

FUSION



A PERIODIC NEWSLETTER ABOUT THE SCIENCES AT ALBRIGHT COLLEGE

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ABSOLUTELY.

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SCIENCE CENTER PHASE ONE TO OPEN FOR FALL

Albright College began construction on its new Science Center in spring 2008. The project is adding more than 41,000 square feet of state-of-the-art lab space to the existing Merner-Pfeiffer Hall of Science, which will be renovated, for a total of more than 78,500 square feet. The new-construction phase of the project will be completed this summer, while the renovations to the original building will be finished in spring 2011.

Karen Campbell, Ph.D., the P. Kenneth Nase, M.D. '55 Chair of Biology, has helped guide the project since its inception. Fusion sat down with Campbell to discuss the building and what it means for Albright and its students.

Q&A

FUSION: Why did Albright need a new Science Center?

KC: The science faculty looked at how we engage students in the process of doing science that involves a lot of independent work. Our students could do that work only in the summer because we didn't have a lot of independent research space. So that started the quest for space.

We also looked at how we teach science in the classroom. Traditional labs had forward-facing benches, and there was much more lecture instruction. Today's students do more group work at tables where

they can collaborate with each other, because that's how we do science. So we want to mirror that in the classroom and the labs.

There were also physical constraints. We've been very good at acquiring current instrumentation for our students, but we were running out of places to put it. One year we reached the point in chemistry where we couldn't plug things in or we'd blow a circuit. It kept escalating, and it finally became obvious that there was a real need.

FUSION: How has the project affected classes and office hours?

KC: There's been some noise and a little disruption of classes, but we've worked around it. IMC (the construction manager) and the people who work for them are amazing. We can give them a schedule telling them when and where we have classes and they won't work in that area. They have a job to do, but they recognize that we do, too, and we've made it work pretty well.

FUSION: Why is lab work such an important part of the curriculum?

KC: We work very hard to show science majors and nonmajors alike that there's more to science than just memorizing things. It's a way of learning about the world, and you can become engaged in that process even if you're not a science major. You can ask a question about something and then rephrase it as a hypothesis that you can

test and gather evidence about. You have to do that to really appreciate it, so it's very laboratory-driven.

FUSION: Why are non-majors required to take at least one laboratory science course?

KC: Part of the philosophy of the sciences is that the natural sciences provide a way of learning about the world that is distinct from the way students learn in the humanities and social sciences divisions. It's not completely different, but we're very focused on gathering information and formulating and testing hypotheses, processes that allow students to see whether something works.

FUSION: How will the new Science Center support interdisciplinary studies at Albright?

KC: By its very nature, science is interdisciplinary. For example, biology majors have to take chemistry, because the two are so intertwined. It will allow us more space to improve on interdisciplinary programs such as environmental science and crime & justice. It will also allow us to expand our contributions to existing programs, including psychobiology.

What's more, the faculty's offices will be in clusters, and that will play a big role in what we do. We're constantly talking about our students and what would be best for them, so it'll be really good for the students when our offices are close to each other. As much as they can be, those clusters are going to be interdisciplinary, driven in part by which labs are on which floors.

FUSION: How will the new Science Center enhance the teaching of science at Albright?

KC: All of the equipment we use for research we also use for teaching. So students learn at least the basics of how to use different instrumentation and how it's employed and what it does.

Sometimes being able to incorporate that into the next step involves more independent research or an advanced class. For example, in an introductory course, students will learn how to use the electron microscope and how to prepare tissues for microscopy. Then they can take an advanced course in scientific imaging to see more applications of those principles. Some students will also use the instruments as part of an independent research project.

So it's important that we have modern instrumentation and are able to instruct students in current techniques, even as those techniques are changing. When they start their careers, they're not going to be working in laboratories that have just the instrumentation that we have. But the fact that they've learned how to use different instruments and how to do different types of procedures demonstrates how trainable they are. So when they go to a pharmaceutical company or a research hospital or the National Institutes of Health, they can quickly become immersed in introductory-research kinds of positions.

FUSION: What do science-minded students look at when considering Albright?

KC: Students are impacted by our instrumentation, our research projects and our buildings. We also go out of our way to make sure that students meet faculty from the beginning, and I've talked to many students who came here because of the faculty.

FUSION: What are you looking forward to most once the Science Center is complete?

