

Indispensable News

MinneCeutics

University of Minnesota

Fall 2006

Department of Pharmaceutics

FROM THE DEPARTMENT HEAD

As you may recall, we did not publish our annual *MinneCeutics* last year. At the time, Professor David Grant, the William and Mildred Peters Endowed Chair in Pharmaceutics, was hospitalized after suffering an aneurism, and we were consumed with covering his teaching, research, and administrative obligations. This year's issue, therefore, will record events over the past two years, which have been filled with ups and downs. There is a lot to report.

Sadly, David passed away on December 9, 2005 from complications following several surgeries. His funeral was held in Minneapolis, and was attended by many of his former graduate students and post docs from around the country. Several of David's professional colleagues from other universities were also present, with one who traveled from Japan. In recognition of David's many outstanding contributions to the field of solid state pharmaceutics, the David Grant Memorial Library is presently under construction on the 9th floor of Weaver Densford Hall. (An extraordinary effort to clean out David's office is also underway!)

The Peters Chair is now occupied by Professor Raj Suryanarayanan (Sury). In order to promote and sustain the field of solid state pharmaceutics, Professor Sury will soon hire an assistant research professor. It is hoped that this individual will eventually take a faculty position and carry on research in this area.

Professor Sury is also heavily involved in establishing the National Institute of Pharmaceutical Technology and Education (NIPTE). This organization is expected to provide a means for funding peer-reviewed grants in areas of the pharmaceutical sciences that are not funded by NIH.

Professor Ron Sawchuk announced his phased retirement after a long and distinguished career at the University of Minnesota. Ron will continue his research and teach, at a reduced level, until 2009 when he will become Professor Emeritus.

We have initiated a search for a faculty member at the associate or full professor level in biological pharmaceutics to replace Professor Sawchuk. We will shortly initiate a search at the assistant professor level in physical pharmaceutics to fill Professor Sury's position now that he is the Peters Chair. Finally, in a couple of years we will be allowed to add one more biological pharmaceutics position at the assistant professor level. Thus, the Department is currently in a growth mode.

In April, the annual Pharmaceutics Graduate Student Research Meeting (PGRSM) was hosted by Minnesota (see page 4). This student-run meeting was dedicated to Professor David Grant, and his wife, Marilyn, was a special guest at the lunch. An extraordinary amount of organizational work was carried out by our graduate students, and the meeting was a resounding success. To recognize their effort, the Pharmaceutics faculty honored them with a campus luncheon. Kudos to the organizers!

The year 2005 marked the 100th anniversary of Albert Einstein's publication of five landmark papers. The faculty, graduate students and postdocs celebrated by reading and discussing these papers, which dealt with the special theory of relativity (including $E=mc^2$), the quantum theory of light, Brownian motion, and the viscosity of suspensions.

The University of Minnesota has announced a strategic objective to place itself among the top three public research universities in the country. This goal is to be accomplished on a 10- to 20-year timescale. Plans are being made to recruit international leaders in various fields, and we hope to be included among the units that can attract such individuals. In this regard, the Dept. of Medicinal Chemistry has hired Professor Gunda Georg as its new department head. Professor Georg has made numerous distinguished contributions to cancer and male contraception research at the University of Kansas. She is planning, in conjunction with the Center for Drug Design, to lead an effort in drug discovery and development on our campus. The College has acquired space in the Minnesota Health Department building, two blocks from Weaver Densford Hall, which was purchased by the University, and will house Professor Georg. The Translational Research Facility building has been completed and is now occupied, in part, by College of Pharmacy researchers. Both buildings provide new space, but the demand is still high!

There are also several campus initiatives in which our department may play a significant role, including centers devoted to nanotechnology, experimental therapeutics in cancer, and medical devices. With regard to the latter, we are seeking to establish a Center for the Integration of Drugs and Devices. If successful, this will be the first center of its kind. As we are situated in the world's largest concentration of medical device companies, we feel that this is an important strategic move for the Department and the College.

We wish to thank 3M, Novartis, and Schering-Plough for support of our graduate program fellowships, Pfizer for supporting a guest lectureship organized by the graduate students, and AAPS for support of our student chapter.



Ronald A. Siegel, Sc.D.
Professor and Head
Department of Pharmaceutics

IN MEMORIAM

David James William Grant

March 26, 1937 – December 9, 2005

David J.W. Grant was an internationally known authority on the solid-state properties of drugs whose research enabled pharmaceutical companies to make safe and effective drug products with reproducible and predictable performance. Numerous Ph.D. students and postdoctoral researchers in Grant's laboratory over the past four decades have taken important positions in academia and the pharmaceutical industry.

Grant earned his Master's degree, D.Phil. and D.Sc., all at Oxford University. Before joining the University of Minnesota, he taught at the University College of Sierra Leone, the University of Nottingham and the University of Toronto, where he served as associate dean for graduate studies.

He joined the University in 1988 and served as head of the Department of Pharmaceutics until 1991. He was founder and director of the Drug Delivery Center in the College of Pharmacy, and was the first William and Mildred Peters Endowed Chair in Pharmaceutics.

"His passing is an enormous loss for the college and to his field of scientific discovery," said Marilyn K. Speedie, Ph.D., dean of the College of Pharmacy. "He leaves a legacy of contributions to the science of developing safe and effective medications. He will be missed."

