

Brigham Young University Chemigram

A newsletter for Brigham Young University Chemistry Alumni
August 2004

Department of Chemistry and Biochemistry, C100 BNSN, Provo, Utah, 84602
Visit our website at <http://chemwww.byu.edu>

Chair's Message

Academic departments are always changing, and the Department of Chemistry and Biochemistry here at BYU is no exception. To those of us who are here on a daily basis, the changes seem gradual, but I can imagine that to those of you who only get periodic snapshots of the department, the changes must seem to be large and abrupt. My face at the head of this column is one of those changes. It is daunting to take the reins of a department that has such a long tradition of dedicated and effective leadership. I am particularly grateful to Fran Nordmeyer for his nine years of selfless service to the department. Fran leaves a department that is in good health. I look forward to the challenge of building on the tradition of excellent scholarship and dedicated teaching that has led the department to a position of leadership in the university.

President Samuleson has rearticulated a vision of BYU as a predominantly undergraduate institution with selected strong graduate programs. I believe that the Department of Chemistry and Biochemistry fits well within that vision. Because of the strength of our graduate program, and because of the external funding our faculty obtain, we are able to offer our undergraduates exceptional opportunities to work with faculty on meaningful research projects. Given the quality of our undergraduate students, the dedication of our faculty, and the breadth of our graduate program, I believe that we can set the national standard for undergraduate education in chemistry and biochemistry.

A commitment to undergraduate education does not in any way imply a lack of commitment to graduate education. We cannot provide the number or quality of research opportunities we desire for our undergraduates without a well-funded, dynamic graduate program, and our faculty cannot remain competitive for external funding without good graduate students. The single biggest challenge we face for our graduate program is a shortage of qualified graduate students who fit well within the BYU environment. I'll reiterate Fran's request that you encourage your friends and family who are considering graduate education in chemistry or biochemistry to apply to BYU. We need your help in bringing good graduate students into the department. With your help we can achieve the combination of undergraduate and graduate excellence that is our place in President Samuleson's vision for BYU.

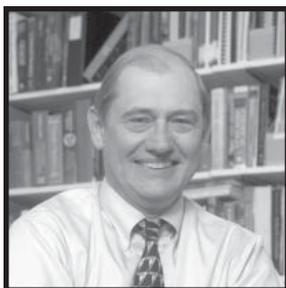
I look forward to renewing acquaintances with you in the coming years. Please come visit us, either during our annual alumni gathering at homecoming or at any other time you happen to be in the area. We value your support of the department, and hope to work with you in the future to reach the level of excellence that I know is within our reach.



Paul Farnsworth, Chair

Notes From the Departing Chair, Fran Nordmeyer

I am taking this opportunity, as the departing chair, to send my greetings to the alumni and friends of the department. The last nine years have been years of growth and change for us. You may know somewhat of our growth. The newly completed Benson Science Building provides us with vastly improved and state-of-the-art facilities for teaching and research. It has lived up to our expectations. Thanks to Earl Woolley. We have all benefited from the arduous effort that he put into the building's design and construction. The facility has helped us attract first-rate people as we replaced retiring faculty and staff. Growth has also come in our numbers of students, with undergraduate and graduate majors both up by about 40 to 50%, and in the number of full-time personnel, with one new staff and five new faculty positions.



We have changed the way we do our work. Like the rest of the world, we have largely switched from paper-based to electronic operations in our laboratories, offices, literature searching, and to some extent, in our classrooms. We regularly update our major and non-major course content. We are judiciously bringing educational technology and methods of active learning to our classrooms. New scientific instrumentation allows our faculty and students to conduct research on the frontiers of their areas. All of this makes for exciting chemistry and excellent education. Incidentally, we do still have chalkboards, as well as video projectors, in our classrooms. Chalkboard are a versatile bit of technology and have reliability at the 99.999%-level. (We might spend a few minutes now and then looking for a piece of chalk.)

The rapidly changing world reminds us that it is our job to educate our students for the future. You, our alumni, can help us know how well we have done that. Since we don't have a crystal ball and because our graduates go into many different careers, we are content (and committed) to give our students a solid foundation in the basics of chemical and biochemical science and opportunities to solve current research problems.

