



University of Massachusetts
Department of Food Science Newsletter
Volume 30, Number 1, 2018

UMass Food Science turns 100 years old

Join us to celebrate the first and best in the U.S.



On April 27, 1918, the trustees of Massachusetts Agricultural College established the nation's first Food Science Department, then known as the Department of Horticultural Manufacturing. Over the years, the department has undergone many transformations until today, where UMass Amherst's Food Science is one of the strongest food science departments in the world (*see the article highlighting UMass Food Science Department's history below*). On September 28 and 29, we will host a celebration of being the *first* and the *best* in the United States at our traditional Alumni Reunion Weekend. We will have a banquet on the evening of Friday, September 28, to honor many of the people who were critical in our success as well as providing the opportunity to bring together many friends to celebrate our tremendous history. On Saturday, September 29, we will organize alumni-student events, have hands-on apple processing in the Chenoweth Pilot Plant, and host a lunch in the newly renovated Old Chapel.

We are hoping to make this the largest and most successful Alumni Reunion Weekend ever. Please mark **September 28 and 29, 2018** in your calendar! The registration site will soon be active and we will send additional information shortly.

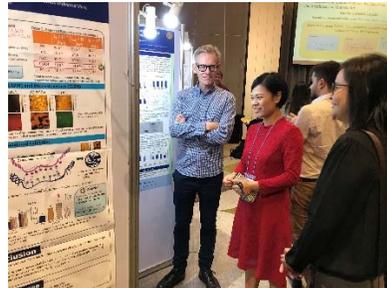
UMass Alumni Reception at IFT

Last year we switched our IFT Alumni Event from a breakfast to an early evening reception as IFT allowed us to move to an offsite location. The reception was a huge success with over 75 people in attendance, compared to our usual 20-25. This year, **David Coles** has arranged for us to have our meeting at the Metropolitan Club on the 66th floor of the Sears Tower (Willis Tower) at 233 Wacker Dr. The event is scheduled for Monday, July 16 from 5:00 to 8:00 pm. You can register through IFT for only \$15 per person which includes one drink (with cash bar) and appetizers. This low price was made possible by sponsors including **D&S Solutions** via **David Coles** and **Kerry Foods** via **Otis Curtis**.

UMass in Thailand



We kicked off the 100th Anniversary celebration in Bangkok, Thailand on January 10-12 with a conference on *Foods for Health: Meeting the Needs of Future Generations*. Alumni. Advisory Board member **Yongjing Li**, Regional President of DuPont Asia Pacific, generously arranged sponsorship to make the conference possible. Many Thai alumni helped in organizing the venue and events. Special thanks to **Withida (Joop) Chantrapornchai**, **Wilailuk (Tuk) Chaiyasit** and **Ketinun (Get) Kittipongpittaya**. Six UMass faculty joined over 85 attendees from Thailand, Japan, China, Taiwan and South Korea to attend 17 talks ranging from the microbiome to nutrient delivery systems to food safety. The conference ended with a round table on “The Future of Foods” with alumni **Yongjing Li**, **Zhenyu Chen**, and former faculty **Pavinee Chinachoti** (picture left below).



Matt Moore, Food Virologist, Joins Food Science



We are extremely excited to have Matt Moore join the Department this semester. Matt received his Ph.D. from North Carolina State University and recently completed a postdoc at the Center of Disease Control. Matt’s lab primarily investigates microbial food safety with a focus on food and waterborne viruses (human Norovirus, hepatitis A/E, rotavirus, etc.). The lab’s three major areas in foodborne virology will focus on 1)

Understanding and utilizing interactions between these viruses and the native human gut bacterial flora. Recent research has demonstrated that viruses that infect the human gut interact and may potentially be assisted by certain gut bacteria while being blocked by others. Our research will lead to a better understanding of how these interactions work and application to control the virus. 2) *Developing sensitive, rapid in-field detection, and sequencing*

platforms. Our lab will continue to do work on a technique that allows for detection of virus in under 30 minutes in a portable lab-in-a-suitcase apparatus that does not require electricity. Additionally, we will develop a platform for portable whole genome sequencing of foodborne viruses that has been used in resource-limited settings such as the Ebola outbreak in Africa. 3) *Development and evaluation of novel viral disinfectants and therapeutics*. Multiple foodborne viruses are difficult to destroy and our lab will be researching novel disinfectants that may have use in industry. Our lab will also further develop therapeutics against a novel viral protein target that has potential to reduce disease symptoms. Our lab is extremely open to collaboration and plans to reach out to members of industry, academia, and government.

Product Development Competition

Congratulations to the Food Science Product Development Experience class for an impressive showing of innovative and healthful food products developed this semester! This past fall, Herbalife Corporation sponsored the product development competition with 17 students receiving hands-on product development experience..

