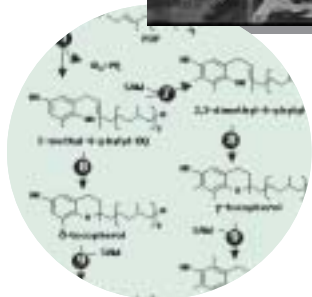


# BIOCHEMISTRY



# *Molecular* BIOLOGY

# 2002

**MICHIGAN STATE**  
UNIVERSITY

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# A Message From the Chairperson

## Dear Friends and Alumni,

This year has seen many positive changes in the Department of Biochemistry and Molecular Biology including the opening of the connecting Bio-Physical Sciences Building, the recruitment of an exceptional new faculty member and a large and promising group of new graduate students, and the well-deserved recognition of the accomplishments of several of our students and faculty. Sadly, however, the year has also been marked by the deaths of two individuals who had made pioneering contributions to the department.

During the past year construction of the new Bio-Physical Sciences Building was completed, and it is now occupied by faculty and students from the Department of Physiology and the Department of Microbiology and Molecular Genetics, both of which had been housed in the century old Giltner Hall, and the Department of Physics and Astronomy which had been located in the Physics Building. The new Bio-Physical Sciences building runs north and south parallel to Farm Lane on the west side and perpendicular to the Biochemistry Building. There are skywalks as well as connectors linking the new building to both the Biochemistry

Building and the Chemistry Building. A new biological and physical science library is located conveniently on the ground floor of a five story atrium in the middle of the Bio-Physical Sciences Building. This atrium is a very pleasant, centrally located high traffic area, and it is just one example of how the new building is facilitating interactions among scientists on campus.

Also on the construction front, plans are in place to do a major (\$15 million) renovation of the ventilation system in the Biochemistry Building. The plan involves making appropriate changes in the fans and exhaust systems on the roof and in the penthouse and then replacing the hoods and duct work in four vertical quadrants. This much needed work will be started in January 1, 2003, and is scheduled for completion by October 1, 2004. Professor Kroos is providing faculty oversight of this operation and will be helped by Joyce Robinson and Ron Norris.

The Department of Biochemistry and Molecular Biology has continued to focus its research efforts and recruiting into the three broad areas of Structural Biology, Biochemistry of the Cell Nucleus, and Plant Biochemistry.

*Continued on page 2*



William L. Smith, Professor and Chair  
Web Site: <http://www.bch.msu.edu>  
Email: [bchalumn@msu.edu](mailto:bchalumn@msu.edu)

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### *BMB Mission Statement:*

*The goal of the Department of Biochemistry and Molecular Biology is to improve the research stature of the department while maintaining quality instruction in our undergraduate, graduate, and medical school programs.*

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# A Message From

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*I am stepping down as departmental chairperson on December 31, 2002, after over eight years of service as chair. During that time I have come to appreciate even more than I had previously, the wonderful group of faculty, staff, students and graduates who make up the Department of Biochemistry and Molecular Biology.*

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You will read more about the efforts of some of the faculty who work in the areas of transcriptional regulation and plant biochemistry later in this magazine. Our efforts in the Structural Biology area also continue to lead to positive outcomes, notably the beginning of the construction of the synchrotron beamline at the Argonne National Laboratory (*see page 24*). I would also like to note the efforts of faculty and staff in the department, particularly David DeWitt and Joe Leykam, who have been very successful in guiding the continued development of the Genomics Technology Support Facility. This facility provides services for sequencing and synthesizing peptides and nucleic acids and for bioinformatics. More recently the proteomics facility has come under the auspices of the GTSF.

In the New Things and Changes category, we are pleased to welcome Dr. Charles Hoogstraten as a new Assistant Professor. Dr. Hoogstraten uses NMR techniques to determine nucleic acid and protein structures and was a unanimous choice of our faculty for a position in the area of structural biology. More information about Dr. Hoogstraten can be found later in this magazine.

In the Special Recognition category, Dr. John Blenis, Professor of Cell Biology at Harvard University, was our Boezi Award winner for 2002. Dr. Glenn Davis, the new Dean of the College of Human Medicine, gave a lively after dinner talk at the Awards Banquet

last April. I encourage you to forward nominations for Boezi Award candidates to me, and I will refer them to our Awards Committee. I am also pleased to note that Dr. Lee McIntosh from Biochemistry and Molecular Biology and the Plant Research Laboratory received an MSU Distinguished Faculty Award. Dr. Mark Fielden was recognized with the Outstanding Graduate Student Award and Ms. Janel Funk received the Outstanding Undergraduate Student Award.

Sadly, Dr. R. Gaurth Hansen, the original chairperson of the Department of Biochemistry and Molecular Biology, passed away this past January. He left a great legacy here and at Utah State University. Dr. Allan Morris, Professor Emeritus in BMB, passed away in May of 2001. Dr. Morris was a good friend to many of us. Professionally, Dr. Morris was recognized for his research on the effects of mRNA secondary structure on translation. Finally, I am sorry to report that Dr. Allen Jacobs, the Dean of the College of Osteopathic Medicine and a strong supporter of BMB, passed away in the Fall of 2001. Dr. William Strampel has been named as his successor.

Dr. Kevin Struhl from the Department of Chemistry and Molecular Biology at Harvard Medical School gave the Wells Lecture and Dr. Ulf-Ingo Flügge of the Botanisches Institut, University of Cologne, Germany, delivered the Tolbert Lecture this year. The contributions made by many of

# the Chairperson

you provided the funding for these endowed lectureships. The faculty and students in the department benefit enormously from visits of distinguished scientists such as these individuals and are very grateful to our alumni for their financial contributions to these endowments. As I have mentioned previously, the State of Michigan has been exceptionally supportive of the universities in the state including MSU, but every year a greater proportion of university costs need to be covered by endowment funding. Your contributions are what provide these endowments and are absolutely essential for maintaining the quality of the institution. We hope that you will keep BMB in mind when you make charitable contributions this year.

I am stepping down as departmental chairperson on December 31, 2002, after over eight years of service as chair. During that time I have come to appreciate even more than I had previously, the wonderful group of faculty, staff, students and graduates who make up the Department of Biochemistry and Molecular Biology. At the time of this writing, we anticipate that my replacement will come from within the present faculty ranks where there are several individuals with exceptional leadership skills. We hope that we can entice one of them to lead us over the next 5-10 years. At the risk of insulting the many others who have been very helpful to me during my tenure as chair, I want to take this opportunity

to offer special thanks to Dr. Ferguson-Miller who has served patiently and skillfully as the Associate Chair, Dr. Bieber who shepherded all the faculty moves during the most recent building renovations (and provided the early leadership in developing the campus-wide Genomics Technology Support Facility) and to members of the staff, particular Mrs. Carol Vanderjagt and Mrs. Julie Oesterle. I have been very fortunate to have been surrounded and helped by such exceptional people.

Finally, let me end by asking you to continue to keep us informed of happenings in your world by completing the form printed at the end of this magazine. We highlight this information in the Alumni News section of this magazine each year, and this is one of our most popular features.

Best wishes to all of you for a happy and prosperous holiday season and 2003.

Best personal regards,



William L. Smith

P.S. And please visit and bookmark our web site (<http://www.bch.msu.edu/>). It is a good site and an excellent way to keep up on what is happening in MSU Biochemistry and Molecular Biology.

## VISIT the Website

<http://www.bch.msu.edu>

- ✓ Updates on Research
- ✓ Faculty
- ✓ Facilities
- ✓ Info. on Graduate & Undergraduate Programs
- ✓ Job Opportunites
- ✓ Weekly Seminar Information
- ✓ WeeklyNewsletter
- ✓ Photos of Recent Events
- ✓ And Much More!

# Thank You! Thank You!

# Thank You!

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*The Department of Biochemistry and Molecular Biology is grateful to the following donors who have contributed to the Department during the period of May 1, 2001, to June 30, 2002. (Donor list provided by College of Natural Science Development Office. Please notify the Department of any inadvertent omissions.)*

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# An Overview

## Department of Biochemistry and Molecular Biology Michigan State University

- Administration (% Funding):** College of Natural Science (Lead Dean; 51%), College of Human Medicine (18%), Michigan Agricultural Experiment Station (17%), College of Osteopathic Medicine (14%)
- Faculty:** 27 wholly appointed in Biochemistry & Molecular Biology, and 9 jointly appointed in other units  
6 University Distinguished Professors  
9 MSU Distinguished Faculty Awardees  
2 NIH MERIT Awardees
- Specialists:** 3 (Laboratory, Bioinformatics and Structure Facilities)
- Staff:** 14 (secretarial, accounting, Biochemistry Instrument Shop, Biochemistry Stores, Animal Room)
- Undergraduate Majors:** 220
- Graduate Students:** 55
- Postdoctoral Fellows:** 45
- University Facilities:** Macromolecular Structure, Mass Spectrometry, Genomics, Bioinformatics/Computer Graphics, Proteomics, Cytometry
- Centers:** REF Center for Biological Modeling  
MLSC Center for Structural Biology
- Research Emphases:** Structural Biology  
Plant Biochemistry  
Biochemistry of Cell Nucleus
- '02 GrantSupport (52):** 26 NIH, 8 NSF, 3 USDA, 2 DOE, 5 Industrial, 8 Other; Approximately \$7.5 million in extramural support for 27 faculty wholly supported by BMB.
- Teaching:** Undergraduates (lectures, labs, independent study)  
Graduate students (core Biochemistry and Mol. Biology)  
Medical Schools (BCH514, Problem-based Learning, Systems Biology)



## 2002 Boezi Award Recipient, John Blenis

The John A. Boezi Memorial Alumnus Award is given annually to a former undergraduate or graduate student from this department who has gone on to a distinguished career. The recipient of the 2002 Boezi Award, Dr. John Blenis (<http://cellbio.med.harvard.edu/faculty/blenis>), is being recognized for his many contributions to understanding the role of protein kinases in signal transduction. To those not familiar with this area of biochemistry/cell biology - and perhaps even to those who are familiar with it - delving into signal transduction can result in an almost overwhelming confrontation with a complex array of protein kinases and kinase substrates, each generally known by a somewhat bewildering acronym (e.g., ERK, MAP, Akt/PKB) or abbreviation (sometimes more than one!) that has meaning only to those conversant with the jargon of the field. John Blenis has focused on a particular subset of these, known as the ribosomal S6 kinases (Rsk). Two structurally distinct subfamilies of Rsk have been characterized, these being pp70-S6K and pp90rsk. Seminal work from the Blenis lab has defined the role of these Rsk in regulation of cell growth and differenti-



Dr. John Blenis

ation and other aspects of cell physiology. The importance of Dr. Blenis' work is reflected in the research support he has received from the Leukemia Research Foundation and the National Institutes of Health. He has also held a Junior Faculty Research Award from the American Cancer Society, and an Established Investigator Award from the American Heart Association.

John came to Michigan State University in 1978, after completing his B.A. in Biochemistry at the University of California, Berkeley. His Ph.D. thesis mentor was Dr. Susan Hawkes, then an adjunct faculty member whose laboratory was located at the Michigan Molecular Institute in Midland. John also carried out

some of his research in East Lansing, in the laboratory of Professor John Wang. As required of all graduate students in the Department, John was assigned a role as a teaching assistant as part of his training. It happened that he was serving as a TA for Dr. John Boezi in the undergraduate molecular biology course during spring of 1980. Sadly, Dr. Boezi's unexpected death occurred during this time. John Blenis, along with fellow TA, Calvin Roff, were asked to take over teaching duties for the rest of the course. Thus, John Blenis had a rather unique relationship with John Boezi, whose passing was marked by his many friends and colleagues with establishment of the award now bestowed on Dr. Blenis.

