



Despite all the challenges facing everyone including Universities, UMass Food Science is doing terrific. The most exciting news is the continued transformation of Chenoweth Lab. Last newsletter, I included pictures of the 3rd floor labs being renovated. These are now complete and include a new teaching lab and 3 labs for research on bioactive food components to improve health. Below are the pictures showing the 40+ year old labs and the amazing new renovated labs.

Chenoweth Labs Before Renovation



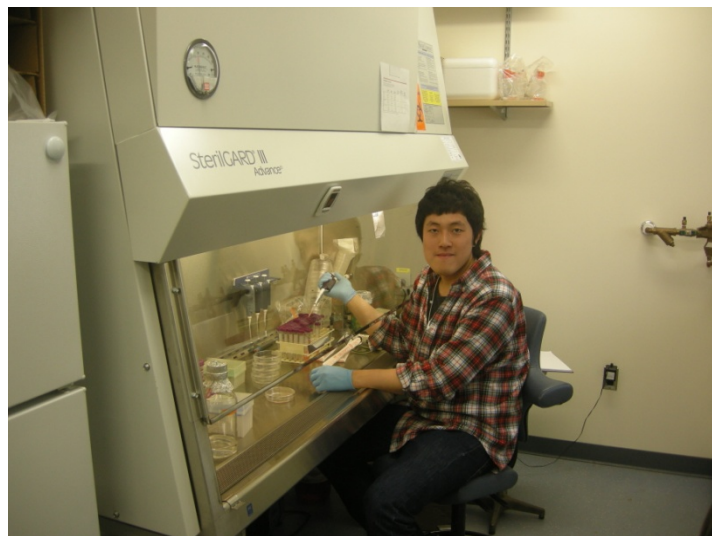
Renovated Labs



New Teaching Lab



Dr. Hang Xiao's Cancer Prevention Laboratories



Dr. Yeonhwa Park's Functional Food Lab

While we are ecstatic about these new labs, we are even more excited about the next phase of laboratory renovation, the **Fergus Clydesdale Foods for Health and Wellness Center**. As you may remember, these labs will be constructed in the Hospitality and Tourism Management Department's kitchen, classroom and Howard Johnson dining room. The driving force behind these laboratory renovations can be attributed to our outstanding Alumni, under the leadership of our Advisory Board, who have raised over \$1.7 million towards this project. This outstanding level of fund raising convinced the University to start this project this year (estimated completion date of January 2010), even though our fund raising goal of \$2.0 million has not yet been reached. A year from now the laboratories should be complete and will house the research programs of Julian McClements and Yeonhwa Park. Here are pictures of the start of the construction and over the next year I will be happy to provide further updates.

This fall we held our first ever **Student Scholarship Luncheon**. For many, many years we have been able to present our undergraduate students with scholarships that are funded by the generosity of our Alumni. As I mentioned in the last newsletter, we were able to give 17 different undergraduate scholarships. Below are some of the undergraduate scholarship winners.



Jackie Mathews (right) and Dan Vollmer (center) with Dr. Lynne McLandsborough

James Lavoie Scholarship winners, Ashley Han (far left) and Katlin Ewald (far right) with the Lavoie family



Linda Letcher of Kraft Foods (far left) presented Freshman Alumni Scholarship recipients to Victoria Boushell, Jay Gilbert, Corey Fitzgerald, Alison Hurysz and Alexis Minniti (left to right)

**Transfer Alumni Scholar winners
Helene Taormino (left), Freeland
Tuden and Danielle Singer. Peter
Salmon of International Food
Network, Inc. presented the
scholarship.**



This year the Department awarded two new **Graduate Student Scholarships**. The first was the **Peter Salmon Graduate Fellowship** that was part of the \$1 million graduate student fellowship campaign. This Fellowship was named after Peter due to his extremely generous efforts to help provide graduate student support. The Fellowship was given to Tanushree Tokle, a PhD student working in Julian McCelments lab. Tanushree will be conducting research on nanotechnology based nutrient delivery systems for use in functional foods.