This program allows for students to design food products geared toward a healthy lifestyle that are both innovative and delicious. Students were required to create production-ready formulas and tasked with ingredient sourcing, ingredient pricing, nutritional labeling, packaging ideas, and developing marketing campaigns for their finished products. **Amanda Kinchla** and **Matt Steffens** (class of '89 and '91) mentored the students as they developed their healthy products.

The UMass Product Development teams presented their final prototypes to the Herbalife Nutrition group with the hope of having their prototypes commercialized. Scholarships were also given to the top three teams. A BIG congratulations to the winning teams and many thanks to Herbalife!

- First Place: Sun-E-Spread; Developers: **Marhaini Md Yasin, Yiren Yue**
- Second Place: Gluten Free Protein Brownie Mix; Developers: **Austin Cain, Emily Newman, Weipeng Qi, Shannon Tzeng**
- Third Place: Power Ramen; Developers: **Ryder Chilcoff, Daniel O'Brien, Rudi Scherff**

UMass Researchers find Food Preservative Affects Gut Microbiome

By **Martin Finucane; Boston Globe Staff; December 20, 2017**

University of Massachusetts Amherst researchers say they've found that antimicrobial compounds that are added to preserve food during storage, change the gut microbiome, underlining the need for more study of the additives' effect. "This is a very interesting phenomenon that we haven't seen before, to our knowledge. We're certainly interested in looking into it further. We do not know enough about what preservatives do to the microbiomes in the gut," **David Sela**, a nutritional microbiologist at the university, said in a statement. Sela and colleagues looked at the effect of one preservative compound, polylysine, in the guts of mice. The researchers said that the compound "temporarily perturbed the diversity of microbes in the mouse gut," but over a 15-week study period, the mouse microbiome returned to conditions

similar to the beginning of the study. Sela said in the statement that there is a “a critical scientific gap in understanding the potential interactions” of antimicrobial compounds with the many species of microbes in our intestines.

A Better Way to Wash Pesticides off Apples

"Effectiveness of Commercial and Homemade Washing Agents in Removing Pesticide Residues on and in Apples: Tianxi Yang, Jeffery Doherty, Bin Zhao, Amanda J. Kinchla, John M. Clark, and Lili He: *Journal of Agricultural and Food Chemistry*; ACS press release



Polishing an apple with your shirt might remove some dust and dirt, but getting rid of pesticide residues could take a little more work. Researchers now report in ACS' *Journal of Agricultural and Food Chemistry*, that washing apples with a common household product — baking soda — could do the trick for residues on the surfaces of the fruit. The use of pesticides can help increase crop yield, but concerns over their potential effects on human health have been raised over the years. Washing could be one effective strategy to clean pesticides off produce, and it is standard practice in the food industry. But some of the plant-protecting compounds that get absorbed by fruits and vegetables might not be easily removed using current cleaning methods.

Lili He and colleagues wanted to find out which washing method can most effectively reduce pesticides. The researchers applied two common pesticides — the fungicide thiabendazole, which past research has shown can penetrate apple peels, and the insecticide phosmet — to organic Gala apples. They then washed these apples with three different liquids: tap water, a 1 percent baking soda/water solution, and a U.S.-EPA-approved commercial bleach solution often used on produce. The baking soda solution was the most effective at reducing pesticides. After 12 and 15 minutes, 80 percent of the thiabendazole was removed, and 96 percent of the phosmet was removed, respectively. The different percentages are likely due to thiabendazole's greater absorption into the apple. Mapping images showed that thiabendazole had penetrated up to 80 micrometers deep into the apples; phosmet was detected at a depth of only 20 micrometers. Washing the produce with either plain tap water or the bleach solution for two minutes, per the industry standard, were far less effective.



Food Science at UMass: A Century of Accomplishment

By Sandra Thomas; Reprinted from ag.umass.edu, the website of the UMass Amherst Center for Agriculture, Food and the Environment.

Attention! Department of Food Science at the University of Massachusetts Amherst: please stand up and take a bow (and raise a toast with a healthy glass of bioactive-packed juice) to celebrate a milestone. This year marks the 100th anniversary of the nation's first food science department. The department was founded in 1918 when UMass was known as Massachusetts Agricultural College (“Mass Aggie”). Today, the National Research Council of the National

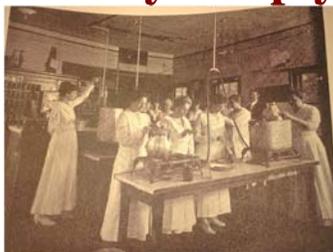
Academy of Sciences ranks the UMass food science PhD research program as number one in the country, another distinction for this award-winning department.