How can you, our alumni and friends, help us? (1) We look closely at the results of Alumni Survey that BYU sends to all alumni three years after they graduate. If you receive this survey, please complete and return it. As a group you, our alumni, have had high response rates. Thanks. (2) Encourage high school students that you know to apply to BYU and consider a career in chemistry or biochemistry. (3) Encourage graduating chemistry and biochemistry majors to consider graduate school at BYU. We have excellent opportunities for qualified Ph.D. students. (4) Attend the departmental activities and visit with us during BYU Homecoming in October. (5) Visit our website at www.chem.byu.edu regularly to learn what is happening and what is new. (6) Support undergraduate and graduate stipends in the department with your (large or small) financial contributions. (7) Tell us by e-mail, letter, or phone if you have ideas on any of the above topics.

Finally, thanks to the department faculty and staff and to alumni and friends for your support during the nine years of my tenure as chair. I look forward to a promising future under the leadership of Chair Paul Farnsworth and Associate Chair Paul Savage.

New Faculty

Allen Buskirk comes to the department fresh from his Ph.D. studies in the Department of Chemistry and Chemical Biology at Harvard University. Working in the lab of David Liu, Allen used directed-evolution techniques to create RNA and protein molecules with novel functions. He developed a genetic switch that allows researchers to regulate the activity of an arbitrary protein of interest using a drug-like small molecule. His research interests include molecular evolution, the biochemistry of functional RNAs, and the regulation of gene expression. Allen returns to Provo (B.S. in Molecular Biology in our department in 1999) with his wife Liesl and their two daughters, glad to be back amidst the glorious mountains of the West. Hobbies include an avid interest in the history and philosophy of science, particularly as it relates to religion, and playing unpopular music styles: bossa-nova guitar, baroque organ, and classical piano.



New Staff

Linda Richards has joined the department as the Assistant Manager of the Chemistry Central Stockroom. She is a graduate of BYU with a B.S. in Microbiology and a minor in Chemistry.



During her undergraduate years she worked in the old Inorganic Stockroom on the fourth floor of the Eyring Science Center doing lab prep. There, she met her future husband, Joseph W. Richards, who received both his B.A. and M.S. degrees in Chemistry from BYU, doing his Master's work in Inorganic Chemistry under Dr. Reed Izatt. He passed away in 2001.

Linda was a stay-at-home mom for many years, raising six. Linda has worked at USU-Uintah Basin for the past six years as the Science Labs Manager doing a wide variety of jobs—Chemistry, Microbiology and Physiology lab prep, ordering and receiving for the Science Group, safety training, chemical inventory, and dissected-cat disposal! She received the Classified Employee of the Year award at USU in 2004.

In her spare time, she enjoys vegetable and flower gardening, reading histories, and anything to do with music: playing it, listening to it, collecting it, and supporting her children's activities with it. Through the years, the Richards' family has enjoyed

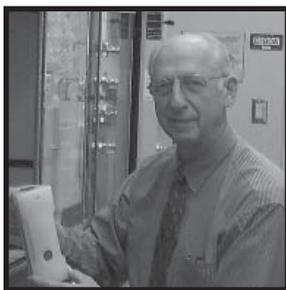
playing recorders together, with a full range of instruments from soprano to bass recorders. For many years, she transported her daughters to SLC for cello and viola lessons and for their participation in the Utah Youth Symphony. She served as an organist at the Vernal Temple for seven years, and hopes to be able to take organ lessons once again here at BYU.

Jim Workman has joined the Chemicals Management Office in the newly created position Laboratory Safety Officer responsible for the support of the academic laboratories on campus. He was born in Richmond California but went to High School in Salt Lake City, Utah. He went on a mission to Duesseldorf Germany and graduated from BYU in Chemical Engineering. Jim also completed an MBA from the University of Houston. He worked for six years at General Electric Plastics, five years for Corning in their Blood Chemistry business and has managed environmental laboratories (including involvement in the 9/11 cleanup effort in NYC) during the past eight years. He is married to the former LaRue McCulloch who is pursuing a degree at BYU in Agriculture and has four children, one (Jenny) who is a senior in the Geology Department at BYU. Jim's hobbies include restoring old homes, gardening, all sports and scouting activities.