Grant earned the praise of colleagues from around the world. "It is like the loss of a big brother, and the family of pharmaceutics will be diminished by his passing," said Peter York, Ph.D., D.Sc., FRSC, CChem, FRSPGB, professor of physical pharmaceutics at the University of Bradford, UK. York spent three months at the University of Toronto with Grant. "David was my guide, mentor and close friend. He truly deserves the ultimate compliments in academia. He was a gentleman and a scholar."

Grant's research earned him numerous honors. At the beginning of his career, Grant received the 1969 Leverhulme Research Award in England. In 1999, he received the Pharmaceutics Award in Excellence from the Pharmaceutical Researchers and Manufacturers Association Foundation (PhRMA). He was the recipient of the 2004 Dale E. Wurster Research Award in Pharmaceutics, the highest award in his discipline, from the American Association of Pharmaceutical Scientists (AAPS). That same year, he received an award from the European Society for Applied Physical Chemistry. In 2005 Grant received the Mettler-Toledo Award from the North American Thermal Analysis Society.

Grant belonged to numerous scientific societies and was recognized as a fellow of AAPS, PhRMA, the American Association for the Advancement of Science and the International Union of Pure and Applied Chemistry. He was the author of nearly 200 research articles and book chapters, and he mentored more than 40 graduate students and postdoctoral researchers. He began serving as associate editor of the *Journal of Pharmaceutical Sciences* in 1994 and was a member of the editorial board of several publications, including *Pharmaceutical Development and Technology* and *AAPS Pharm.Sci.*

"David Grant was a superstar: A highly productive, engaging colleague whose research, writing and training of students had worldwide impact," says Ronald A. Siegel, Sc.D., professor and head of the Department of Pharmaceutics. Colleagues from outside the University called him one of the best in the pharmaceutics business. "David Grant was a giant in his field," says Stephen R. Byrn, Ph.D., professor of medicinal chemistry and head of the Department of Industrial and Physical Pharmacy at Purdue University. "His work on the thermodynamics of solids was groundbreaking and truly noteworthy. David was a gentleman and a great guy. He will truly be missed."

Professor Grant was described by fellow faculty and staff as a kind, humble and brilliant man. In addition to his research and teaching, he was a licensed radio amateur.

Professor Grant is survived by his wife Marilyn; sons Robert (Joanne) of Listowel, Ontario, Canada and Kevin of Toronto, Ontario, Canada; sister Gillian Grant of Toronto, Ontario, Canada; stepchildren Virginia Sims and Lori Stanley; and three stepgrandchildren, Dara, Melissa, and Rebecca Mole. He is also survived by cousins Beryl Mallinson of Chicago, Illinois, and Peter Stringer of Winkleigh, England.

**PHARMACEUTICS
FACULTY:**

William F. Elmquist
Carolyn A. Fairbanks
Ronald J. Sawchuk
Ronald A. Siegel
Raj G. Suryanarayanan
Timothy S. Wiedmann
Cheryl L. Zimmerman

**AFFILIATE GRADUATE
FACULTY:**

Walid M. Awni, Abbott
Laboratories. **Richard C.**
Brundage, Dept. of
Experimental and Clinical
Pharmacology, U. Minne-
sota. **Keith K.H. Chan**,
GloboAsia LLC and Revico
Inc. **Belinda W.Y. Cheung**,
Dept. of Pharmaceutics, U.
Minnesota. **Janet M.**
Dubinsky, Dept. of Neuro-
science, U. Minnesota.
William H. Frey, II,
Alzheimer's Institute,
Regions Hospital. **Z. Jane**
Li, Pfizer, Inc. **Aldo**
Rescigno, U. Parma, Italy.
Evgeniy Y. Shalaev, Pfizer,
Inc. **Ray Skwierczynski**,
Millennium Pharmaceuti-
cals, Inc. **Laura S. Stone**,
Dept. of Neuroscience, U.
Minnesota. **Calvin**
Changquan Sun, Amgen,
Inc. **Chalet Tan**, Dept. of
Pharmacy Practice and
Pharmaceutical Sciences,
U. Minnesota at Duluth.
Timothy S. Tracy, Dept. of
Experimental & Clinical
Pharmacology, U.
Minnesota. **Chun Wang**,
Dept. of Biomedical
Engineering, U. Minnesota

FROM THE DIRECTOR OF GRADUATE STUDIES

Dear Friends and Colleagues:

On July 1, 2006 I became the Director of Graduate Studies in Pharmaceutics. I wish to thank my predecessor, Dr. Tim Wiedmann, for his many years of service in this position, and I hope to maintain his high standards in administering our program. Of course, it helps to continue to attract the very best graduate students. A major concern of mine, however, regards the financial future of our graduate program. Can it be sustained at its present level, or expanded?

It is perhaps not appreciated how much money is required to train a Ph.D. student at a state institution such as the University of Minnesota. The State does not provide direct support for individual graduate programs beyond the salaries of the faculty and support staff. The stipend for a full-time research or teaching assistant is now approximately \$21,000 per year. Tuition costs, along with health insurance, are included as fringe benefits, adding over 60% to the stipend. Thus, the individual faculty member needs to raise approximately \$35,000 per year per student. Multiply this sum by 4-5 years and add the costs for the student's Ph.D. research project, and one can see that the total cost of training a graduate student approaches, or even exceeds, \$200,000.

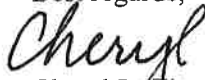
We have six teaching assistant positions to support instruction in the pharmacy curriculum, along with partial fellowships that we award each year, but the burden of student support is great. With the National Institutes of Health presently awarding grants only in the top 10%, the situation is becoming dire.