The department's faculty members are (truly) the rock stars of food science (images of full faculty below). From the beginning, their vision as food pioneers, eminent leaders, and ground-breaking world-class researchers has allowed them to stake out the territory. Superlatives can be clichéd, but for this department, they ring true. A century after the UMass Food Science Department was created, it remains one of the world's preeminent food science programs. What makes them stand out, you might ask? Here is a short list:

- They are rated #7 worldwide in agricultural sciences for high-impact citations in scholarly journals
- Three faculty members are rated among the most highly-cited agricultural scientists in the world
- They are one of the top scientifically-equipped food science departments in the world
- An industry partnership, Strategic Research Alliance, was formed that conducts valuable research to develop solutions to problems in the food industry
- The Food Science Policy Alliance addresses current and future issues of food policy and regulation for both domestic and international markets
- Numerous faculty members have been appointed to leadership roles within the National Academy of Sciences' Institute of Medicine, as well as in the State Department.

Their stated goal is to develop safer and more nutritious food to improve the health and wellness of the state, the nation and the world. If you spend time in the company of a UMass food scientist, you will quickly discover that they are passionate about everything you eat. A heady list of research studies, innovations and novel food approaches can be credited to UMass food scientists. You are not alone if you eat a delicious spinach salad, enjoy a tasty pork roast with a side of sauerkraut, or snack on a yogurt without contemplating the extensive research that may have gone into your meal. Who could have imagined in the 1950's when infant formula became the modern feeding method of choice for Americans, that in 2017 it would be fortified with healthy Omega 3 fatty acids? When your Grandma was canning pickles in the 1960's, did she have any idea of the health benefits of fermentation? UMass food scientists research these, and many other food choices we make every day, positively influencing our diets in many ways.

History Deeply Rooted in Ground-Breaking Research



Massachusetts Agricultural
College-canning class 1917



UMass Amherst food preservation class 2017

From its beginnings in canning classes to the industrialization of food manufacturing to developing foods for health and wellness, much has changed over a century of food science

research. In the early days, the Mass. Aggie Food Science Department was established in order to research and teach food preservation techniques (motivated by critical food shortages during World War I). Today's research focuses on diverse aspects of food including such concerns as food safety and nutritional enhancements that boost functional food efficacy. All through this history, departmental growth has responded to the needs of the times and has benefited from exceptional food scientists who have been advanced at the forefront of progress in this field.

Who's Who at UMass Food Science: The First Century

In 1918, **Walter Chenoweth**, became the first department head of what was then called the Horticultural Manufacturing Department. He published the first comprehensive textbook on food preservation in 1930. Chenoweth Laboratory, home to the Food Science Department, was named in recognition of his foresight and determination. **Carl Fellers** was chosen as second department head in 1941. His research program had a breadth that is unheard of today covering chemistry, microbiology, nutrition, and engineering. Fellers patented a process for canning and freezing shellfish that prevented discoloration and excessive grit, a process that solved two of the most serious problems of the canned shrimp industry. Fellers' patent constituted the greatest technical advance in 25 years. He was not only a productive faculty member, but also an active member of the armed forces. During WWII, he was stationed in Australia and is credited for establishing 33 dehydration plants that provided dried milk and egg products to the troops. He was awarded the Bronze Star for this work. In 1957, **William Esselen** was appointed as third department head. He brought a broad research program focused on thermal processing, spore resistance, pickle technology, vitamin retention, and packaging of cranberries. One of Esselen's most important scientific contributions was establishing the time-temperature relationships of vitamin destruction using the Arrhenius equation. This pioneering research established the basis for today's practice of utilizing high temperature-short time pasteurization to ensure food safety yet maximize nutrient retention. During Dr. Esselen's tenure, the department experienced tremendous growth and national recognition.

Jack Francis served as the fourth department head. He often wrote in support of food science and technology both in local and national publications. "*We cannot feed tomorrow's population with yesterday's technology.*" Francis was also quoted as saying, "*Why is grain so important in world trade? Because it's nature's way of preserving calories so we can eat them six months later.*" An example of Dr. Francis's insight occurred some work with Pfizer in the early 1960s. He was impressed with their technology and made a modest purchase of their stock. Some 40 years later, he donated \$1.5 million from this investment to establish the first endowed chair in the history of the UMass Food Science Department. **Herbert Hultin** joined UMass Food Science after obtaining his MS and PhD from MIT in an amazing 3 years, emphasizing the ability of UMass to attract the brightest and best in the field. Dr. Hultin was considered the founding father of food biochemistry by many of his colleagues. His vision was to use the basic sciences to expand the multidisciplinary nature of food science, a concept that remains prevalent in food science research today. **Charles Stumbo** was one of the world's top thermobacteriologists. He conducted ground-breaking research on methods to determine thermal processing times to ensure food safety. His book entitled "Thermobacteriology in Food

Processing” contained over 250,000 food processing operations. Stumbo also developed novel sterilization operations such as ethylene oxide and vapor phase sterilization. These techniques were used by NASA to sterilize space ships to avoid terrestrial organisms from contaminating extraterrestrial life. His research decreased NASA’s sterilization time from 23 hours to 90 seconds.