KC: I'm looking forward to having a building that I'm proud of. We're proud of the program, we're proud of the students, we're proud of the faculty and the type of education we offer. The building that houses it all is beautiful on the outside, and now we'll be proud of the inside, too. ■



Karen Campbell, Ph.D., the P. Kenneth Nase, M.D. '55 Chair of Biology

PROFESSOR LAUDED FOR ENVIRONMENTAL WORK

David Osgood, Ph.D., associate professor and chair of the Biology Department, received the Rising Star Award from the Berks County Chamber of Commerce last fall. The award is given to professionals under the age of 45 who have already begun to shape the Berks business community. Osgood was lauded for his environmental work in the community, which included collaborating on wetland restoration with Reading, County Conservation District, Schuylkill Action Network, and Berks County Conservancy.

MARINE SCIENTIST JOINS FACULTY

Bryce Brylawski, Ph.D., has joined Albright as assistant professor of biology. His research interests include marine biology, animal physiology, nutrition, and toxicology. Brylawski previously served as marine scientist at the Virginia Institute of Marine Science. He earned a bachelor of arts degree in biology from St. Mary's College of Maryland and a doctorate in marine science from the Virginia Institute of Marine Science at The College of William and Mary.

VACATION? DEFINITELY NOT.

by SOPHIA SCHUSTER '12

LIFE-CHANGING AND EYE-OPENING? ABSOLUTELY.



EACH WINTER, two-thirds of the North Pacific's population of humpback whales journey to the waters around Maui, Hawaii, to mate and give birth. That's why, since 1986, Marsha Green, Ph.D. '63, professor of psychology and founder and president of Hawaii's Ocean Mammal Institute, has taken students there during Interim for an ongoing field study of the effects that boats have on this endangered species.

Students taking Green's general lab studies course, "Protecting Endangered Species: Field Study on Marine Mammals – Hawaii," also explore other marine environmental concerns, including whaling, global warming, chemical pollution, noise pollution and over-fishing.

The data Green's students collect has been put to use to protect the whales from human interference. For instance, research conducted on the 1989 trip helped pass a law banning parasail boats from December 15 to May 15, when whales are in the area. The law was passed after Green presented the Hawaii state legislature with data showing that the boats disrupt the whales' mating and birthing habits.

Sophia Schuster '12, an environmental studies and political science concentrator from Wyomissing, Pa., made the trip to Hawaii as part of Green's course earlier this year. Following are her impressions of the experience.

CAPTAIN RYAN was talking about the history of humpback whales in Hawaii when I happened to look over his shoulder.

At that moment, two humpback whales breached. Despite all of my training, I was rendered speechless. Never before had I seen anything so beautiful. All I could do was point and hope that my meaning was understood.

Few people are given the opportunity to travel to Hawaii, let alone research humpback whales during their annual journey there for their breeding and mating season. Even more than that, few people get such a great opportunity to comprehend the insignificance of their own size and the magnificence of the world around them.

For those of us from Albright College, every day was a new experience that demanded our constant attention. And it didn't take long for us to realize that this was not a vacation. Four hours of field research every day, two hours of night classes, and between four and five hours of data compilation left little time for daydreaming.

During each day's four-hour field research session spent on the Pali, an area

of cliffs overlooking the ocean, one person worked with the theodolite (a surveyor's instrument with a 30 power telescope), three people used binoculars, and one person collected the data. Whenever we located a pod of whales we would track their location as well as their behaviors, focusing on their reactions to the various boats, which ranged in size from kayaks to large whale-watching ships.

On average, the whales tended to stay underwater longer when boats were near, indicating that they avidly avoided the boats if they could. To gain a better perspective, it is important to understand that sound is amplified and travels much faster in water than it does in air. Unfamiliar noises, especially loud ones, have the potential to cause great amounts of stress.

Most college students are aware that stress can have a negative impact on their health. After all, it's no coincidence that we tend to get sick at the worst possible times.

The same is true for the humpback whale. Studies have shown that increased stress caused by boat noises and staying underwater longer could compromise the whales' immune systems and alter their reproductive behavior.

Noise pollution, however, is not the only threat to the whales or the oceans. Today, both face challenges on multiple levels. Some countries, including Japan and Norway, still barbarically slaughter

whales and dolphins, justifying their actions as attempts to keep their cultures and traditions alive.

Krill, a major source of food for a variety of marine organisms, thrives in cooler waters. Therefore, increasing water temperatures affect the availability of nutrients for many along the food chain.

The humpback whale, an endangered species, is being attacked from all sides, with all of these conditions posing serious threats to their survival.