What is to be done? More than 90% of our Pharmaceutics Ph.D. graduates join the pharmaceutical industry. Our graduates are in high demand, and would have little trouble finding positions even if we doubled the number of graduates we trained. We are exceedingly grateful to the industry for supporting our students with summer internships and for donating to our many fellowships. (We especially thank Novartis and Schering-Plough for initiating their own fellowship awards.) However, if we are to continue training Ph.D.s in Pharmaceutics, we will have to increase our levels of interaction, collaboration and communication with our industrial stakeholders. Increased industrial support for graduate training will be needed to sustain the pipeline of well-trained scientists for research and development.

We are developing strategies to engage our industrial colleagues in collaborative training programs. We ask that you, our industrial alumni and friends, support these initiatives at your company. If you are aware of funding opportunities at your company for which we could apply, please let us know. If there is an opportunity for a research collaboration between your company and a University partner, please think of us. Of course, we hope that you will, with your individual or corporate contributions, help us fully fund the Sawchuk, Grant and Rippie Fellowships.

We take great pride in our ability to attract highly talented graduate students to our graduate program and convert them into top-notch researchers. Unfortunately, we have to turn away many well-qualified young people for lack of funding. With your financial help, we can sustain or even increase the availability of such talent to the pharmaceutical industry.

Best regards,



Cheryl L. Zimmerman, Ph.D.
Professor
Director of Graduate Studies

FROM THE AAPS STUDENT CHAPTER

It has been a busy year for members of the **American Association of Pharmaceutical Scientists (AAPS) Student Chapter** at the University of Minnesota. The 38th Annual Pharmaceutics Graduate Student Research Meeting (PGSRM) was hosted by the Department of Pharmaceutics June 8-10, 2006. This event was funded entirely by the generous contributions of the pharmaceutical industry and other corporate sponsors. Without their support, the meeting would not have been possible:

- ◆ 3M ◆ AAPS ◆ Abbott Laboratories ◆ Allergan ◆ Amgen ◆ Bausch & Lomb ◆ Boehringer Ingelheim
- ◆ Bristol-Myers Squibb ◆ CIMA Labs, Inc. ◆ Dow Pharmaceuticals ◆ Eli Lilly and Co. ◆ GlaxoSmithKline
- ◆ Johnson & Johnson ◆ Mallinckrodt ◆ Merck and Co. ◆ Pfizer ◆ Sanford Brands ◆ Tyco Healthcare
- ◆ U. of Minnesota Century Mortar Club, College of Pharmacy ◆ U. of Minnesota GAPSA
- ◆ U. of Minnesota/Coca Cola Beverage Partnership ◆ Upsher-Smith

The meeting was dedicated to the memory of our late professor and mentor, Dr. David J.W. Grant, who was honored at a luncheon by one of his first graduate students, Dr. Raj Khankari of CIMA Labs, Inc., who spoke about Dr. Grant's scientific and personal achievements. Meeting attendees included graduate students, post-doctoral fellows, professors and industrial representatives from across the country, representing 13 universities and 6 pharmaceutical companies. Highlights from the meeting included a networking skills workshop presented by Dr. Karen Habucky (Johnson & Johnson), and an interviewing skills panel discussion with Dr. David Moeckly (Eli Lilly & Co.) and Ms. Mary Ann Johnson (Merck and Co.). The three-day meeting provided a platform for participants to present and discuss

the latest in pharmaceutics research through podia and poster sessions, ranging in topics from drug delivery systems to techniques used in solid-state characterization. In addition to awards for best podia and poster presentations, the newly established Dr. Grant Award was presented to Ms. Jaspreet Vasir of Nebraska for the best overall presentation that exemplified Dr. Grant's dedication to professionalism and outstanding scientific merit. We look forward to participating at PGSRM next year when the University of Missouri-Kansas City will host the event.

STUDENT CHAPTER EXECUTIVE COMMITTEE:

Chair - Shyeilla Dhuria
Chair-Elect - Laura Maertens
Secretary - Li Li
Treasurer - Yuanyuan Xie
Website Coordinator - Enxian Lu
Faculty Advisor - Dr. Raj Suryanarayanan

GRADUATE STUDENT REPRESENTATIVES:

Enxian Lu
Prakash Sundaramurthi

www.pharmacy.umn.edu/pharmaceutics/aaps

In addition to hosting the PGSRM, AAPS Student Chapter members participated in numerous events ranging from scientific seminars and skill development workshops to social outings, such as baseball games and picnics in local parks. All activities have been planned and organized by committee members with the goal of increasing scientific knowledge, enhancing professional skills, and encouraging interaction among chapter members. Since its inception in 2002, chapter membership has expanded to include postdoctoral staff and graduate students from other programs at the University of Minnesota, such as Experimental and Clinical Pharmacology and Biomedical Engineering, and we currently have over 30 members!

The 2006-2007 academic year is sure to be another productive year for AAPS Student Chapter members. Our planned events include a visit to CIMA Labs, Inc., a local pharmaceutical company specializing in fast-dissolve oral dosage forms; workshops on fellowship opportunities; advanced use of Excel and referencing software; a bowling tournament; and a seminar on inhalable insulin for diabetes management presented by John Patton, co-founder and chief scientific officer of Nektar Therapeutics. We wish to thank Pfizer Global Research and Development, and their Recruiting Team of the Materials Science and Solids Development, Parenterals, Biologics and Research Support Centers of Emphasis, for their sponsorship of our Student Chapter seminars.