**Peter Salmon presenting
Tanushree Tokle with the first
Peter Salmon Graduate
Fellowship.**

The second scholarship is the **Herbert Hultin Scholarship**. As many of you know, this endowment was funded by former students and friends of Dr. Hultin. This scholarship is to recognize the excellence of one of our existing graduate students. The first Herbert Hultin Scholarship was awarded to Thaddao (Dao) Waraho. Dao is working on the impact of minor lipid components on lipid oxidation in emulsions. Dao gave a presentation of her research at our Industrial Strategic Research Alliance meeting as part of her award.

**Herbert Hultin Scholarship
Winner Thaddao (Dao) Waraho
(second from the left) with the
Hultin family.**



Finally, one of our most outstanding undergraduate students received a unique honor this fall. Junior **Kevin Johnson** was named the Fall Male Scholar Athlete by the UMass Athletic Association. In addition, Kevin was voted onto the 2009 Atlantic 10 Cross Country Academic All-Conference team and he also made the Outdoor Track and Field Academic All-Conference team for the second year in a row. If you want to see an interview with Kevin please go to <http://www.umassathletics.com/sports/m-xc/spec-rel/122309aab.html>

This fall we also held of **20th Endre Endresen Lecture**. This year's lecture was given by **Al Bolles**, Executive Vice President of Research, Quality and Innovation at ConAgra Foods. Al gave a great lecture on "Current Trends in the Food Industry". Dr. Bolles provided the students with outstanding insight into the use of science to drive business results. He showed excellent examples of science driven innovations that can be used to produce convenient foods with exceptional consumer acceptance. He also presented an interesting perspective on the role of the Food Industry in providing food choices that have good value so that healthy foods can be accessible to all consumers regardless of their economic status. This was a great perspective into the importance of processed foods that is often overlooked by current critics of the food industry whose dietary recommendations are often only available to economically elite consumers. We finished the lecture with a lunch where Al interacted with our students. Following the event, Dr. Bolles initiated an internship program that will send several students to ConAgra this summer for valuable work experience.



Dr. Al Bolles, Executive Vice President of Research, Quality and Innovation at ConAgra Foods receiving a UMass T-shirt from Eric Decker after his Endresen Lecture.

Faculty news:

Dr. **Fergus Clydesdale** is failing miserably at retirement. Ferg has organized a symposium in conjunction with the National Academies Food Forum on "The Role of Food Technology in Helping to Combat the Behaviors which Lead to Obesity" on Nov 2,3 2010 in Washington DC. In addition, he continues to work with the Food and Nutrition Board, Chair the Board of ILSINA and have recently been appointed to an FDA Committee to examine their research mission and priorities.

Dr. **Julie Goddard** who is highlighted in the research section below has begun teaching the laboratory section of Food Analysis and participated in the

Dr. **Ron Labbe** presented a seminar on Role of Spore-Forming Bacteria in Food Safety at International Congress of Food Safety, held at Villahermosa, Tabasco, Mexico.

Dr. **Lynne McLandsborough** gave a talk entitled "*Listeria monocytogenes*" biofilm formation: transfer and remediation at the 5th annual Microbiology Symposium held by the Department of Chemistry & Life Science at the United States Military Academy in West Point, New York

Dr. **Julian McClements** was interviewed by NPR about "In Defense of Food Science". He also participated in a RQI Academic Lecture Series at ConAgra Foods.

Dr. **Sam Nugen** is developing research collaborations with the Center of Hierarchal Manufacturing in the Polymer Science Department. His students are now conducting microfabrication research in the Nanotechnology clean room. In addition, Sam is incorporating extremely novel teaching methods to expand student experiences in the Food Processing Lab.



Graduate Student Fang Tian conducting biosensor research for Dr. Sam Nugen in the nanotechnology clean room.

Dr. **Yeonhwa Park** finished her work with the Institute of Medicine as the report “School Meals: Building Blocks for Healthy Children” was released much to consumer and industry interest.

Finally, I gave a lipid oxidation short course at the Latin American Oil Chemist meeting in Argentina. I also gave a talk on the role of processed food in a healthy diet at the Healthy Foods, Healthy Lives Conference at the University of Minnesota and a talk on food and health as a Kansas State University Distinguished Lecturer.

Below is a research summary of one of our new faculty members.

Julie M. Goddard, Ph.D.

