuals in an intentional manner rather than the more haphazard networking activities usually available to meeting attendees such as receptions and mixers.

AOCS Connect account activation is simple and free, requiring only a few minutes to complete. All members and meeting attendees will receive an e-mailed invitation to join the community. Once registered, participants will have year-round access to it from the AOCS website.

Your personal AOCS Connect page will allow you to manage your profile as well as gain quick access to discussion groups and forums focused on key issues of the day. Registering for AOCS Connect will enhance your professional life by allowing you to:

- Create or join discussion groups or forums relevant to your interests;
- Post and share documents and files such as abstracts, poster presentations, power point presentations, CVs, résumés, and the like; and
- Contact other attendees in advance and after meetings.

eLEARNING

Wikipedia suggests that modern distance education has been practiced at least since the 1840s, when Isaac Pitman taught shorthand

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Annual Meeting & Expo at a glance
May 3–6, 2009
Rosen Shingle Creek, Orlando, Florida, USA
Register for the meeting and hotel online at http://Annual_Mtg.aocs.org.

in Great Britain via correspondence. The history of AOCS-sponsored distance learning is more recent: The beta test of a course on oilseed processing as well as an introductory course on surfactants went live at www.aocs.org/meetings/education/ol in January 2008.

A demonstration of current AOCS eLearning offerings will be available at the AM&E during the receptions held in the Expo Hall on Sunday, Monday, and Tuesday, as well as on Wednesday from 1:00–2:00 p.m. in the AOCS Press Bookstore. In addition, a demonstration of the Introduction to Surfactants Modules 1 & 2 will be available during the S&D reception. Details about that reception were not available at press time but will be provided in the meeting program.

In addition, AOCS eLearning Specialist Amy Lopez will give half-hour presentations on Trends in eLearning on the Main Stage of the Expo Hall on Monday, May 4, at 1:00 p.m., and Tuesday, May 5, at 12:30 p.m. A short survey on attendees' wants and needs regarding eLearning will be collected in drop boxes at the registration desk and in the Expo Hall. A drawing from the completed surveys will be held on Wednesday, May 6, at 2:25 p.m. in the Bookstore. The winner will receive a 30-day subscription for the e-course of his or her choosing. Free 30-day subscriptions will also be given away as door prizes on Monday and Tuesday.

"My goal at the meeting," said Lopez, "is to be as accessible as possible to attendees. There really is no limit to the possibilities for eLearning, but we need to know what AOCS members want. We are also open to designing custom e-courses for both member and nonmember companies."

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eLearning

Term covering a wide set of applications and processes, such as web-based learning, computer-based learning, virtual classrooms, and digital collaboration. It includes the delivery of content via Internet, intranet/extranet (LAN/WAN), audio- and videotape, satellite broadcast, interactive TV, CD-ROM, and more.

AOCS Connect

A social network service focused on building online communities of people who share interests and activities in fats, oils, and surfactants.

The two latest technologies provided by AOCS to further members' professional development—social networking and eLearning—will intersect when Lopez creates an eLearning discussion group on AOCS Connect. For an invitation to join the discussion group—or to contact Lopez with ideas or questions—e-mail her at amylo@aocs.org, or call +1-217-693-4836. ■

The quality of olive oil produced under the super high-density system (SHD)

Potential and prospects from the point of view of olive oil quality

Alessandro Mersi

Olive growing is going through a process of change worldwide. Innovation has become a vitally important concern for a sector that has long been at a standstill and affected by crises and ongoing economic difficulties. The modern cultivation techniques used in the super high-density (SHD) system are being disseminated rapidly and becoming statistically significant, both in countries where olive-growing is a traditional crop, such as Spain, and in a series of new and interesting production areas (Chile, Portugal, Morocco, the United States, etc.). Only Italy, beset by a number of traditionalist, policy-setting, and economic difficulties, has been left behind, watching from a distance and facing the risk of losing its role as the world's leading producer of olive oil.

