John Kinsella Endowed Chair in Food, Nutrition and Health
Dr. Alyson Mitchell, Professor
Food Science and Technology
foodscience.ucdavis.edu • aemitchell@ucdavis.edu

ENDOWMENT PURPOSE
The John E. Kinsella Chair in Food, Nutrition and Health was established in 1994, after Dean Kinsella’s passing. The endowment was created using funds provided by General Foods that originally supported the late Professor Kinsella’s research in food science and human nutrition, with specific focus on the interrelationships between food, nutrition, and health. In keeping with Kinsella’s long-standing support and cultivation of junior faculty, the Kinsella Chair recognizes outstanding faculty members during the development stages of their careers.

RESEARCH
This generous endowment is instrumental in my ability to support graduate and postdoctoral scholarship and research focused on developing a comprehensive understanding of the chemistry of food in order to interpret the impact contemporary agronomic and post-harvest processing techniques have on quality and chemical food safety. This is increasingly important research, as both agriculture and food manufacturing has changed at an unprecedented rate during the 21st century, and is now a globalized endeavor. Developing a chemical understanding of food systems is important for optimizing the quality of fresh and especially processed foods, food authentication, and is critical for improving global health.

During this past year our research efforts have focused on the following projects:
1. Bees (Apis mellifera) forage on different plants and the characteristic flavor of honey is a reflection of the nectar choice of the bee. Mono-floral honey is nectar that originates primarily from a single plant species and possesses distinct organoleptic characteristics. Honeys from a single botanical source are considered premium products. Unfortunately, honey adulteration is
common and difficult to detect. Adulteration can involve feeding bees with sugar and/or syrups, mixing mono-floral honey with honey from different botanical origins or mixing the honey with sugar and/or syrups such as high fructose corn syrup. During the past year, Kinsella funding has allowed us to purchase equipment and support a student to work in collaboration with the UC Davis Honey and Pollination Center to characterize the volatile profiles of a wide variety of contemporary mono-floral honeys. This exciting project will help provide a chemical foundation for identifying honey adulteration.

2. California is experiencing a severe drought. Our lab strives to support water conservation efforts by re-evaluating water intensive food processing methods and developing new approaches for processing these foods using less water. One such product is the California-style black ripe olive which requires an extensive amount of water for lye-curing and washing olives prior to canning. Kinsella funding has allowed us to continue to develop foundational data supporting the use of novel resin-based methods for debittering olive fruit under low-water conditions. With this preliminary data, we can now leverage the Kinsella funding by applying to the USDA specialty crop grants program. Our goal is to enhance the quality/healthfulness of California style black ripe olives in addition to improving the sustainability of this water intensive product.

3. Identifying the basic chemical changes in composition that occur in tree nuts in response to moisture damage. Tree nuts exposed to post-harvest moisture can develop a brown discoloration and off flavors upon roasting. Unfortunately, this damage is not apparent until after roasting and there is currently no way to monitor this concealed damage (CD) in raw nuts. Our lab is focusing on understanding the conditions and chemical changes that occur in raw almonds that relate to CD. Our goal is to develop simple chemical assays (i.e. nIR and UV) that will allow for inexpensive monitoring of CD in raw almonds. Additionally, we are studying the impact of drying on moisture exposed nuts and the impact on shelf life stability. Although this project is largely supported by the Almond Board of California, we have used Kinsella funding to support ancillary projects on the same almond samples. For example, Kinsella funding was used to support an undergraduate research project evaluating relationships between CD and colorimetric measurements, and to develop preliminary evaluating key flavor volatiles and flavonoids in several almond varieties. This baseline information can be used for a grant submission evaluating the impact of drought and deficit watering on tree nut quality.

4. Identifying the composition of volatile compounds and amygdalin in almond samples taken from the hull of a Byzantine shipwreck (~410 AD). Amygdalin is the compound responsible for the bitterness of bitter almonds. This is a highly collaborative project involving archaeologists, divers and historians from around the globe. Our data will be used to better understand how almonds were traded, used and consumed in ancient times. To date, funding to support this research has been cobbled together from variable sources including the Kinsella endowment.