Plans are also underway to recruit scientists to discuss their research experiences in the pharmaceutical industry with graduate students and faculty through the AAPS Visiting Scientist Program. Chapter events have generously been funded by the AAPS as a part of their continuing effort to encourage ongoing education, professional development and active participation of individuals at all levels of their academic and professional careers.



Shyeilla V. Dhuria

DRUG DELIVERY CENTER NEWS

The Drug Delivery Center's 8th Annual Open House was held on campus on October 5, 2006. Professor Tony L. Yaksh, Vice Chair of the Department of Anesthesiology and Professor of Pharmacology at the University of California at San Diego, was invited to present "Challenges and Rewards in Developing Spinal Drug Therapies". The presentation and reception were attended by faculty, students and scientists from the University of Minnesota and the Twin Cities area. The event, which was hosted by Professor Carolyn Fairbanks, was sponsored by the Advanced Therapies Initiative, the Center for Pain Research, and the Department of Pharmaceutics.

Last year's Open House was held on October 6, 2005, and featured Professor Mark Saltzman of Yale University, who presented a seminar on "Positioning the Dose: Materials for Localized Drug Delivery". Professor Saltzman is the Goizueta Foundation Professor of Chemical and Biomedical Engineering, and is Chair of Yale's Dept. of Biomedical Engineering.

A course on

BASIC PHARMACOKINETIC CONCEPTS FOR THE PHARMACEUTICAL SCIENTIST

will again be offered July 17-20, 2007 by the Department of Pharmaceutics, College of Pharmacy. The three-day course will be organized and presented by professors William Elmquist, Ronald Sawchuk, and Cheryl Zimmerman for academic and industrial scientists seeking a basic understanding of pharmacokinetics and pharmacodynamics essential to the evaluation of traditional dosage forms and innovative medical delivery systems and devices. This short course has been considered a great success by the attendees and presenters alike for the last three years. For information regarding specific topics and registration, please visit

<http://ce.pharmacy.umn.edu/kinetics.htm>

ALUMNI NEWS

Walid M. Awni [Ph.D. 1984] received the University of Minnesota's Biederman Sculpture on behalf of Abbott Laboratories for its generous donations of over \$1 million to the University. The award was presented to Awni by his doctoral advisor, Dr. Ronald Sawchuk, on April 10. The award was named after Charles Biederman, a world-renowned sculptor from Red Wing, Minnesota. Awni is Senior Director of Clinical Pharmacology and Pharmacometrics at Abbott.

Rebanta Bandyopadhyay [Ph.D. 1998], **Paramita Bandyopadhyay** [Ph.D. 1996] and daughters relocated to Hyderabad, India, where Rebanta is Director of Formulations Development at Dr. Reddy's Laboratories, Ltd.

Richard Clyde Brundage [Ph.D. 1996] is Director of Graduate Studies for Experimental and Clinical Pharmacology at the University of Minnesota College of Pharmacy.

Keith K.-H. Chan [Ph.D. 1980] of GloboAsia LLC and Revico, Inc. visited the Department in April 2006 to meet with faculty, staff and students and presented two seminars on "Development of a Novel Phosphate Binder for the Treatment of Hyperphosphatemia in End Stage Renal Disease Patients" and "Modern Technology Based Botanical Drug: Window of Opportunity for Drug Development?"

Xueqing Chen [Ph.D. 2000] and **Zheng Yang** [Ph.D. 1997] announced the birth of their daughter Alyssa Jia-Chen on October 11, 2005.

Smita Ramkanai Debnath [Ph.D. 2003] and Herman St.-Gelais were married in Kirkland, Quebec, Canada on November 19, 2006. Smita is a Senior Research Pharmacist at Merck Frosst in Montreal, Quebec.

Grace Yu-Li Lo [Ph.D. 1995] was promoted to full professorship in 2005 in the Department of Biological Science and Technology at the National University of Tainan, Taiwan.

Mak S. Jawadekar [Ph.D. 1982] was the lead representative for the pharma sector with the U.S.-India Business Alliance, and met with members of Congress and President George Bush during the 2005 Presidential Annual Dinner. He is Assistant Director of the Pharmaceutical Sciences Division of Pfizer Global Research and Development in Groton, Connecticut.

Abira Pyne [Ph.D. 2001] and her husband, Dr. Divakar Ramakrishnan, welcomed their son, Arjun, on June 19 of this year. Abira is with Eli Lilly in Indianapolis, Indiana.

Agam Rajendra Sheth [Ph.D. 2004] was awarded the 2005 APhA Ebert Prize for the best report of original investigation of a medicinal substance. "Dehydration Kinetics of Piroxicam Monohydrate and the Relationship to Lattice Energy and Structure", published in the *Journal of Pharmaceutical Sciences*, was co-authored by **Deliang Zhou** [Ph.D., 2003], Dr. Francis Muller, and the late **Dr. David Grant**. The Ebert Prize, established in 1873 and administered by the APhA Academy of Pharmaceutical Research and Science, is the oldest pharmacy award in the U.S. Agam is a Senior Research Chemist at Merck Research Laboratories.

Chitralekha Telang [Ph.D. 2004] and her husband, Francis Lobo, welcomed their first child, Ashwin, on March 3. Chitra is a scientist at Boehringer Ingelheim Pharmaceuticals, Inc. in Ridgefield, Connecticut.

SLEUTHING FOR ORIGINS OF PGSRM

During their planning for this year's Pharmaceutics Graduate Student Research Meeting, the Minnesota students discovered that no one really remembers the origins of the meeting. Do you?