There can be no doubt that the country at the forefront of this innovative olive-growing system is Spain, which, following 15 years of research and experimentation by private entrepreneurs, has developed a new, modern, and efficient approach to olive growing.

It is particularly in recent years, however, that SHD olive cultivation has grown most, and not just in numbers: In terms of agricultural science, production techniques are being continually improved by adapting them to different productive conditions throughout the world. Leading harvesting-machine manufacturers have been quick to understand the importance of this new trend and are constantly improving their technology, particularly in regard to models designed specifically for olive harvesting.

From the standpoint of olive varieties, much research is being done in public sector centers such as Cordoba University in Spain and in private sector companies such as Agromillora, which, in conjunction with researchers and sector professionals around the world, are conducting a major research and development program on new varieties and clones of internationally used Spanish varieties to assess their adaptability to the SHD system. This aspect is extremely important, since the greater the number of varieties available, the more the SHD system will be in a position to meet a wide range of production demands by diversifying olive quality.

On comparing traditional and SHD olive growing, the SHD system's technical and agricultural superiority provides obvious, major economic advantages. SHD cultivation, which is based on a high density of trees per acre (Fig. 1), depends on optimal soil use, greater genetic efficiency of olive varieties, and adaptability to high mechanization, which in turn lead to a drastic cutback in agricultural management costs, particularly in relation to pruning and harvesting. Furthermore, with regard to olive oil quality, there can be no doubt that the SHD system is more efficient and provides greater potential for improving oil quality than traditional methods.

FIG. 1. *Super high density plantation.*

That is particularly true at harvesting time because of harvesting speed, timely harvesting when different olive varieties are ripe, and immediate milling. The advantage of the SHD system lies in the use of mechanical harvesters, which are swift and highly efficient. In fact, in some growing areas it is possible for just two operators to harvest up to nine tons of olives per acre in a matter of two to three hours. (*Editor's note: In California we witnessed the harvesting of five to six tons/acre in under one hour.*) That remarkable harvesting capacity makes it possible to pick large quantities of olives with a perfect degree of ripening even on large-scale plantations, and in some cases, olive processing can be carried out immediately, since it is becoming increasingly common in SHD plantations to build onsite olive oil mills.

In SHD plantations, different varieties are planted separately, harvested separately, and processed and stored separately, so as to make blending easier in keeping with each company's marketing

requirements. This makes it possible to produce oils covering the entire scale of fruitiness, ranging from light to medium to intense, and to be in a position to meet all consumer and market demands.

In the near future, as more olive varieties become available, the SHD system will also help to further optimize olive oil quality, since it will be possible to produce high-quality extra virgin olive oil with lower management costs while also providing each country, region, and even farm with a more distinctive characterization and differentiation to use in marketing their blends on international markets.

Another very important consideration that closes the cycle is the choice of processing system. The final chemical and organoleptic characteristics of olive oil depend on several factors: the production ecosystem (soil and climate), olive varieties (whose physical state and degree of ripeness also vary), and milling techniques and systems, which have a bearing on the oil's chemical and organoleptic profile. A careful, professional choice of the most suitable processing system based on the productive environment, the varieties used, and market needs makes it possible to change the oil's sensory profile by emphasizing certain characteristics or diminishing others in order to maximize oil quality and therefore economic benefits. Leading manufacturers of oil-mill machinery have become aware of the potential of SHD olive growing and are focusing increasingly on designing machines that combine high productivity with a high-quality end product.

We will now analyze the oil produced by three clones of the three varieties being used in super-intensive olive growing: Arbequina Agromillora (Nurstech) Selection, Arbosana I-43, and Koroneiki I-38. The accompanying charts show the chemical, organoleptic, and sensory characteristics of each oil (Fig. 2A–D). The three oils sampled, which were produced in Spain during the 2007 harvest, were made using optimal technical criteria, particularly in regard to harvesting, which was carried out with the appropriate degree of olive ripening and milled immediately.

