Almost there...

The renovation of Searle Laboratories is almost complete. Besides updated labs, the building now features modern improvements such as new insulation and windows, low-flow water fixtures, and a partial "green roof." These environmentally friendly modifications have allowed Searle to become the first LEED certified building on campus, and will decrease the building's operating costs to boot. Searle will reopen early in 2009.

Our Losses

CARLOS DIAZ,
March 14, 1947–May 26, 2008

Carlos Diaz, a 35-year employee of the University, began working at the University in 1973, managing the undergraduate teaching laboratories, equipment and chemical stockroom for the Department of Chemistry. He was a resident of the Pullman Historic District in Chicago.

"Carlos was a very dependable and loyal employee who provided much value to the running of the undergraduate Chemistry laboratories throughout his many years of service," said Vera Dragisich, Executive Officer and Senior Lecturer in Chemistry.

"Mr. Carlos Diaz was a gentleman and was a pleasure to work with," said Lab Director Meishan Zhao, Senior Lecturer in Chemistry. "He was one of our most dedicated people and shared a passion for his work. Being more than 30 years in our undergraduate chemistry laboratories, he made significant contributions to our undergraduate education and to the laboratory development," said Zhao.

Alumnus Endows Weil Graduate Fellowship

The Department is pleased to announce that John A. Weil, SM'50, PhD'55, has generously established and endowed the first of a new kind of fellowship. The Weil Graduate Fund was established with a gift from Dr. Weil, a 33% matching gift from the Physical Sciences Division Visiting Committee (a group of friends and alumni that advises the dean), and a 67% matching gift from a pool of University funds. This fellowship will be awarded annually to outstanding Chemistry graduate students to provide them with stipend and tuition support.

Please join us in thanking Dr. Weil for his generosity on behalf of the Department.

Faculty Kudos

Chuan He was named a recipient of the 2008 Burroughs Wellcome Investigators in the Pathogenesis of Infectious Disease Award.

David Mazziotti was named by Microsoft as one of ten recipients of its Newton Breakthrough Award.

Aaron Dinner was named an Alfred P. Sloan Fellow.

Rustem Ismagilov was named the recipient of the 2008 American Chemical Society Award in Pure Chemistry.

Hisashi Yamamoto has been named the recipient of the 2009 American Chemical Society Award for Creative Work in Synthetic Organic Chemistry.

Thank You to Chemists Club Donors

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Calling graduates from the 1950s and earlier!

Do you have news to share in the next *Chemists Club* newsletter?

Information of interest might include: company for which you work, job description, promotions, research, awards, publications, and news of your family. Please use the enclosed card for such information. We hope to hear from you!

The University of Chicago
Department of Chemistry
5735 South Ellis Avenue
Chicago, Illinois 60637

THE CHEMISTS CLUB

THE UNIVERSITY OF CHICAGO

NEWSLETTER 25 | FALL 2008

From the Chairman

Fall quarter brings new graduate students to campus, as well as our returning students and faculty back from vacations. I am happy to report that we have an excellent incoming class of new graduate students. In addition, we are already anticipating the reopening of Searle Labs next year, as well as the awarding of the first Weil Graduate Fellowship (both of which you can read about in this issue of *Chemists Club*).

The two feature articles in this issue of *Chemists Club* describe the work of two chemists, Ka Yee Lee and Chuan He, who have performed exceptional work in chemistry that also applies to other fields. He's work on the crystal structures of proteins may change the way physicians treat cancer in the future; Lee's study of the wrinkle-to-fold transition could impact both medicine and electronics. I am pleased to be chairman of a department where chemists make connections between their research and the frontiers of other fields.

I hope that in the next issue we can include a short section featuring the memories of alumni from the 1950s and earlier. I think alumni, from both this and later generations, will enjoy reading stories about people and places they remember. You can send your stories in via the enclosed envelope, or e-mail them to chemistsclub@uchicago.edu.

As this issue was going to press, we were saddened to hear of the death of Professor N.C. Yang. His full obituary will follow in the next issue. Please take a moment to remember him and his family.

Best regards,

Michael D. Hopkins
Professor and Chairman

Student Fellowships

Academic Year 2008–09

McCormick Fellowships
Fangkun Deng
Andrew Fidler
Chengyang Jiang
Davis Moravec
Chunxiao Song
Caroline Womack

Freud Fellowships
Justin Caram
Dugan Hayes
Jason Karpus
Raman Shah
Nicole Tuttle

NIH Predoctoral Training Grants
Jeremy West
Elizabeth Wiltrout

NIH Ruth L. Kirschstein National Research Service Award Predoctoral Fellowship
Gerri Hutson

UNCF Merck Graduate Science Research Dissertation Fellowship
Gerri Hutson

National Academies Christine Mirzayan Science and Technology Policy Graduate Fellowship
Amy Hee Young Kim

National Sciences and Engineering Research Council of Canada Postgraduate Scholarship
Alexander Ross Dickson

Named Lectures

February 02, 2009
Lecture: Abbott
Speaker: Professor Masakatsu Shibasaki (University of Tokyo)

April 13, 2009
Lecture: Wheland
Speaker: Professor Christopher Walsh (Harvard)

April 27, 2009
Lecture: Kharasch
Speaker: Professor JoAnne Stubbe (MIT)

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Chuan He (center) in his lab

Chemists Blaze New Path in Fighting Cancer

By Steve Koppes

A team of University of Chicago scientists, led by Chuan He, Assistant Professor in Chemistry, has shown how two proteins locate and repair damaged genetic material inside cells. This discovery raised the possibility of designing a molecule that could interfere with the repair process, making cancer treatment more effective.