Former professors and graduate students around the country were contacted. Some thought it originated in Minnesota, or Pittsburgh, or Kansas. If you know how the meeting first came about and which school was the host, will you let us know? If you were one of the participants, please share your memories of the meeting so we can add them to the history of the event.

Our e-mail address is pceuts@umn.edu, and our mailing address is:
Dept. of Pharmaceutics, College of Pharmacy, University of Minnesota,
308 Harvard Street SE, Room 9-177, Minneapolis, MN 55455.

GRADUATE STUDENT NEWS

DEGREES EARNED

Yushi Feng, Ph.D. in Pharmaceutics

Thesis: Effects of Solid-State Structure on the Tableting Properties of Pharmaceuticals. (Advisors: Prof. David Grant/ Prof. Raj Suryanarayanan). Yushi recently joined Vertex Pharmaceuticals, Inc., in Cambridge, Massachusetts.

Cory James Hitzman, Ph.D. in Pharmaceutics

Thesis: Respiratory Delivery of 5-Fluorouracil for the Treatment of Lung Cancer. (Advisor: Prof. Timothy Wiedmann). Cory is an R&D Engineer at Boston Scientific in Maple Grove, Minnesota.

Hao (Helen) Hou, Ph.D. in Materials Science

Thesis: Development of Novel Diazepam Formulations for the Treatment of Seizure Emergencies. (Advisor: Prof. Ronald Siegel). Helen accepted a position at Amgen, Inc., in Thousand Oaks, California.

Sachin Lohani, Ph.D. in Pharmaceutics

Thesis: Understanding the Nucleation Process in the Crystallization of Polymorphs. (Advisor: Prof. David Grant/ Prof. Raj Suryanarayanan). Sachin recently joined Merck & Co., Inc., in Rahway, New Jersey.

Cletus Nunes, Ph.D. in Pharmaceutics

Thesis: Use of High Intensity X-radiation in Pharmaceutical Characterization: Quantification of Crystallinity and Study of Solid-State Reaction Kinetics. (Advisor: Prof. Raj Suryanarayanan). Cletus is a Senior Research Investigator at Bristol-Myers Squibb Company, New Brunswick, New Jersey.

Yan Song, Ph.D. in Pharmaceutics

Thesis: Pharmacokinetics of Zidovudine and Stavudine in Cerebrospinal Fluid During Intrathecal Administration in a Novel Rabbit Model. (Advisor: Prof. Ronald Sawchuk). Yan is employed at Bristol-Myers Squibb, Princeton, New Jersey.

The Department welcomed these new students in Fall 2006:

Mr. Sagar Agarwal earned a Diploma in Pharmacy from the Institute of Pharmacy, and a B.Pharm from the Dr. D.Y. Patil Institute of Pharmaceutical Sciences and Research in Pune, Maharashtra, India. He was ranked fifth and fourth in his class in 2001 and 2002, respectively, and was ranked third in the class during his final year of his B.Pharm.

Ms. Tianli Wang earned a B.S. in Pharmacy and an M.S. in Pharmaceutics from Fudan University in Shanghai, China. She was twice awarded the recipient of the Second-Rate People's Scholarship, as well as the First-Rate People's Scholarship and the Title of Excellent Graduate.

GRADUATE STUDENT ACTIVITIES

Amardeep Bhalla received the 2005-06 David J.W. Grant Fellowship in Physical Pharmacy, and is the recipient of the 2006-07 Schering-Plough Science and Innovation Award. He also received the Best Poster Award at the April 2005 Design of Medical Devices Conference held in Minneapolis. He and his wife, Harmeet Sehgal, welcomed their first child, a son named Navdeep, in December 2005.

Sisir Bhattacharya was awarded a travel grant by the Parenteral Drug Association (PDA) to attend the 2006 annual meeting in April in Anaheim, California and present a research poster. He was married to Ananya De in May.

Paroma Chakravarty was chosen to receive the 2006-07 Edward G. Rippie Fellowship. Paroma is the first recipient of the fellowship.

Dabing Chen is the recipient of the 2006-07 David J.W. Grant Fellowship in Physical Pharmacy.

Ying Chen is the recipient of the 2006-07 Ronald J. Sawchuk Fellowship in Pharmacokinetics.

Yuanyuan Xie and her husband **Guoyu Pan**, a postdoctoral associate for Dr. William Elmquist, welcomed their first child, Emily, on July 14.

Shyeilla Dhuria was the 2005-06 recipient of the College of Pharmacy's Ted Rowell Graduate Fellowship. She received a Best Poster Award at the 2006 Pharmaceutics Graduate Student Research Meeting in Minneapolis.

Yushi Feng was the recipient of the 2005 Novartis Fellowship Award.

Cory Hitzman was invited to give two research presentations at the 2005 Engebretson Symposium on "Sustained-Release Respirable Microcarriers for Adjuvant Therapy of Lung Cancer" and "Optimization of Microcarriers for Inhalation Lung Cancer Therapy."

NEW GRADUATE STUDENTS

The Department welcomed these new students in Fall 2005:

Mr. Prakash Sundaramurthi earned a B.Pharm. at C.L. Baid Metha College of Pharmacy in Chennai, India, and an M.S. in Pharmaceutics from the National Institute of Pharmaceutical Education and Research in Mohali, India. He received the NIPER Fellowship for the entire period of his M.S. program.