Based on the great importance and strong influence of milling and extraction/pressing techniques on organoleptic-sensorial characteristics, and on the final quality of the olive oil produced, uniform samples have been examined in reference to the main processing parameters (paste temperature and whisking time, etc.). Chemical studies were conducted in Spain by specialized labora-

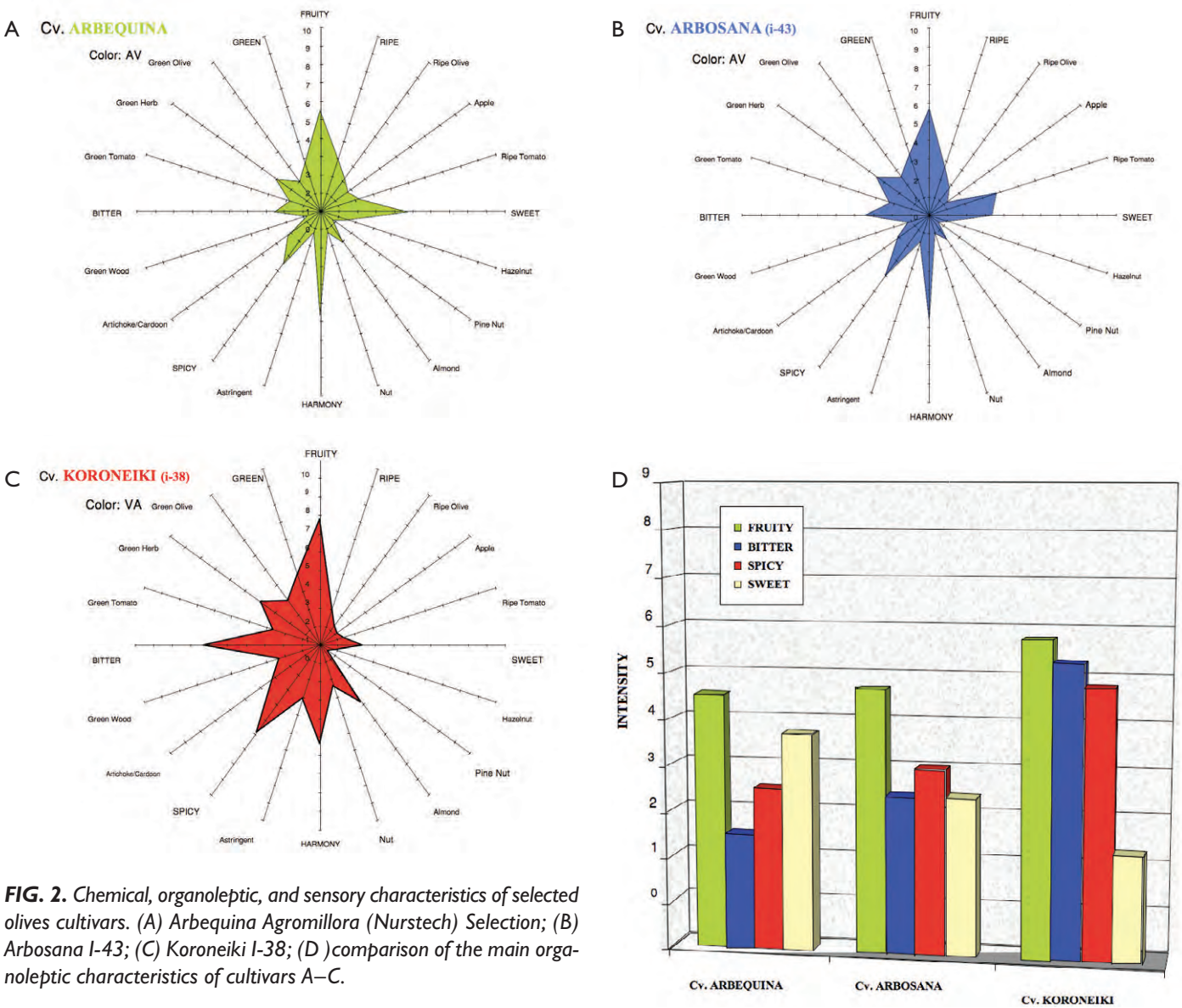

FIG. 2. *Chemical, organoleptic, and sensory characteristics of selected olives cultivars. (A) Arbequina Agromillora (Nurstech) Selection; (B) Arbosana I-43; (C) Koroneiki I-38; (D)comparison of the main organoleptic characteristics of cultivars A–C.*

tories, whereas the sensory analysis was carried out by professional Italian tasters under my supervision.