Subsequent to completion of his Ph.D. work, Dr. Blenis did postdoctoral work at Harvard University (1983-1987), then joined the faculty at Northwestern University Medical School for a short period (1987-1989). He was soon recruited back to Harvard, where he has remained since, and currently holds the rank of Professor of Cell Biology in Harvard Medical School.





John A. Boezi

# Remembered & Honored

Professor John A. Boezi joined the newly formed Department of Biochemistry in 1963. Together with colleagues like Fritz Rottman and Allan Morris, John represented the emerging field of “molecular biology” and played a major role in shaping the research and teaching program in the early days of the Department. John’s sudden death in 1980 was deeply felt by his students and faculty colleagues alike. In his memory, they established an award to be given annually to a recipient of a B.S., M.S., or Ph.D. degree from this department who had gone on to a distinguished career that reflects the qualities personified by John Boezi.

## Past Recipients of the Boezi Award

In the many years that have passed since establishment of this award, the number of degree recipients from this department has continued to grow steadily. Communications being imperfect, the Department recognizes that it may not be aware of some graduates whose accomplishments since leaving MSU would make them worthy candidates for the Boezi Award. We thus solicit your assistance in identifying past graduates of this department, undergraduate or graduate, who would merit consideration. Please send suggestions and pertinent information to Dr. William L. Smith, Chairperson, Department of Biochemistry and Molecular Biology or e-mail us at [bcolumn@msu.edu](mailto:bcolumn@msu.edu).

1983	Donald W. Carlson	Ph.D.	1961
1984	Allen T. Philips	Ph.D.	1964
1985	John A. Gert	B.S.	1969
1986	George H. Lorimer	Ph.D.	1972
1987	Lawrence B. Dumas	B.S.	1963
1988	Douglas D. Randall	Ph.D.	1970
1989	Ronald C. Desrosiers	Ph.D.	1975
1990	George M. Stancel	Ph.D.	1970
1991	Raymond J. Dingleline	B.S.	1971
1992	Howard C. Towle	Ph.D.	1974
1993	A. Stephen Dahms	Ph.D.	1969
1994	Sherwood R. Casjens	M.S.	1967
1995	Friedhelm Schroeder	Ph.D.	1973
1996	Philip L. Felgner	Ph.D.	1978
1997	Arlyn Garcia-Perez	Ph.D.	1984
1998	Ann E. Aust	Ph.D.	1975
1999	Peter Steck	Ph.D.	1981
2000	Sally Camper	Ph.D.	1983
2001	Tony Serianni	Ph.D.	1980

### Faculty-Student Honors

In addition to presentation of the Boezi Award to Dr. John Blenis, the annual departmental Awards Banquet (April 18, 2002) was the occasion for noting recent honors accorded to various faculty members. Chairperson Bill Smith recalled that Zachary Burton had been named as recipient of the 2002 Outstanding Undergraduate Advisor Award from the College of Natural Science Dean's Student Advisory Committee, while Laurie Kaguni received the College of Natural Science 2002 Distinguished Faculty Award. During the past year, Jack Preiss and Bill Smith had been designated University Distinguished Professors, while Lee McIntosh had received a 2002 University Distinguished Faculty Award. In addition, Dr. Smith noted that Synthon Chiragenics, the company founded by Dr. Rawle Hollingsworth, had received the

"Private Company of the Year" award from the New Jersey Technology Council.

Various student awards were also presented at the Awards Banquet. Mark Fielden was recognized with the Outstanding Graduate Student Award, presented by his mentor, Tim Zacharewski. Janel Funk received the Outstanding Undergraduate Student Award, presented by Zach Burton, with whom she had done undergraduate research. Dr. Burton also noted Janel's active role as President of the Undergraduate Biochemistry Club as well as her efforts in establishing a tutorial service for students enrolled in undergraduate biochemistry courses. Elena Bray was recognized with the Outstanding Graduate Student Teaching Award for her exemplary efforts as a Teaching Assistant in an undergraduate biochemistry laboratory course.

In addition, Justin Barnes was named recipient of a \$2,000 Undergraduate Research Award, which will support his continued work with Christoph Benning. Aaron Kosinski (Min-Hao Kuo laboratory), Cassandra Campbell (Laurie Kaguni laboratory), Irene Flick (David Arnosti laboratory), Jay Sage (Jon Kaguni laboratory), and Shanna Ashley (Jack Preiss laboratory) received \$1,000 Undergraduate Research Awards to support continuation of their undergraduate research in the indicated laboratories. Undergraduate Research Awards are funded from contributions to the Department, and are awarded to students with financial need; the intent is to provide them with funding that will allow them to spend time in the research laboratory in lieu of alternative employment.

Honors 2002  
Honors 2002  
Honors 2002

### Remembering R. Gaurth Hansen, Founding Chairperson of the Department

**R.** Gaurth Hansen, Distinguished Professor Emeritus at Utah State University, passed away in January, 2002. Dr. Hansen was the first Chairperson of the Department of Biochemistry (now Department of Biochemistry and Molecular Biology) when it was organized as a separate academic unit in the early 1960s. He was instrumental in securing the funding for construction of the Biochemistry Building, which was completed in 1964. The foresight and careful planning by Dr. Hansen, together with that of his colleagues, Professors Willis Wood and Ed Tolbert, ensured that the new building was - and remains - a remarkable example of blending architecture and function in support of teaching and research activities. As founding Chairperson, Dr. Hansen was also responsible for hiring the faculty members that were critical for expansion and development of the new department. Many of those faculty members are mentioned elsewhere in this or previous issues of this magazine.

Dr. Hansen started his undergraduate work at Utah State University, but moved for his final year at the University of Wisconsin, receiving his B.S. degree in Chemistry from that institution in 1944. He stayed on for graduate work at Wisconsin, earning both the M.S. (1946) and Ph.D. (1948) in Biochemistry. He immediately

joined the faculty in the Department of Biochemistry at the University of Utah, but in 1950, moved to the University of Illinois as an Associate Professor and subsequently Professor. He came to Michigan State University as Professor of Biochemistry in 1957, and began his role in the establishment and nurturing of the new Department. Dr. Hansen remained at Michigan State until 1968, when he returned to Utah State University as Provost and Academic Vice President, remaining there for the duration of his academic career. Throughout his tenure at Utah State, Dr. Hansen also held faculty appointments in the Department of Chemistry and Biochemistry as well as the Department of Nutrition and Food Sciences.

Widely known for his work in nutritional biochemistry, Dr. Hansen held numerous appointments to various governmental and international agency committees. His research dealt with metabolic reactions of central importance in human nutrition and disease. Particular research interests were focused on the role of the vitamin, pantothenic acid, in lipid and carbohydrate metabolism, and on glycogen synthesis. His laboratory was the first to isolate and crystallize UDPG-pyrophosphorylase, the enzyme responsible for "activation" of glucose units necessary



Dr. R. Gaurth Hansen

for their incorporation into glycogen. A characteristic of Dr. Hansen was to choose basic research topics that were closely linked to practical applications. He was instrumental in developing nutritional guidelines for both domestic and international programs, and for evaluation of the nutritional benefits of food-stuffs.

There is a declining number of still-active faculty in the Department who can claim to have been a friend and colleague of R. Gaurth Hansen during his time at Michigan State - indeed, it is sobering that, upon reflection, the writer of this article finds himself alone in that regard. However, all faculty and students, past and present, of this Department owe R. Gaurth Hansen an immense debt of gratitude for his foresight and hard work in laying the foundations upon which this Department was built.

*In Memoriam:*

## Allan J. Morris, Professor Emeritus

Dr. Allan J. Morris passed away in May, 2001. Dr. Morris joined the Department as an Assistant Professor in 1963. This was shortly after the Department had been established as a separate academic unit. Thus, the mid-1960s were a time in which, under the leadership of founding Chairperson R. Gaurth Hansen, there was a marked expansion in the number of faculty members and the laying of a firm foundation for subsequent developments in the teaching and research programs of the Department. Dr. Morris played an important role in this, including development and teaching BCH 402 and BCH 802, which were core courses of the undergraduate and graduate curricula, respectively.

Dr. Morris' major research interest was in protein biosynthesis, one of several areas of biochemistry that comprise what has come to be known as "molecular biology." Sparked by the discovery of the "double helix" by Watson and Crick a few years before, numerous young scientists were actively investigating the relationship between structure of nucleic acids and biological functions. Thus, Dr. Morris was particularly interested in the secondary structure of messenger RNA and its effect on

"translation" of the message into protein. Other work in his laboratory was concerned with definition of the mechanism of various protein synthesis inhibitors, and with metabolism of purines and purine analogs. Throughout most of his research career, his research was supported by grants from the National Institutes of Health. Ten students received their Ph.D. under his direction, and he was the author or coauthor of more than 25 papers in refereed journals as well as several book chapters.

Dr. Morris was born and raised on the family farm in Linn Grove, Iowa, graduating from Linn Grove High School in 1944. Immediately after graduation, he entered World War II service in the U.S. Navy, including postwar assignment in China; he received honorable discharge in 1946. In 1954, he completed his undergraduate degree, with honors, in Chemistry at Iowa State University. He then did graduate work at the University of Utah, receiving the M.S. in 1957 and the Ph.D. in Biochemistry in 1959. This was followed by postdoctoral work at the City of Hope Medical Research Center in Duarte, CA, and the University of Wisconsin, Madison, prior to his joining the MSU faculty. He was promoted to Associate Professor in 1968, and



Dr. Allan J. Morris

to Full Professor in 1972. In the course of his academic career, Dr. Morris spent sabbaticals or research visits at Columbia University, the Jackson Laboratory (Bar Harbor, ME), and the University of Alberta. After his retirement in 1988, Dr. Morris traveled extensively in Central America and the Southwest of the United States, pursuing his interests in native American cultures.

In Memoriam:

## Dr. Mark Bieber

On April 21, 2001, Dr. Mark Bieber suffered a fatal heart attack while on a business trip to Germany. Mark (no relation to Professor Emeritus Loran Bieber) received his Ph.D. in Biochemistry from Michigan State University in 1973, with Dr. Charles C. Sweeley as his major professor. Mark then spent four years as a postdoctoral fellow at the National Institutes of Health before joining Bestfoods for a career that lasted 24 years. At the time of his death, Mark served as Nutrition Research Associate for this company; his responsibilities included keeping abreast of advances in nutritional science and providing scientific advice as well as monitoring pertinent governmental regulatory proposals.

In addition to his duties with Bestfoods, Mark was active in several professional organizations, including the American Heart Association and the Institute of Food Technologists. He was particularly active in the American Oil Chemist's Society (<http://www.aocs.org/>), and was serving as Secretary of AOCS at

the time of his death. He was a founding member of the Health and Nutrition Division of AOCS, and served as Chairperson of this division in 1993-1995. His colleagues in the AOCS have honored his memory by establishing a Mark Bieber Symposium Fund, which will support an annual symposium on "Dietary Fat and Health," a topic of central interest to Mark Bieber. The initial Mark Bieber Symposium took place on May 7, 2002, during the 93<sup>rd</sup> annual meeting of AOCS in Montreal, Quebec.

