Albright Professor Phil Dougherty, Ph.D. and his investigative team find out what’s really in the water...

**ALBRIGHT COLLEGE**
If you have ever used water on the Albright College campus you can thank Phillip Dougherty, Ph.D., professor of chemistry and biochemistry, for protecting its purity.

Dougherty was recently awarded an Educational Sector Source Water Protection Award by the Schuylkill Action Network. This award, presented to seven recipients in southeastern Pennsylvania, was given in recognition of Dougherty’s efforts in reducing water pollution in the Schuylkill River. The commendation accompanies a $3,000 award to Albright College.

Dougherty was also recently awarded a $5,000 grant from the Pennsylvania Department of Community and Economic Development. The grant, secured by Representative Thomas Caltagirone, will support Dougherty’s work this summer and help fund a student research assistant.

For more than two decades, Dougherty and his students have tested the waters of Blue Marsh, an Army Corps of Engineers-made lake in western Berks County. It began in 1980 when the late John Hall, Ph.D., professor emeritus of biology, discovered that Dougherty had purchased a new powerboat.

Hall convinced Dougherty to take to the waters of Blue Marsh and do some testing, giving them a baseline for future testing by students. What they found was an extremely unstable and unpredictable body of water, one that has captivated Dougherty ever since. In the late 1980s the two professors partnered with the Western Berks Water Authority to write a comprehensive study on the water supply and quality.

Dougherty recently added Lake Ontelaunee to his testing pool as a way of protecting the watershed in Berks County. “It goes even further than the county limits,” says Dougherty. “Pennsylvania is the largest source of pollutants to the Chesapeake Bay, mostly through run-off from farms. Someone must be dedicated and vigilant about monitoring and protecting our environmental assets.”

The Blue Marsh data is used by the Western Berks Water Authority while the Lake Ontelaunee data is used by the Reading Area Water Authority. Both bodies of water are used as sources of drinking water in Berks County. The data collected has allowed the authorities to protect the purity of the water.

Today, Dougherty has upgraded his 1980 powerboat to a 22-foot water research craft with electronic monitoring and testing equipment. But while the equipment makes his job easier, funding is still a challenge.

Grant monies received for his projects are diminishing quickly, thus limiting the number of students who can work on this project. Despite the struggle for funding, Dougherty says he plans to continue his work for years to come.

Blue Marsh Lake and Lake Ontelaunee are used as sources of drinking water in Berks County. The data collected has allowed the authorities to protect the purity of the water.

what’s really in the water...
Ever since LaKeisha A. Hall ’07 was a little girl, she loved animals and science. “My mom really likes animals too,” says Hall, 20, of York, Pa. “She let me have lots of pets—hamsters, rabbits, birds, gerbils, fish, dogs, cats and hermit crabs.”

But Hall had never handled a bat until she started working on an Albright Creative Research Experience (ACRE) project with Karen A. Campbell, Ph.D., the P. Kenneth Nase, M.D. ’55 chair of biology. Hall, who is majoring in biotechnology and pre-veterinary medicine, collaborated with Campbell on a project titled “Diet Analysis of Little Brown Bat (Myotis lucifugus) Females During the Reproductive Season: A Comparison with Insect Availability.”

ACRE is a summer and January interim program that enables students to work individually with faculty members. Hall and Campbell designed the research to determine if Little Brown Bats are dietary specialists or generalists, and whether diet preferences changed during pregnancy and lactation, as insect availability changed.

Every week during summer 2005, Hall and Campbell captured approximately 20 female bats from each of two sites in Berks County, a barn near Blue Marsh Lake and a bridge at the Berks County Heritage Center. Both of these sites house “maternity colonies” of mother bats and their young.

“The bats go there in the summer,” says Hall. “In the winter they hibernate. About 1,000 bats roost at the barn, and about 3,000 bats roost at the bridge. They like to hide in the cracks.”

Hall, who hopes to become a veterinarian in the future, says that watching hundreds of bats fly out of their roost at night to find food was an amazing sight.

Campbell and Hall removed some bats by hand while they were roosting, and caught some using mist nets, which feel like hair nets, Hall says. The bats were caged individually until they defecated and then released.

The Little Brown Bats are extremely small animals, says Hall. Two or three can fit in your hand. However, when they open their wings they are much larger. Each one has a different personality, she says. Some are aggressive, while others are mild.