DESCRIPTION OF OIL CHARACTERISTICS AND SENSORY ATTRIBUTES

Arbequina Agromillora (Nurstech) Selection (Fig. 3). On visual inspection, the oil obtained from the Arbequina variety (Agromillora Selection clone)—the main Spanish super-intensive variety—is a light yellow with green tints In terms of smell it has a fairly clean and persistent fresh fruitiness with evident herbaceous tinges, whereas, conversely, in taste sweet sensations prevail: apple, olive, and ripe tomato, together with almond and hazelnut, are more prevalent than the fresh-green sensations of artichoke/cardoon, olive, and green tomato. Astringency is also light, and bitterness is soft, with optimal overall harmony.

It is a decidedly pleasant olive oil, which by virtue of its delicate nature is also well balanced. Its markedly neutral, light characteristics make Arbequina Agromillora (Nurstech) Selection a "universal" oil. This is particularly interesting from a strictly commercial standpoint, because it can meet the needs of most markets throughout the world. It is also an "ideal" base for making a wide range of products creating blends with other intensive olive oils, even those with opposite characteristics.

The "natural" affiliation of Arbequina oil to the "light fruity" category has also been verified in chemical analyses through the relative values of the percentage of oleic acid (71.1%) and above all total polyphenol content (167 mg/kg), which is not very high. The polyphenol content could give this monovariety oil limited stability over time. From the professional and oil quality point of view, however, specific deficiency can easily be corrected by blending it with fairly low percentages of other particularly intense oils rich in phenolic substances (Koroneiki).

From the gastronomic point of view, "pure" Arbequina oil lends itself to all dishes that require a delicate condiment, and is therefore ideal on broiled and charcoal-broiled fish, salads, cheeses, and fresh pasta.

Arbosana I-43 (Fig. 4). On visual inspection, the oil obtained from the Arbosana variety (clone I-43) was a yellow or golden color with green tints (Fig. 3B). In terms of smell, it clearly demonstrated a green tomato fragrance with an herbaceous background. In terms of taste, it showed a medium harmonious fruitiness with

FIG. 3. *Arbequina Agromillora (Nurstech) Selection.*

FIG. 4. *Arbosana I-43.*

an optimal balance between green/fresh and sweet/mature sensations. A perception of artichoke, green olive, and fresh herb was intrinsic, together with olive and ripe tomato against a background of dry fruit (almond, nut, and hazelnut). A spicy sensation was very evident and pleasant, with bitterness and sharpness definitely less intense.

The results of the chemical analyses were also good, with fairly high oleic acid (74.5%) and overall polyphenol (278 mg/kg) content, which therefore place Arbosana variety oil in the "medium fruity" category. In short, Arbosana I-43 olive oil has an optimal sensory balance and a marked variety characterization, but in this case, this does not limit its appeal and its suitability to all culinary purposes and/or blending with other kinds of oils.

Koroneiki (I-38) (Fig. 5). The oil produced by the Koroneiki (clone I-38) variety, which is of Greek origin, is characterized by a green-gold color and by medium-intense fragrance (Fig. 2C), whereas in terms of taste its fruitiness, it is markedly intense. In terms of aroma, it gave off persistent herbaceous notes and long aromatic almond notes.

In terms of taste, it immediately showed intense perceptions dominated by green and spicy sensations (fresh herb, olive, and green tomato) and a clear aftertaste prevalence of bitter and tart notes (artichoke/cardoon and green wood). Its spiciness was very strong, while bitterness was potent and persistent on the palate. This oil has a strong personality and a very particular taste, and for this reason and its rather "extreme" characteristics, does not have a particularly high level of harmoniousness. This general appraisal changes on examining its chemical values.