Those of us who knew Mark during his days here at Michigan State will certainly remember his sense of humor as one of his outstanding qualities. Together with fellow graduate student, the sharp-witted Mark Roseman, Mark Bieber organized the *first* departmental "Christmas Party," featuring skits that skewered many a faculty member and fellow student. (In retrospect, it seems interesting that the first "Christmas Party" should have been organized by the two Marks, both of Jewish heritage.)



Dr. Mark Bieber

Such skits were a standard, and much anticipated (and perhaps feared?), feature of this annual gathering for many years. But time marches on, the "Christmas Party" has become the "Holiday Party," and skits have given way to alternative diversions. For those who shared the laughs with the two Marks, fond memories remain.



## The Pioneers - and Their Successors

Previous issues of this magazine have noted the retirements of Professors Kindel, Suelter, and Wells, and the passing of Professor Tolbert. The present issue notes the retirement of Professor Bieber and the passing of Professors Hansen and Morris. Those readers familiar with the history of this Department will recognize these, and others such as John Boezi and Fritz Rottman, as the names of people whose ability, enthusiasm, and dedication were critical for the development of Biochemistry and Molecular Biology at Michigan State University. While remembering them with gratitude and affection, we also recognize those who have come after and continue to build the stature of this Department. Some of these younger faculty members have been featured in previous issues of this magazine, and others are featured elsewhere in the present issue.

# Healthier Eating: Vitamins Made Simple?

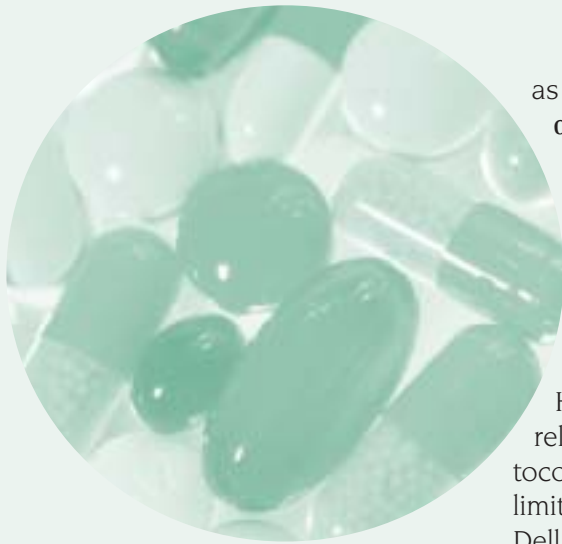
Good nutrition is universally recognized as a key to good health. Unfortunately, good nutrition is beyond the means of many in this world. And even in more affluent communities, adequate supplies of essential nutrients are not always the norm. Take Vitamin E, for example. This is one of the “lipid soluble” vitamins, most commonly obtained from food sources such as spinach or vegetable oils. However, large segments of the population do not obtain the “recommended daily allowance” (RDA) of Vitamin E in their diet. Moreover, to obtain additional health benefits from Vitamin E, it has been suggested that one needs to ingest at least five times the RDA, which translates into eating four pounds of spinach or two pounds of soybean oil a day. Not likely, right? The result is that even typical American diets provide less than optimal supplies of Vitamin E. Is there a more palatable solution than choking down four pounds of spinach or two pounds of soybean oil? Dean DellaPenna

(<http://www.bch.msu.edu/faculty/dellapenna.htm>) thinks so.

DellaPenna and his colleagues seek to engineer higher Vitamin E levels in common food sources, providing an easier - and tastier - way to avoid Vitamin E deficiency. He coined the term “nutritional genomics” for his approach to this task. Nutritional genomics draws on the more traditional methods of biochemistry, physiology, genetics, and molecular biology *but* weaves them together with *genomics* as the common thread. A universally-accepted definition of “genomics” seems to be rather hard to come by, but what is certainly central to the field is effective utilization of the tremendous amount of information made available by recent successes in sequencing the genomes of many different types of organisms, including the widely-heralded publication of the human genome. The work of DellaPenna and his colleagues provides an outstanding example of the power of this approach.

To understand this story, we must begin with a little





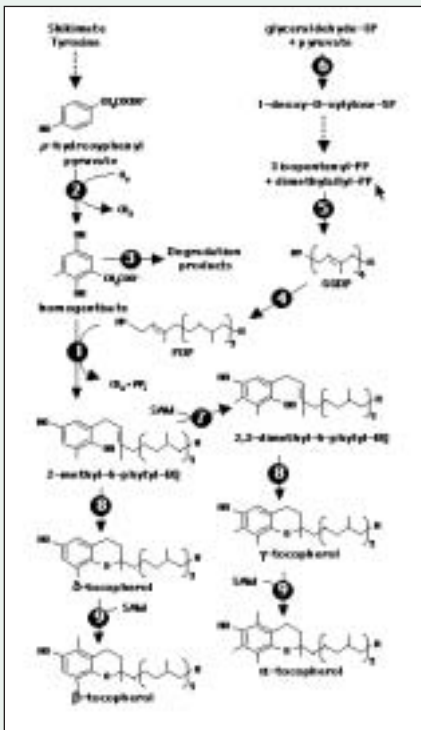
as vegetable oils, is not  $\alpha$ -tocopherol but its immediate precursor,  $\gamma$ -tocopherol. The enzyme that converts  $\gamma$ -tocopherol to  $\alpha$ -tocopherol is called  $\gamma$ -tocopherol methyltransferase ( $\gamma$ -TMT).

Hypothesizing that the relatively low amount of  $\alpha$ -tocopherol resulted from a limitation in the activity of  $\gamma$ -TMT, DellaPenna and his postdoctoral associate, David Shintani, set out to engineer increased levels of this enzyme in plants, hoping for a corresponding increase in  $\alpha$ -tocopherol levels. However, conventional genetic engineering requires a gene, and DellaPenna and Shintani didn't have a gene for  $\gamma$ -TMT. So the first step was to get one! More specifically, they wanted the  $\gamma$ -TMT gene from *Arabidopsis thaliana*, the widely used model system that has been described as the "laboratory rat" of plant biochemistry.

But no one had isolated or determined the sequence for *Arabidopsis*  $\gamma$ -TMT - so where to begin? Here's where DellaPenna and Shintani used genomics to great advantage. While the sequence for the *Arabidopsis*  $\gamma$ -TMT was not known, the sequence for the *Arabidopsis* "HPPDase," the enzyme catalyzing the first step in the pathway of tocopherol synthesis was known. And furthermore, the genomic sequence of *Synechocystis*, a photosynthetic bacterium that was also known to synthesize tocopherols, had also been determined. Moreover, in

bacteria, it is commonly the case that genes encoding enzymes catalyzing sequential steps in a metabolic pathway are located in a contiguous genetic unit called an "operon." DellaPenna and Shintani reasoned that if they could find the gene for the *Synechocystis* HPPDase, the gene for the  $\gamma$ -TMT might lie nearby. So they searched the *Synechocystis* genomic sequence for something similar to the known sequence of the *Arabidopsis* HPPDase. Bingo! They found it, and searching nearby they found the sequence coding for what was suspected to be the desired  $\gamma$ -TMT gene. Further work confirmed this to be the case. Then, using the sequence of the gene for the *Synechocystis*  $\gamma$ -TMT, they returned to the genomic sequence of *Arabidopsis*, which had also been determined by this time, and quickly found the corresponding sequence, the gene for the *Arabidopsis*  $\gamma$ -TMT.

Using genetic engineering methods, Shintani and DellaPenna then overexpressed the gene for  $\gamma$ -TMT in *Arabidopsis* seeds. Because of the limitation of this enzyme in normal ("wild type") *Arabidopsis*, the seeds normally contain >95%  $\gamma$ -tocopherol and only about 1%  $\alpha$ -tocopherol. But the engineered *Arabidopsis* plants, with the overexpressed  $\gamma$ -TMT, produced seeds with 85-95%  $\alpha$ -tocopherol, a greater than 80-fold increase in this more bioactive form of Vitamin E. While *Arabidopsis* is a marvelous experimental system, it is not cultivated as a food crop. Thus,



background on the biochemistry of Vitamin E. Actually, Vitamin E is not a single compound, but rather a class of compounds called tocopherols. The several members of the tocopherol family differ in their Vitamin E activity, the most potent being  $\alpha$ -tocopherol. However, the predominant tocopherol in common dietary sources, such

*Continued on page 36*

## Dean DellaPenna

**Dr.** DellaPenna received a B.S. in Cellular Biology from Ohio University in 1984, followed by graduate work leading to the Ph.D. in Plant Physiology, which was awarded in 1987 by the University of California, Davis. Dr. DellaPenna remained at UC Davis for a year's postdoctoral work, then spent 3 months as a Visiting Scientist/Lecturer in the Department of Scientific and Industrial Research, Auckland, New Zealand. During the latter period, he taught a course on molecular biology techniques and provided advice on the establishment a laboratory and program focused on molecular studies of postharvest biology of New Zealand crops. He continued postdoctoral work as a McKnight Postdoctoral Fellow at Washington State University, 1989-1990, before accepting his first faculty appointment as an Assistant Professor in the Department of Plant Sciences at the University of Arizona. He moved to the University of Nevada, Reno, as an Associate Professor of Biochemistry in 1995, and was recognized with that university's "Researcher of the Year Award" in 1999. He joined the faculty of the Department of Biochemistry and Molecular Biology, Michigan State University, as an Associate Profes-



Dr. Dean DellaPenna

sor in April, 2000, and was promoted to Full Professor in 2002.

Dr. DellaPenna describes his research interests as the use of molecular, genetic, and biochemical approaches to understand fundamental processes in plant biology. His specific areas of interest include: 1) structure, function, and regulation of synthesis of plant cell wall proteins, 2) synthesis and function of carotenoids, and 3) synthesis and function of tocopherols, especially  $\alpha$ -tocopherol (Vitamin E). He currently has grant support from the National Science Foundation, the United States Agency for International Development, and the

United States Department of Agriculture.

An avid fisherman and golfer, Dr. DellaPenna is taking advantage of the opportunities for these activities that are available in East Lansing and elsewhere in Michigan. He and his wife, Dr. Kathy Osteryoung (Associate Professor, Department of Plant Biology), reside in a rural setting near Williamston, MI.

## Former Spartan Fritz Rottman Returns to Michigan

Those readers who were affiliated with the Department during the 1960-1980 time frame will remember Dr. Fritz Rottman. Fritz was one of several young faculty members hired by the first Chairperson, R. Gaurth Hansen, shortly after the Department was established as an independent academic unit. Fritz Rottman, John Boezi, and Allan Morris were the first “molecular biologists” in the Department, and added a critical dimension to the research and teaching programs of the Department. Dr. Rottman joined the Department as an Assistant Professor in 1966, after receiving his Ph.D. from the University of Michigan (1963) and postdoctoral work with Nobel Prize winner, Dr. Marshall Nirenberg, at the National Institutes of Health. Dr. Rottman established an active research program focused on post-transcriptional regulation of eukaryotic gene expression, particularly the roles of alternative splicing and methylation of mRNA. He advanced through the professorial ranks, attaining the rank of Professor of Biochemistry in 1974.

In 1981, Dr. Rottman was recruited as Professor and Chairman of the Department of Molecular Biology and Microbiology at Case Western Reserve University School of Medicine in Cleveland, OH. He spent the rest of his academic career at CWRU, ulti-

mately being named as the Reinberger Endowed Professor of Molecular Biology in 1998. During his latter years at CWRU, he also became involved with the development of technology transfer within the University and its interface with the Cleveland community. Dr. Rottman notes that, after all those wonderful years of research, it was somewhat difficult to shut down his laboratory, but he treasures the memories of his associations with past students, postdoctoral associates and faculty colleagues at both MSU and CWRU. Effective June, 2002, Dr. Rottman became CWRU Professor Emeritus.