TEACHING

Teaching is the most rewarding aspect of my career. I am responsible for three courses at UC Davis:

1. The Chemical and Physical Analysis of Foods (FST103): This is an upper-division core course in the Food Science curriculum. I thoroughly enjoy teaching this course, which meets three hours per week for general lectures and has four weekly three-hour laboratory sections, as it promotes one-on-one time with students. I have worked to improve the analytical capabilities of the teaching laboratory in order to raise the competency and marketability of our graduating seniors. I strive to keep lecture topics relevant and focused on addressing contemporary needs of the industry. Food manufacturing has changed at an unprecedented rate and is now a globalized endeavor. Ingredients are increasingly purchased abroad, through brokers, and manufactured in
food products in the US. This past year, I have continued to incorporate information on how analytical chemistry can be used to support supply chain management and ingredient sourcing (e.g. validation, authentication, certificates of analysis, etc.). The students responded very positively to this new presentation of information as it links the chemistry they learn in the classroom directly to contemporary food manufacturing issues.

2. Food Toxicology (FST128): This is an upper-division course offered in both Food Science & Technology and Environmental Toxicology. This course meets three hours per week and covers basic principles of pharmacology and toxicology, animal, plant and marine toxins, toxicants arising from food processing and now, global issues in food adulteration. I continue to develop new curricula for this course to keep it dynamic. New lectures include: Global Food Sourcing & Adulteration-The Melamine Story; Food Colorants: Natural vs. Certified Dyes, and Ingredients and Additives.

3. Food, Folklore and Health (FST10): This is a large (~450-525 student), fast paced undergraduate freshman course. This course meets three hours a week and is ton of fun to teach. I strive to bring current insights into the curriculum lecturing on topics such as: Contemporary Food Movements: Industrial Agriculture, Organic Foods, Local Foods and Food & the Obesity Epidemic. Teaching a freshman course this size requires a very different approach to conveying information. I keep students engaged by incorporating videos, practice questions, pictures and humor into the lecture materials.

My teaching commitments extend far beyond the classroom and teaching laboratories. I have been very active mentoring undergraduate (3 students) and graduate students (3 students), and a postdoctoral scholar. Two of the undergraduate students that I mentored (Kelly Phang and Arunwong Opastpongkarn) presented research posters at the UCD Undergraduate Research Scholarships and Creative Activities Conference. I am Master Advisor for the Food Science & Technology major, and advisor in the Agricultural and Environmental Chemistry and Food Science graduate groups.

STUDENTS

This past year, Dr. Suthawan Charoenprasert was supported through the Kinsella Endowment as a postdoctoral scholar. Suthawan's research focuses on developing HS-SPME GS/MS and UPLC-QTOF-MS methods for identifying and quantifying target and nontarget secondary plant metabolites and volatiles in foods for authentication, safety and biological relevance.

Kinsella funding was also used to support the research activities of Rebecca Johnson, a graduate studying the possible use of using resins to debitter olives under low-water conditions.

OUTREACH

I have given several presentations at meetings of the American Chemical Society and International Society for Nutraceutical and Functional Foods (Istanbul, Turkey). I was also able to send a graduate student, Rebecca Johnson, to give an oral presentation at the American Chemical Society meeting in Denver, Colorado.

NEW AND UNIQUE ENDOWMENT USE

Last year I was able to travel to Cyprus to meet with the diver who brought up and reassembled a ship from the Byzantine empire (~410 AD). The ship is housed in a remote site along with ~400 amphora that it was carrying when it sank. Numerous amphora were filled with almonds. We hope to identify if the almonds it carried were...
sweet or bitter almonds though chemical analyses. This is a highly collaborative project involving archaeologists, divers, historians and scientists from around the globe.

**LEVERAGING ADDITIONAL FUNDING**

Kinsella funds were used to leverage the purchase of gas chromatography system with a head space autosampler for volatile analysis through our partnership with Agilent Technologies (~80K). Students can now be trained and perform research on this cutting edge equipment. This enhances their research capabilities and gives them a competitive edge in the job market.