The high oleic acid content (78.2%) and above all the high concentration of polyphenols (600 mg/kg)—natural anti-oxidant substances—make the olive oil from this variety truly excellent as compared to the other two we have examined. Strictly from an oil-quality point of view, Koroneiki oil is an outstanding "blending" oil and therefore has the capacity, in small percentages, to "revitalize" any type of oil through a "natural" injection of aromatic, anti-oxidant substances.

At the same time, it can be highly appreciated in demanding markets that are used to "intensely fruity" olive oils.

The sensory analyses show that the three olive oils produced using the varieties currently in use in the SHD system are clearly distinguishable from each other (Fig. 2D) and, by virtue of their

organoleptic characteristics, can cover the entire range of fruitiness. In fact, in the case of the Arbequina variety, which is considered a light fruity oil, a medium intensity can easily be obtained in some production ecosystems using certain milling techniques. The use of just three varieties to meet productive and market demands throughout the olive-growing world may be considered rather limited, but it is worth pointing out that fortunately the system is already self-sufficient with these varieties alone.

To understand this concept better, we can refer to the example of the three primary colors (yellow, blue, and red) which of themselves are enough for the NTSC [National Television System Committee] system, in use in all video systems (televisions, screens, etc.) to recreate a virtually infinite range of colors. Similarly, by blending the three oils using different percentages of each and/or optimizing milling and extraction techniques, one can produce a large, diversified range of oils. In conclusion, we will describe some examples of particularly interesting blends of oils of the three varieties.

A small percentage of Koroneiki added to an Arbequina base makes a very interesting oil. By progressively increasing the blending percentage, a medium-light fruity oil can be turned into medium-intense, with the possibility of producing a full commercial range. In the specific case of the three varieties under study, which in themselves are high-quality oils, it is not difficult to produce high-level blends that can compare favorably with world-class extra virgin oils.

For instance, a "prototype" based on Arbequina with a fairly consistent percentage of Arbosana and a smaller amount of Koroneiki leads to a truly complex, extraordinary medium-intense fruity oil with great harmony and optimal balance, making for a really excellent oil that can hold its own in the most prestigious contests around the world. It should be emphasized that such results can only be achieved by optimizing the entire process through appropriate plantation and crop management, using the latest milling techniques, and painstaking, professional oil-quality management. These technical considerations, which are difficult to achieve through traditional olive-growing methods, are easily implemented "naturally" through the SHD system.

The above is confirmed through an analysis of chemical values (Table 1) regarding acidity and the number of peroxides (oxidation ratio). These specific values, unlike others stemming mainly from the variety of olive, the production ecosystem, and the milling system, can be directly and strongly influenced by the physical state of the olives on processing. The three oils analyzed reflect the highly uniform and particularly low values that characterize high-quality products. This is the last important confirmation of the effectiveness of the SHD system and its superiority over the traditional system, especially in regard to its highly efficient, clean-harvesting, and effective approach to olive tree health management.

FIG. 5. *Koroneiki I-38.*

CONCLUSIONS

After analyzing the chemical, organoleptic, and sensory characteristics of the three oils, we can say that under optimal conditions, and taking excellence as a benchmark, all three meet all the requirements needed for high quality and not only show the same standard of quality but are superior in the main to the oils produced through traditional olive-growing methods.

However, the biggest difference that has led to a genuine technical and economic revolution in the sector is that, owing to the drastic reduction of management costs, olive oils produced using the SHD system can be marketed at lower price levels that are acceptable to most consumers, while still providing growers with satisfactory profit margins. In fact, in some cases, certain olive oils from well-structured large-scale olive holdings in favorable agricultural areas can be marketed at similar or very slightly higher prices to those sold by major distributors of current "commercial" oil brands. Their quality is so obviously superior to that of mainstream commercial brands that it can be noticed by the average consumer. A reasonable sale price would make it easy to promote "real and genuine" extra virgin olive oil on world markets.