In retirement, Dr. Rottman and his wife, Carol, returned to their native Michigan, where they now reside in their new home constructed on a 53 acre plot near Grand Rapids. They enjoy proximity to their three children and eight grandchildren who all reside in the Grand Rapids area. Dr. Rottman has not severed his connections to science, however, since he serves as a Trustee for the Van Andel Research Institute in Grand Rapids and as a consultant for a genomics biotech company, Athersys, in Cleveland. He notes that one of the advantages of retirement is increased time to read more widely in areas of science not specifically related to his previous research area. In addition, he



Fritz Rottman

values the time available for his other interests, which include gardening, beekeeping, fishing, and other recreational pursuits, including his annual hunting trip with Loran Bieber, back to the Bieber family farm in North Dakota - see page 28. Fritz and Carol Rottman have also pursued their interest in “macrobiology” and ecology. They are working with biology professors at Calvin College in Grand Rapids (Dr. Rottman’s alma mater) and Bill Schneider, a landscape architect from Mason, MI, who makes extensive use of native plants, to return a substantial portion of their land to a native grass/wildflower prairie.

## Our Newest Faculty Member, Charles Hoogstraten



Dr. Charles G. Hoogstraten

Charles G. Hoogstraten returned to familiar territory when he assumed his new position as Assistant Professor of Biochemistry and Molecular Biology in August. Charlie had done his undergraduate work at Michigan State, receiving dual B.S. degrees in Biochemistry and Chemistry in 1990. His outstanding undergraduate record merited recognition with the American Chemical Society's Robert Clark Kedzie Award as Outstanding Chemistry Major, as well as the MSU Board of Trustees' Scholarship Award. During his undergraduate days, Charlie did research with Professor Shelagh Ferguson-Miller in Biochemistry (studies on proton pumping in cytochrome oxidase) and the late Professor Jerry Babcock in Chemistry (theoretical studies of resonance Raman spectroscopy).

Charlie went on to graduate work as a Howard Hughes Medical Institute Predoctoral Fellow at the University of Wisconsin. His Ph.D. work, completed in 1995, was done with Professor John Markley, and dealt with development of improved NMR techniques for distance measurements in macromolecules and their application to protein structure.

Supported by a Helen Hay Whitney Postdoctoral Fellowship, Charlie moved to the University of Colorado where his interests shifted to application of high resolution NMR to studies on the structure of catalytic RNAs (ribozymes). This work was done with Professor Arthur Pardi in 1995-1998. Subsequently, Charlie did further postdoctoral work with Professor R. David Britt in the Department of Chemistry at University of California, Davis, focused on the application of electron paramagnetic resonance spectroscopy to studies of metal ion-nucleic acid interactions. As he embarks on his career as an independent faculty member, Charlie indicates that he intends to continue his focus on application of spectroscopic methods to protein and ribozyme structural studies, including dynamics of conformational changes, and to work on protein-nucleic acid interactions.

Charlie has an excellent background in the application of various spectroscopic techniques to

structural studies of biomolecules, and will complement existing faculty expertise in the area of structural biology. The latter is an area of emphasis both in the Department as well as, more broadly, through developments related to the Michigan Life Sciences Corridor (MLSC). The MLSC has fostered interactions between major research universities and institutions in Michigan. One result has been establishment of the Center for Structural Biology, headed by MSU Professors Shelagh Ferguson-Miller and Jack Preiss (see related article elsewhere in this magazine).

Charlie and wife Rebecca returned to East Lansing with new daughter, Sarah Eileen, born July 19, 2002. New father, new faculty member - clearly Charlie is going to be a busy guy. Welcome aboard, Charlie - and welcome back to MSU!



Sarah Hoogstraten



## Lillevik Family Gathering

Professor Emeritus Hans Lillevik and his wife, Connie, enjoyed a family reunion in June. All four of their children and all but two of their grandchildren made it to East Lansing for the festivities. Together with their families, daughters Nancy (from Tacoma, WA), Anita (from Redwing, MN), and Kristi (from San Diego, CA) joined son, Sig (from Portland, OR), for the memorable event. Some of you may remember Sig, who worked in the Biochemistry Instrument Shop for a time, before proceeding on to graduate school and ultimately his present position as a faculty member in the Department of Electrical Engineering at the University of Portland.

Together with others like Jim Fairley, Dick Luecke, Harold Sell,

and Dick Byerrum, Hans Lillevik was one of the original faculty members when the Department was first organized, bringing together faculty members from various other departments to form the Department of Biochemistry as a distinct academic unit. Though trained as a classical protein biochemist, prior to his retirement Hans developed expertise in clinical chemistry and served as coordinator of the clinical chemistry course that, in those days, provided laboratory training for the medical technology program. Hans and Connie continue to reside in the family home (708 Knoll Road) in East Lansing, and we're sure they'd love to hear from old friends.

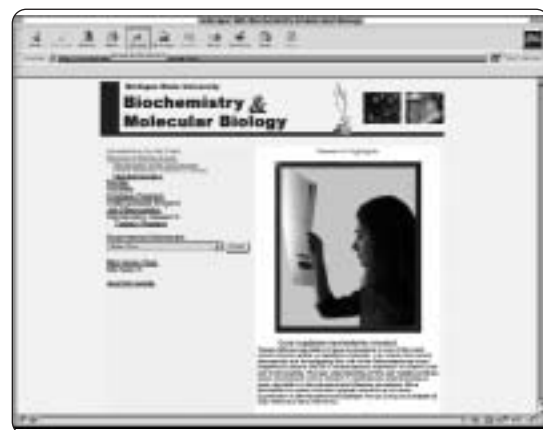


Dr. Hans Lillevik

## Visit Our Web Site

Point your browser to <http://www.bch.msu.edu> and you will find information about many aspects of the department. Get current information about faculty members you may remember, and meet faculty members who have joined the department since your time with us. Find out about on-going research activities, and about departmental support facilities such as the computer graphics facility, transgenic *Drosophila* facility, and others. Information about current graduate and undergraduate programs is available through the web site. Should you have a specific question, you may e-mail the Department at [bchalum@msu.edu](mailto:bchalum@msu.edu), which will quickly provide the answer to your question.

<http://www.bch.msu.edu>



# FACULTY Involved In GEDD

**David Arnosti,**

Associate Professor,  
Biochemistry and  
Molecular Biology

**Zachary Burton,**

Professor, Biochemistry  
and Molecular Biology

**Bill Henry,**

Assistant Professor,  
Biochemistry and  
Molecular Biology

**Lee Kroos,**

Professor, Biochemistry  
and Molecular Biology

**Min-Hao Kuo,**

Assistant Professor,  
Biochemistry and  
Molecular Biology

**Steve Triezenberg,**

Professor, Biochemistry  
and Molecular Biology

**Jim Geiger,**

Associate Professor,  
Chemistry

**Michele Fluck,**

Professor, Microbiology  
and Molecular Genetics

## Transcriptional regulation in

Contributed by BMB Associate Professor David Arnosti

The transcriptional regulation of gene expression is a critical control point in biological systems, and changes in gene expression underlie many human ailments, such as cancer, diabetes, and infectious diseases. To bolster a growing strength at MSU in the area of transcriptional regulation, six laboratories of the Department of Biochemistry and Molecular Biology, as well as laboratories in the Department of Microbiology and Molecular Genetics and the Department of Chemistry, joined forces in launching the Gene Expression in Development and Disease (GEDD) Focus Group last year. With initial support provided by a \$1 million grant from the MSU Foundation, the Focus Group brings the interdisciplinary strengths of the member laboratories to bear on a range of new topics. Postdoctoral fellows have been recruited for new research initiatives in the area of gene expression in development and disease, and the first fruits of their efforts were described at a symposium in June at the Kellogg Center in which new research findings were presented to over fifty scientists from the participating research groups.

Transcription involves the basal transcriptional machinery, which can be compared to an automobile's engine, and regula-



Dr. David Arnosti

tory factors, which function as the brakes and accelerator. Communication between these two classes of proteins is critical to regulation of gene expression. Postdoctoral researcher Stacy Hovde, working with the laboratories of Jim Geiger and Bill Henry, has focused on one such interaction by solving the structure of the DNA binding domain of the Oct-1 transcription factor complexed with DNA and a protein component of the basal transcription machinery, SNAP190. Her high resolution molecular structures reveal critical contacts between the two proteins that allow Oct-1 to discriminate between sequences controlling expression of protein-coding genes transcribed by RNA Polymerase II and small nuclear RNA genes transcribed by RNA Polymerase III.

Retinoblastoma (Rb) proteins are transcriptional repressors that



# development and disease

control expression of genes linked to the cell cycle, and mutations in Rb occur frequently in human cancers. The Henry laboratory has been studying the role of mammalian Rb in regulating a class of small nuclear RNA genes. Combining the biochemical skills of the Henry laboratory and the Arnosti laboratory's expertise with development and transcription in the fruitfly *Drosophila melanogaster*, postdoctoral researchers Scott Keller and Zakir Ullah have been analyzing the function of Rb proteins in *Drosophila*, where their role in development can be more readily assessed. They have shown that the fly expresses two proteins of the Rb family, and that these proteins are likely to have distinct activities based on their complementary expression patterns and formation of complexes of distinct sizes. This research seeks to functionally characterize the activities of the proteins using biochemical and molecular genetic means, with the ultimate aim of better understanding the role of Rb proteins in cancer.

Chromatin is the form in which DNA is packaged within the tight constraints of the nucleus. Covalent and non-covalent modifications of histones and other chromatin proteins are integral events associated with gene activation and repression, and are known to play important roles in development and disease. To identify novel factors that associ-

ate with histone proteins and may play a role in modification of chromatin structure, postdoctoral researcher Asha Acharya in the Kuo laboratory is using advanced genomic techniques to identify factors in the yeast *Saccharomyces cerevisiae* that bind to modified histone "tails," the portions of these proteins that are subject to modification with resulting effect on gene expression. Another project related to chromatin modification is being pursued by postdoctoral researcher Amy Hark in the Triezenberg laboratory. Amy is examining the structure of promoters subject to regulation by the ADA2 and GCN5 proteins, both involved in modification of histones in the plant *Arabidopsis thaliana*. These proteins have been found to regulate many aspects of development in this plant, and may provide an effective means to modulate expression of stress-tolerance genes in plants, a topic of substantial commercial importance.

Recent X-ray crystallographic analysis has afforded unprecedented views of the core enzyme of transcription, RNA polymerase. However, like a still photo, these structural images do not convey the dynamic aspects of the enzyme in operation. Using a novel "running-start" kinetic approach to transcriptional initiation, Xue Qian Gong in the Burton laboratory has been tracking the movements of human

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By combining MSU's strengths in basic mechanisms of transcriptional regulation, the GEDD Focus Group aims to make the Department a nationally-recognized center for gene expression research.

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RNA polymerase II on a millisecond scale, to understand the molecular transitions that allow this enzyme to work rapidly and accurately. In collaboration with the Geiger and Yan laboratories, they have proposed a novel kinetic pathway in which RNA polymerase prealigns its NTP substrates by base pairing to the DNA template prior to movement into the active site. This study has medical relevance in that the molecular actions of the deadly fungal toxin  $\alpha$ -amanitin and the hepatitis delta antigen have been integrated into this picture to show how these factors inhibit and stimulate transcription, respectively.