Retirements

Nolan F. Mangelson retired after 34 years as a member of our department. Nolan is one of those rare individuals who made a strong mark in all areas of University life. He has a strong record of performance in citizenship, teaching and research. Nolan taught courses at every level. He taught honors classes, physical science, first year chemistry, physical chemistry, and graduate level classes. His teaching has been rigorous and thorough, and his students have shown their appreciation for his attention. He received the Departmental Outstanding Teacher Award in 1989.



Nolan maintained an active research program in the area of nuclear chemistry and applications to analytical and environmental problems. His work has spanned trace analysis of obsidian and mummy hair to the use of lichen to measure trace contaminants in the air. To date he has authored about 80 papers in primary journals and given 100 presentations on the results of his work. He received the University's Karl G. Maeser Research and Creative Arts Award in 1990.

Nolan served on the Faculty Advisory Council on two separate occasions and served as the chair of that Council. He served as a member and chair of the University's Computer Center Advisory and Steering Committees, as the Assistant Department Chair,

Associate Department Chair, Department Chair, and as Associate Dean. Altogether, Nolan carried these significant administrative duties during 27 of his 34 years at BYU. Fittingly, Nolan received the Phi Kappa Phi Faculty Award for significant service in citizenship, teaching, and research in 1999. Nolan has been an example and role model to students and faculty alike. We appreciate the service Nolan has provided to the University. He and his wife are currently serving as missionaries in the New Mexico State University Institute of Religion.

Lee D. Hansen came to BYU in 1972. Since then he has taught freshman, upper division and graduate classes, promoted departmental initiatives, and served as the chemical-information anchor man for the department. He led in the creation of the Micro-ACS Meeting in 1979 (now the Annual Spring College Research Conference), in developing Chem 391, Technical Writing Using Chemical Literature, and in establishing the Exploratory Lab. He has brought state-of-the-art innovations to calorimeter design and applied those designs to chemical and biological problems.

Professional development leaves have taken Lee to California (twice), Nova Scotia, France and Australia. His active research program has, to date, generated 300 publications and patents on topics ranging from thermodynamic studies of aqueous equilibria, to aerosol particulates, to models of plant growth and respiration. His research has been recognized often and widely. These recognitions include the Karl G. Maeser Research and Creative Arts Award (1984), the Utah Award of the Central Utah and Salt Lake Sections of the American Chemical Society (2000), the Christensen Memorial Award from the U.S. Calorimetry Conference for Innovations in Calorimetry (1993), The Lavoisier Medal of the International Society for Biological Calorimetry (1994), and the Editorship of *Thermochemica Acta* (1975-present).



Student Biochemist Wins Top Honors at Biomolecular Conference

Karen Merrell, a first-year BYU Ph.D. candidate in biochemistry, won the award for best poster presentation at the recent conference of the Association of Biomolecular Resource Facilities.

The group consists of scientists from academic and industry labs that do bioanalytical work, emphasizing technologies such as DNA sequencing, microarrays and proteomics.

Merrell was one of only 30 students among the 1400 attendees, and she shared her award with a postdoctoral fellow from Germany, a faculty member at a biomedical research institution and the chief scientific officer from a biotech company.

A native of Las Cruces, N.M., Merrell studies under the direction of Steven Graves and Craig Thulin, both BYU biochemistry

professors. Her project involves developing methods for discovering diagnostic biomarkers from the serum of people who are at risk for diseases that don't show strong clinical symptoms until late in the disease progression, when therapy is often unsuccessful.

Such diseases include complications of pregnancy like preterm birth and preeclampsia, as well as various forms of cancer. The study will soon be published in the Journal of Biomolecular Techniques.

