New Hire and Alumnus: Dr. Michael Held

After completing postdoctoral programs at Purdue and Michigan State, Ohio University graduate Michael Held returned to Athens this fall as a new hire in the biochemistry wing of the department.

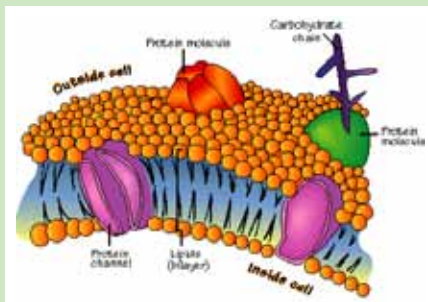
Dr. Held researches the structure of plant cell walls. Ultimately, he wants to learn methods for making cellulose – the most common organic compound on Earth – more readily available as a source of biofuel. "If we can understand what genes have an effect on the expression of other genes, we can start to figure out how to tailor cell walls for digestibility for biofuels."

Dr. Held received a PhD in 2004 for his work studying the cross linking of glycoproteins into plant cell walls. He found that the structural proteins of the cell wall become glycocilated in the golgi, then cross-linked into the cell wall by di-isodityrosine, one of a family of tyrosines responsible for synthesizing proteins.

At Purdue, where he completed his first postdoc, Dr. Held researched cellulose biosynthesis. Cellulose is synthesized in the plasma membrane, producing a microfibril polymer that gives the cell wall, and much of the plant, its structure. Dr. Held and other researchers at Purdue applied viral induced gene suppression in order to silence some of the genes responsible for biosynthesizing cellulose. They found that suppressing these specific genes had an effect on the expression of other genes in the cell wall, such as pectin, another structural polymer in the cell wall. Dr. Held hopes to find out more about the extent to which silencing the region of a plant's genome responsible for cellulose production affects other regions.

In 2007, Dr. Held took a second postdoc at Michigan State, where he continued his studies in plant biosynthesis.

He interviewed for his current position last fall, and is currently teaching the general biochemistry course for the department. In addition to his chemistry work, Dr. Held is also raising two children with his wife Jessica, a fellow OU graduate.



Biochem Professor Receives NSF Grant

Professor Marcia Kieliszewski received a $460,000 grant from the National Science Foundation to continue her studies on how proteins in plant cell walls create form and protect plants from diseases.

"We want to know how the structural proteins interact with other molecules in the plant cell wall to create a living superstructure," she said.

Dr. Kieliszewski is working with Dr. Maura Cannon, a geneticist at the University of Massachusetts, Amherst, in order to study a group of rod-like glycoproteins called extensins. Extensins are integral to the assembly and growth processes of plant cell walls, though how they carry this out is less clear. Dr. Kieliszewski and Cannon are creating mutations in key amino acids in order to find out how changing them affects the structure of the cell wall.

The current grant is actually a renewal of a previous three-year installment of this project. Dr. Kieliszewski notes that they have made significant progress in this first phase. "We're starting to characterize some of the proteins themselves that we can isolate from our mutations," she said. Cannon can then introduce these proteins into plants and study how the protein changes the composition of the cell wall.

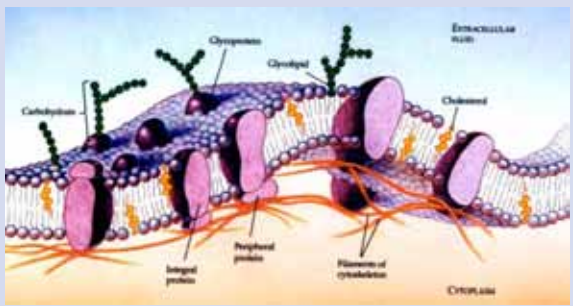
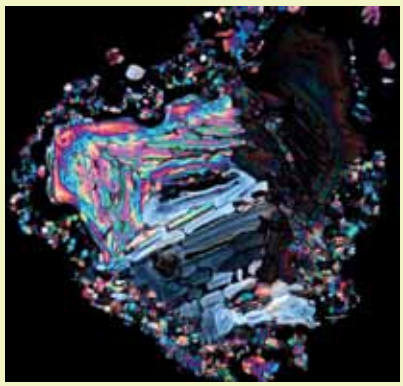


Photo Contest Winner

Ryan O'Donnell ('10), won third place in the American Chemical Society's (ACS) photo contest. The photo was published in the organization's C&EN magazine this past November.

While an undergraduate, Ryan used ion mobility spectrometry to study explosives. For the contest, he submitted a light microscopy image of ammonium nitrate crystals.

Ryan is now a graduate student at Johns Hopkins University.



Chemistry Fraternity's "Conclave" Event in Athens

The Alpha Chi Sigma (AXE) chemistry fraternity held its 50th biannual Conclave at Ohio University last August, making the OU chapter the youngest ever to host a Conclave since the fraternity's founding.

Registration began on Tuesday, August 3rd and over 200 members came from chapters all over the country to conduct fraternity business and have a good time.

"There was a very wide range of people at Conclave, from students in college, to young alums, to people who are in their retirement years," said Lauren McMills, the faculty advisor for the event.

During the mornings, delegates from both university and professional chapters met to discuss issues such as the constitutional bylaws and the fraternity's risk management policy. The delegates also made decisions on fraternity leadership and held open forums about how to improve the chapters and recruit new members.