Assistant Professor

Innovative Food Contact Materials

Materials are used to handle, process, and package our food at many stages from farm to fork. *The goal of the Goddard Research program is to modify these materials to improve the quality, safety, and environmental sustainability of our food.* The fundamental concept behind much of our research is that while food contact materials can be quite thick, the portion of the material that interacts with the biological (food, microbiological) environment is on the order of 2-4 nanometers. We can change the chemistry and bioactivity of the top several nanometers of the contact material, and manipulate how the material interacts with food products and microorganisms. We use cutting edge techniques such as ATR-FTIR, atomic force microscopy, and surface tensiometry, all available within the Department of Food Science, to analyze our novel materials. Below are three examples of research projects. For more details, and a list of recent publications, please visit: www.umass.edu/goddardresearch.

Self-Sanitizing Food Processing Surfaces: The surfaces of stainless steel and polymers can be modified to be rechargeably antimicrobial. Such self-sanitizing food processing surfaces can help to improve food safety in the processing plant environment.

Bioactive Food Packaging: Bioactive packaging can enhance the quality and safety of packaged foods by further processing the product or preventing degradative processes after packaging. We are researching immobilization of enzymes, antioxidants, antimicrobials, and other bioactives.

High Barrier Sustainable Materials: We are currently researching ways to improve the barrier properties of sustainable materials through surface modification of the top several nanometers of sustainable films.

Julie M. Goddard Bio: After receiving a B.S. in Chemical Engineering at Cornell University, Julie worked at Kraft Foods as a research engineer. She returned to Cornell to complete a Ph.D. in Food Science, with minors in

material science and food microbiology, under Prof. Joseph Hotchkiss. Prior to joining the UMass Food Science faculty, she worked in Prof. David Erickson's *Integrated Micro- and Nanofluidic Systems* lab as a.

Additional Research News

Research Faculty Profile -- Kalidas Shetty-- Sustainable Food Systems and Health



When discussing issues of food security and sustainability, many people mention the phrase “think globally, act locally.” This may be a good place to start, but it’s more complicated than that, says Kalidas Shetty, UMass Amherst Professor of Food Science. In order to create more sustainable food systems we need to take an integrative approach. As Shetty explains, “What we’re seeing already is that food, health, energy, environment, and of course water and sanitation – they all connect. If we don’t understand that, we cannot address the issue.”

The “green revolution” of the 1970s involved farming methods that were “highly dependent on monoculture and petroleum-based fertilizers and pesticides,” says Shetty. While this movement was somewhat successful in providing food to the hungry, the nutritional and environmental drawbacks were not considered. Regarding nutrition, the foods that emerged from the green revolution were primarily based on refined carbohydrates and lipids. As a result, the worldwide epidemic of malnourishment has rapidly shifted to global calorie-excess diseases, such as Type II Diabetes and cardiovascular disease.

In terms of calories, Shetty says, “we are now producing enough food for 12 billion people, and our population is 6.7 billion.” To address this epidemic, Shetty believes that “food diversity, traditional foods, and local foods are among the logical and best ways to achieve food security, health, and environmental sustainability.” With this in mind, Shetty has spent the past three years creating a research institute of food systems biology in Mangalore, India. This is a targeted location, considering the fact that nearly 40 percent of the 140 million people in India have Type II Diabetes, most likely due to diet.

“My goal now is trying to group all the foods in a geographic environment that have evolved there for a long time,” Shetty explains. In a study published last year in the *Journal of Medicinal Food*, Shetty examined the effects of a traditional diet on Native Americans, an ethnic group of whom 70 percent are diabetics in some specific communities. As he explains, “indigenous communities in this country are totally uprooted from their traditional food diversity.” By comparing the current diet of fried bread and refined sugar with the traditional “three sisters” (native corn, beans, and pumpkin), Shetty found evidence supporting his ideas. Overall, the traditional foods had much higher protective ingredients to potentially combat Type II Diabetes and hypertension. “Just switching back to a diet that’s their own, on which they have built a spiritual base,” is beneficial, he says. “Here we give the scientific rationale.” Shetty is also researching the potential benefits of traditional “Soul Food” elements originating from West Africa. From the perspective of a microbiologist, he is applying the concept of “redox biology” to this food system. As Shetty explains, “The rationale for redox biology is that environmental breakdown and human disease are interconnected, and emerge due to cellular breakdowns in dominant oxygen-based higher organisms.” By studying foods on a cellular level, especially those that have been linked to good health in West Africans, he hopes to develop food systems that will fight Type II Diabetes and heart disease in African-Americans.