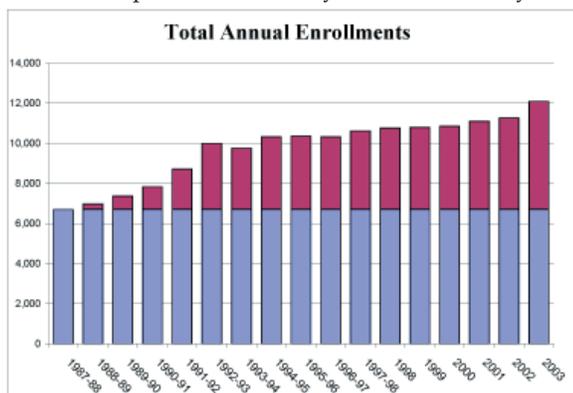


Biochemistry graduate students Michael Carter and Zhao Yuan Chen also presented posters and will have their research published in the same journal.

Sarah Warburton, the fourth BYU graduate student at the conference, presented her poster and has submitted her study to the Journal of Biological Chemistry.

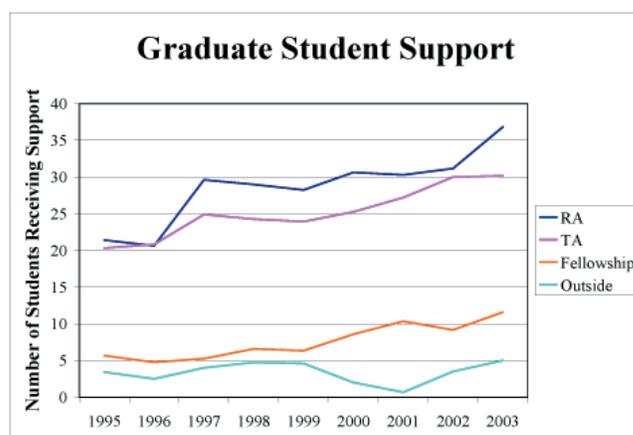
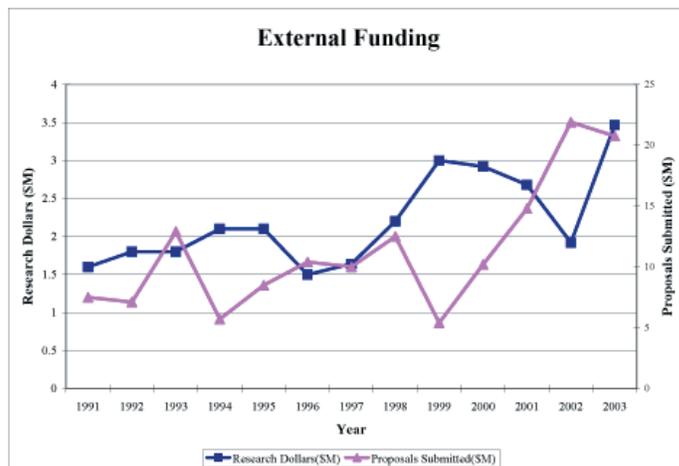
Growth in the Chemistry and Biochemistry Department

The student enrollments in our classes continue to rise. The graph below shows the trend over the past almost two decades. This increase results from several factors. The number of academic majors that require chemistry has increased, the university has allowed the student body to increase, and the number of students majoring in Chemistry has increased. These are all positive trends and reflect the importance chemistry has in our society.

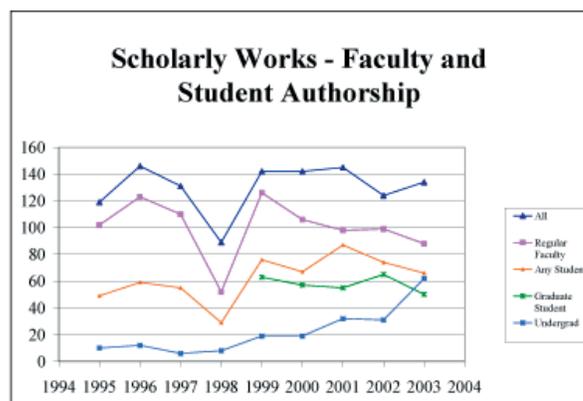


Our faculty have been successfully applying for and obtaining research funding from external funding agencies. This funding reached a new high of \$3.4 million this past year as shown in the graph below. These funds help our students gain experience with current research needs in our society. They also help them in finding jobs in industry and gaining positions in other academic institutions.