Editor's Note: Arbequina (Nurstech) Selection will be available in North America for planting in 2009.

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Variety	Origin	Date of Extraction	K 232	K 270	Acidity % Free of Oleic acid	Peroxides % Fn°meq 02/Kg	Fatty Acids per GC (%) Palmitic C16:0	Palmitoyl C16:1	Stearic C16:0	Oleic C16:1	Linoleic C18:2	Linolenic C18:3	Polyphenols Caffeic mg/Kg
Arbequina	Spain	Beginning 11/07	1.46	0.09	0.19	4.0	14.02	1.40	1.49	71.10	11.70	0.78	167
Arbosana	Spain	Beginning 11/07	1.52	0.09	0.21	6.8	12.96	1.44	2.17	75.40	6.0	0.54	278
Koroneiki	Spain	Beginning 11/07	1.54	0.12	0.16	5.6	10.77	0.75	2.75	78.18	5.01	0.62	600

TABLE 1. *Comparative chart of the chemical parameters of oils from super-intensive varieties.*

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AOCS Connect is funded by the AOCS Foundation.

Meeting Roundup

Functional Foods and Edible Oils: The Future

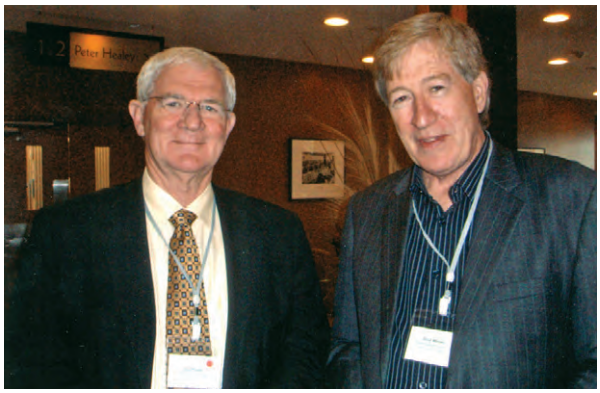
The Australasian section of the American Oil Chemists' Society, the Oils & Fats Specialist Group of the New Zealand Institute of Chemistry, and the University of Auckland held a joint conference on Functional Foods and Edible Oils: The Future at the Heritage Hotel, Auckland on November 12–13. A record 169 delegates from industry, research organizations, and academia attended.

The Omega-3 Lipids Seminar, held in the morning session of Day 1, was well received. Among the highlights was the plenary paper by Philip Calder, whose topic, "Future directions for nutritional and therapeutic research in omega-3 lipids," reflected the purposes of the conference: reasoned argument and stimulating research presentations.

Calder's talk highlighted key basic research issues that need to be addressed if the full potential of ω-3 (n-3) fatty acids to improve human health and well-being is to be harnessed. It is generally accepted that ω-3 fatty acids are beneficial to human health, especially the forms associated with oily fish and with the Inuit diet (eicosapentaenoic acid [EPA] and docosahexaenoic acid [DHA]), which are known to lower the risk of cardiovascular disease. Calder said that we now know many, though certainly not all, of the mechanisms by which these fatty acids act in the body to exert their cardiovascular benefit, and we are beginning to identify beneficial actions of EPA and DHA elsewhere in the body. He issued a note of warning, though: The real impacts of lower-dose regimens that are relevant to fish consumption, of consumption of enriched foods, and of modest supplementation need to be clarified. Furthermore, the dose-response relationships between ω-3 fatty acid intake, ω-3 fatty acid appearance in target tissue(s), and alteration of physiology need to be better described.

He went on to note that, in addition to EPA and DHA, at least four other ω-3 fatty acids are consumed in the human diet or present in the body. Of these, research has focused on the main plant form (α-linolenic acid). This fatty acid is seemingly weaker in its effects than the combination of EPA and DHA, and its chief role may be as a precursor to these more active fatty acids.