Hall and Campbell also caught insects at the two sites, to help assess which insects were available for the bats to eat.

During the January interim, Hall analyzed the bats’ waste, called guano, using a dissecting microscope. She identified the presence of different insects by finding their body parts. She then compared what the bats ate to what insects were available.

“LaKeisha excels both in the field and in the lab,” says Campbell. “Her love and respect for animals, her scientific ability, and her enthusiasm and good humor all contribute to her strength in science research.”

According to the research, bats of different ages and reproductive conditions do not prefer specific insects, Hall says. All the bats ate the insects that were most abundant, easiest to catch, and that provide the most energy.

However, bats at the bridge consumed the insect Diptera, while bats from the barn did not. This is a mystery and an avenue of future research for Campbell, since this insect was available at both sites. Future work will also test the digestibility of various insects, to see if they are not easily detected in the guano. To test this, bats will be handfed certain insects.

“I really enjoyed working with Dr. Campbell in the field,” says Hall. “You know that your teachers are people too, but when you are out in the field with them, it proves it.”

Recently, Hall presented her research at the National Council of Undergraduate Research conference in Asheville, N.C. This summer, Hall will head to Indiana University to work on animal behavior research for 10 weeks.

“I have learned so much,” says Hall. “I would definitely encourage other students to participate in the ACRE program. It was an experience I’ll remember the rest of my life.”

Many of the bats try to bite. It doesn’t hurt much; it just feels like a little pinch.”

LaKeisha A. Hall ’07

Going batty! LaKeisha Hall’s Love of animals leads to hands-on experience

Ashley B. Nomland & Ian J. Rhile, Ph.D.
Progress Toward Studying the Intramolecular Cyclization of a Carbene

Julia A. Pfaff & Pamela G. Artz, Ph.D. ’87
Hemisuccinate Synthesis: Investigation of Dibutyltin Oxide as an Esterification Catalyst

Tara L. Smith & Andrew I. Samuelsen, Ph.D.
Improved Karyotyping of Low Volume Blood Cell Cultures

Gary L. Willman & Christian S. Hamann, Ph.D.
Synthesis of Ambrox from Abietic Acid Isolated from Pine Rosin

Jeanette M. Young & Christian S. Hamann, Ph.D.
Verifying the Predicted Nuclear Magnetic Resonance Signals of Specifically Deuterated Molecules
Q & A with...

Brian Buerke, Ph.D., Chair and Assistant Professor of Physics

Q: Where were you prior to joining the Albright faculty?
A: At the University of Rochester where I got my Ph.D. I came here directly out of graduate school.

Q: Why did you decide to focus on physics?
A: By the time I was 12, my goal was to be an inventor and invent things that would help people have better lives, more comfortable lives. Eventually I became more interested in the actual science rather than the applications of science. By the time I was in college I was more interested in going into academia rather than industry.

Q: What made you decide to go into an academic setting?
A: I enjoyed being able to figure things out. My mother was a teacher so I guess it just came naturally. Just the interaction and the immediate feedback you get when you’ve explained a great idea to someone and they go, “Wow! That’s great. That’s neat,” is obviously a thrill. It’s also a different way to help people. Instead of creating things they can use, you’re giving them knowledge.

Q: What kind of research are you involved in?
A: My main specialties are atomic physics and optical physics, which are the interaction between very intense light and atoms. I am still involved in some of that research, more on the theoretical end instead of the experimental end. In addition to that I’ve done research with students here in optics class, such as building optical devices. The research with students tends to be more pure optics than atomic.

Q: How many students are in the program? Is it growing?
A: I think we are now up to eight physics concentrators overall, which is definitely growing. We only started four years ago with a single concentrator, but we are going up every year. We’ve now reached the point where we will probably start graduating about two per year, which is a nice steady pace. We are graduating three this year, which is a big accomplishment.

Q: What challenges does teaching present?
A: I think the biggest challenge is trying to get inside the heads of the students. Asking where are they right now, what their understanding is. We know they don’t come in as blank slates. They have their own ideas of what’s true and what’s not and sometimes those ideas are wrong. We have to clear them of their notions before we can actually teach them what’s correct. It’s hard, especially when you’re teaching a wide range of courses. I teach introductory courses and upper level courses for physics majors. So it’s a different head you’re getting into when you’re trying to teach them. That’s also a challenge. The classes are different so you have to tailor it to their needs.