The increase in external funding has allowed even more of our undergraduate and graduate students to be supported by external funding. The next graph shows the number of graduate students supported by research funds (RA), teaching assistantships (TA), fellowships from endowment funds, and outside support (self supporting or private funding).



With the increase in research funding and the funds donated by our alumni for mentoring grants, we have been able to increase the number of undergraduate students participating in research programs. The effect has been a steady increase in the number of research papers published in scholarly journals by our undergraduate students. The graph below shows a 6-fold increase in these publications over the past decade.



We appreciate your support in providing mentoring grants for our undergraduate students.

College Spring Research Conference

The 18th Annual Spring Research Conference, held on Saturday, March 20, provided a forum for nearly 300 undergraduate and graduate students to present the results of their research, spanning every discipline in the college. These students also represent the efforts of 100 faculty mentors. At the opening session of the meeting, 14 undergraduate students were awarded Annual Fund Undergraduate Mentorships, which, as the name implies, are supported by the President's Leadership Council match to College Annual Fund donations. Many of you contribute to the College Annual Fund, so your donations benefit not only our department, but the mentored students as well. We very much appreciate your generosity.

The Annual Fund Undergraduate Mentorships were awarded to Tom Anderson (Chemistry & Biochemistry), Robert Bradshaw (Mathematics), Kellyn Farlow (Mathematics Education), Brent Gorbun (Mathematics), Paul Johnson (Statistics), Spencer Jones (Chemistry & Biochemistry), Carly McKay (Statistics), William Monn (Geology), Rebecca Olson (Physics & Astronomy), Annika Quick (Geology), Jeremy Robertson (Computer Science), Nick Stetich (Computer Science), Mark Transtrum (Physics & Astronomy), and Janel Williams (Mathematics Education).

Research Highlights

Professor **Milton Lee**, who has directed research in analytical chemistry for over two and a half decades at BYU, is excited about recent progress that his group has made in improving the instrumentation used in mass spectrometry. He first reported these developments at a National American Chemical Society Meeting one year ago, and reported improvements in the design last March at the Pittsburgh Conference.



Specifically, a novel electron ionization source has been incorporated in a time-of-flight mass spectrometer, which provides nearly two orders of magnitude improvement in the limits of detection of electron

ionization mass spectrometry. Scientists at Agilent, the major commercial supplier of gas chromatography-mass spectrometry instrumentation, reported three years ago the use of a radio frequency-only quadrupole as an ionization chamber to confine ions in a narrow volume as they were produced. An electron gun was used to direct ions into and along the axis of the quadrupole where they reacted with sample molecules. Unfortunately, this configuration provided only marginal improvement in sensitivity. Work along the same lines was being done in parallel at BYU, however, computer modeling experiments showed that the electrons were ejected out of the quadrupole by the radio frequency field immediately after entering. This problem was resolved by

placing a 500 gauss cylindrical permanent magnet around the quadrupole. The magnetic field held the electrons in the quadrupole for maximum interaction with the sample molecules.

A patent on atmospheric pressure ionization time-of-flight mass spectrometry was issued to BYU in 1991 from work performed in Professor Lee's laboratories. The recent significant improvement in electron ionization extends the capabilities of mass spectrometry to numerous additional chemical compounds, especially for trace analysis, and is the subject of a new patent filed by BYU just one month ago. The new technique should provide better analysis of trace environmental pollutants, clinical samples, pharmaceuticals, and petrochemicals, to name a few. Two mass spectrometer manufacturing companies have already shown interest in licensing this technology for incorporation in their commercial instrumentation.

Professor Lee is also involved in developing new instrumentation for separating proteins in blood samples for early detection of cancer, and in developing a portable, handheld chemical analyzer. He supervises the research of 3 undergraduate students, 12 graduate students who are working on PhD degrees, and two post-doctoral research scientists.

Homecoming Reception and Dinner

BYU Homecoming activities this year are scheduled for Tuesday, October 12, through Saturday, October 16. You can receive an update of these activities as they become available by checking the BYU website <http://alumni.byu.edu/sections/newsandevents/homecoming/>. The Department of Chemistry and Biochemistry will continue the tradition of hosting a get-together for alumni, friends, and faculty during Homecoming on Friday evening, October 15, starting at 6:00 pm. This special evening will feature a mixer/reception, followed by dinner and a speaker.