Calder added that other ω-3 fatty acids such as eicosatrienoic acid and docosapentaenoic acid may have physiological effects and health benefits, but these are virtually unexplored at present. Recent research has suggested that there may be a genetic predisposition to the effects of dietary fat and to the health benefits of ω-3 fatty acids; this raises the possibility of "responders" and "non-responders" and of targeting the therapeutic effects of ω-3 fatty acids to certain subgroups or individuals. This will be a great challenge to researchers, manufacturers and marketers, and regulators, he said.



AOCS Vice President Ian Purtle, left, and Rod Mailer, recipient of the 2008 Timothy L. Mounts Award, pictured here at the Functional Foods and Edible Oils: The Future conference held November 12–13 in Auckland, New Zealand.

As always at the annual Functional Foods Conference, there was a competition for student oral and poster presentations. The University of Auckland and the

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oils+fats 2008

The second edition of oils+fats, the International Trade Fair for the Production and Processing of Oils and Fats Made from Renewable Resources, held November 18–20 in Munich, Germany, included some 1,500 participants (1,200 visitors and 273 representatives of exhibiting companies) from 58 countries. (The countries with the largest number of visitors were Germany, Austria, the Netherlands, Belgium, Italy, Denmark, Poland, the United States, Turkey, and France, in that order.) Seventy companies from 15 countries used this platform to present a range of manufacturing and processing solutions and technologies (from auxiliary materials, plants, and machinery to quality control and logistics) for oils and fats made from renewable resources. The share of foreign exhibitors increased approximately 40%.

The managing director of Euro Fed Lipid, Frank Amoneit, said, "Euro Fed Lipid is extremely pleased and satisfied with the way that 'our' trade fair oils+fats is developing and growing. Besides allowing us to meet with our members and partners, we also made several valuable contacts that have helped us to further improve our scientific activities."

One of the fair's visitor highlights was a panel discussion about "Oils and fats made from renewable resources and the conflicting priorities of food vs. energy," the title of which was "Plenty for everyone – Fact or fiction?"

Additional information about oils+fats is available at www.oils-and-fats.com.

96th Session of the Council of Members of the International Olive Council

The Council of Members of the International Olive Council (IOC) held its 96th session at its headquarters in Madrid, Spain, November 17–21, 2008. Discussions were chaired by Israel.

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New Zealand Institute of Food Science and Technology Prizes sponsored prizes for the winners.

The winning oral presentation—"Anti-inflammatory and cardio-protective effects of omega-3 polyunsaturated fatty acids and plant sterols in hyperlipidemic individuals"—was presented by Michelle Micallef, a student from the Nutraceuticals Research Group, School of Biomedical Sciences, University of Newcastle, NSW.

The winning poster presentation—"Omega-3 PUFA status from farmed salmon compared with salmon oil capsules"—was presented by Melanie Pauga, a student at Institute of Food, Nutrition and Human Health, Massey University, Albany.

AOCS Vice President Ian Purtle was also a presenter at the conference; the title of his presentation was: "The History and Ongoing Development of Plant Sterols for Cholesterol Reduction." ■

This session marked the end of the term of office of the majority of the members of the management team put in place at the Executive Secretariat on November 21, 2004, which was charged with carrying out the reform of the council; and it coincided with the appointment of a new deputy director who will head the council beginning in January 2011. It was also the first session at which the chairman of the IOC Advisory Committee on Olive Oil and Table Olives attended as an observer. This participation is part of the drive to strengthen the cooperative ties between the IOC and the business circles of its member countries.

The specialist committees met on November 18 and 19, and their meetings were preceded by meetings of the Advisory Committee and the associations that have signed the agreement to control the quality of the olive oils and olive-pomace oils sold on import markets.

The Council of Members also approved the action plan endorsed by the Promotion Committee to promote the consumption of olive products in 2009. A financial allocation of €2.5 million has been earmarked for this purpose. The plan includes:

- The second phase of the promotion campaign first launched in India in September 2007.
- A study designed to establish a three-year action plan for the promotion campaign scheduled in Russia, China, South Korea, the United States, and other markets. ■