With respect to environmental quality, Shetty is hopeful: “We are seeing more integrated farming systems that use natural fertilizer and more sustainable production systems. Over time the ecology and soil biology is better.” While he suggests that we return to a local agricultural system based on traditional foods, Shetty also approves of developing new technologies. “No one is calling for us to live like hermits,” he says. “We can bring new technologies in and integrate them with the logic of the Earth.” If we keep in mind the connections that food systems have to health and the environment, Shetty says, “we will have a better rationale to move forward in a more sustainable manner.” With a barrel of oil projected to stay in the \$150 range for some time, we will be forced to accept this reality. This article originally appeared in the report “Environmental Research 2008” by the UMass Amherst Environmental Institute.

Antioxidant claims based on ORAC/DPPH questioned

New research from AOCS member Eric Decker and his team at the University of Massachusetts in Amherst (USA) suggest that basing antioxidant activity claims on results of basic antioxidant assays such as ORAC and DPPH (2, 2'-diphenyl-1-picryl-hydrazyl) could be deceptive. "Free radical scavenging assays such as ORAC [Oxygen Radical Absorbance Capacity] and DPPH were not able to consistently predict the ability of compounds to inhibit lipid oxidation in cooked ground beef," they wrote in the *Journal of Agricultural and Food Chemistry* (57:2969-2976, 2009).

"While simple one-dimensional free radical scavenging assays can be helpful in evaluating the antioxidant mechanisms of a compound, the data from these assays should not be used to imply that compounds with high free radical scavenging capacities are good antioxidants in food systems. "The major drawback of the free radical scavenging assays is that they do not measure the ability of a compound to chelate metals, partition in to lipids where oxidation is prevalent, or interact with other antioxidants and prooxidants (e.g., metals) in a food product," they concluded.

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Park, other experts recommend changes in school lunches

Yeonhwa Park, assistant professor of Food Science, was the only food scientist on an Institute of Medicine (IOM) panel that this week recommended a new set of nutrient targets and standards for menu planning for school lunches. The expert report was released Oct. 20 by the 15-member national Committee on Nutrition Standards for National School Lunch and Breakfast Programs, sponsored by the U.S. Department of Agriculture. Committee members recommend targets and standards to limit sodium and maximum calories, and encourage children to eat more fruits, vegetables, and whole grains. The recommendations would bring school meals in line with the latest Dietary Guidelines for Americans and Dietary Reference Intakes. The programs' current nutrition standards and meal requirements are based on the 1995 dietary guidelines and the 1989 recommended dietary allowances.



Park brought special expertise to the panel in two areas: how to reduce sodium content and how to increase the amount of whole grains in foods in school breakfast and lunch in a form that students will accept and at an affordable price. In the case of whole grains, research shows there is good acceptance among school-age children for certain grain products to contain up to 70 percent whole grain, she says. However, due to their limited availability and cost at present, the panel recommended that schools try to reach a target goal of at least 50 percent whole-grain-rich content in school lunches and breakfasts within three years of final requirements being adopted for school meals. For sodium, the problem is that reducing it means foods taste different and are less likely to be accepted by children. Thus the panel recommended a stepwise reduction over the next 10 years, with a goal of an approximate 10 percent decrease for every two-year period. For example, recent data show that a typical high school lunch contains around 1,600 milligrams of sodium. The report recommends that lunches for high school students should eventually contain no more than 740 mg. The committee recognized that consumers are less likely to detect incremental changes, and it is unrealistic to expect food preparers to make rapid, dramatic changes and still produce meals children will eat.

Park says, "We hope industry will also respond and that students will accept substitutes. We thought the gradual reduction of sodium over 10 years was reasonable and worth a try." For the first time, the committee also set maximum calorie levels. Lunches should not exceed 650 calories for students in grades K-five, 700 for children in grades 6-8, and 850 for those in grades 9-12. Breakfast calories should not exceed 500, 550 and 600 respectively for these grade groups.