While multicellular development is often thought to be the province of eukaryotic organisms,

*Continued on page 22*

## Gene Expression Focus Group marks one year milestone

Continued from page 21

the lifestyle of some bacteria, such as *Myxococcus xanthus*, involves formation of elaborate multicellular structures known as fruiting bodies. Gene regulation during development of this bacterium is the focus of research by Durairaj Srinivasan in the Kroos laboratory. Working with the Kuo laboratory, novel regulatory factors are being sought using yeast-based genetic screens, and the binding of known transcription factors to promoters *in vivo* is being studied to better understand how genes are activated in response to cell-cell signaling during development.

The initial support of the GEDD Focus Group, provided by the MSU Foundation, is for a three year period. At this point, the research will have developed to a stage at which successful applications for extramural support, e.g., from NIH, may be expected. In addition to attracting additional individual grant support to MSU, the GEDD Focus Group plans to apply for a training grant, based on the ongoing graduate and postdoctoral training provided by the weekly research forum and weekly transcription journal club attended by members of the GEDD laboratories. To comple-

ment these activities, three intensive graduate courses have been developed. These cover chromatin and transcription, development and transcription, and transcriptional mechanisms.

With the explosion in genomic information, it is increasingly important to understand the molecular basis for regulation of gene expression. The GEDD Focus Group initiative ensures that MSU researchers will play an important role in elucidation of basic mechanisms of transcriptional regulation relating to development and disease.

## MSU Grad Establishes Viral Database

As noted by Onodera and Melcher (*Nucl. Acids Res.* **30**, 203-204, 2002), viral specific oligonucleotides play an indispensable role in identification and detection of viruses by the Polymerase Chain Reaction (PCR) and Southern blotting procedures. According to these authors, more than 8000 articles describing virus-specific PCR have been published since the advent of PCR as a major tool in contemporary science. However, these reports have been published in a wide variety of journals, many not readily accessible (e.g., not available on the

Internet). Onodera and Melcher have established the VirOligo database (<http://virologo.okstate.edu/>) to provide ready access to this information. The initial sequences deposited in the database were for viruses associated with bovine respiratory diseases, but the intent is to extend this greatly. Submission of additional sequences from other investigators is encouraged, and instructions for submission are available at the **virologo** site.

Ulrich Melcher (<http://opbs.okstate.edu/~melcher/UM.html>) received his Ph.D. from Michigan

State University in 1970, with Professor Joe Varner (jointly appointed in the Department of Biochemistry and the Plant Research Laboratory) serving as his mentor. After postdoctoral work at the University of Aarhus (Aarhus, Denmark), New York University Medical School, and University of Texas Southwestern Medical School, Dr. Melcher joined the faculty in the Department of Biochemistry, Oklahoma State University, in 1975. He remains at Oklahoma State, where he presently is Robert Sirny Professor of Agricultural Biochemistry.

## Graduates during the 2001-2002 Academic Year

### PhD and MS Degrees

Hien Thi (Jackie) Dao	Ph.D.
Mark Fielden	Ph.D.
Prashanti Franklin	M.S.
Jeremiah Frueauf	M.S.
Tong Hao	Ph.D.
James Kastenmayer	Ph.D.
Philip Kilanowski-Doroh	M.S.
Su-Yin Li	M.S.
Hongyan Liang	Ph.D.
Jason Matthews	Ph.D.
Paul Sanschagrin	Ph.D.
Michael Theisen	Ph.D.
Otis Vacratsis	Ph.D.
Hemant Varma	Ph.D.
Sridhar Venkataraman	Ph.D.
Yi Yang	M.S.

### BS Undergraduate Degrees

#### Fall, 2001

Christopher Eakin	BMB
Kristen England	BMB
Joseph Mmwirichia	BMB/BT
Ryan Shannon	BMB

#### Spring, 2002

Jessica Apostol	BMB
Robert Bauman	BMB
Janel Funk	BMB
Matthew Goddeeris	BMB/BT
Danielle Grondin	BMB
C. Matthew Hawkins	BMB
Ruth Helmus	BMB/BT
Jennifer Kornosky	BMB
Scott Loiselle	BMB
Michael Maile	BMB
Timothy McKnight	BMB
Jan Mincarelli	BMB/BT
Matthew Sekedat	BMB
Kate Shores	BMB/BT
Natasha Tasheva	BMB
Jelani Thomas	BMB
Douglas Whitten	BMB
Sarah Zawacki	BMB
Andrew Zimolzak	BMB

#### Summer, 2002

Kathryn Bembas	BMB/BT
Robin Goodwin	BMB/BT

2001  
2002

Congratulations  
*Graduates*

## A Bright, New Light for Biochemistry

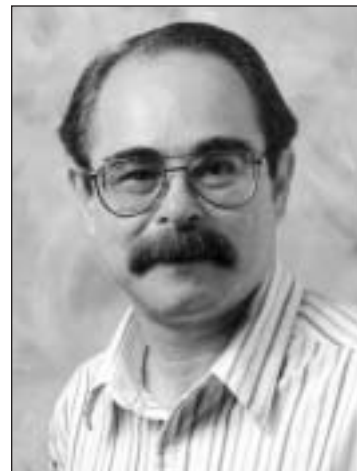
**Contributed by:**  
**R. Michael Garavito**

On May 24, 2002, the Advanced Photon Source at Argonne National Laboratory in Illinois signed a Memorandum of Understanding with 4 Michigan institutions and Northwestern University to establish the Life Sciences Collaborative Access Team (or LS-CAT). This simple two-page document was the culmination of over two years of effort by Michigan State University, the University of Michigan, and Wayne State University to provide life scientists in Michigan with unparalleled access to cutting-edge synchrotron radiation facilities for structural biology. For many faculty members in the Department of Biochemistry and Molecular Biology, LS-CAT may soon begin to alter the way we perceive and do biochemical science.

The birth of LS-CAT, in many ways, began with the faculty in BMB. Structural biology has not only become an important research area, but also a technological resource for the life sciences. Three-dimensional structures provide the essential underpinning for research that deals with biological phenomena at the molecular level. Atomic structures, as provided by macromolecular X-ray crystallography, convert the information encoded in DNA sequences into detailed pictures of the biological macro-

molecules that are the key to understanding life. Once the structures of the components of biological machines or pathways are known, we can begin to pose new, and more refined questions in our research. Thus, the demand for structural information in all molecular fields of biology continues to grow rapidly, particularly as genome sequences proliferate. Structural biology now impacts such diverse fields as cell biology, immunology, molecular biology, neurobiology, pharmacology, physiology, virology, and medicine. A wide array of life scientists found themselves forming collaborations with X-ray crystallographers as part of their own comprehensive research efforts.

To exploit this new research synergism, faculty in BMB and throughout MSU began a concerted effort to acquire funding from the Michigan Life Science Corridor (MLSC) to establish state-of-the-art facilities for X-ray crystallography, multidimensional NMR, and other structural methodologies. These new, but very expensive facilities would not only have immense impact on research at MSU, but also throughout Michigan. Thus, we joined other like-minded researchers at the University of Michigan, Wayne State University, and the Van Andel Institute in Grand Rapids to make a coordinated push for an unprecedented leap in research infrastructure in Michigan. Our efforts were



Mike Garavito

rewarded with the establishment of MLSC Core Technology Alliance, which is composed of 5 new research centers including the Michigan Center for Structural Biology (MCSB) here at MSU.

The largest and most ambitious goal of the MCSB is the \$10.5 million dollar project to build a synchrotron beamline as part of LS-CAT consortium of institutions. This sounds very impressive and many people, from geneticists to the governor of Michigan, have bandied about the words "synchrotron" and "beamline" in conversations. But what is a synchrotron beamline and what can it do? As an X-ray crystallographer, I have used synchrotron facilities for over 20 years, but to many life scientists, a synchrotron is still not a familiar research tool. Thus, a little primer on what a synchrotron is and why it is an important tool in X-ray crystallography is needed.

Moreover, the story behind how the synchrotron became a tool for the life sciences illustrates how truly interdisciplinary science can be.

The synchrotron arose from the early days of particle physics and atom smashers. The search for elemental particles required that electrons, positrons, alpha particles, and even large atomic ions be whirled around and slammed into each other. Physicists soon found that the particles needed to reach higher and higher energies to test their theories. Higher energies mean higher speeds. Soon, electrons and positrons were whizzing around the accelerator rings at velocities approaching the speed of light. The particles' high speeds have two undesirable consequences for the experimentalist. First, to turn a charged particle around in a circle imposes a change in the particle's acceleration through each turn. Every time a charged particle accelerates or decelerates, it emits electromagnetic radiation. As the speed of the particle increases, the energy of the emitted radiation increases and its wavelength decreases. Second, the emission of radiation

becomes more intense and focused as relativistic speeds (i.e., approaching the speed of light) are reached. In a modern particle accelerator, particles traveling near the speed of light emit a searing, pencil-thin ray of electromagnetic radiation (synchrotron radiation) that can burn through

solid lead in seconds. Thus, very heavy shielding is needed on the outside of a particle accelerator to protect the experimenters.

During the late Sixties and early Seventies, physicists and chemists realized that simply punching a small hole through the shielding would give them access to this intense source of ultraviolet and soft X-ray radiation, radiation that would make possible novel experiments in material physics, spectroscopy, and environmental science. Unfortunately, these experiments were parasitic to the work of the high-energy physicists: the beam of synchrotron radiation would suddenly disappear the moment the physicists allowed the particles to collide with each other. However, the wealth of information from these early, "first generation" synchrotron experiments convinced the physics

and chemistry communities that particle accelerators dedicated to the production of synchrotron radiation would be an important scientific resource. Moreover, as synchrotrons began to produce hard X-ray radiation, technologies like X-ray lithography and microscopy, medical X-ray imag-



Figure 1

The Advanced Photon Source. The upper panel shows an aerial view of the APS; a schematic of the synchrotron facility and the participating CATs is seen in the lower panel. For more information, see the APS web site at <http://www.aps.anl.gov>. The photograph and illustration are from the APS photograph gallery. For a color version of this figure, see back cover.

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## A Bright, New Light for Biochemistry

Continued from page 25

ing, and X-ray crystallography began to rely on synchrotron radiation.

What attracted X-ray crystallographers to synchrotron beamlines is the simple ability to obtain intense and spectrally pure radiation at a wide range of wavelengths. Solving a protein's structure was an endeavor lasting months and years; the process can now be done in weeks, days, or even hours, using the intense synchrotron radiation. Using such hot beams of X-rays forced us to change radically the way we prepare the protein crystals for analysis. Now, we have to flash freeze the crystals and keep them at liquid nitrogen temperatures to prevent them from decaying in seconds. Synchrotron radiation also allowed us to use new methods to determine the structure of a novel protein and this has resulted in another quantum leap in technology for X-ray crystallography. The pharmaceutical industry has already embraced synchrotron beamlines as a way to do "high-throughput" structure determination for drug discovery and design. Thus, by the beginning of the 1990's, macromolecular X-ray crystallographers heartily agreed that access to dedicated sources of synchrotron radiation was vital to their research.