My final observation may come as a shock, but I believe that one of the most glaring errors we make as humans stems from our decision to take wild animals captive. When we take hostage the free who live on this planet, we jeopardize their lives for the sake of our own pleasure. After all, it has been statistically proven that animals in captivity, as they are at Sea World, have shorter life spans than those in the wild.

I doubt very much that many individuals consider the impact that their decision to board a whale-watch boat or attend a show at Sea World has on the whales and other sea creatures. In fact, I have been one of those individuals. That said, I also doubt very much that many individuals consider the consequences of their everyday actions on the world around them. Supposedly the most intelligent creatures on this planet, we tend to forget that we share it with

others who also have extraordinary capabilities in terms of mental capacity and survival.

When I signed up for the class with Dr. Green, I knew that I would be studying the humpback whale. I did not know, however, that my perspective on the world would change entirely. I did not know that I would feel such a strong, basic attachment and love for the subjects of my study. And, most importantly, I did not know that my life would be changed forever.

With that, I implore you to look at yourself, go outside, look around you, and realize how small you truly are. Then, and this is the most critical part, realize how much power and potential you, as a single human being, have. I ask you to use your hands and your mind for the benefit of our world for future generations and for our fellow inhabitants as well.

I leave you with a quote from Ric O'Barry, a former dolphin trainer who's now a leader in the fight against the captivity industry, who said, "You're either an activist or an inactivist." I ask that you be the former. ■ Above, Sophia Schuster '12 uses a theodolite to locate whales. Photo courtesy of Sophia Schuster.



MARINE AND AQUATIC SCIENCE PROGRAM OFFERED

Albright College now offers a program in Marine and Aquatic Science that expands on the Marine Science program previously

offered. The new program's required courses, which will be taught by either Bryce Brylawski, Ph.D. or David Osgood,

Ph.D., include Wetlands Ecology, Aquatic Ecophysiology, and Aquatic & Marine Ecology. To supplement the required

courses, students will be able to gain field station experience by participating in off-campus marine or aquatic research

programs. The Marine and Aquatic Science program is available to biology and environmental science concentrators. ■

READY TO MAKE HIS MARK

BUDDING RESEARCHER PREPARES FOR LIFE OF SCIENCE

Trevor Hamlin '10 "is wringing every drop out of the Albright experience." That's the observation of Christian Hamann, Ph.D., associate professor of chemistry and biochemistry as well as chair of the faculty, who has worked with Hamlin since he was a sophomore.

A biochemistry concentrator, Hamlin has taken extra courses to achieve American Chemical Society certification. ("Imagine taking 'Instrumental Analysis' and 'Inorganic Chemistry' as electives!" Hamann says.) He's also served two internships at a chemical company, he's completed an Interim Albright Creative Research Experience (ACRE) project, he's assisted Hamann with his research, and he's presented his own research at the National Conference for Undergraduate Research, the National Organic Chemistry Symposium, and a national American Chemical Society meeting.

Hamann and Hamlin first met when Hamlin paid a pre-enrollment visit to Albright's campus. He had gone to see a number of other schools as well, and chose Albright because it was a smaller liberal arts college with a strong science program.

"At a smaller school you can form relationships with your teachers that you couldn't form at a larger university," Hamlin explained. "The distinction

between Albright and the other schools was that I felt welcome here. It was more of a community atmosphere, and I felt that I could make connections that went beyond the schooling."

After taking Hamann's organic chemistry course in the fall of his sophomore year, Hamlin went to his professor and expressed an interest in doing undergraduate research. "We mapped out what we called at the time a very aggressive research plan, which was to do enough research to present at the National Conference for Undergraduate Research in May 2009 as well as the National Organic Chemistry Symposium that June," Hamann said. "Not only did Trevor do the work necessary to achieve those two goals, but he also had a paper accepted for oral presentation in the physical organic chemistry division of the American Chemical Society meeting in March of 2010."

Hamlin's first foray into research was an ACRE project he and Hamann worked on during Interim 2009.

"We work in areas typically called theoretical chemistry and computational chemistry," Hamann explained. "Our understanding of quantum mechanics has become sophisticated enough that we can describe mathematically the nature of matter and how matter behaves in a chemical sense simply by doing calculations.

"If you have an accurate mathematical model for the molecules, you can make profound and important statements about the chemical be-

havior of those molecules. Essentially, we use computers to do experiments in the way that wet chemists use chemicals to do experiments. We have hypotheses, we set up experiments, we get the results of those experiments, and they modify our hypotheses. So the scientific process is the same. It's just that the most dangerous chemical we work with is coffee."