Q: Albright’s tagline is “A different way of thinking.” How does the College’s focus on interdisciplinary studies play a role in the sciences at Albright?
A: Interdisciplinary thinking is all about solving real-world problems. It’s one of the main focuses of it and most real world problems have some technical aspects to them. That’s usually where science comes in. How can you come up with a technology to do this better? How can you make it more efficient, less expensive and so on? Those are obviously economic issues. There are also psychological issues involved with new technology. But the actual creation of these things is usually where the science comes in, especially physics and being able to combine the
technical end with the end of making it acceptable for society. Selling the product, if you will, and dispersing it widely so everyone starts using it is sort of the main interdisciplinary problem that people work with in our field. It certainly involves a lot of different perspectives and a lot of different disciplines. You can’t just create a device and have it be successful. It doesn’t work that way. Engineers have to be aware of the other end of things and how to get it into people’s hands.

Q: How do you focus on interdisciplinarity in your classroom?
A: I probably do that more in my general lab science courses than I do in the upper-level physics courses. In astronomy, for example, I bring in a lot of history. We talk about how astronomy has impacted a lot of cultures along the way, things that might have affected why we have seven days of the week, for example. We talk about all those ways that it has touched different areas of people’s lives while always focusing on physics, of course. The other thing that we really focus on is how can students take what they’ve learned and express it to other people, either through writing or speaking. That really requires an interdisciplinary understanding, not just the science itself, but how people perceive it and the role it has on society.

Q: How will the new Science Center contribute to this focus?
A: I think the immediate impact will be in helping those who are in the sciences communicate more, do more things together, have more shared class space, more opportunities for being together and collaborate more. There’s a lot of optics related to biology, obviously microscopes and different Imaging, more advanced technology like optical tweezers, which is something I talk about in my optics class. There are things that have immediate applications to biology, but we really haven’t done a lot at this point between the physics and biology departments in terms of collaborating in classes.

Q: What are you looking forward to the most once the new Science Center is finished?
A: I’d say it’s equal between the increased collaboration and the new lab space we’ll have available to us. One of the problems we have in physics is that some of our labs are over in Masters Hall still. We don’t have enough room in Science Hall for us to bring everything over here. It’s not very convenient right now. That will be a big benefit for us just in terms of teaching in the labs.

Q: If you could give your students one piece of advice as they graduate, what would it be?
A: I guess the first thing that comes to mind is try to enjoy what you’re doing. One of the great things about physics is you can get exciting jobs in physics, but you’re not necessarily limited to physics. There are people who go into sales. There are people who go into management. There are people who go into financial areas out of physics because they have a very good mathematical background. I would say don’t limit yourself to just physics if you find other things that excite you.

Brain Teasers Answers...
Unfortunately, no one was able to correctly answer all of the chemistry questions from the winter 2006 issue. Here are the answers:

Q: What narcotic asphyxiant is commonly used to add volume to foods such as whipped cream, potato-and-lobster foam, and chocolate mousse? A: Nitrous oxide

Q: The process of crushing sugar cubes or rubbing two pieces of milky quartz together generates light. What is the name for this phenomenon? A: Triboluminescence

Q: What water pollutant exhibits its toxic effect by mimicking iodide in the body? A: Perchlorate

Q: What enzyme is used for the bioremediation of swine manure, removing its phenolic stench? A: Horseradish peroxidase

Q: There has been a recent upswing in the illegal production of a drug using the over-the-counter decongestant pseudoephedrine as the starting material. What is the name of this drug? A: Methamphetamine

Albright grads in Berks County! We need your help!

Give $150 to the new Science Center to celebrate Albright’s 150th.

For 150 years, Albright has excelled in teaching science. The Berks County Capital Campaign for the Science Center is seeking to raise $2.5 million for the Science Center from Berks County alumni, friends, corporations and foundations. The Science Center will replace the 48,000-square-foot Merner-Pfeiffer Hall of Science, built in 1929, which will be renovated to provide much-needed classrooms and offices.

The new, 89,000-square-foot Science Center will be a model building for interdisciplinary teaching and learning of science.

This regional campaign, approved by the Berks County Capital Campaign Review Board, is limited to Berks County and ends in August 2006. The Berks campaign is one part of the national fundraising effort—Crossing Boundaries: The Campaign for Albright.