He's co-authors included Phoebe Rice, Associate Professor in Biochemistry and Molecular Biology at the University of Chicago, and five researchers from his laboratory: Cai-Guang Yang, Chengqi Yi, Erica Duguid, Christopher Sullivan, and Xing Jian. Their work was supported by the National Institutes of Health, the W.M. Keck Foundation, and the Arnold and Mabel Beckman Foundation.

In a paper published in the April 24 issue of the journal *Nature*, the scientists determined, for the first time, the crystal structures (showing the three-dimensional framework of atoms) of two related DNA-repair proteins bound to double-stranded DNA: a bacterial protein called AlkB, and a corresponding human protein, ABH2. Scientists had been seeking the structures of these proteins to better understand how they perform their key roles in repairing DNA.

The bacterial protein can bind to either single- or double-stranded DNA. The strands separate during the replication process, but the bacterial protein avoids the latter. "This is very bizarre, because most other DNA repair proteins prefer double-stranded," He said. The AlkB protein avoids double-stranded DNA because binding it takes more energy.

"Double-stranded DNA is rigid. Single-stranded is very flexible," He explained. "You can cause all kinds of distortion in single-stranded without paying much energetic penalty."

Many labs have unsuccessfully attempted to solve the structure of the bacterial protein with double-stranded DNA. They failed because this family of proteins binds DNA weakly, which foils the application of traditional crystallographic methods, He said. His team reinforced the complex by cross-linking the DNA to the protein.

Previous crystal structures of this protein included only a very short, single-stranded segment of DNA, and did not reveal all of its interactions with larger, more biologically relevant strands of DNA.

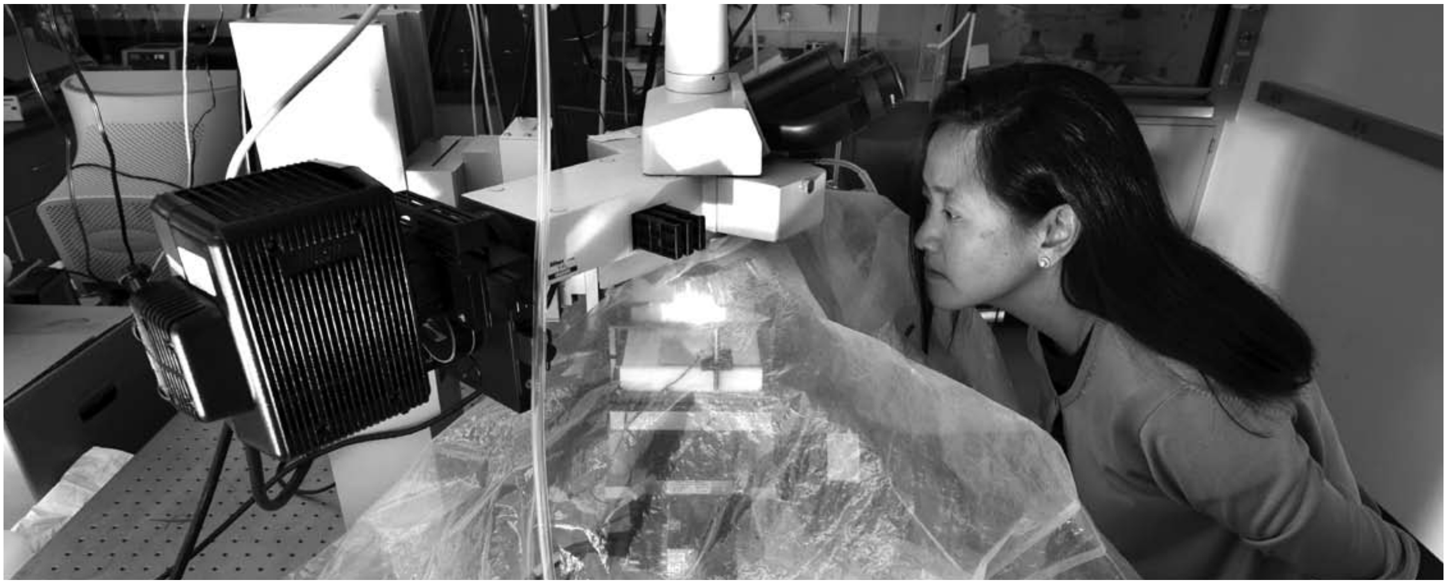
"The technique that they used to grow these crystals is very clever," said Rice, who served as the team's crystallographer. "It's a nice application of chemistry to solving important questions in biology.