The unanimity among such a diverse group of scientists helped the establishment of a "second



Figure 2

A synchrotron beamline. The synchrotron radiation comes through the radiation shielding (arrow in upper panel) and travels through a beam pipe to the optical system (monochromators, mirrors, shutters, etc.). After beam conditioning, the X-ray enter the experiment "hutch" (lower panel) where the diffraction data is measured. During the collection of data, the heavily shielded doors of the hutch are closed. Dow-Northwestern-DuPont-CAT (DND-CAT) will be subcontracted to build LS-CAT. Photographs are courtesy of Denis Keane.

generation" of dedicated synchrotrons in Europe and the United States. These synchrotrons were often refurbished particle accelerators inherited from the high-energy physicists. In the late 1980's, a push was also made to develop even more powerful "third generation" synchrotrons, instruments specifically designed for generating synchrotron radia-

tion. At Argonne National Laboratory, the Advanced Photon Source was brought on line in 1994 as the premier "third generation" synchrotron in the United States. Through support from the U.S. Department of Energy, the APS operates as a national research facility and source for synchrotron radiation that is open to researchers from across the United States and around the world.

Although the APS is often called a particle accelerator for electrons, it is actually composed of four separate instruments (Figure 1). The generation of a pulse of electrons begins at the electron gun, much like one in a television. One or more short (30 nanosecond) pulses of electrons are raised to 450 million electron volts (MeV) by a linear accelerator (or linac). The pulses or "bunches" of electrons are then injected into a 368 meter long, ring-shaped booster synchrotron that raises electron energies by 32 keV on every turn. Within a quarter of a second, electrons have increased their energy to 7 billion electron volts and are traveling at approximately the speed of light. The electrons are then injected into the main, kilometer long storage ring where they circle around the storage ring at more than 271,000 times per second. The storage ring, which is an interconnected system of 240 vacuum chambers and 1097 electromagnets, is actually a polygon with forty sides or "sectors". Each sector has a 5.2 meter long "straight" section preceded by a

Continued on page 27



# PROFILES



### Charles C Sweeley, Professor Emeritus

*This prestigious award was given in recognition of Dr. Sweeley's pioneering contributions in the application of gas chromatography and mass spectrometry to analysis and characterization of carbohydrates and lipids.*

Professor Emeritus Charles C. Sweeley received the 2001 Anachem Award from the Federation of Analytical Chemistry and Spectroscopy Societies. This prestigious award was given in recognition of Dr. Sweeley's pioneering contributions in the application of gas chromatography and mass spectrometry to analysis and characterization of carbohydrates and lipids. Dr.

Sweeley was the major force in establishing the Mass Spectrometry Facility at Michigan State University, and served as Chairperson of the Department in 1980-1985. For the past several years, he and his wife, Marilyn, have been enjoying retirement, dividing their time between the East Lansing area and winters in Florida.

## A Bright, New Light for Biochemistry

*Continued from page 26*

"bending" magnet section, where electromagnets turn and focus the electrons into the straight section. As an electron bunch decelerates into this turn, it emits synchrotron radiation. The electron bunches will continually emit synchrotron radiation for 10-20 hours before more electrons need to be added to the storage ring.

Of the forty "sectors" around the APS storage ring, 35 sectors are available for synchrotron radiation experiments. To date, experimental stations have been or are being built in 28 sectors (Figure 1). Researchers from

across North America have organized at the APS as members of Collaborative Access Teams (or CATs). A CAT is a consortium of universities and/or companies with common research objectives. Each CAT enters into an agreement with the APS to design, construct, fund and operate beamlines designed to take synchrotron radiation from the storage ring and tailor it to meet specific experimental needs (Figure 2). The excellent APS website (<http://www.aps.anl.gov>) gives you a virtual tour of the synchrotron and the research objectives

of the working CATs. LS-CAT (a research consortium composed of Michigan State University, the University of Michigan, Wayne State University, the Van Andel Institute, and Northwestern University) is now responsible for the development of experimental stations for macromolecular X-ray crystallography in sector 21 (Figure 1).

The current plan for LS-CAT envisions building five beamlines for X-ray crystallography within the next 3-4 years. To achieve this ambitious goal, LS-CAT will not only use the synchrotron radiation from the bending

*Continued on page 36*

## Loran Bieber Retirement



Dr. Loran Bieber

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*Dr. Bieber's primary research interest was in the area of fatty acid metabolism, particularly the role of carnitine and carnitine acyltransferases.*

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One of the stalwarts of the Department retired, effective January 1, 2002. Loran L. Bieber is a native of Mott, North Dakota. He earned his B.S. (1955) and M.S. (1956) in Chemistry from North Dakota State University, and then received the Ph.D. in Biochemistry from Oregon State University in 1963. After postdoctoral work with Dr. Paul Boyer at UCLA, Dr. Bieber joined the Biochemistry faculty as an Assistant Professor in 1965, shortly after the organization of the Department as an independent academic unit at Michigan State University. Together with other faculty members in the newly-formed department, Dr. Bieber worked to develop a strong undergraduate program in Biochemistry. At the time, this was a rather novel undertaking, with very few institutions offering an undergraduate curriculum leading to a degree in Biochemistry.

From the very beginning, encouraging undergraduate participation in research has been a hallmark of the program at Michigan State, and many undergraduates (including 1991 Boezi Award recipient, Raymond Dingleline) became actively involved in Dr. Bieber's laboratory. Graduate education was also important, of course, and Dr. Bieber served as major professor for eleven Ph.D. students and five M.S. students during his career. In addition, his laboratory has provided research opportunities for numerous postdoctoral

associates and visiting professors. Dr. Bieber developed particularly close interactions with colleagues at the Medical Academy of Pecs in Hungary. Several faculty members from that institution have been in his laboratory for various periods, and Dr. Bieber has in turn made extended research visits to Pecs, as a Fogarty Fellow in 1991 and as a Visiting Scientist supported by the Hungarian National Academy of Science in 1992-1993. He was also a Distinguished Visiting Scholar at the University of Adelaide (Australia) in 1983.

Dr. Bieber's primary research interest was in the area of fatty acid metabolism, particularly the role of carnitine and carnitine acyltransferases. For various reasons, the common housefly was a useful organism for the study of carnitine metabolism, and in his early days at Michigan State, Dr. Bieber maintained an active fly colony in the basement of Biochemistry. But accidents do happen, and the occasional escape was inevitable. Thus, Dr. Bieber's colleagues found it useful to keep an "anti-Bieber machine" (a flyswatter) handy. But research soon progressed to mammalian systems, and in later years, Dr. Bieber focused his interest on the function of carnitine in cardiac mitochondrial function and in lymphocyte proliferation (the latter in collaboration with Professor Pamela Fraker). Through the years, his research was supported by

grants from the National Institutes of Health, the Michigan Heart Association, the Juvenile Diabetes Association, and the United States Department of Agriculture. He has contributed more than 100 refereed papers to the scientific literature, along with numerous book chapters, and was widely recognized for his work on carnitine function.

In addition to his active role in research and teaching, Dr. Bieber has been highly regarded for his extensive and exemplary service in committee and administrative roles. For many years, he served as Associate Dean for Research in MSU's College of Human Medicine, and he has also served in various capacities in the Office of the Vice President for Research and Graduate Studies (OVRGS). Most recently, Dr. Bieber was instrumental in organizing the funds, staffing, equipment, and laboratory space for the Genomics Technology Support Facility (see article in last year's issue of this magazine, and other information elsewhere in the present issue). Dr. Bieber has indicated that he will continue to assist the OVRGS with special assignments after his retirement.

Within the Department, Dr. Bieber has served in many committee and administrative roles, including service as Associate Chair (1977-1984). Perhaps many former graduate students

and faculty colleagues will consider one of his "unofficial" duties most memorable. For many years, Dr. Bieber manned the charcoal grill at the annual departmental picnic each Fall, welcoming the incoming class of graduate students with "Bieber burgers."

Dr. Bieber also is well known for his passion for outdoor activities, including gardening (the earliest and the biggest tomatoes in East Lansing!), fishing, and hunting. Many friends and acquaintances can attest to his skills in the preparation of smoked duck breast, smoked salmon, and other tasty creations that utilize the harvest from his fishing and hunting trips.

Loran Bieber has held many different titles over the course of his more than 35 years of service to Michigan State University. But those who know him well will tell you that one of the titles that he treasures most is "Grandpa." We are confident that much of the additional personal time made possible by retirement will be filled with Loran and his wife, Marion, enjoying their grandchildren. Loran and Marion - may you have a long and happy retirement, and thank you for all your contributions to making the Department a great place to be over these many years.



Loran and Marion Bieber

Dr. Robert W. Gee

# Remembers the Department

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*In recognition of his generous support to MSU and the Department of Biochemistry and Molecular Biology, Dr. Gee is enrolled as a member of The Hannah Society and The Landon Legacy Society.*

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Those who were in the Department in the 1970s and 1980s will remember Dr. Robert W. Gee. Bob received his Ph.D. in Biochemistry from the University of Southern California in 1967, and joined the MSU laboratory of Professor Ed Tolbert in 1972. That became a long-standing relationship, and Bob remained formally associated with the Department until 1992. During the last few years of that working relationship, Bob and Ed were involved in a collaborative project with Dr. Richard Byerrum, who had returned as a faculty member in the Department after his many years of service as Dean of the College of Natural Science. Bob, Ed, and Dick Byerrum were interested in various aspects of glycerol production in plants, a topic of both fundamental interest as well as potential commercial importance. Unfortunately, physical disabilities necessitated that Dr. Gee end his active scientific work. He said that, after hip replacement surgery, "everything that could go wrong did go wrong," with the result that he was unable to return to the laboratory. Nonetheless, he continued to

interact with Ed Tolbert, with frequent telephone conversations in which they discussed their shared scientific interests until Ed's death in December, 1999.

Now retired, Dr. Gee continues to reside in Lansing, and pursues his long-standing interest in photography. Many may remember that, during Bob's formal affiliation with the Department, he was a regular fixture at departmental events, snapping pictures that showed up in many venues and were an important part of documenting departmental history.

Dr. Gee has been a previous contributor to MSU and the Department, including a contribution to the Tolbert Lectureship that was established in Ed Tolbert's memory. Dr. Gee has also worked with the MSU Development Office ([www.givingto.msu.edu](http://www.givingto.msu.edu)) to incorporate a bequest to the University and the Department in his will. In recognition of his generous support to MSU and the Department of Biochemistry and Molecular Biology, Dr. Gee is enrolled as a member of The Hannah Society and The Landon Legacy Society.

# Alumni News

The concluding section in the last issue of this magazine provided some information about several past graduates of this department. Since that time, several other alums have responded to the request to let us know what life has brought to them since they left MSU, and we thank them for that. Their responses are collated below. Look them over and you might see a familiar name, and perhaps the opportunity to renew contact with a friend from your days at MSU. If you don't see your name below (or even if you do), we invite you to use the form attached to this publication to bring us up-to-date on your post-graduation activities and current position. You can use the postage-paid envelope to return the form to us or, if you prefer, send the information by e-mail to [bchalum@msu.edu](mailto:bchalum@msu.edu). We look forward to hearing from you!

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## **Bariola, Pauline A. - PhD '96**

Pauline earned her degree in the laboratory of Dr. Pam Green, and subsequently did postdoctoral work at the Institute d'Ecologie, Universite de Lausanne, in Switzerland. She returned to the US in early 2001, and accepted a position with EDEN Bioscience Corp. in Bothell, WA. Pauline can be contacted at [Bario-laP@edenbio.com](mailto:Bario-laP@edenbio.com).