Fergus Clydesdale was one of the most successful teachers in the history of UMass. Along with Dr. Francis, he developed Food Science 101, “The Struggle for Food.” This class was one of the most popular courses of its time with over 1,300 students per semester, reaching an estimated 15,000 during its time. His lectures were so popular that students attended the class and took the midterms even though many were not even enrolled. Clydesdale also had an illustrious research career as one of the ground-breaking scientists to integrate the fields of food science, nutrition, and public policy. He was one of the leading food industry consultants providing expert advice for various projects, including the establishment of the health benefits of whole grains. He also gave his time to public service working with the National Academy of Science, Food and Drug Administration, International Life Sciences Institute and IFT. In 2011, The Fergus Clydesdale Foods for Health and Wellness Center opened at UMass Amherst with seven state-of-the-art research and teaching labs. Clydesdale is currently the Director of the UMass Food Science Policy Alliance, the only such program in the U.S.

“UMass is one of the best food science institutions in the world,” says **Mehmood Khan**, Chief Scientist, Head of Global Research and Development, Pepsico. “There is no doubt in my mind about the value and power of strong academic institutions that help in training and research, but ultimately help business. Having experts to work with in one place where we can come and say, “Here’s a problem we’d like to work on together, there is a common mind and common interest, powerful things happen.”

Faculty News

Amanda Kinchla is the PI for a recently awarded a USDA NIFA Food Safety Outreach Program grant for \$398,000 entitled, “Food Safety Management Training for Small and Emerging Food Businesses: Integrating a Food Safety Culture from Concept to Commercialization” in collaboration with the University of Rhode Island.

Maria Corridini was part of team with Ashim Datta from Cornell that got a USDA grant on Food Manufacturing Technologies to enable computer-aided food product and process design. She was also selected as a member for the Registry of Experts of the National Commission on College Education and Accreditation- Argentina.

Eric Decker gave a series of lectures at Zhejiang University of Technology in Hangzhou China and was appointed to the National Academies of Sciences, Engineering, and Medicine’s Committee to Review the Dietary Reference Intakes for Sodium and Potassium.

Lili He gave research talks at SERS Faraday Discussion, American Chemical Society Conference and the SciX Conference. Lili also received the UMass Faculty Convocation Award. Lili was the first Assistant Professor to win this award and was the 5th Food Science faculty member to win this prestigious campus award.

Lynne McLandsborough, in her role as undergraduate program director, worked tirelessly to obtain our 5 year approval of our undergrad program from IFT.

Julian McClements was a Keynote Speaker on “Biopolymer microgels: Design, fabrication and utilization as delivery systems in foods” at the Delivery of Functionality in Complex Food Systems in Auckland, New Zealand and gave a talk on Encapsulation and Delivery of Bioactive Agents in Foods at the Center for Bioactive Delivery Annual Meeting at UMASS Amherst.

Matt Moore was selected as the American Society for Microbiology’s Young Ambassador from Massachusetts. The Young Ambassadors are charged with engaging early career scientists to help develop programing from ASM. Matt also joined the editorial board of the textbook Emerging and Re-Emerging Viral Pathogens.

Yeonhwa Park gave an invited lecture at the Annual meeting for the Korean Society for Food Science and Nutrition, entitled: Application of *Caenorhabditis elegans* in food and nutrition research.

Mich Peleg gave an invited paper entitled "Innovations in kinetics calculations" at INNOVA 2017 held in Montevideo, Uruguay. He also taught an industrial course on QC and the potential uses of Wolfram Demonstrations at the Uruguayan Food and Agricultural Research Center.

Hang Xiao was elected Fellow of the Agricultural and Food Chemistry Division of the American Chemical Society. Drs. Xiao, McClements and Decker received funding to conduct a human trial to determine the effects of black pepper on the absorption of essential nutrients (i.e. carotenoids) in the salad. This is a part of their research effort to develop healthier foods.

Leadership Fundraising Campaign

The success of our students has always been a tremendous strength of the Department and has been critical in shaping our future. We recognize that the food industry is changing and requires us to expand our curriculum beyond the science and technology, and develop the education into areas such as marketing, product development, business communications, finance, and entrepreneurship. For our students to continue to be as successful as their predecessors, we must provide broad training, early research experience, and a more diversified curriculum. To meet these goals, we are building a \$750,000 endowment, the Food Science Student Leadership, to expand student opportunities to strengthen their training and augment their experiences. We have obtained over \$500,000 in pledges towards a \$750,000 goal. Please contact Lina Thompson (lina.thompson@umass.edu; 413-577-4015) if you would like to donate to the campaign.