Please support the Science Center at Albright with a gift of $150 or more in honor of Albright’s 150th anniversary celebration. The names of donors who give $150 or more to this campaign will be listed on a plaque in the Science Center. Gifts can be sent to: Albright College, Development Office, Thirteenth & Bern Streets, P.O. Box 15234, Reading, PA 19612-5234.

For more information, contact Frank Falso, vice president for advancement, at 610-921-7501 or ffalso@alb.edu.
Inside her dressing room lay the bloody body of waiter Tom Duke. A .38 revolver, which had been wiped clean, lay on the body, the signature of a mob hit.
From DNA analysis to explosives and firearms to code deciphering, there are 15 discipline specific units within the FBI Laboratory that Trzcinski must be familiar with. In addition to determining which unit to send evidence to, Trzcinski must also keep track of the chain of custody. “The chain of custody is so important,” she stresses. “Who handled the evidence…we have to be aware of that at all times.”

Trzcinski enjoys the every day challenges of working on extremely sensitive cases. Although she is not able to specify which cases she has worked on, she says most are extremely high profile and the topic of current news stories in the media.

Handling missing person’s cases is where Trzcinski says she finds the greatest satisfaction. “Even though I may not know the person by name, knowing that the evidence comes here and every now and then they find someone…it makes you feel good at the end of the day. If I can help do that then I’m doing what I’m supposed to be doing.” Although it can be difficult and often sad to see such cases, Trzcinski says it makes her feel good to be able to provide family members with closure and ensure the person who committed the crime will be held responsible.

She’s quickly learned though that the way forensics is portrayed on television in shows such as “CSI: Crime Scene Investigation,” Mindy Lancaster Trzcinski ’02 helps to uncover these types of cases every day as a physical scientist in the Evidence Control Unit of the Federal Bureau of Investigation (FBI) in Quantico, Va.

Trzcinski began working at the FBI in 2004 as a biologist in DNA Unit 1, the nuclear DNA unit responsible for identifying body fluids recovered as evidence, and, if possible, developing a DNA profile. In 2006 she accepted a position in the Evidence Control Unit as a physical scientist and is currently in training to become a request coordinator.

As a request coordinator, Trzcinski is the primary contact for the contributor, or the person who brings evidence to the lab. It’s her job to design an “exam plan” to ensure the evidence is passed along to the right units in the proper order, depending on the needs of the contributor. For example, in a homicide in which the perpetrator used a knife, Trzcinski would first send the knife to the trace evidence unit, then to latent prints to do a visual exam. They would indicate areas that should not be disturbed and collect any stains, and then send it back to latent prints.

“It’s absolutely fascinating to hear about current investigations and then handle the evidence in the laboratory,” she says. “One day it’s on the news and the next day you’re looking at it.”

Having graduated with a degree in biology/chemistry/criminology, Trzcinski says her job as a request coordinator allows her to use her background in science and knowledge of forensic examinations to help contributors and agents understand what the FBI can do for them, and coordinate the examination of their evidence with the various units. “I’m always thinking about science. Even where you put a box really matters. If you refrigerate an item that could have latent prints, the condensation could compromise exams,” she says.

From DNA analysis to explosives and firearms to code deciphering, there are 15 discipline specific units within the FBI Laboratory that Trzcinski must be familiar with. In addition to determining which unit to send evidence to, Trzcinski must also keep track of the chain of custody. “The chain of custody is so important,” she stresses. “Who handled the evidence…we have to be aware of that at all times.”
Time to brush up on your knowledge of physics. The first 10 readers to submit the correct answers to the following questions will receive a prize! Answers will be provided in the winter 2007 issue.

1. Why does the pitch of wind instruments increase as an orchestra warms up? Why does the pitch of string instruments decrease?
2. How long does it take light to travel from the sun to the earth?
3. How long ago did the Big Bang occur?
4. What makes the sound when a whip is cracked?
5. How many types of neutrinos are presently known?

E-mail your answers to jstoudt@alb.edu or send them to Jennifer Stoudt, Albright College, 13th & Bern Streets, Reading, PA 19612-5234. You can also submit answers via the Albright website: http://www.albright.edu/fusion/index.html.

Answers to Brain Teasers - winter 2006 - can be found on page 5.