According to the IOM, the National School Lunch Program is available in 99 percent of United States public schools and in 83 percent of private and public schools combined. The School Breakfast Program is available in 85 percent of public schools. About 30.6 million school children, 60 percent, participated daily in the school lunch program in fiscal year 2007, and 10.1 million children ate school breakfasts. Participating schools served about 5.1 billion lunches and 1.7 billion breakfasts that year. As the report also acknowledges, implementing the recommendations will likely raise the costs of providing school meals - particularly breakfasts - mainly because of increased fruit, vegetables and whole-grain foods to be served. A combination of higher federal meal reimbursement, capital investment and additional money for training food service operators will be needed to make the necessary changes in school cafeterias.

The amount of vegetables offered should increase to 3/4 cup per day for grades K-eight, and 1 cup per day for grades nine-12. Schools should offer starchy vegetables such as potatoes less often and provide at least 1/2 cup each of green leafy vegetables, orange vegetables, and legumes per week. Students should be provided 1 cup of 1 percent or nonfat milk at breakfast and at lunch each day. This will help lower calories.

The amount of meat or meat alternatives in lunches should be 2 ounces on most days for all grades, but schools should have the flexibility to provide greater amounts to students in higher grades. The amount of meat or meat alternatives in breakfasts should be 1 ounce per day for children in grades K-eight and 2 ounces on most days for high school students. Schools that allow students to decline individual items rather than take a whole meal should require them to take at least one serving of fruits or vegetables at each meal. The meal programs currently have no such requirements. The amount of fruit offered in breakfasts should increase to 1 cup per day for all grades and in lunches should increase to 1 cup per day for students in grades nine-12. No more than half the fruit schools provide should be in the form of juice.

The IOM recommended nutrition standards for food and beverages available a la carte in school stores and vending machines, which compete with school meals, in a 2008 report, Nutrition Standards for Foods in Schools.

Food Science receives PhD training grant in foods, health and policy

The Food Science Department has been awarded a \$234,000 Graduate Training Fellowship Grant from the U.S. Department of Agriculture to develop scientists with cutting-edge multidisciplinary training in food science, nutrition and public policy. The award from the USDA Food and Agricultural Sciences National Needs Graduate Fellowship Grants Program will provide funding for three doctoral students. Hang Xiao, assistant professor of Food Science, is the principle investigator for the program.



Currently, new ingredient delivery technologies are presenting novel opportunities for the incorporation of health-promoting bioactive compounds into foods. However, for these technologies to be successfully used in foods, the delivery systems must be designed to increase the chemical stability and biological efficacy of the bioactive compounds, as well as being compatible with the food matrix, economically feasible, safe and legally acceptable. To design such ingredient systems, scientists must have a combination of interdisciplinary skills in the physical properties, chemistry and health-promoting impact of food components. Moreover, the safety and benefits of these novel delivery systems must be understood so that science-based policies and regulations can be established for their proper use in foods.

The training program will use both interdisciplinary teaching and research activities to educate students on how the physical properties of ingredient delivery systems impact the chemical stability and biochemical efficacy of bioactive food components. The program will also provide innovative experiential and mentoring opportunities that combine food science, nutrition and functional foods. Due to the importance of the link between science and public policy, the program will include a combination of classes offered by the Center of Public Policy and Administration and an internship with the National Academy of Science, the International Food Information Council or International Life Science Institute. Faculty involved in the program include are Eric A. Decker, David J. McClements and Yeonhwa Park, Food Science; Richard Vachet and Paul Dubin, Chemistry, and Rong Shao from Pioneer Valley Life Sciences Institute.

Don't forget to register for the **UMass Alumni Breakfast** at this year's **IFT**. The breakfast will be held at from 7:30 to 9:00 a.m. on Tuesday, July 20th at the Hilton Chicago Hotel. Hope to see you there and have a great Spring.

A handwritten signature in black ink, appearing to read 'Eric Decker'. The signature is stylized and cursive.

Eric Decker,
Department Head