Hamlin found his ACRE project to be quite gratifying. "It really intrigued me to be participating in research with a Ph.D.," he said. "I worked hand in hand with him eight hours a day for three weeks. We were doing something that no one else had ever done and possibly never even thought about doing."

Hamlin presented the results of his work at the National Conference for Undergraduate Research at the University of Wisconsin. "That really started a fire," he said. "From there I went on to the next research project, which was even better."

That project involved assisting Hamann with his ongoing research into the motion of molecules and the effect that motion has on the molecules' chemical behavior.

"In addition to his ACRE project, Trevor worked with me in the spring semester for no credit while he was taking a rigorous full course load and being involved in his extracurriculars," Hamann said. "He did probably as much if not more work than he did during the ACRE so he'd be ready to present his work."

Hamlin presented the project at both the National Organic Chemistry Symposium at the University of Boulder and the Lebanon Valley Section of the American Chemical Society at Moravian College in June 2009.

"The National Organic Chemistry Symposium is a pretty prestigious conference in the organic chemistry world," Hamlin said. "Having the chance to talk to Nobel laureates one on one for half an hour was invaluable. It was awesome; I wouldn't have passed it up for the world."

After he presented his work at the National Organic Chemistry Symposium, Hamlin continued working on the research before presenting it at the 239th American Chemical Society National Meeting in San Francisco in March.

"The project he brought to the National Conference for Undergraduate Research was a completely different project from the one he brought to the National Organic Chemistry Symposium," Hamann explained. "And the project he brought to the American Chemical Society was related to the project he brought to the National Organic Chemistry Symposium but was a new and more complicated approach. So he expanded his breadth and depth with regard to his formation as a scientist, and those are important characteristics of his work."

In the summers after his sophomore and junior years, Hamlin gained practical experience by completing internships with Innospec

Fuel Specialties, Newark, Del., which develops customized additives to enhance the qualities of their customers' fuels.

"They run tests on samples of crude provided by the customer," Hamlin explained. "From those results they'll develop an optimized package that could include cold-flow improver and conductivity improver to decrease emissions and increase mileage. I was in the lab every day, so I got great hands-on experience.

"It was awesome to be able to apply what I was learning in class to something greater than what I was doing and helping this multi-million-dollar company," Hamlin said. "It was rewarding to participate in something like that."

In addition to his research, internships and regular classroom work, Hamlin is active on campus with Pi Kappa Phi, he's the president of

the Inter-Fraternity Council, and he's a student assistant in the laboratory and a former conference group leader for organic chemistry.

Hamlin was recently accepted into the University of Connecticut's doctoral program in chemistry. "I'll be working with pharmaceutical drugs doing docking studies," he explained. "I'll use computers to model the drugs and the proteins they bind to, and then suggest structures to enhance the interaction between the two. Like here, I'll be doing computational research, but I'll be moving from small molecules toward more complex protein-docking research." ■



Christian Hamann, Ph.D., and Trevor Hamlin '10 study a model of a humulyl cation. Photo by David Markowski.

Capping caries in Kids Dentist's volunteer services improve young lives



Anyone with young children knows how frustrating it can be to get them to sleep through the night. That's why some parents use a bottle as a pacifier when putting their baby to bed.

While the practice may get the results the parents want in the short term, it can easily lead to a condition called nursing bottle caries, defined as tooth decay caused when liquid is allowed to pool in the sleeping child's mouth.

Aaron Mannella, D.M.D. '82 is a pediatric dentist who's all too familiar with the damage that results. It's one of the reasons he runs a volunteer nursing bottle caries program at Morristown Hospital, Morristown, N.J.

"If very young children are put to bed with a bottle of milk or juice, it soaks the teeth in carbohydrate or sugar for an extended period of time," Mannella explained. "It can also happen with breast feeding. That's why it's called nursing bottle caries."

Symptoms include white spots on the teeth and the early development of cavities. "We probably see it a little more today than we did 20 or 30 years ago," Mannella said. "That's because you have both parents working, and when it's three in the morning and they have to be up at five or six to get to work, oftentimes they'll do whatever it takes to get the child to go to sleep."