## **Borders, Jeffrey S. -BS '92**

After graduating from MSU, Jeffrey spent 3 years doing research in molecular biology at Wayne State University, earning an MS degree. He subsequently enrolled in Wayne State School of Medicine, from which he received the MD degree. Jeffrey and his wife, Andrea, were married in 1999, and at last report, were expecting their first child in June, 2002. Andrea also holds two degrees and is a critical care nurse. Jeff can be contacted by mail at 22510 Heinze St., Dearborn, MI 48128, phone (313)

792-8015, or e-mail to [brdrs@comcast.net](mailto:brdrs@comcast.net).

## **Cress, W. Douglas - PhD '91, and Cress, Andrea P. - MS '89**

It was great to hear again from old friends, Doug and Andrea Cress. Doug earned his PhD in Dr. Steve Triezenberg's lab while Andrea did her graduate work with Dr. Pam Fraker. After their time at MSU, Doug and Andrea both took positions at the Howard Hughes Medical Institute at Duke University, Doug as a Post-doc and Andrea as a Research Associate. Doug is now an Assistant Professor in the Moffitt Cancer Center at the University of South Florida in Tampa. Doug says that his first two PhD students successfully defended their thesis work within the past year, and he has received word that his NIH grant has been renewed for another five years. Sounds like Doug's academic career is off to a good start. Andrea and Doug have three sons, John, Isaac, and Joseph,



who, at the time we received the update from Andrea, were ages 8 years, 5 years, and 5 months, respectively. Doug and Andrea can be contacted by e-mail to [doug-andrea@hotmail.com](mailto:doug-andrea@hotmail.com) or to [cressd@moffitt.usf.edu](mailto:cressd@moffitt.usf.edu).



Steven Dahms

## **Dahms, A. Stephen - PhD '69**

In 1972, Steve joined the faculty at San Diego State University (SDSU),



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where he currently holds the rank of Professor of Chemistry. He was the founding Director of the SDSU Molecular Biology Institute, established in 1974, and he continued to serve in that role until 1992, during which time the Institute grew to include over 100 personnel. From 1992-1997, Steve was Director of a campus-wide Biotechnology Research and Training Program, a program designed to bring together diverse elements from engineering, sciences, and business. In 1997, he was appointed Director of the newly-established SDSU Center for Bio/Pharmaceutical and Biodevice Development ([www.cbbd.sdsu.edu](http://www.cbbd.sdsu.edu)). Since 1987, he has also served as Executive Director of CSUPERB ([www.csuschico.edu/csuperb](http://www.csuschico.edu/csuperb)), a biotechnology research and education program that involves the 23-campus California State University system. When Steve sent us the most recent update on his activities (March, 2002), he was Chair-elect of the Board of Directors for the U.S. Council of Biotechnology Centers/BIO (CBC/BIO), and also serving on the Board of Directors for the Biotechnology Industry Organization and chairing the CBC/BIO National Biotechnology Workforce Committee. He is extensively involved in various other activities related to the biotechnology industry, both in California and nationally, as well as serving on the Board of Directors for two companies and a private research foundation. It is evident that Steve has established an exceptional record of service in linking academia and the biotechnology

industry. For his outstanding accomplishments, Steve was recognized with the Boezi Award in 1993. Steve can be contacted at the Department of Chemistry, SDSU, San Diego, CA 92182-1230, or by e-mail at [sdahms@sciences.sdsu.edu](mailto:sdahms@sciences.sdsu.edu).



Ryann Russell and Allison Domzalski happily enjoying their new east coast residence!

**Domzalski, Alison, & Russell, Ryann - BS, '01**

Alison Domzalski wrote to tell us that she is currently enrolled in a graduate program leading to an MS degree in forensic science at John Jay College in Manhattan. Ryann Russell is working as a research assistant in a bacterial pathogenesis/immunology laboratory at Rockefeller University, also in Manhattan. Alison and Ryann say that they are "loving NYC!!" They can be contacted by mail to 146 Freeman St., Apt. 2L, Brooklyn, NY 11222; phone: (718) 383-3221; e-mail: [tarzanfille@hotmail.com](mailto:tarzanfille@hotmail.com).

**Finn, Erin M. - BS '01**

Erin is currently enrolled in the graduate program of the Entomology & Nematology Department, University of Florida. Erin's research interests

are in the development of integrated pest management programs, with the aim of reducing pesticide use in commercial plantings. She says her research is going well and expects to receive her MS in Entomology in May, 2003. Erin can be contacted by e-mail to [erinfinn@ufl.edu](mailto:erinfinn@ufl.edu).

**Goodier, Anson - BS '69**

Anson is currently an aerospace engineer at Tinker Air Force Base in Oklahoma. Never know how those biochemists are going to end up, do you? Anson can be contacted by mail to 1336 NW 138<sup>th</sup> St., Edmond, OK 73013.

**Griffin, Jacob B. - BS**

Jacob wrote to tell us that he is currently a Laboratory Supervisor at the University of Nebraska, Lincoln. He can be contacted by mail to his home at 1511 SW 36<sup>th</sup>, Lincoln, NE 68522.

**Hanson, Douglas M. - PhD '68**

Doug Hanson wrote to fill us in on developments since he received his PhD from MSU, oh so many years ago. Doug did a postdoc at Boston University Medical School, then joined the Veterans Administration. However, in 1977, he embarked on a biotechnology endeavor with two partners, starting up a company which eventually went public. He sold his interest in this company in 1985, and then served as President or CEO of several laboratory companies working in the areas of toxicology and environmental chemistry testing. In 1992, he joined another



biotech company as Director of Technology Transfer, a job that took him to Japan and the People's Republic of China on several occasions, negotiating technology trade deals relating to various vaccine products. The vaccines were to be further developed and then produced in India for sale in third world countries. Doug says that these jobs were pretty "high stress" and after three heart attacks and quadruple bypass surgery, he decided to shed the management roles and try to find something a little less stressful. Currently he is a Senior Technical Writer for EMC, a major computer company located in the Boston area. Doug says "it's a lot less stress and I get to work with a lot of crazy computer software designers and hardware engineers." On January 4, 2002, he received a heart transplant, and in a communication received March, 2002, he said that he was doing very well and expected to return to work by April. He and his wife, Lorraine, live in New Hampshire and have three sons and an adopted daughter, and three grandsons with another grandson "on the way" when his message was received in March. Doug can be contacted by phone (603-886-1219) or e-mail: (dougmh@attbi.com).

### **Hindash, Ammar - BS '01**

Ammar Hindash is working as a production biochemist in the Synthetic Biochemicals Department of Sigma-Aldrich in St. Louis, MO. Ammar tells us that he is involved in development and production of their

nucleotide line of products, one of the company's most profitable. He says that this has been a great experience. In addition, however, Ammar has started working on an MBA at St. Louis University, and intends to specialize in international business administration. Ammar notes that St. Louis is a nice city but "not many lakes and very different from Michigan." Ammar also told us that he is still dating another MSU BMB grad, Darcy Fruner. Darcy works for Pharmacia-Upjohn, and after working in Kalamazoo for a year after graduation, transferred to the Pharmacia-Upjohn operation in St. Louis. Ammar can be contacted by mail to 7361 Pershing Ave., Apt. 1W, St. Louis, MO 63130.

### **Kachel, C. Alan - BS '01**

During his undergraduate days at MSU, Alan had worked in the laboratory of Dr. James Tiedje, in MSU's Center for Microbial Ecology (CME). He noted that, together with his undergrad BMB labs, this provided him with excellent experience that put him in good position when he sought employment after graduation. Through contacts made in the course of his work in CME, he was offered a position as a laboratory technician for Dr. Gerben Zylstra at Rutgers University in New Brunswick, NJ. Alan indicated that he had other offers also, but chose to work with Dr. Zylstra and has found this work most rewarding. His duties include daily laboratory management as well as a great deal of DNA sequencing for members of the Zylstra lab and

other investigators. Alan notes that the only drawback to his position is the 5 hours per day spent commuting between the New York City area, where he lives, and Rutgers. Alan can be contacted by e-mail to [kachel@aesop.rutgers.edu](mailto:kachel@aesop.rutgers.edu).

### **Lewis, Douglas S. - PhD '78**

Doug Lewis received his PhD with former faculty member Dr. Bob Ronzio as mentor. Doug subsequently had been a faculty member at Iowa State University for many years, during which he collaborated with another former MSU student (PhD with Willis Wood) and now faculty member at Iowa State, Don Bietz. In November of 2001, Doug became Professor and Chair of the Department of Human Nutrition and Food Science at Cal Poly in Pomona. He and his family currently reside in Claremont, CA. Doug's research interests are in biological, nutritional, and educational interventions to lower chronic disease risk factors in children and young adults. Current research projects include the role of bile salts in fat digestion in early neonates, and developmental regulation of the cholesterol 7 $\alpha$ -hydroxylase gene. Another project involves the use of additives (e.g., plant sterols, antioxidants) to enhance the nutritional quality of "foods that are habitually consumed but may not be viewed as healthy." (Hey, Doug, is that a fancy way of saying "junk food?") Doug and his wife, Christine, have been married 21 years and have five children. Two kids are in college (one a senior biochemistry major

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and the other a sophomore biomedical engineering major), two in high school and, last but not least, one in 4<sup>th</sup> grade - quite a spread. Doug said that he was looking forward to throwing a block party when he was finally through with public schools. Doug can be contacted by phone (909-869-2167) or e-mail (dslewis@csupomona.edu).

**Lippitt, Denise (Messing) - BS '90**

Denise completed her MD degree at the University of Michigan and then did a pediatrics residency (program run through Northwestern University) at Children's Memorial Hospital in Chicago. She is currently in private general pediatrics practice in Glenview, IL, and also participates in teaching medical students and residents at Northwestern University School of Medicine. When we last heard from Denise, she said that she and her husband were expecting their first child in June, 2001. Denise can be contacted by phone to her home (847- 425-9223) or office (847-729-6445).

**Merski, Matthew - BS '99**

Matt is currently enrolled in the PhD program in the Department of Biophysics, Johns Hopkins University, in Baltimore.

**Ioannis Moutsatsos - Ph.D. '86**

Ioannis recently sent us the following message: I'm currently employed at Wyeth Research in Cambridge, MA. I have been with the company (formerly known as Genetics Institute) for 14



Marco, Tere and Mayte Villanueva, Ioannis and Angela Moutsatsos in Merida Mexico (Summer 2001). Mayte Villanueva's 15th birthday celebration. Ioannis and Angela are Mayte's godparents.

years, 12 of them in the lab. Most recently, I've pursued a career in bioinformatics. In 2001, I obtained my Masters degree in Software Engineering from Brandeis University, and I'm now working in the Bioinformatics field developing software for proteomic analysis using mass spectrometry data. Although, unfortunately, I have not kept in close contact with many of my former colleagues at MSU, I had the pleasure to continue a lifelong friendship with Marco Villanueva (John Wang lab, Ph.D. 1987). I visited Marco in Mexico in 1987 when his daughter, Mayte, was christened, and again in 2001 with my wife Angela and kids, Andreas (11 years old) and Eleni (5 years old), to celebrate Mayte's 15th birthday. Marco has also visited us twice in recent years in Boston during short research sabbaticals in Providence, Rhode Island. We are hoping to travel with our families and meet again in Greece next year ahead of

the 2004 Athens Summer Olympics. I can be reached easily via e-mail at imoutsatsos@msn.com

**Neudahl, Gary A. - MS '82**

From Gary: "Twenty years after graduating from MSU, my career path is firmly established in cosmetic science. After my initial work with Alberto Culver Company, first developing and then managing the development of personal care products, I joined an entrepreneurial company, Costect, to assist formulating chemists throughout the American Midwest. With the purchase of Costec by RTD\*HallStar in late 2001, my reach will



Gary Newdahl

become national, and perhaps international. There's nothing like a biochemistry degree to provide a basis for the understanding of skin and hair and the products used on them!" Gary is Product Application Manager for RTD\*HallStar. Gary's family now includes six children (4 by birth, 2 adopted), ranging in age from 2 to 15. Sounds like that must keep him busy but he also notes that he is an "occasional" bicyclist and softball player. He and his family live at 559 Ada St., Cary, IL, and he can be contacted by phone (847-516-7075) or e-mail (caryneudahls@att.net).