On the back page of this newsletter you will find more information about our Homecoming activities. We encourage you to make plans now to join us for an evening of food and relaxation, renewing friendships and reminiscing about past years at BYU.

Cancer Research Center



2004 saw another successful Rex Lee Run hosted by the BYU Cancer Awareness Group and the BYU Cancer Research Center. The Rex Lee Run is an annual event in honor of the late Rex E. Lee, who was lost to cancer in 1996 after valiantly fighting the disease

during his tenure as president of Brigham Young University. The race is organized by student volunteers and proceeds from the race go directly to funding cancer research at the Cancer Research Center through its Summer Cancer Research Fellowship Program. This program allows students to have capstone experiences in cancer research to help them gain the skills and interest necessary for a successful career in cancer research. The race raised a record amount of nearly \$30,000 dollars with over 1,400 participants and increased support from local and national corporations.

This year's race saw many changes with a new logo, a new venue, an added 10K race, and a renewed focus on families, with inflatables for kids, live music, and a chance to cheer runners in a final lap around the BYU Outdoor Track. The BYU Cancer Awareness Group also welcomed law professor Thomas Lee, son of Rex E. Lee, as faculty advisor for the race. The Chemistry and Biochemistry Department also stepped forward with increased support by designing and maintaining the rexleerun.byu.edu website with on-line registration and in assisting with much of the business aspects of this year's race.

The race provides an opportunity for the BYU and local community to come together to support those who are fighting or who have fought cancer. Many choose to honor their loved ones by making donations through the Honor a Cancer Fighter program. Certificates with these cancer fighter's names are worn by runners during the race and then sent to contributors as a keepsake. Rex Lee Run President Riann Garbett said, "Cancer, in its many forms, has touched the lives of practically everyone involved in this race."

Many students, faculty, staff, and volunteers from the community come together each year to make this race a continued success. If you would like to know more about the Rex Lee Run, or are interested in making a contribution to cancer research on campus, please contact the BYU Cancer Research Center at (801) 422-3913 or send an e-mail to cancer_research@byu.edu.

Student Awards

Undergraduate Student Awards

Keith P. Anderson

Craig Gurney

ACS Analytical Chemistry – Junior Award

John Sargent

Analytical Chemistry

Scott Burt

Biochemistry

Michael Turner

Chemistry Literature

Randy Stoltenberg

Freshman Chemistry Major

Stacey Janel Lewis

Freshman Chemistry Non-major

Carl William Hoiland

Inorganic Chemistry

Jody L. Richards

Organic Chemistry Major

Spencer Jones

Organic Chemistry Non-Major

Jared L. Parkinson

Physical Chemistry

Justin Peacock

Bevan Ott-Service Award

Juliet Go (M.S. student) received it this year.

College Undergraduate Research Awards – Spring and Summer 2004

<i>Name</i>	<i>Faculty Adviser</i>
Joseph Bair	Harrison
Britta Bergstrom	Vollmer-Snarr
Nicole Giauque	Fleming
Brian Hom	Sevy
Spencer Jones	Castle
Aaron Lewis	Burton
David Michaelis	Savage
Jordan Olsen	Farnsworth
Quinn Peterson	Lamb
Paul Reeve	Farnsworth
Matthew Sparks	Vollmer-Snarr
Jeff Stephens	Andrus
Daniel Stone	Linford
Thomas Anderson	Owen

Ott Award

Jared Parkinson

Castle

Harr Award

Carrie Jensen

Asplund

Garth L. Lee Undergraduate Teaching Awards for Fall 2003

Rebecca Adams	Chem 105-29	Sandberg
Jared Bailey	Chem 105-25	Eatough
Jason Hawkes	Chem 105-14	Wood
Bryan Houlberg	Chem 105-44	Nielson
Ben Hull	Chem 106-12	LaFleur
Dickson Kissi	Exploratory Lab	Hansen
Nate Lewis	Chem 105-17	Eatough
Tim Miller	Chem 353-4	Hinshaw
Bryant Oliverson	Chem 106-3	Brown
Rick Shamo	Chem 105-31	Sandberg
Marc Thomas	Chem 353-1	Hinshaw
Kari Waite	Chem 107-3	Brown
Mike Waters	Chem 107-3	Brown

Nomination for BYU Outstanding Student Employee

Dickson Kissi

Graduate Student Awards

Fellowships

Bradshaw Graduate Fellowship in Organic Chemistry –

Outstanding continuing graduate student in organic chemistry – 10-hour research assistantship for up to 12 months beginning Fall 2004.