Ms. Pengyun Zeng earned a B.S. in Pharmacy and an M.S. in Pharmaceutics from Fudan University in Shanghai, China. She was the recipient of the Top Student of Sichuan Province and Top Student of Chengdu City; Excellent Student Leader, the First Class Excellent Scholarship (highest) every year, the Excellent Undergraduate Student of Fudan University; and the Guanghua Graduate Student Scholarship.

Zhihong Li received the 2005-06 Ronald J. Sawchuk Fellowship in Pharmacokinetics. He is also the proud champion of the ping pong tournament at the annual Dept. Fall Fling held at Professor Tim Wiedmann's home in October.

Sachin Lohani was awarded a 2005-06 USP Fellowship.

Enxian Lu and his wife, Tong Jiang, became the proud parents of Alexander on July 28, 2005.

Laura Maertens received the 3M Science & Technology Fellowship for a third year. She also received a Scholar-in-Training Award from the American Association for Cancer Research (AACR) - National Foundation for Cancer Research - Chemistry in Cancer Research, which supported her travel to the 97th AACR Annual Meeting in Washington, DC in April 2006, where she presented a poster entitled "Metabolism and Extraction of NNK in an Isolated Perfused Lung." Only the top 10% of applicants are given this award.

Siddhartha Mujumdar, a graduate student in Biomedical Engineering, worked as an intern at Boehringer-Ingelheim during summer 2006 with Dr. Chitralekha Telang in Ridgefield, Connecticut. He also received a "Highlights of the

Student Poster Session" on his study of glucose mediated crosslinking in phenylboronic acid-based hydrogels at the Controlled Release Society Meeting in Vienna, Austria in July 2006.

John Roberts is the recipient of the 2006 Novartis Fellowship Award, which was presented by Dr. Yatindra Joshi of Novartis at the University of Minnesota during a breakfast celebration on September 7, 2006.

Naveed Shaik received the Best Poster Award at the 2005 Pharmaceutics Graduate Student Research Meeting in Lawrence, Kansas for his poster "Effect of Pluronic P85[®] on the *In Vitro* P-glycoprotein Mediated Active Efflux of the Protease Inhibitor Nelfinavir." The award included a cash prize of \$250.

Pengyun Zeng was a 2006 summer intern at Boehringer Ingelheim Pharmaceutical Company. Her research project on providing insight into the solubilization behavior and mechanistic understanding of dissolution enhancement of one new compound with excipients was supervised by Dr. Danping Li.

SCHOLARS

The following undergraduate students conducted research in Dr. Timothy Wiedmann's laboratory: **Anna Meehan** (2005 UROP recipient); **Pooja Chakrabarty** (2005 Technician), **Kunal Desai** (2005-2006 Directed Study); **Lauren Wood** (2005-06 UROP recipient); **Kirsten Kinneberg** (2005-06 UROP recipient); **Jon Harrison** (2006 UROP recipient); and **Linh Pham** (2004-06 Volunteer and Directed Study).

Khoulood A. Alkhamis, Ph.D., a visiting professor from the Jordan University of Science and Technology, recently completed a one-year sabbatical in Dr. Raj Suryanarayanan's laboratory.

Bakul Bhatnagar, Ph.D., joined Dr. Raj Suryanarayanan's group this year as a postdoctoral associate after completing his Ph.D. at the University of Connecticut at Storrs with Professors Robin Bogner and Michael Pikal. He is currently studying the phase transitions during freeze-drying of pharmaceutical formulations.

Ion Dranca, Ph.D., joined Dr. Raj Suryanarayanan's group in September and will participate in the preparation, characterization and stabilization of amorphous drugs and excipients, and improve understanding of the mobility of amorphous materials. He is a native of Moldova and earned his Ph.D. degree at Moldova State University, then spent 15 years at the Chemistry Institute of the Academy of Sciences of Moldova. He was a Fulbright Fellow at the Energy Institute at Penn State University before joining the University of Alabama Dept. of Chemistry in Birmingham.

André Eriksson, Ph.D., joined Dr. Cheryl Zimmerman's laboratory in November 2005 as a postdoctoral associate to

work on a project involving the characterization of the absorption of a dipeptidyl prodrug. A poster describing this work has been selected for presentation at the 2006 AAPS Meeting. He earned his Ph.D. degree in August 2005 from the Danish University of Pharmaceutical Sciences in Copenhagen, Denmark. He received a C.W. Maplethorpe Postdoctoral Fellowship at the Department of Pharmacy at Kings College, University of London, and will begin his appointment there in December.

Yuchuan Gong, Ph.D., a postdoctoral associate for the late Dr. David Grant, began his position at Vertex Pharmaceuticals, Inc., in July in Cambridge, Massachusetts. As Assistant Research Professor, and with the support of Vertex, he postponed the start of his employment for several months in order to finish Dr. David Grant's still-active research projects and assisted the transition of the graduate students to Dr. Raj Suryanarayanan's laboratory. The Department of Pharmaceutics is deeply grateful for the sacrifice and enormous effort put forth by Dr. Gong and to Vertex.

Ramprakash Govindarajan, Ph.D., recently accepted a position at GlaxoSmithKline in Research Triangle Park, North Carolina after completing his postdoctoral work with Dr. Raj Suryanarayanan.

Takehisa (Take) Hanawa, Ph.D., Associate Professor in the Faculty of Medicine, Yamanashi University, Japan, spent a sabbatical year in Dr. Ron Siegel's lab characterizing the interaction of sodium salicylate with polymers and hydrogels of hydroxyethyl methacrylate. He was accompanied by his wife, Tomoko, daughter, Nozomi, and son, Takanori.