# Alumni News

## **Peterson, Donna N. - MS '67**

Donna (who worked with Professor Emeritus Paul Kindel for her MS degree) is currently a Scientist with the Minnesota Technical Assistance Program (MNTAP), with which she has worked for the past 15 years. Donna tells us that MNTAP is located at the University of Minnesota and was established to help Minnesota businesses understand environmental requirements and reduce waste and emissions. This has included working on some EPA programs and with various state and county regulatory agencies in Minnesota.

## **Rollins, Thomas E. - BS '78, MS '81**

Tom says he is an "old guy; gray hair; not submitting photo; two kids; married; still have sense of humor and still having fun." Same old Tom, who brought lots of laughs to those associated with him during his days at MSU. Tom is now Senior Vice President for Development and Operations for Sepracor, Inc.. He and his family live in Hopkinton, MA, and he can be contacted by phone (508-497-2561) or e-mail ([trollins@sepracor.com](mailto:trollins@sepracor.com)).

## **Saxe, Stephen A. - MS '78**

In October, 2001, Steve assumed his new position as in-house patent counsel for Alexion Pharmaceuticals, Inc., in Cheshire, Connecticut. He currently resides at 10 Coachman Lane, Bethany, CT, and can be contacted by phone (203-271-8289) or e-mail ([saxes@alxn.com](mailto:saxes@alxn.com)).

## **Spencer, Andrew - PhD '98**

Since receiving his PhD, Andy had been doing postdoctoral work at University of Colorado in Boulder, working on cell migration and downstream control of Ras signal transduction pathways in *C. elegans*. However, in July of 2002, he moved to a new postdoctoral position at the University of Wisconsin, Madison, where he will be continuing studies of receptor-mediated signal transduction and the role of transient glycosylations in signaling. He can be contacted at his new address: 1724 Jefferson St. Apt. #2, Madison, WI 53711 (phone: 608-255-1070). Andy says he enjoyed his work in Boulder and looks forward to the scientific opportunities in Madison, but the move to Madison also will bring great personal benefits. Andy met Katie Miller (daughter of departmental Associate Chairperson Shelagh Ferguson-Miller) while he was still in Bill Smith's lab here at MSU. Andy moved on to Colorado for his postdoc, while Katie stayed in East Lansing, completing her MD degree in MSU's College of Human Medicine. Katie is now doing a residency in Madison, and she and Andy decided that "being in the same city should be priority number one." Stay tuned.

## **Voige, William H. - BS '69**

Bill (<http://csm.jmu.edu/chemistry/faculty/voige/whvindex.htm>) is currently a Professor at James Madison University in Harrisonburg, VA, where he holds a joint appointment and teaches in both the

Department of Chemistry and the Institute of Technical and Scientific Communication. Bill's teaching interests are in the history of science, particularly British science, and he has developed a London-based travel-study program that enables students to visit historical sites and museums associated with important British scientists. Bill can be contacted by e-mail to [voigewh@jmu.edu](mailto:voigewh@jmu.edu).

## **Welton, Ann F. - PhD '74**

Ann has pursued a research career in the pharmaceutical industry. She tells us that she spent "20+ years" at major pharmaceutical companies in New Jersey. Ann was Vice President for Preclinical Development at Hoffmann LaRoche in 1998, when she says she got hit by the "bug" to join a small biotech company. She and her husband moved to California, where Ann joined Axus Pharmaceuticals, which was acquired by Celera in 2001. Ann currently holds the position of Vice President for Biology and Preclinical Sciences for Celera. She says she enjoys the "rough and tumble" of the biotech world, and is involved in work focused on discovery of drugs with applications in oncology and treatment of inflammatory diseases. Ann and her husband currently reside in San Mateo, and can be contacted by mail (3307 El Sobrante St., San Mateo, CA 94403-3714) or e-mail ([weltona@ad.com](mailto:weltona@ad.com) or [ann.welton@celera.com](mailto:ann.welton@celera.com)).

## Healthier Eating - Vitamins Made Simple?

*Continued from page 15*

the current work is directed at using the same approach to engineer overexpression of  $\gamma$ -TMT, with resulting increase in  $\alpha$ -tocopherol content of more common food products, such as canola oil.

DellaPenna sees this as both do-able and desirable. Moreover, he believes this general approach is applicable to improving dietary sources of other plant-derived nutrients. He points out that about three billion people worldwide suffer from chronic micronutrient deficiencies, and

states: "We're in a unique position to actually do something beneficial. This won't cure malnutrition, but it will make a dent in the problem. And that's all we can hope for." Nor is there any reason to limit it to vitamins. DellaPenna points out that plants produce an amazing array of compounds - more than 80,000 of the 100,000 known "secondary metabolites" are produced by plants. Most of these are poorly characterized, if at all, and they may represent an untapped source of nutritionally or

therapeutically important compounds. DellaPenna is still a relatively young man - he celebrated his 42<sup>nd</sup> birthday with a round of golf on a local course this past year - but even for a man of his considerable energies, it is unlikely that he will have exhausted the possibilities represented by these 80,000 plant products in the course of his career. However, his pioneering work in nutritional genomics has shown the potential, and led the way for further developments.

## A Bright, New Light for Biochemistry

*Continued from page 27*

magnet section, but also add insertion devices called undulators into the straight section of sector 21. An insertion device is simply a linear series of north-south permanent magnets that are "inserted" above and below the path of the electrons. When the electrons pass through the alternating fields, they undulate up and down in a roller coaster fashion. The alternating magnetic fields in an undulator narrow the cone of emitted synchrotron radiation, allowing all of the radiation from "undulations" to interfere constructively. This interference creates spikes of high-brilliance X-rays that are tunable to the specific wavelengths. These undulators markedly increase the power and versatility of the planned beamlines. Of the five beamlines in LS-CAT, four will be

served by undulators. When LS-CAT is fully operational, it will be one of the most advanced and unique synchrotron facilities for X-ray crystallography in the world.

LS-CAT will significantly enhance the scientific scope and impact of research in structural biology within MCSB, at MSU, and in the state of Michigan. Several professors in BMB, including Shelagh Ferguson-Miller, Jack Preiss, Bill Henry, Christoph Benning, and Bill Smith, are already engaged in cutting-edge structural research using X-ray crystallography. Their current scientific foci span a broad spectrum of biological research: gene regulation, membrane biogenesis, fatty acid metabolism, enzyme action, and energy production. Many other research projects in BMB are focusing on aspects of

modern drug design and protein engineering. Here, a protein structure serves as a "workbench" for molecular design in order to develop new inhibitors (i.e., new drugs) or to redesign the proteins as commercial catalysts. Structural biology will continue to impact all these research endeavors, as well as help open up new research directions in biochemistry well into the 21<sup>st</sup> century. When LS-CAT and the other MCSB supported facilities for structural biology are fully operational, the faculty and students in BMB will have the new tools to keep their research at the highest levels of excellence.

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# *Contributions to the Department of Biochemistry and Molecular Biology*

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# Contributions to the Department of Biochemistry and Molecular Biology

Contributions from past students and other supporters of the Department of Biochemistry and Molecular Biology provide funding for several departmental awards and developmental activities. Endowment funds have been established to provide support for the William W. Wells and N. Edward Tolbert Lectureships and the John A. Boezi Memorial Alumnus Award. Additional endowment funds are the Biochemistry Undergraduate Endowed Scholarship Fund and the Biochemistry Enrichment Fund. Unrestricted financial gifts to the Department are also used for these activities.

Your contribution to the Department, either designated for one of the endowment funds or as an unrestricted gift, would be most welcome and sincerely appreciated. For additional information, contact the department at [bchalumn@msu.edu](mailto:bchalumn@msu.edu).

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### **Biochemistry Undergraduate Endowed Scholarship Fund**

*Provides funding, awarded on a competitive basis each year, to support excellent undergraduate students pursuing research in the department.*

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### **Biochemistry Enrichment Fund**

*Provides funding for various departmental activities (e.g., undergraduate and graduate student awards, Biochemistry and Molecular Biology Undergraduate Club, travel costs for graduate students attending professional meetings) for which general fund dollars are unavailable.*

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### **John A. Boezi Memorial Alumnus Award**

*An award given annually to a recipient of a B.S., M.S., or Ph.D. degree from this department who has continued on to a distinguished career that reflects the qualities personified by John Boezi.*

\$ \_\_\_\_\_

### **William W. Wells Lectureship in Biochemistry**

*Annual lecture by a prominent scientist in the field of biochemistry.*

\$ \_\_\_\_\_

### **N. Edward Tolbert Endowed Lectureship in Plant Biochemistry**

*Annual lecture by a renowned plant scientist.*

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### News to Share

What have you been up to since graduation? Please include any information about research projects, awards, personal events, etc., that you would like to share with fellow alumni and former classmates.

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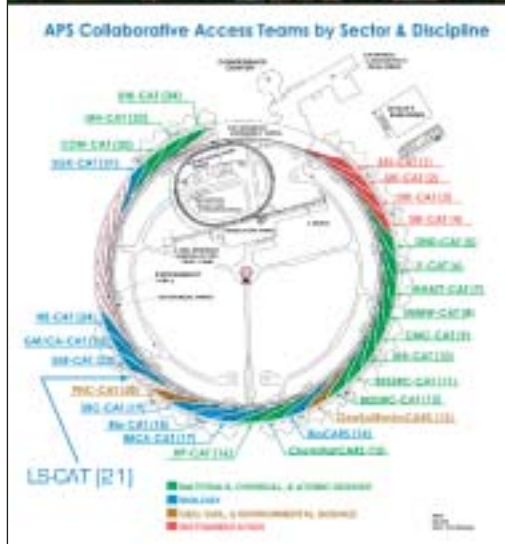
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## *A Bright, New Light for Biochemistry*

*See article on page 24.*

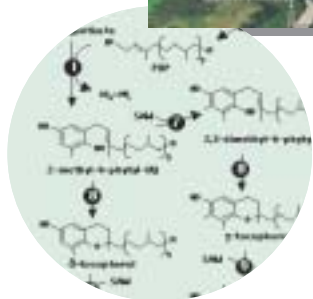
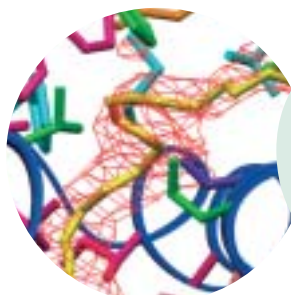
The Advanced Photon Source. The upper panel shows an aerial view of the APS; a schematic of the synchrotron facility and the participating CATs is seen in the lower panel. For more information, see the APS web site at <http://www.aps.anl.gov>. The photograph and illustration are from the APS photograph gallery.

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