Generally speaking, the children that Mannella volunteers to treat at Morristown Hospital don't

have dental insurance or the ability to pay for treatments. "I volunteer my time and treat them for free under general anesthesia in the hospital's operating room," he said. "The overwhelming majority of them wouldn't be able to afford it if they had to pay the private fee, so it's a service I provide to the community."

To treat the condition, Mannella will frequently use white restorative materials, or composites. "If we have to treat the nerve of the baby tooth, if the cavity gets so big that it gets into the nerve, then we treat the nerve and place a stainless steel crown on top of the tooth."

Mannella also makes use of the hospital's operating room to treat special needs patients who aren't comfortable in a normal dental setting.

Photo courtesy of Aaron Mannella.

"These are kids who have autism, kids who have Down syndrome," he said. "Sometimes it's almost impossible to get inside the mouth to even just examine them. So if they're really nervous and their dental needs are very expansive, then we work under general anesthesia in the hospital so they can sit through what may not be a pleasant experience.

"I also deal with special needs adults," Mannella continued. "So when I say kids I could have patients who are in their 50s and 60s. A general dentist can deal with the average adult population, but oftentimes children or special needs adults have a difficult time with it, and there are psychological tools that we use to try to get them more comfortable."

Mannella typically uses the hospital's operating room to treat two nursing bottle caries or special needs patients every Thursday morning. The rest of the week, he and his wife, Susan Arnold, D.M.D., an orthodontist, operate Pediatric Dental Associates of Randolph, N.J., a pediatrics-orthodontics practice they opened in 1991. "I see the kids when they're very young," Mannella said, "and when they get to be orthodontics age, which is somewhere around ten, then it's a natural transition for them to see my wife if they need orthodontics."

Even before he entered dental school, Mannella knew he wanted to work with children. "I worked with four other dental residents when I did a general practice residency, and they started

referring their youngest patients to me. They couldn't handle it, and I was able to do it. So I knew I had a certain talent for it. I'm certainly glad that that's the direction I went in. I love what I do, and I love the interaction I have with the kids and their parents."

In 2002, Mannella was named Head Start Volunteer of the Year for his work with nursing bottle caries patients. "The Head Start Program gives underprivileged children medical and educational care at a very early stage," he said. "So when they have a case of nursing bottle caries they know to send them over to me and I'll take the case. We were acknowledged by Head Start for donating hundreds of thousands of dollars of services over the years." ■

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This issue of Fusion, along with previous issues, may also be found online at www.albright.edu/fusion.

FUSION

BRAIN TEASERS

Time to brush up on your knowledge of physics. The first 10 readers to submit correct answers to the following questions will receive a prize! The answers will be provided in the next issue.

- Q. What non-metallic element named for an ancient Greek deity found extensive use in photocopying machines?
- Q. Before the development of the modern wave-particle theory of light, wherein the term "photon" has become predominant, what term was commonly used to refer to light "particles"?
- Q. Where does the PE of a spring tied in compressed state go when dissolved in acid (ideal conditions)?
- Q. You place a cup half full of water on a scale. If you put your finger into the water without touching the sides or the bottom of the cup, will the scale read a different weight?
- Q: Protons are the positively charged particles in an atomic nucleus. What are protons made of?
- Q: In 2001, scientists discovered that neutrinos, tiny particles given off by fusion in the sun, can change from one type to another. What did this prove about neutrinos?

Answers may be e-mailed to rshade@alb.edu or submitted via the Albright web site at www.albright.edu/fusion.

Brain Teasers Answers, Summer 2009

Congratulations to Bobette Schmid '77, Demi Hyres '99, Michelle (Kantner) Turula '95, Gary Lewis, D.O. '63, Leslie Hersh '69, Kelly-Ann (Bieber) Schlegel '04, Robert Bechtel '72, Joanne Clegg '83, Lt. Col. Russell Luck, USAF '47, Joseph Mallon '88, and Lisa (Godek) Haack '96, the winners of the summer 2009 Brain Teaser quiz!

- Q. Alchemist Hennig Brand attempted to isolate gold from urine, but instead discovered which element? **Phosphorous**
- Q. To what class of drugs do oxycodone, heroin, and morphine belong? **Opioids**
- Q. What is the resin identification code ("recycling number") for polyethylene terephthalate? **1**
- Q. The supercritical form of which substance is used to decaffeinate coffee? **Carbon dioxide**
- Q. What chemical agent did terrorists release into the Tokyo subway system in 1995? **Sarin**
- Q. Apart from its use as an explosive, what other use does nitroglycerin have? **It's used to treat heart failure and angina.**