"Knowing which pieces of the enzyme are important for interacting with double-stranded DNA and which pieces are missing when it would prefer a single strand will help us to predict the functions of related proteins," Rice said.

Said He: "We're now applying this same strategy to all kinds of other protein-DNA complexes."

The AlkB and ABH2 proteins repair alkylation damage to DNA, including the damage caused by alkylating cancer treatments. Alkylation is the addition of certain chemical groups to DNA and is particularly harmful to rapidly growing cells such as cancerous ones.

He oversees a research team of approximately 20 students and postdoctoral scientists, which occupies nearly half of one wing on the third floor of the Gordon Center for Integrative Science. The team collects most of its data at the Department of Energy's Advanced Photon Source at Argonne National Laboratory.



Experiments Reveal Cause of Wrinkle-to-fold Transition

By Steve Koppes

Scientists at the University of Chicago and the University of Santiago in Chile have explained, for the first time, the physics that governs how thin materials at scales millions of times different in thickness make the transition from wrinkles into folds under compression.

The study stems from a research program at the University of Chicago labs of Ka Yee Lee, Associate Professor in Chemistry, which aims at understanding the characteristics of lung surfactant, a microscopically thin membrane that facilitates breathing. But the findings would apply both to the design of foldable electronics and to the production of synthetic lung surfactant for therapeutic uses.

"Our paper is getting at the generality of these types of transitions," said Luka Pocivavsek, an MD/PhD student at the University of Chicago. Lung surfactant has the ability to wrinkle and fold under pressure, then gracefully pop back into a stiff configuration when relaxed. "It's not necessarily something special about lung surfactant that lets it do this. It's really the fact that lung surfactant behaves like an elastic, thin sheet," Pocivavsek said.

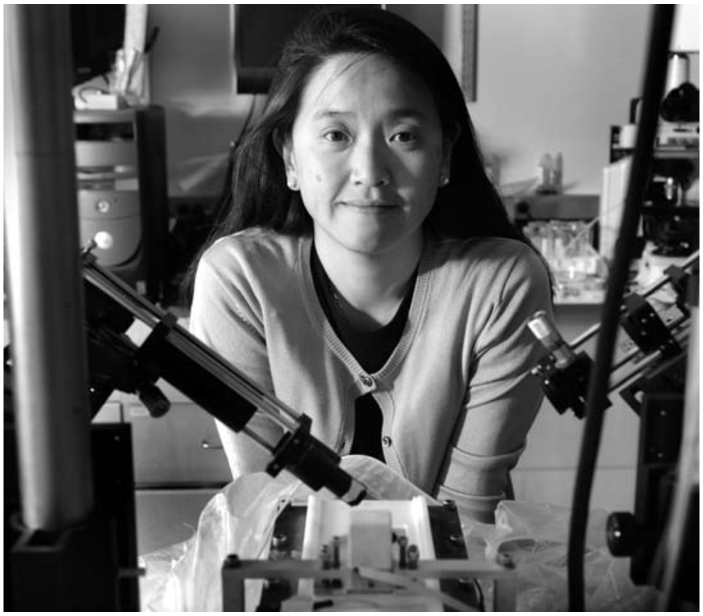
Pocivavsek, Lee, and their co-authors published their results in the May 16 issue of the journal *Science*. Their co-authors include Binhua Lin, Senior Research Associate in the Center for Advanced Radiation Sources at the University of Chicago, and Enrique Cerda, Associate Professor of Physics at the University of Santiago. Also contributing to the study were two summer researchers: Sebastián Johnson, an undergraduate exchange student from the University of Santiago, Andrew Kern, a 2007 graduate of the University of Chicago Laboratory Schools, now at Northwestern University, and Robert Dellsey of Tulane University.

Lee's laboratory typically works with materials that resemble lung surfactant, which measures only 2 nanometers in thickness (the width of several atoms). "When we breathe, lung surfactant is compressed in the air sacs during exhalation," Pocivavsek said. "It's compressed so far that eventually it has to transition from being just a flat surface to something that's now crumpled."

The chief component of lung surfactant is called dipalmitoylphosphatidylcholine (DPPC). Pocivavsek likened DPPC in its purest form to a porcelain plate. "If you push on it hard enough, it's going to crack," he said. If lung surfactant consisted of 100 percent DPPC, the cracked pieces would hold together under the pressure during exhalation. But the plate would fall apart upon inhalation, which would decrease the stress.

Scientists can alter the properties of their experimental surfactants by mixing another type of lipid (fat) with the DPPC. The "magic lung-surfactant-lipid composition" is approximately 70 percent of the electrically neutral DPPC and 30 percent of a charged lipid, Lee said.

"It's a tricky thing," she said, balancing the stiffness of DPPC with the fluid behavior of the other lipid component. "In natural lung surfactant, various lung surfactant proteins are involved as well."



CONGRATULATIONS

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Andrew Steiner

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Alec Block
Liam Bradshaw
Alexander Donovan
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Diana Bo Young Ha
Alan Wing Chiu Hau
Gregory Kaufman
Omer Kaymakcalan
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Daniel Benjamin Zwick

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*posthumous

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