Xiangmin Liao, Ph.D., a postdoctoral associate for Dr. Raj Suryanarayanan, accepted a position with Forest Laboratories on Long Island, New York. His research in Dr. Sury's laboratory involved characterization of lyophilized protein formulations.

Jayne Lindstad, a senior mathematics student at Minnesota State University at Moorhead, performed statistical mechanical calculations regarding cooperative binding of nanoparticles to surfaces in Dr. Ron Siegel's lab in summer 2006. Jayne was supported with a summer research fellowship from the Minnesota Supercomputer Institute.

Tamaki Miyazaki, Ph.D., recently joined Dr. Suryanarayanan's laboratory for a five-month period of study. She is a senior researcher in Tokyo with the National Institutes of Health Sciences of Japan.

Eric Nuxoll, Ph.D., wife, Kim, and son, Sebastian, welcomed a second son, Ambrose, in 2006. Eric is a postdoctoral associate for Dr. Ronald Siegel.

Jeffrey Nyberg, an undergraduate at the University of Minnesota, received an Undergraduate Research Opportunity Program (UROP) Award entitled "Online Drugs and Their Carcinogenic Potential". He worked in Dr. Zimmerman's lab under the supervision of Brian Willis in spring and summer of 2006. This work was accepted for presentation as a poster at the 2006 AAPS Annual Meeting in San Antonio.

Julia Phillips, a second-year Pharm.D. student at the University of Minnesota, received a Melendy Summer Research Scholarship to work in Dr. Cheryl Zimmerman's laboratory on the transport of tobacco-specific nitrosamines by various membrane transport systems.

Kannan Sivaprakasam, Ph.D., joined Dr. Raj Suryanarayanan's group to investigate processing-induced phase

transitions in pharmaceuticals. He earned his Ph.D. from the Indian Institute of Science in Bangalore, India, then served as Procter and Gamble postdoctoral fellow at Ecole Nationale Supérieure de Chimie et Physique de Bordeaux, France, followed by a research associate position at Cornell University in New York. He is currently an adjunct professor in the Dept. of Chemistry at St. Cloud State University.

Manthena Varma, M.S., Ph.D., joined Dr. Cheryl Zimmerman's group in 2006 after earning his degrees from India's National Institute of Pharmaceutical Education and Research. His is currently working on the biopharmaceutical and pharmacokinetic evaluation of novel anticancer phosphoramidate prodrugs.

Dushyant Varshney, Ph.D., a postdoctoral associate in Dr. Raj Suryanarayanan's lab, accepted a position with Eli Lilly in Indianapolis, Indiana. He earned a Ph.D. degree from the University of Iowa. His research with Dr. Sury involved pharmaceutical applications of synchrotron radiation.

Lauren Wood, a junior biomedical engineering student at the University of Minnesota, and **Bridget Mollner**, a senior biomedical engineering student at Washington University in St. Louis, worked in Dr. Ron Siegel's lab during summer 2006 developing novel hydrogel-powered micromachines. Lauren is continuing to work in Dr. Siegel's lab.

Hiroyuki Yamada, a visiting scientist in Dr. Raj Suryanarayanan's laboratory, recently returned to Japan after working on novel applications of X-ray powder diffractometry. He is a scientist at Mitsubishi Pharma.

Yuegang Zhang, Ph.D., a postdoctoral associate in Dr. David Grant's lab, accepted a position in the Physical Sciences and Pharmaceutical Research Division of Vertex Pharmaceuticals, Inc.

STAFF

Jay Brownell, a good friend of the Dept., retired from the University in September. A scientist in the Dept. of Medicinal Chemistry and the Drug Design Center, Jay participated in many Pharmaceuticals activities over the years. At one of his retirement celebrations, he said that of all the great people and experiences over the years, the most joy came from helping people and celebrating the successes of graduate students as they progressed in their careers following graduation.

Erica Flynn joined the Pharmaceuticals Dept. office in November 2005. She earned her Bachelor's degree in May 2005 in American Studies from the University of Minnesota, focusing on the Cold War in eastern Europe. Her home town is Madison, Wisconsin.

Genevieve Kluender departed the Dept. in August 2005 to continue work on her Bachelor's degree in art at Prescott College in Prescott, Arizona.

Candy McDermott traveled to several cities in northern and central Morocco in March, including the ruins of Volubilis, a 2nd century Roman city that was home to Cleopatra Silene, daughter of Marc Antony and Cleopatra.

Rick Simon is singing in his 8th consecutive season with the internationally renowned Twin Cities Gay Men's Chorus. Rick was Dr. David Grant's assistant for the Peters Endowed Chair and the Drug Delivery Center until Dr. Grant's death in December. He accepted a position in the Dept. of Pharmaceutical Care and Health Systems in College of Pharmacy.

Anne Waltz, Dr. David Grant's assistant in the *Journal of Pharmaceutical Sciences*, accepted a position with the Minnesota Medical School's Program in the History of Medicine following Dr. Grant's passing. Anne's efforts over the years were greatly appreciated by Dr. Grant and the Department.

FACULTY NEWS AND ACTIVITIES

PROFESSOR WILLIAM F. ELMQUIST developed a survey course in pharmacogenomics for the Pharm.D. curriculum that was inaugurated in spring 2006.

Dr. Elmquist was invited to give the keynote address on "Innovative Delivery Systems to Improve the Delivery and Targeting of Drugs to the Brain" at the China International Drug Delivery Systems Summit in Beijing, China in December 2005. He was also invited by the Department of Pharmaceutical Metabolism and Biologies, Institute of Pharmacology Toxicology, Academy of Military Medical Sciences, to present "Drug Targeting for Better or Worse: Mechanisms Influencing the Tissue Distribution of Therapeutic Agents."