A slew of social events took place every day after the legislative meetings. Several attendees participated in the "Hexagon Olympics," where 12 teams or "districts" competed in games of sand volleyball, cornhole, and tug-o-war. "Needless to say, our district won the trophy," said Anthony Vallence, the student who led the efforts to organize Conclave conference at OU.

In addition to physical competitions, the Hexagon Olympics also included trivia nights. The trivia nights took place at Buffalo Wild Wings, which was relatively empty due to the dearth of students in Athens during the summer months. "We had the entire bar-side full," Vallence said, commenting on the many dozens of people who participated in the competition.

Many of the conference attendees went to Athens' uptown bars and restaurants in the evenings, although a wine tasting and other events took place in Washington Hall, the dorm where registered Conclave attendees stayed during the week. Attendees took their meals in Nelson Dining Hall, and the fraternity provided snacks and drinks throughout the day.

AXE is a service-oriented professional chemistry fraternity, founded in 1902 at the University of Wisconsin, Madison. As a professional fraternity, most of the members in the collegiate chapters are interested in learning chemistry and in working in some chemistry-related field in the future. "You have to have some love of chemistry. Most of the members are chemistry majors of some sort," Dr. McMills said of the organization. Anyone with an academic background in chemistry is eligible for membership in AXE. People working in chemistry related fields are potential candidates for membership in one of the professional chapters, however, regardless of their academic background.

Members of AXE are members for life, although they are technically only part of a collegiate chapter so long as they are students or faculty at their college. AXE members can join a professional chapter after graduation, however, and if no professional chapter exists in their city, they can petition to start a chapter, so long as eight or more members live in their region.

"You have to have some love of chemistry."

Ohio University has had an AXE chapter since 2000, after a group of chemistry students approached McMills and other faculty about bringing the fraternity to OU. According to McMills, six faculty members and approximately 50 students are currently members of OU's AXE chapter, Gamma Nu.

Vallence first expressed an interest in bringing Conclave to OU while attending his first Conclave at Indiana University during the summer of 2008. The national office contacted OU in early 2009 about putting a bid together, and by early 2010 they found out they had won the bid. Vallence thinks OU's accommodations may have been the tipping point, with its dorms available and ready to accommodate over 200 visitors.

After agreeing to host, Vallence and other volunteers had to work well into the evening, every night. Ultimately the event was a success. "Where we didn't have manpower we had will and determination," he said.

Dr. Glen Jackson and his students Rachel Kyper and Lee Greenawald as they head toward the National Mall

Dr. Jackson and Rachel Kyper pose with Sid from PBS's Sid the Science Kid

Dr. Glen Jackson in the Nation's Capital

Associate Professor Glen Jackson introduced forensic chemistry to primary school children at the USA Science and Engineering festival in Washington DC.

The exhibit, titled, "You Can Be a Forensic Scientist!" was one of 15 exhibits in the National Mall sponsored by the National Science Foundation (NSF). Dr. Jackson, along with forensic chemistry students Rachel Kyper and Lee Greenawald, showed dozens of visitors how the elemental composition of a substance could be measured through light absorption technology.

Visitors used a portable instrument to shoot a beam of light at a substance, such as a wedding band, and then learn the percentage of substances that made up the band.

"We never make a measurement of something that you don't want to know the answer to," Prof. Jackson said. He also showed visitors how the "light gun" could be used to authenticate period paintings, and how a comparison of the composition of different shards of glass could help convict a suspect in a burglary case. Visitors stayed anywhere from a minute to close to an hour analyzing substances brought by Dr. Jackson, as well as those on their person.

Dr. Jackson found out about the event from a program officer at the NSF. He submitted a proposal to participate in the festival, and received funding for the entire trip. This is Prof. Jackson's second award from the NSF, the first being an early career development award, which he is using to develop a portable device that will measure the molecular mass of a substance.

Francis Breivogel, former faculty member (1967-1970) passed way on January 21, 2009.

Long-time alum **Helen Gray** passed away December 25, 2009. She was 98 at the time and probably one (if not the oldest) living alum.

Bessie Day (spouse of former faculty member Jesse Day) passed away on February 12, 2010.

Phyllis Tate (spouse of former faculty member Fred Tate) passed away on September 7, 2010.

Maryann Sympson (spouse of former faculty member Robert Sympson) passed away on December 10, 2010.

Department Purchases Femtosecond Spectrometer

The chemistry department purchased a femtosecond spectrometer in September, thanks in large part to a $400,000 grant from the National Science Foundation. This instrument will help Associate Professor Jeffrey Rack and Associate Professor Gregory Van Patten study changes in photosensitive molecules at an extremely fast rate.

Officially titled the femtosecond transient electro spectrometer, the instrument measures the change in the electronic structure of compounds on a femtosecond timescale (10^{-15} seconds). Both Dr. Rack and Dr. Van Patten are using the instrument to measure changes in absorption in various light-sensitive particles.

Dr. Van Patten is studying electron transfer reactions in semiconductor nanocrystals. These crystals absorb light very intensely, and Van Patten hopes that understanding electron transfer reactions in these crystals will provide insight into light to energy conversion.

Dr. Van Patten

Dr. Rack is also researching how certain photochromic materials react to light. He hopes to identify the factors causing the compounds to change color when exposed to light. "We are interested in knowing if we can control these factors. Can we identify them and can we control them?" he said. Rack suggests that more knowledge in this field could lead to a plethora of potential uses, such as photochromic lens that eliminate the glare from explosions and other dramatic light variations by absorbing the light faster than the eyes can process it.