Yunshan Peng

Charles E. & Margaret P. Maw Research Fellowship –

Outstanding continuing graduate student in any area – 20-hour research assistantship for up to 12 months beginning Fall 2004.

Georgi Lukov

Roland Robins Research Fellowship –

Continuing graduate students in any area – 20-hour research assistantship for up to 12 months beginning Fall 2004.

Randall Goff	Brett Grover
Erik Hicken	Ryan Kelly
Sarah Warburton	Phillip Wilson

BYU Graduate Studies Research Fellowships (Internships) –

Continuing graduate students in any area – 10-hour research assistantship for up to 12 months beginning Fall 2004.

Jenny Armenta	Haizhen Zhang
Nicholas Hundley	Jing Liu
Karen Marell	Jiangqiong Liu

Stanley & Leona Goates Research Fellowship –

Continuing graduate student in any area – 20 hour research assistantship for Spring and Summer beginning Spring 2004.

Iyas Masannat	Tao Pan
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Continuing Student Supplementary Awards

Garth L. Lee Award –

Outstanding continuing graduate student in any area, based on religious commitment, service, and scholarship – \$1,250 (paid \$625 Fall and \$625 Winter Semesters)

Nosa Agbonkonkon

Loren C. & Maurine F. Bryner Award –

Continuing graduate student in any area – \$1,000 (paid \$500 Fall and \$500 Winter Semesters)

Hector Becerril-Garcia

Jennie R. Swensen Award –

Continuing biochemistry graduate student – \$1,000 (paid \$500 Fall and \$500 Winter)

Georgi Lukov

J. Bevan Ott Service Award – \$300

Juliet Go

Graduating Awards

Outstanding graduating M.S. or Ph.D. graduate students - \$300

Uchenna Paul – M.S.

Ning Yin – Ph.D.

Planned Gifts to the Department of Chemistry and Biochemistry

Your planned gift to the Department of Chemistry and Biochemistry can help you achieve personal goals, enhance your financial security, and help shape the Department's future.

State and federal law provides advantageous tax treatment to encourage charitable giving. Often, these tax advantages will make it possible for you to make a larger gift than you thought possible, while also benefiting your family and heirs. The LDS Foundation at Brigham Young University has assembled a staff of professionals to help you and your advisors develop a plan personalized for your particular needs. This service is provided to you in confidence, and without charge.

Planned giving techniques may provide you with an opportunity to diversify your holdings and turn highly appreciated assets into a gift that provides you an income for life. Good planning may allow you to reduce or eliminate estate, inheritance, or gift taxes, while allowing your family and the charities you support to benefit most fully from the work of your lifetime.

The Department's representative with the LDS Foundation at Brigham Young University is David Bonner. He can be reached by phone at (801) 422-1691, or toll free at (800) 525-8074. David's email address is David_Bonner@byu.edu. David would like to hear from you.

2004 BYU Homecoming Events

- **Chemistry and Biochemistry Alumni Reception, Dinner, and Program**, Friday, Oct 15, 2004
 - 6:00pm – Mixer in Rm W-170, BNSN
 - 6:30pm – Dinner in Rm W-170
 - 7:30pm – Speaker (Daniel L. Simmons)

- Homecoming Spectacular, 7:30pm, Thursday and Friday, Oct 14 & 15, 2004 at the Marriott Center

- Homecoming Game, Saturday, Oct 16, 2004
 - 10:00am – Parade
 - TBD – Homecoming game, BYU vs. University of Wyoming

Please mark your calendars and plan to renew your friendships in the department at our reception and dinner Friday, October 15.

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