In March 2006 Dr. Elmquist was invited by the Department of Pharmacy and Pharmaceutics at the University of Washington-Seattle to give a joint seminar on Targeted Bioavailability vs. Molecularly-Targeted Drugs: Gleevec asks, "Where is the Tyrosine Kinase?"

PROFESSOR CAROLYN A. FAIRBANKS received the 2005 Young Investigator Research Award in Pharmacokinetics, Pharmacodynamics, and Drug Metabolism from the American Association of Pharmaceutical Scientists for her work on the neuropharmaceutics of pain.

The NIH-NIDA Mentored Career Awardees Meeting invited Dr. Fairbanks to present "Agmatinerbic Control of Opioid Tolerance and Drug Abuse" in August 2005 in Bethesda, Maryland.

Dr. Fairbanks was invited to present "Drug Delivery in Pain Treatment", an Advanced Survey of Biomedical Neuroscience Workshop, at the Dept. of Neuroscience, University of Minnesota in August 2006.

Dr. Fairbanks will serve as a member of the Committee on Education for the International Association for the Study of Pain from 2006-09.

PROFESSOR RONALD J. SAWCHUK was inducted into the University of Minnesota Academy of Distinguished Teachers in 2005.

Dr. Sawchuk was invited to give the Wyeth Distinguished Lecture at Temple University's School of Pharmacy in February 2006. His presentation was entitled "Assessing Drug Delivery Using Microdialysis to Measure Target Site Exposure in Animals and Humans."

Dr. Sawchuk was invited to present "Microdialysis—Introduction to Basic Principles and Applications" at the 2005 AAPS Workshop on Microdialysis Principles, Application, and Regulatory Perspectives" in Nashville, Tennessee.

PROFESSOR RONALD A. SIEGEL was invited by the National Institute of Child Health and Human Development to present "Autonomous Biochemomechanical Oscillations from Gels and Enzymes" in August 2005. He was also invited to present "Integration of Soft, Responsive Hydrogels in Hard

Silicon Microstructures, With Applications in Biosensing, Drug Delivery, and Microfluidic Control" by Guidant, Inc. in October 2005.

The Dept. of Pharmaceutical Chemistry at the University of Kansas invited Dr. Siegel to present "Gels and MEMS for Biosensing and Temporally Modulated Drug Delivery" in February 2006.

In July, he presented an invited lecture titled "Mathematical Modeling of Rhythmic, Pulsatile Hormone Delivery Through Hydrogels" at the annual meeting of the Controlled Release Society held in Vienna, Austria. This was followed by two lectures delivered in Budapest and Debrecen, Hungary.

Professors Siegel and James Cloyd of the College of Pharmacy's Dept. of Experimental and Clinical Pharmacology submitted a provisional patent application on "Supersaturated Benzodiazepine Solutions and Their Delivery."

PROFESSOR RAJ G. SURYANARAYANAN received the 2005 Award for Outstanding Contributions to Graduate and Professional Education in from the University of Minnesota in recognition of his outstanding record in teaching at both the graduate and professional levels. He was also voted Professor of the Semester in Spring 2005 and Spring 2006 by the first-year pharmacy students in the College of Pharmacy.

Dr. Suryanarayanan was invited to give the keynote lecture, entitled "Physical Form: Importance in Solid Formulations", for the Technical Conclave, Analytical Chemistry, Dr. Reddy's Laboratories Ltd., in Hyderabad, India in November 2005.

Dr. Suryanarayanan was invited to present *Key Messages from the Arden House Conference* at the Open Forum entitled "Regulatory and Intellectual Property Issues Related to Pharmaceutical Materials Science and Follow-up Discussion to the AAPS Pharmaceutical Technologies Conference at Arden House" at the 2005 Annual Meeting of the American Association of Pharmaceutical Scientists in Nashville.

In August 2005 he was invited to present "Qualitative and Quantitative Applications of Non-Ambient X-ray Diffractometry" at the session entitled *Non-Ambient Powder Diffraction and Kinetic Studies* at the 20th Congress of the International Union of Crystallography in Florence, Italy.

PROFESSOR TIMOTHY S. WIEDMANN was invited to give a presentation on "Nanoscience in Drug Delivery" at the Prince of Songkla University, Hat Yai, in Songkla, Thailand in 2005.

Also in 2005 he was invited by the Second International Pharmaceutical Symposium in Shanghai, China, to present "Deposition and Distribution of 5-Fluorouracil/Lipid-Coated, Polymeric Nanoparticles Following Inhalation."

Dr. Wiedmann was invited to present "Drug Release from Nanolayered Particles at the Design of Medical Devices Meeting in Minneapolis in 2005.

PROFESSOR CHERYL L. ZIMMERMAN was inducted into the University of Minnesota Academy of Distinguished Teachers in 2005.

Along with Dr. Raj Suryanarayanan, she is restructuring two pharmacy courses, Drug Delivery I and Drug Delivery II, in advance of a major curricular restructuring for the College of Pharmacy.

In October 2005 the Department of Chemistry at the University of Minnesota-Morris invited Dr. Zimmerman to present "Stereoselective Biological Disposition of Tobacco-Specific Nitrosamines".

Dr. Zimmerman is serving the final year of her term on the AAPS Executive Council as Member-At-Large.

RECENT PUBLICATIONS

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